Conduct Disorder and Hyperactivity: I

Separation of Hyperactivity and Antisocial Conduct in British Child Psychiatric Patients

E. TAYLOR, R. SCHACHAR, G. THORLEY and M. WIESELBERG

The distinction between hyperactivity and conduct disorder was explored in a mixed group of 64 children referred to psychiatric clinics because of antisocial or disruptive behaviour. A semi-structured interview measure (the Parental Account of Children's Symptoms, PACS) proved to have adequate inter-rater reliability, internal consistency and factorial validity. The PACS scales of defiance and hyperactivity, and similar subscales from Conners' Teacher Rating Scale, were tested against laboratory and clinical measures of activity, attention, cognitive performance, psychosocial background and family relationships. The hyperactivity (but not the defiance) scales were associated with greater activity, younger age, poorer cognitive performance and abnormalities on a developmental neurological examination. The defiance (but not the hyperactivity) scales were associated with impairment of family relationships and adverse social factors. It was concluded that a dimension of inattentive, restless activity should be separated from one of antisocial, defiant conduct in children with psychiatric disorder.

Hyperactivity and conduct disorder are frequently present at the same time and in the same people. It is not even clear whether they are genuinely different problems. This paper examines the question.

North American writers on hyperactive children have made it clear that aggression and defiance are frequently the target symptoms for treatment rather than the core symptoms of poor attention and excessive movement (Safer & Allen, 1976; Barkley, 1981). Indeed, the third edition of the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-III) states explicitly that non-compliance and bullying are part of the condition of 'attention deficit disorder with hyperactivity' — and, conversely, that many cases of 'conduct disorder' have hyperactivity symptoms (American Psychiatric Association, 1980). Stewart *et al* (1981) reported that two out of three hyperactive children had a conduct disorder as well.

A complementary situation exists in British practice. Hyperactivity is rarely diagnosed, conduct disorder frequently: but overactivity and restlessness are common among the conduct disordered. Thus, Taylor (1979) reported that Conners' Classroom Rating Scale scores of a group of children with the clinical diagnosis of conduct disorder were very similar to those of children diagnosed as hyperactive in the USA.

The extent to which the two problems overlap raises a real question about whether they are in fact distinct. Few studies have sought differences between the hyperactive and the conduct disordered; fewer still have found any; and none have found a sharp distinction between conditions (Sandberg, 1981; Taylor, 1985). Indeed, Quay's (1979) review of classification argued with authority against the use of hyperactivity as a valid construct for the description of behaviour problems. Loney *et al* (1978) found different implications of dimensional ratings of hyperactivity and of aggression; but the ratings were based upon chart records and in principle subject to bias. The issue has usually been examined in terms of categorical schemes of classification, based upon diagnostic rules for allotting children's disorders to one group or another. Such rules are bound to be somewhat arbitrary, inasmuch as most children with one behaviour show the other too. Even before establishing criteria for diagnoses, one needs to determine whether the behaviours (on which the rules are based) are functionally independent.

Accordingly, in this paper we ask whether a dimension of hyperactivity, separate from one of antisocial conduct, is valuable for describing children attending psychiatric clinics.

760

Method

Subjects

64 boys, aged from 6 to 10 years, were examined; all had been referred to psychiatric clinics in south London for treatment of conduct problems (including aggressive, antisocial and/or hyperactive behaviours). Three clinics co-operated in this study: two child guidance units and the children's outpatient department of a postgraduate psychiatric teaching hospital. The subjects also met the inclusion criteria of living in a family home (and not an institution), and attending normal state schools. All had IQs over 65, none had overt neurological disease or psychotic symptoms. None had had any psychotropic drugs prescribed in the preceding 6 months. They are further described in the section on 'Results'.

