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# A Critical Note on the Value of Attention Deficit as a Basis for a Clinical Syndrome

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## EDITOR'S COMMENTS

In this chapter, "inattention" is analyzed and the inadequacy of the questions on commonly used rating scales for diagnosing this symptom are specified. The authors demonstrate the difficulties encountered in attempting to diagnose inattention as a cardinal symptom using the one relevant question on the Rutter Behaviour Questionnaire. Subsequently, the authors point out the limitations in the measurement of activity in children using various methods, both in a strict setting and a more naturalistic one.

David Shaffer then proceeds to discuss the analysis of his research sample of boys who were known to have neurological soft signs at the age of 7 compared with a matched control group known to have been without such signs. Problems in using teachers' and parents' rating scales of overactivity are explored. For instance, there were no significant correlations between scores on the parents' Motor Activity Checklist and the teachers' checklists of either activity or attention. It is suggested that there is a strong correlation between hyperkinetic and inattentive factors, rated by teachers, raising questions about their independence.

The authors conclude by submitting that "the definitional problems pertaining to the symptoms of hyperactivity and inattention are so considerable that it is premature to base any behaviorally defined psychiatric syndrome on their presence or absence."

* * *

William James wrote, "We all know what is meant by attention." Surely a warning note. The complexity of the behaviors that we loosely call *overactivity* and *inattention* has received critical attention elsewhere (see Cromwell, Baumeister and Hawkins, 1963; Martin and Powers, 1967; Shaffer and Greenhill, 1979; Douglas and Peters, 1979). The purpose of this chapter is to present some epidemiological and laboratory data that suggest that the problems of defining and hence measuring these behaviors are so considerable that they call into question the wisdom of basing a clinical syndrome on their presence or absence.

The term "inattention" is usually used to refer to off-task behavior. It is reasonable to suppose that this form of behavioral deviance could follow from a number of causes, including: the *inappropriateness* of the task, i.e., when the difficulty or interest level of the task does not match the chronological or mental age, or the cultural habits of the child; *inadequate motivation*, which could in turn follow from a disturbance of affect, variations in achievement motivation (a purported personality dimension); *inadequate or inappropriate reinforcement opportunities* associated with the task. or more specific *cognitive elements*, such as distractibility or impaired vigilance (an inability to sustain attention). It may also be that certain children who are called inattentive will on close examination show appropriate on-task behaviors but also inappropriate or annoying behaviors, which are better understood as denoting such dimensions as dependency, aggression, or anxiety. In the face of this complexity, the ways in which we most frequently ask about attentional behaviors are surprisingly naive. Table 1 lists the wording found in several commonly used behavior rating scales, which have been employed as the basis for subject definition in a large number of research studies.

If a statement that a child is inattentive cannot be relied upon to indicate a single psychological construct, we might expect that different children will be called inattentive or overactive for different reasons, that "inattention" used in this way will not be a particularly useful discriminant between normal and disturbed children nor between children with different clinical entities, and that different ways of measuring attention will not necessarily correlate well with each other.

It is possible to review the data collected from Rutter's epidemiological study on the Isle of Wight (Rutter, Tizard, and Whitmore, 1970) to examine some of these predictions. In that study, information about the presence of a variety of symptoms was obtained from a representative, population-based sample of nondisturbed 10- to 11-year-old children and from all the children of the same age who had a psychiatric disorder. The presence of disturbance was determined, not through an administrative procedure such as a history of clinic referral, but after screening and obtaining information from two informants (parents and teachers) and a direct assessment of the child. The advantage of that approach for this examination is that, in addition to studying patients with

**Table 1. Inattention Scale Items in Commonly Used Behavior Inventories**

| Scale | Item |
|---|---|
| Quay, Peterson (1975) | Short attention span<br>Daydreaming<br>Distractibility |
| Conners (1969) | Inattentive; easily distracted<br>Fails to finish things he started<br>Short attention span<br>Daydreaming<br>Distractibility or attention span problem<br>Easily frustrated in efforts |
| Achenbach (1981) | Fails to finish things he starts<br>Can't concentrate, pay attention for long |
| Rutter, Tizard and Whitmore (1970) | Cannot settle for anything for more than a few moments |

more severe problems, it allows us to compare the prevalence of behaviors such as inattention or overactivity in disturbed children who are not encumbered with a diagnostic label, with both normal children and children with relatively minor disorders who might not otherwise be seen at a clinic.