Measures

Parental account of childhood symptoms (PACS)

This standardised, semi-structured interview was developed as an instrument for the measurement of children's behaviour problems as seen at home. It is administered by a trained interviewer. Parents are asked, not for their ratings of problems, but for detailed descriptions of what their child has done in specified situations over the previous week. Such situations are defined either by external events—e.g. watching TV, reading a book or comic, playing alone, playing with friends, going to bed, travelling—or by behaviours shown—e.g. crying, worried talk, tempers, fighting with siblings. The interviewers then make their own ratings, on the basis of their training and written definitions of the behaviours to be rated, on a four-point scale of severity (0 to 3) and frequency in the previous week. The judgements of frequency and severity are made independently and according to written criteria. Scores on frequency and severity are then averaged to yield the score for each item.

The recall of the previous week's behaviour is then used as the basis for enquiry about the same situations in the previous year. Frequency, severity, age-inappropriateness and degree of handicap imposed are combined into a single four-point rating of problem severity for each item of behaviour.

In all, 44 items of behaviour are enquired about in this detailed way. Some, however, relate to rare symptoms (e.g. in sexual development) or to symptoms not directly relevant to this study. The remaining items are grouped into three subscales, each of which is averaged to give a metric score ranging from 0 to 3.

The subscales are:

(1) *Hyperactivity*. This is made up of attention span (time spent on a single activity, rated separately for four different kinds of activity), restlessness (moving about during the same activities), fidgetiness (movements of parts of the body during the same activities) and activity level (rated for structured situations such as mealtimes and car journeys).

(2) *Defiance*. This scale is composed of items concerning temper tantrums, lying, stealing, defiance, disobedience, truanting and destructiveness.

(3) *Emotional disorder* is made up from items of misery, worrying, fears, apathy, hypochondriasis, and obsessionality. It therefore relates to overt emotional distress, not to inferences concerning the emotional basis of symptoms.

Classroom behaviour

This was measured with Conners' Teacher Rating Scale (Conners, 1969, 1973). Minor changes of wording were made to increase its acceptability to teachers in England. The modified questionnaire has acceptable reliability and stability over time; and normative values have been established in a normal school population in south London (Taylor & Sandberg, 1984). The scoring system was based on those normative values: factor scores were estimated from the standardised z-scores on those items loading on the 'hyperactivity' and 'defiance' factors, weighted by their factor score coefficients. The scale validly describes children's behaviour problems in classrooms (Sandberg *et al*, 1980; Schachar *et al*, unpublished m.s., 1984).

Psychiatric interview

The interview with the child was carried out in the standard format described by Rutter & Graham (1968). This yields a number of interviewers' ratings of psychiatric symptoms, each on a three-point scale. Factor analysis of the interview has indicated that the first factor to emerge is made up chiefly by the items of overactivity, attention span, distractibility, fidgetiness and social disinhibition (Luk, personal communication). These items were summed to give a scale of 'observed hyperactivity'.

Physical examination

This examination included a scored developmental neurological examination (Sandberg *et al*, 1978) and assessment of minor physical anomalies (Waldrop *et al*, 1968).

Psychological testing

The revised version of the Wechsler Intelligence Scale for Children (short form) was given to all children (WISC-R). In addition, a set of tests was given to measure abilities related to 'attention'. They are described in detail by Thorley *et al* (unpublished m.s., 1984). They included:

(1) *A Continuous Performance Test* (CPT) of sustained attention (Erlenmeyer-Kimling & Cornblatt, 1978). In this vigilance paradigm, pictures representing playing cards are presented successively by a micro-computer on a TV screen; the child presses a button whenever a stimulus is identical to the one preceding it. The number of correct responses, false positives and false negatives are recorded, and non-parametric measures of observer sensitivity and observer criterion are calculated, based on signal detection theory (Pastore & Scheirer, 1974).

(2) *A Paired Associate Learning Test* (PAL) (Swanson & Kinsbourne, 1976), in which a verbal response is learned to each of a set of visual stimuli. It is thought to reflect efficient use of strategies in short-term memory.

(3) *The Porteus Mazes Test* (Porteus, 1947), which is sensitive to an impulsive and disorganised style of problem-solving.