Table 2 shows the prevalence of behaviors that are regarded as pathognomonic of Attention Deficit Disorder in disturbed and nondisturbed children. The rates are derived from responses to the Rutter Behavior Questionnaires (1970), checklists similar in form and content to other commonly used inventories, such as the Conners Parent and Teacher Rating Scales (1969) and Achenbach's

**Table 2. Features of the Attention Deficit Disorder in Disturbed and Nondisturbed 10- to 11-Year-Old Boys, in Percent**

| Item | Source | General population (controls) | Psychiatric disturbance |
|---|---|---|---|
| Poor concentration | Parent scale | 25.2 | 65 |
| Poor concentration | Teacher scale | 35.3 | 81.1 |
| Overactivity | Parent scale | 35 | 65 |
| Overactivity | Teacher scale | 16 | 55 |
| Distractible | Psychiatric examination | 10 | 28 |

From Rutter et al. (1970), *Education, Health and Behavior.*

Child Behavior Checklist (1981). It can be seen that the rates are significantly higher among the disturbed than among the nondisturbed on all measures. However, the point of interest is the very high base rate for these symptoms among normals. A simple calculation will convey the impact of these figures. The prevalence of psychiatric disorder in that population was approximately 7%. Therefore, in a population of 1,000 children there would be 70 disturbed and 930 nondisturbed children. If 35% of the nondisturbed children and 81% of the disturbed children are considered inattentive by their teachers, then the population of 1,000 will include a total of 382 children called *inattentive*, of whom only 52 (15%) will be disturbed. Clearly, this is a problem if inattention is to be regarded as a cardinal symptom in a clinical entity.

If we regard hyperactivity or inattention as symptoms of such specificity that a diagnostic entity can rest on their presence, which is certainly the implication of the DSM-III glossary (Spitzer, 1980), we would also anticipate that they would be differentially distributed in children with different clinical problems. However, a further examination of the Isle of Wight data (see Tables 3 and 4) shows that prevalence rates for inattention and overactivity are similar in three different diagnostic groups, regardless of the source of information. This is in spite of the very considerable differences in other types of symptomatology, family background, individual differences, and prognoses that are found in these groups of disturbed children. This could be explained if different types of behavior with different psychological meaning are being described in a similar nonspecific and ultimately confusing fashion.

**Table 3. Poor Concentration in 10- to 11-Year-Old Boys with Different Psychiatric Diagnoses, in Percent**

| | Neurotic disorder | Conduct disorder | Mixed neurotic conduct |
|---|---|---|---|
| Poor persistence (psychiatric examination) | 34 | 43 | 54 |
| Distractibility (psychiatric examination) | 23 | 23 | 36 |
| Poor concentration (teacher questionnaire) | 75 | 85 | 78 |
| Poor concentration (parent interview) | 82 | 77 | 71 |

From Rutter et al. (1970), *Education, Health and Behavior.*

Table 4. Overactivity in 10- to 11-Year-Old Boys with Different Psychiatric Diagnoses (Teacher's Ratings), in Percent

| Rating | Neurotic disorder | Conduct disorder | Mixed neurotic conduct |
|---|---|---|---|
| Overactive (teacher) | 44 | 62 | 57 |
| Fidgety (teacher) | 50 | 62 | 70 |

From Rutter et al. (1970), *Education, Health and Behavior.*

What possible solutions are there to these problems of definition? One approach has been through the standardization of reporting and the use of formal behavior inventories. Data obtained in this way can be treated empirically to identify clusters of symptoms that are commonly found to be associated with each other. However, a "hyperactivity factor" derived in this way may be no freer of semantic muddle than the individual items from which it is constituted. In support of this we find high correlations between hyperactivity factors and other symptom groups within the same individual (Goyette, Conners, and Ulrich, 1978). We find poor correlations between items checked on inventories and observations made on the same children (McConnell, Cromwell, Bialer, and Son, 1964; Blunden, Spring, and Greenberg, 1974; Whalen and Hencker, 1976). We also find generally poor levels of interrater reliability when different raters use the same scale on the same child (Whalen and Hencker, 1976).