(4) *A test of Selective Listening for Digits* (SLD), in which one voice has to be listened to in the presence of another and subsequently recalled. This is intended to measure the selective 'filtering' of input on the basis of simple physical cues (Broadbent, 1971).

A composite scale of attention test performance was derived by summing the log- and z-transformed scores on the observer sensitivity measure from the CPT, the percentage success rate on the PAL, the age score from the Porteus Mazes, the selectiveness score from the SLD and the digit span from the same test. The justification for this procedure and the factor analysis of the test battery are described by Thorley *et al* (unpublished m.s., 1984).

Social background factors

These were assessed during the interview with the parents. Social class was defined by the Registrar-General's classification of occupations (OPCS 1970). Family size was defined by the number of children under 17 living in the household. The parental situation referred to the people with whom the child was currently living, and a 'broken home' was defined as any situation other than living with two natural or adoptive parents. 'Previous separations' referred to any spells of 1 month or longer when the child was living away from parents. Institutional care was defined as present when the child had spent any period of his life in a children's home, regardless of the reasons for this and the legal status of the stay.

Family relationships

Family relationships were assessed by standardised semi-structured interview methods based on those described by Quinton *et al* (1984).

Efficiency of parental coping with behaviour problems is asked about for a wide range of potential problems. The interviewer's questioning is directed to the style of coping, not to its outcome, and does not make assumptions as to which techniques are desirable. Rather, efficient responses to children's behaviour are defined as being tailored to the individual child; involving clear goals, a coherent plan and adequate follow-through; being flexible and modified in the light of events; and using pressure appropriate to the child's level of development. Ratings are made (after training) on an eight-point scale ranging from 1 (for very efficient) to 8 (for highly inappropriate responses).

Consistency between parents is separately rated, for each of the problem areas. The scale ranges from 0 (for no disagreements or countermanding) to 3 (for arguments in front of the child or mutual countermanding).

Ratings of expressed emotion are made for the mother's emotional tone when talking about the child. Warmth and criticism are separately rated on scales from 0 (for no warmth or criticism) to 5. The ratings are based on counts of positive and negative comments, content of speech and tone of voice, spontaneity of comments, sympathy for the child's position and interest in the child as a person.

Contact between parent and child is rated by the description of the previous week and all occasions when there were conversations between parent and child (regardless of content) or positive interactions, such as games, that are not merely incidental to child care. Frequency is rated from 0 (for none) to 3 (for interactions every day).

Quality of parents' marital relationship was assessed by the detailed interviewing scheme described by Brown & Rutter (1966). The scale ranges from 1 (for a marriage typified by mutual concern and affection with no long-lasting tension or important quarrels) to 6 (for one with absence of affection and negligible co-operation). The presence of open discord was separately recorded.

Procedure

When referrals were received at the clinics, subjects and parents were offered an immediate assessment by the research team, with the possibility of a trial of treatment in advance of the routine waiting list time for assessment and therapy. Only 83, out of 154 identified, accepted the offer; and a further 19 preferred not to proceed with the assessment after initial discussions. This high refusal rate should be seen as reflecting unfavourable public and media attitudes towards research and physical treatments, as well as the uncertainty of people referred to psychiatric clinics for the first time. Full informed consent was obtained from all those who accepted.

For those entering the study, parents were interviewed by a psychiatrist; the child was interviewed, and then physically examined, by a different psychiatrist; and the child was given psychometric tests by a clinical psychologist. Each assessor was blind to the other assessor's findings, and to other clinical information, until after his own ratings had been made. In 25 cases, the parents' interview was witnessed by an independent assessor, who made his own ratings as a check on the reliability of the technique. School reports and completion of rating scales were independently obtained. Medical records were requested whenever relevant.

After the assessment, the research team met for consensus decision on the five diagnostic axes of the multiaxial version of the 9th edition of the International Classification of Disease (Rutter *et al*, 1976). Diagnostic decisions were based upon all available information, except that the set of tests related to attention were not used as no normative data were available.

Results

Characteristics of sample

Since the self-selection of subjects for the study could have introduced a bias, this series is compared in Table I with

TABLE I
Comparison of subjects with previous clinical series

	Present study (n = 64)		Previous series (n = 68) (*Sandberg* et al 1978)	
	Mean	(s.d.)	Mean	(s.d.)
Age in years	8.6	(1.7)	8.2	(1.8)
IQ	96.4	(15.5)	96.6	(15.5)
Conners' Parent hyperactivity	10.9	(5.0)	10.7	(5.0)
Conners' Parent defiance	7.2	(5.3)	6.9	(5.0)
Conners' Teacher hyperactivity	11.2	(5.5)	10.4	(5.3)
Conners' Teacher defiance	12.5	(10.1)	12.9	(9.4)
Neurological examination	9.2	(8.1)	8.4	(7.7)
	Percentage		*Percentage*	
Social class: manual	57		73	
Broken home	41		33	
Marital discord	39		40	
>three children at home	39		43	

a previous series of consecutive cases from the outpatient department of the Maudsley Hospital (described by Sandberg *et al*, 1978). Age, IQ, neurological status and symptom levels on Conners' rating scales (using the scoring system given by Conners, 1973) were compared by *t*-tests

and showed no significant differences. Social factors, tested by χ^2 tests, did not differ between the two series. The present sample can be considered representative of boys referred for psychiatric help in this area.

The 90 boys who did not enter the study were not obviously different from those who did. Only limited information was available from initial referral sources. Their age was similar (8.4 years, s.d. 1.9); a similar number came from broken homes (35.6%); and a similar number of their referral letters mentioned overactivity or poor concentration as a specific problem (24.4%; by comparison with 26.6% of those entering the study).

Parental account of children's symptoms: reliability and factor structure

Product-moment correlations were computed for each pair of raters' scores on the scales from the PACS. These indicated an acceptably high level of agreement. For the hyperactivity scale (previous year) the correlations ranged from 0.92 to 0.95; for defiance, 0.89 to 0.95; for emotional disorder, 0.79 to 0.90. For efficiency of parental coping the range was 0.69 to 0.76; for expressed warmth, 0.78 to 0.91; for expressed criticism, 0.79 to 0.86; for father–child contact, 0.79 to 0.96; for mother–child contact, 0.81 to 0.95.

The internal consistency of the scales for behaviour in the previous year was also acceptably good. Cronbach's α was 0.89 for the hyperactivity scale, 0.87 for defiance.

Fifteen of the behavioural items were selected for a factor analysis on the basis of being relevant to the main question of the study (so that developmental and somatic symptoms were omitted), being reliably rated by two interviewers, and having a 0 score present in not less than 10% and not more than 90% of cases. They were then submitted to principal factor analysis with iteration (as maintained in the SPSS

TABLE II
Rotated factor loadings for PACS items of previous year

Symptom	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Misery	0.25	0.14	0.09	<u>0.52</u>	−0.09
Apathy	−0.02	0.03	−0.07	0.11	<u>0.42</u>
Specific fears	−0.01	0.26	−0.11	<u>0.56</u>	<u>0.34</u>
Worrying	−0.01	0.01	−0.01	<u>0.63</u>	0.21
Obsessional behaviour	0.27	−0.01	−0.07	0.09	<u>0.76</u>
Lying	−0.10	0.15	<u>0.69</u>	0.00	−<u>0.21</u>
Stealing	0.05	0.14	<u>0.86</u>	−0.01	0.00
Tantrums	0.19	<u>0.65</u>	0.12	0.00	−0.10
Defiance	0.16	<u>0.69</u>	0.12	0.17	0.20
Disobedience	0.21	<u>0.68</u>	0.16	0.23	0.03
Attention span	<u>0.59</u>	0.21	−0.06	0.01	0.18
Restlessness	<u>0.83</u>	0.14	0.12	0.00	0.05
Fidgeting	<u>0.82</u>	0.23	−0.11	0.25	−0.20
Activity level	<u>0.63</u>	<u>0.46</u>	0.02	0.00	0.00
Accident-prone	<u>0.44</u>	0.06	−0.04	0.08	0.25
Percentage of variance	46.8%	20.9%	15.4%	9.2%	7.7%