Yet another approach is to devise laboratory tests to obtain objective measurement of abnormal behaviors. Laboratory approaches to the measurement of activity include the use of ballistographs (Foshee, 1958); ultrasonics (Peacock and Williams, 1962); photoelectric cells arrayed in a free-activity area (Ellis and Pryor, 1959); pneumatic floor pads (Cromwell et al., 1963); pedometers (Stunkard, 1958); actometers (Schulman and Reisman, 1959; Colburn et al., 1976), and stabilimeters (Sprague and Toppe, 1966). The limitations on the measurement of activity level in children using some of these methods have been critiqued by Johnson (1972). Studies using multiple informants and analyzing activity in different locations (Stevens, Kupst, and Suran, 1978) show somewhat inconsistent relationships and the whole issue of the objective measurement of activity has been reviewed by Porrino, Rapoport, Behar et al., (1983). They conclude that measurement in very restricted settings may be misleading; they have gone on to study activity in a naturalistic rather than in a laboratory setting, an approach that presents considerable difficulties and expense when applied to the measurement of attention or "on-task" behavior.

**Table 5. Agreement between Parents and Teachers on High Activity**

| Conners checklist hyperactivity factor (teachers) | Motor activity checklist (parents) | | |
|---|---|---|---|
| | Low | High | Total |
| Low | 61 | 4 | 65 |
| High | 12 | 2 | 14 |
| Total | 73 | 6 | 79 |

In Table 5, data are presented from a study of 115 black male 7-year-olds who were being investigated as part of a systematic follow-up of children who had been enrolled in the Collaborative Perinatal Project (see Shaffer, Stockman, O'Connor, et al., 1983, for a full description of the sample). Half of the sample are adolescent boys who are known to have had neurological soft signs at the age of seven and the other half were known to have been without such signs. Behavioral ratings were obtained using the Conners Teachers Rating Scale (Conners, 1969, 1973) completed by three different teachers, and the Motor Activity Checklist (Werry and Sprague, 1970) in an interview with the parents. The checklist is made up of a series of systematic questions concerning gross motor activity, restlessness, and fine motor activity during everyday activities such as watching television, reading, playing a game, eating a meal, and during a social conversation. Both the Passive Inattentive Factor and the Hyperactivity Factor from the Conners Teachers Rating Scale have been used in our analyses. The direct examination carried out on these adolescents also included a number of laboratory measures of attention, including the Continuous Performance Test (Rosvold, Mirsky, Sarason, et al., 1956) and David's (1971) assessment method for hyperkinesis. The Continuous Performance Test uses a microprocessor continuously to monitor errors of omission and commission. A feedback system reduces the interstimulus interval and thereby increases the difficulty of the task as a function of the number of correct and appropriate responses. A brief interstimulus interval at the end of the ten-minute test therefore reflects an accurate and attentive performance, whereas a longer interval indicates a performance with more errors.

If the argument expressed above is correct, i.e., that attention and overactivity are poorly defined variables that may not be reported in a standardized fashion by observers, we should expect to find low correspondence between teachers' and parents' ratings and between laboratory measures such as the Continuous Performance Test, but good agreement between different behavior factors rated by the same individual.

Table 5 shows the relationship between parents' and teachers' evaluations of overactive behavior in 79 adolescents from whom sufficient data were available. A high teacher's score on the hyperactivity factor was taken as equal to or more than the mean plus one standard deviation for the sample (1.24). A similar statistical criterion was used to define a high overactive score on the parent's Motor Activity Checklist. If more than one teacher's rating had been obtained for each child, those ratings were averaged. Table 5 shows that approximately 18% of all children have a high score on the teacher's and 8% a high score on the parent checklist. The agreement between teachers and parents was highly unsatisfactory with only 2 out of the 18 adolescents noted to be hyperactive by both raters.

This finding of poor correspondence between teachers' and parents' evaluations of children's and adolescents' activity and attention has been found elsewhere (Sandberg, Rutter, and Taylor, 1978) and it has been suggested (Schachar, Rutter, and Smith, 1981) that it is only in cases where overactivity or inattention is clearly cross-situational and has been noted by both parents and teachers that the diagnosis of hyperactivity should be applied. It may well be that the reason for poor concordance between parents and teachers is the situation-specificity of the behaviors under examination; however, another explanation is a lack of agreement between raters on what constitutes overactive behavior. This might in turn be confused with a threshold effect, so that agreement only focuses where activity or attention is severe.

Table 6 demonstrates correlations between the parent-completed Motor Activity Checklist Scores and scores on the Conners' Teacher Scale Hyperactivity and Inattention factors and the final interstimulus interval obtained on the Continuous Performance Test.