Underlined figures show loadings greater than 0.40

TABLE III
Product-moment correlations of behaviour scales and overactivity measures

	PACS hyperactivity	Classroom hyperactivity	Observed hyperactivity	Observed number of gross body movements	Observed number of fine body movements
PACS hyperactivity	—	0.39*	0.56*	0.28*	0.22
PACS defiance	0.41*	0.09	0.20	−0.01	−0.02
Classroom hyperactivity	0.39*	—	0.54*	0.43*	0.48*
Classroom defiance	0.11	0.49*	0.06	−0.04	0.08

*$P<0.05$

program package) and rotated according to varimax criteria. Table II shows the solution for the previous-year ratings.

The first factor is clearly one of restless, inattentive, impulsive behaviour ('hyperactivity'). The second is one of non-compliance and tempers ('defiance'), which emerges separately from Factor 3 ('antisocial'), made up of the behaviours of lying and stealing. Emotional symptoms load separately on to Factor 4 ('affective') and Factor 5 ('obsessional'). The item of activity level was split between hyperactivity and defiance factors. Since the orthogonality of factors could not be assumed *a priori*, oblique rotations were also taken. The same number of factors emerged, with the same pattern of variables loading on them: the only differences were in the order of emergence of the factors (and, of course, the exact values of factor loadings).

This analysis gave some support to the distinction between hyperactivity and defiance as separate dimensions of behavioural symptoms. The pattern of factors was very similar for the previous-week ratings: the same factors appeared in the same order. Fuller results on the reliability and factorial validity of the scales are available from the authors.

Home and classroom behaviour and observed activity level

Table III shows the correlations between the previous-year PACS ratings and the Conners teacher rating scales; and between these and the rating of hyperactivity made by the psychiatrist and the observations during psychological testing in the laboratory. Both the teacher and the parent hyperactivity scales significantly predicted the independent clinic measures of overactivity in interview and motor activity during testing. Neither of the defiance scales was associated with laboratory measures of activity.

Home and classroom behaviour and chronological age

There was a significant inverse correlation between the child's age and his PACS hyperactivity ($r= -0.32$; $P<0.05$) and classroom hyperactivity rating ($r= -0.24$; $P<0.05$). By contrast, there was no association between age and defiance as measured by the PACS ($r= -0.11$, NS) or by the Conners teacher scale ($r=0.12$, NS).

Age has therefore been taken into account in the following analyses by the statistical method of partial correlation.

Home and classroom behaviour and developmental measures

Product-moment correlations were substantial between parent hyperactivity and attentional performance ($r= -0.54$; $P<0.001$) and between teacher hyperactivity and attentional performance ($r= -0.47$; $P<0.001$); but non-significant between defiance scales and attentional performance. Table IV sets out the partial correlations between behaviour ratings on the one hand; and the full-scale IQ, the attentional performance scale, and the developmental neurological examination on the other hand. In each case, age has been partialled out.

TABLE IV
Partial correlations between behaviour ratings and developmental measures, after allowing for age

	IQ (WISC-R)	Attentional performance	Neurological examination
For all children			
PACS hyperactivity	−0.28*	−0.27*	0.32*
PACS defiance	−0.06	−0.16	0.05
Classroom hyperactivity	−0.42*	−0.29*	0.47*
Classroom defiance	−0.06	0.00	0.05
For those with IQs more than 80			
PACS hyperactivity	−0.30*	−0.26*	0.31*
PACS defiance	−0.17	−0.19	0.09
Classroom hyperactivity	−0.47*	−0.31*	0.50*
Classroom defiance	−0.16	−0.03	0.12

*$P<0.05$

Correlations, though small, remained significant between the hyperactivity scales and the three test measures, and remained insignificant for the defiance scales. When both age and IQ were partialled out, few significant correlations remained between any of the behavioural scales and the developmental measures. However, the partial correlation between the PACS measure of home hyperactivity and the attentional performance scale was just significant at the 0.05 level ($r= -0.23$) even after both age and IQ had been partialled out.

These results were not the consequence solely of including some children with dull intelligence. Table IV shows that, when the eight children with IQs of less than 80 are excluded,

TABLE V
Partial correlations between behaviour measures and family relationships

	Parental coping	Parental inconsistency	Father–child contact	Mother–child contact	Warmth by mother	Criticism by mother	Marriage quality
PACS hyperactivity	0.10	0.17	0.47*	0.14	−0.16	0.18	−0.09
PACS defiance	0.42*	0.45*	0.19	−0.03	−0.38*	0.40*	0.16
Classroom hyperactivity	0.02	−0.02	0.15	−0.19	0.05	−0.01	−0.12
Classroom defiance	0.13	0.05	0.08	−0.32*	−0.07	0.07	−0.20

*$P<0.05$

the associations between hyperactivity and impaired cognitive performance and coordination remained positive and specific.

The distinction between dimensions of hyperactivity and defiance was paralleled by that between diagnoses of hyperkinesis and conduct disorder in the ICD 9 scheme. The mean IQ for the seven with hyperkinetic syndrome was 79.7 (s.d. 10.1); for the 42 boys with conduct disorder 95.8 (s.d. 13.1); for the 15 with other diagnoses 108.5 (s.d. 15.5); analysis of covariance with age as covariate indicated a significant difference ($F=7.6$; $P<0.05$). The mean scores on the attention performance scale were −4.24 (s.d. 2.16) for the hyperkinetic, −0.04 (s.d. 1.88) for the conduct-disordered, and 1.29 (s.d. 1.36) for the others ($F=21.4$; $P<0.01$). The attentional differences remained significant when both age and IQ were entered as covariates ($F=5.3$; $P<0.01$).

The children's behavioural scores were also broken down by the presence or absence of background factors relevant to developmental delay. Neither an abnormal obstetric history, nor a history of delay in the developmental milestones of language, mobility and continence, nor the presence of minor congenital anomalies proved to be associated with the level of any behaviour problem.

Behavioural measures and family relationships

The same measures of hyperactivity and defiance at home and at school are related in Table V to the scales of parental

efficiency in coping, consistency between parents, contact between parent and child in the previous week, expressed warmth and criticism by mother, and quality of parents' marital relationship. The measure of association is the partial correlation coefficient after controlling for chronological age. Defiance at home was associated with inefficient coping strategies by parents, inconsistency between parents, less expressed warmth and more expressed criticism by mother, and quality of parents' marital relationship. The measure of association is the partial correlation coefficient after controlling for chronological age. Defiance at home was associated with inefficient coping strategies by parents, inconsistency between parents, less expressed warmth and more expressed criticism. Defiance in the classroom was associated with less contact between mother and child at home. The measures of hyperactivity did not show this pattern of associations: the only significant finding was an *increased* contact between father and child (which may, of course, have been initiated by the child).

Behavioural measures and social factors

The frequency of some background social factors was described in Table I. Table VI presents the means of the behavioural measures for groups differing on these background social factors and also on the country of birth of parents. No significant differences were found on the home measures, nor the hyperactivity measures at school. The only differences were on the teachers' ratings of defiance, where greater severity was associated with lower socio-economic status and with having a parent born in the West Indies.