**Table 6. Correlation Between Different Measures of Inattention and Overactivity in 83-106 Black Male Adolescents**

| | Conners factor scores | | |
|---|---|---|---|
| | Hyperactivity | Inattention | Final I.S.I.[a] |
| Motor activity checklist (parent) | -.043 | -.116 | .143 |
| Conners hyperactivity factor (teacher) | – | .582*** | .417*** |
| Conners inattentive factor (teacher) | – | – | .229* |

[a]Interstimulus interval on continuous performance test.
*p <.05
***p <.001

**Table 7. Correlation Between Different Measures of Inattention, Overactivity, and I.Q. in 83-106 Black Male Adolescents**

| | Conners factor scores | | |
|---|---|---|---|
| | Hyperactivity | Inattention | Final I.S.I.[a] |
| Full scale I.Q. | -.303*** | -.307** | -.552*** |

[a]Interstimulus interval on continuous performance test.
**p <.01
***p <.001

In the correlation matrix presented in Table 6, we can see that there are no significant correlations between scores on the parent-completed Motor Activity Checklist and the teacher checklists of either activity or attention. However, there is a strong correlation between the hyperkinetic factor and the inattentive factor completed by the teachers, which raises questions about their independence. The parent-completed Motor Activity Checklist score is unrelated to the final interstimulus interval measure of the Continuous Performance Test. This is reasonable because the parent Motor Activity Checklist is a report on gross and fine motor activity and does not focus on inattentive behaviors. However, when we look at the relationship between the teacher's hyperactivity and inattentive factors and the laboratory tests, we find a more confused situation. Both are significantly related to performance on the Continuous Performance Test, but all three of these measures are also related to I.Q. (see Table 7). If we examine partial correlations, taking out the effects of full-scale I.Q. (see Table 8), we find that a score on the Conners Inattentive Factor is no longer significantly related

**Table 8. Partial Correlations Between Different Measures of Inattention and Overactivity, Taking Account of I.Q., in 83-106 Black Male Adolescents**

| | Conners factor scores | | |
|---|---|---|---|
| | Hyperactivity | Inattention | Final I.S.I.[a] |
| Motor activity checklist: (parent) | -.015 | -.140 | .059 |
| Conners hyperactivity factor (teacher) | – | .590*** | .333** |
| Conners inattentive factor (teacher) | – | – | .097 |

[a]Interstimulus interval on continuous performance test.
**p <.01
***p <.001

to the laboratory measure of inattention, although the hyperactivity factor remains correlated to a somewhat lesser extent.

To summarize: A parent's rating of overactivity is unrelated to a teacher's rating of overactivity or to a teacher's or laboratory measure of inattention. A teacher's rating of overactivity is very strongly related to a teacher's rating of inattention and to a laboratory measure of inattention, even after taking into account I.Q.; however, a teacher's rating of inattention is unrelated to a laboratory measure of inattention after taking account of I.Q.

This argument has only dealt with the confusion that surrounds the various designations of attention and does not deal with the quite different problem concerning the differences between Attention Deficit Disorder and conduct disorders, which has been addressed elsewhere (see Shaffer and Greenhill, 1979).

In conclusion, we submit that the definitional problems pertaining to the symptoms of hyperactivity and inattention are so considerable that it is premature to base any behaviorally defined psychiatric syndrome on their presence or absence.

## DISCUSSIONS

### Dennis P. Cantwell

*Dr. Cantwell*: It is probably unfortunate that this disorder, by whatever name you want to call it, was given a name switching from *one symptom* (hyperactivity), to *another symptom* (inattention), with the implication that this is now the "central core" of the disorder. When DSM-III was being put together, early on, I think Paul [Wender] and I jointly suggested that this disorder should be called Hoffman's syndrome, named after Heinrich Hoffman, the pediatrician who, you are all aware, first described this condition in a German children's book called, *Der Strüwelpater*, in describing a little boy called "fidgety Phil." Now our suggestion was voted down at the time because it was decided there would be no eponyms in DSM-III. But I think it would have been much better to have a neutral name for our disorder, rather than assuming that something like attention, which has been pointed out by many people actually carries multiple connotations, really is the central core problem.

When different measures are used to measure what is supposedly the same thing, not surprisingly, you come up with different results. That indicates that not only do we need better theoretical looks at our constructs, but also better ways to measure them.

Now some specific comments on some of the main points. In the Isle of Wight study, as I remember, the final diagnosis of "disturbed" vs. "not disturbed" did include items from parent/teacher rating scale. So those were not mutually

exclusive and it's not surprising that you find certain symptoms that are higher in a disturbed population, because it was on the basis of those symptoms that the diagnosis was made.