TABLE VI
Behaviour ratings and social factors

	Parental situation		No. of children				Social class				Parents birthplace			
	Family intact	Broken home	≤2	3	≥4		I & II	III	IV & V		UK	WI	Other	
PACS hyperactivity	0.9	1.0 NS	1.0	0.8	0.9	NS	1.1	0.8	1.0	NS	1.0	0.9	0.7	NS
PACS defiance	1.3	1.4 NS	1.2	1.6	1.5	NS	1.3	1.2	1.6	NS	1.4	1.1	1.4	NS
Classroom hyperactivity	1.5	1.7 NS	1.7	1.1	1.9	NS	1.9	1.4	1.7	NS	1.6	1.9	1.0	NS
Classroom defiance	1.3	1.5 NS	1.2	1.1	2.0	NS	1.3	1.0	2.3	*	1.1	2.3	1.2	*

*$P<0.05$
NS = not significant.

Adverse events were noted in the history of a number of the children: 14 had been separated for more than a month from one parent only, 19 from both parents. The behaviour scales of the children who had undergone separations were no different from those who had not, when tested by analysis of covariance using age as covariate. Eleven children had had periods of institutional care, and their home behaviour was no different from the others. However, their hyperactivity in classroom (mean 2.3) was significantly greater than that of the others (mean 1.4). Full details are available on request.

Discussion

Is hyperactivity different from antisocial conduct?

The results above give some support to a distinction between two dimensions of disruptive behaviour problems. The classification of symptoms by factor analysis suggests that — at least in this kind of clinical series — items of restless, inattentive behaviour are associated with one another more than with non-compliant, antisocial conduct. However, for such a separation to mean anything it must be capable of predicting relationships with variables other than those which defined the dimensions in the first place. Furthermore, the factor analysis by itself is not conclusive: it is based upon a relatively small number of cases and the number of variables was correspondingly restricted. The key item of activity level was in fact split between the factor we have labelled 'hyperactivity' and that of 'defiance'.

Accordingly, construct validity needed to be tested from a network of potentially important associated variables. The most obvious of these were similar behaviours in different settings. The point is not only that hyperactivity at home showed a modest correlation with that in school, or that defiance did the same; the apparent absence of links between hyperactivity in one situation and defiance in another is as important. Similarly, the lack of a clear association between direct observation of activity and ratings of defiance is as important as the presence of an association with hyperactivity ratings at home and at school. It should, of course, be no surprise that children rated as overactive should turn out to make more movements. Nonetheless, the finding is not a tautology but an approach to validating the concept. There is a distinct pattern of associations with other variables — hyperactivity being related most strongly to neuropsychological test results, and defiance to measures of interaction between family members. The negative results, as well as the positive, suggest that these two constructs have some discriminative validity.

Some possible objections to this conclusion need to be considered. The first is that the preconceptions of the researchers could have led to halo effects and contamination of one measure by another. This certainly cannot explain all the results. Pains were taken to ensure the independence of the different sources of information. The parental measures, the teachers' ratings, the psychiatrist's ratings and the direct observations were all made in ignorance of the results from the others. However, on a few variables there is a chance of contamination: most notably, the measures of family life and relationships were not blind to the accounts of behaviour at home. We do not think that our preconceptions account even for this aspect of the distinction between hyperactivity and defiance, since our original view of hyperactivity — based on pilot studies — was as a non-specific and situation-dependent aspect of conduct disorder. The repeated checks on inter-rater reliability would also have worked against such an artefact.

A second possible objection comes from our choice of a heterogeneous group of boys as subjects. It may indeed be that the associations of hyperactivity with other variables would appear much weaker if we had confined our study to a narrow range of high scores on the hyperactivity measures. But that would not imply that the present findings are in any sense an artefact. Certainly the results cannot be attributed to the group's heterogeneity in IQ scores: they are unchanged by the exclusion of those with low IQ.

Another possible reservation comes from the series being composed exclusively of clinic attenders. Since several centres were involved, we anticipate that the results will be generalisable to other psychiatric settings. We do not assume that the distinction made on clinic attenders will necessarily apply to other groups, such as normal schoolchildren, or girls, or intellectually retarded children, or older or younger children with behaviour disorder. More research will be needed on these populations.

A previous pilot study did not show agreement between different measures of activity in different settings (Sandberg *et al*, 1978). However, the present study should be seen as extending rather than contradicting those findings. It has used more developed measures, and associations may well have been obscured by error variance in less satisfactory instruments. The few positive findings of the previous paper are replicated here: the chief of these was the association between teacher ratings of hyperactivity and a low IQ. While the associations between hyperactive behaviour in different settings are now statistically significant, they are still rather modest

in size. In general, less than a quarter of the variance of hyperactivity in any one situation can be accounted for by other hyperactivity measures. Situational factors are important too.

Is hyperactivity based on attention deficit?

'Attention deficit' can mean a set of behaviours such as frequent changes of activity and impersistence. It can also refer to an impairment of central processing manifest in psychometric tests. In the first sense, attention deficit is clearly bound closely together with overactivity in this population. In the second sense, there appears to be an association between hyperactivity and poor scores on the attentional scale. However, the association between hyperactivity and IQ is just as large; and when IQ is also allowed for, attention deficit is only weakly related to behavioural hyperactivity. The implication is that hyperactivity is indeed associated with cognitive impairment, but of a rather general kind. It may reflect a problem of reduced central processing capacity or of diminished test motivation. It may be that high activity levels impair one's ability to perform well on any kind of structured psychological test. The association might also be accounted for if both hyperactivity and cognitive impairment result from a common cause, such as immaturity of development.

Further research will be needed to determine whether any specific cognitive deficit accounts for the hyperactives' general difficulty in performance tests. This research will have to take careful account of IQ before claiming a specific deficit in the hyperactive. It will not be sufficient merely to exclude the intellectually retarded, for our results indicate that the relation with IQ holds across the whole range of abilities. For the present, one should not regard hyperactive behaviour as a result of, or synonym for, a specific deficit in central processes of attention.

Aetiology of hyperactivity and conduct disorder

It would be tempting to conclude that hyperactivity is rooted in developmental delay, conduct disorder in problems of family life. Tempting, but not yet justified. Association does not prove causal relationship. It remains possible, on this evidence, that defiant, antisocial behaviour evokes inefficient and inconsistent coping strategies from parents, and causes coldness and hostility; rather than being caused by parental styles or genetically linked to them. It is just as likely from these data that teachers'

perceptions of antisocial behaviour are conditioned by their pupils' social class and ethnic background as that those factors cause antisocial behaviour. These findings are only clues to further research. They do suggest that psychological and social factors in children's conduct problems would be obscured if hyperactive behaviour were included as evidence of conduct disorder; and that neuropsychological studies should not include defiant or disruptive behaviour as evidence for the presence of hyper-activity.

Hyperactivity in the classroom showed only one significant association with the range of background factors examined: a previous episode of institutional care. This is nonetheless noteworthy, in view of previous findings on the consequences of institutional care. Tizard & Hodges (1978) reported that there were some long-term consequences of life in a children's home, even years after leaving it; notably, the children were hyperactive and inattentive at school but not at home. Since this finding is closely paralleled by our own, it directs interest towards the question of whether some kinds of close personal interaction are a necessary condition for the development of the normal modulation of activity and attention.

Implications for classification

The associations that we have reported have related to a conceptual framework of dimensions of behaviour disturbance on which each individual can meaningfully be ranked. This has only indirect implications for a categorical system of description such as the first axis of the International Classification of Disease. Inasmuch as they appear to be separate problems, it makes sense to have separate categories for pure hyperactivity and pure conduct disorder. However, most cases show a mixture of the two problems. Their classification is doubtful, and analyses of this paper do not help. Rather one will need to know how cases cluster on these dimensions, and the predictive value of such groupings. The application of cluster analysis to this question will be reported separately.

Regardless of what scheme of classification is adopted, clinicians should recognise both kinds of problem and include them both in diagnostic formulations. Though the behaviours are often present together, they have different implications. They are likely to require different kinds of treatment. Management will be less clear if the two problems are confounded into one label, whether that be 'conduct disorder' or 'attention deficit disorder with hyperactivity'.