I also want to comment on something that Hans Huessy said regarding the use of high scores on teacher and parent rating scales and using them alone to indicate disturbance. Now, part of the idea of a psychiatric disorder is that it requires clinical judgment to decide whether the combination of symptoms that the child presents (evaluated from a variety of sources; parent, teacher, child himself, etc.) is really causing a significant disturbance and functional disability in the child's life. There are many numbers of people who might have had high scores on the Conners Rating Scale when they were young, and many who would have high scores right now. That is, they have not changed. But I would submit that a high score doesn't necessarily mean psychiatric diagnosis and I think that it is important to recognize that.

Number three: Often we are seeing that Parent and Teacher Rating Scales are being used alone in factor and cluster analysis to create subgroups of patients. There are several problems with that. If you look at the data from the Isle of Wight study, one of the most striking things is that if you take the disturbed group vs. the nondisturbed group, that the Parent and Teacher Rating Scales are equally good at picking out deviant children, but they pick out *different* children. So that if you use only the Parent or only the Teacher Rating Scale, to use that in a factor or cluster analysis, you're going to come up with clusters that I don't think necessarily have that much meaning.

Number four: There are items on the Rating Scale that *we* know what they mean. I mean, when Keith Conners wrote his rating scale, he knew what those items meant. I'm not so sure that the parent and teacher–*all parents and teachers*–know what those items mean in the same way. One of the items with which I consistently come across this is an item–it's on a rating scale we're using and it is probably on your scale and it's probably on the Achenbach scale–something like "obsessive ideas . . . can't get mind off certain thoughts." It is always checked by parents. When you ask them what that means, it means, "Well, when we go to Toys 'R Us and we won't buy him a toy, he won't shut up." Now that obviously does not mean obsessive ideas to us, but if you use that in a factor analysis, you're going to come up with a nice group of obsessive ideas over here that don't mean a clinical tinker's damn. So I think that that's important to recognize.

The question I would have with regard to your study has to do with CPT findings worse in the "soft" sign group and then the washing out with I.Q. Are the CPT findings related to the presence of later signs . . . at the age 17, when you saw them?

*Dr. Shaffer*: With children who had signs at age 17, there were also CPT differences; there were also I.Q. differences. Furthermore, the differences washed out when adjustment was made for the I.Q.

*Dr. Cantwell*: Is it related to later diagnosis at all?

*Dr. Shaffer*: No. The data really showed that they were reciprocally related to diagnosis in the "soft-sign-positive" group.

## C. Keith Conners

It's not surprising to me that one would find that in the collaboratory paranatal study, those children with motor signs don't have attention deficits. In the same way, if you picked up a group of children with sensory signs, they wouldn't necessarily have motor deficits. It's not the same thing to have an attentional dysfunction in the brain as to have a motor dysfunction. There may be some slight overlap, but of course over that large period of time you wouldn't expect there to be much of an association.

With respect to parent and teacher evaluations of inattentiveness, one way to look at it is in terms of the correlation between the factors on the separate teacher and parent scores. If you look at our standardization example in Pittsburgh, you'll see that the correlations are something like 0.4—modest but highly significant. They're obviously significantly related but they wouldn't give you much more than a 16% overlap if you were to look at the shared variance. I think it's obvious that these factor symptom scores are not diagnostic devices. They are simply measures, in a very crude way, of somebody's impression of the presence of a class of symptoms; whether those symptoms represent a diagnostic entity or just normal variations of behavior isn't really addressed by these studies. There are data to show that teachers' measures on the symptom ratings in the classroom do correlate with other measures of attentiveness.

One might ask: which is really the valid measure? The CPT measures one kind of very specific laboratory activity and it would be a miracle if it were identical to a teacher's perception of restlessness and inattentiveness in the classroom. There may well be some overlap in the data, however. It's not very persuasive to me that children with a clinically defined disorder have a marginal performance on teacher ratings or CPT. In other words, I don't think you could reduplicate diagnosis by a single measure, particularly a gross measure. I think it's wrong to conclude from these low associations with teacher ratings that a carefully structured hyperkinetic group isn't inattentive or restless. What those

symptom rating measures do is tell you what the major *dimensions* are in the symptom ratings. Whether those symptom ratings measure something pathological is an entirely different question.

I think that the dimension of "inattentiveness" that shows up on these measures is not necessarily a measure of brain information processing that could be picked up on laboratory measures. I don't think that you can dismiss the notion of an attention deficit because you don't find very high correlations with teacher or parent ratings, given that they will not pick up the momentary "tuning out" so characteristic—we believe—of ADD.

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