Papers and Originals

Organic Brain Dysfunction and Child Psychiatric Disorder

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Summary: The total population of 11,865 children of compulsory school age resident on the Isle of Wight was studied to determine the prevalence of epilepsy, cerebral palsy, and other neurological disorders. With the use of reliable methods, children selected from screening of the total population were individually studied by means of parental interviews and questionnaires, neurological examination and psychiatric assessment of each child, information from school teachers, and perusal of the records of hospitals and other agencies. The association between organic brain dysfunction and psychiatric disorder was studied by comparing the findings in the children with epilepsy or with lesions above the brain stem (cerebral palsy and similar disorders) with those in (1) a random sample of the general population, (2) children with lesions below the brain stem (for example, muscular dystrophy or paralyzes following poliomyelitis), and (3) children with other chronic physical handicaps not involving the nervous system (for example, asthma, heart disease, or diabetes).

Psychiatric disorders in children with neuro-epileptic conditions were five times as common as in the general population and three times as common as in children with chronic physical handicaps not involving the brain. It was concluded, on the basis of a study of factors associated with psychiatric disorder, that the high rate of psychiatric disorder in the neuro-epileptic children was due to the presence of organic brain dysfunction rather than just the existence of a physical handicap (though this also played a part). However, organic brain dysfunction was not associated with any specific type of disorder. Within the neuro-epileptic group the neurological features and the type of fit, intellectual/educational factors, and socio-familial factors all interacted in the development of psychiatric disorder.

Introduction

The behavioural and emotional disorders of children who have clear-cut organic brain dysfunction (particularly cerebral palsy and epilepsy) have been studied by a number of workers whose findings have often been in conflict. For example, it has been claimed that organic brain dysfunction is specifically associated with particular types of psychiatric disorder—especially the "Strauss syndrome" (Strauss and Lehtinen, 1947) of hyperkinesia, disinhibition, distractibility, perseveration, and increased intensity of response (Bradley, 1955; Clements and Peters, 1962). However, others have refuted this claim (Pond, 1961; Schulman *et al.*, 1965; Werry, 1968), and no certain conclusions emerge from a review of published studies.

Four basic questions still require answers. (1) Is the rate of psychiatric disorder raised in children with organic brain dys-

function? (2) If it is raised, is the high rate of psychiatric disorder due to the presence of physical handicap or, rather, to the presence of a disorder specifically of the brain? (3) Is there a specific type of psychiatric disorder which is associated with organic brain dysfunction? (4) As it is abundantly clear that not all children with disorders of the brain have psychiatric abnormalities, what features of the child—his brain disorder or his environment—determine the development of emotional or behavioural problems?

The opportunity to re-examine these issues arose through the availability in the epidemiologically based Isle of Wight survey of a random sample of the general population as well as complete samples of school-age children with epilepsy, with cerebral palsy and related disorders of the brain, and with other chronic physical disorders not involving the brain, all of which had been studied in the same way. In each case the total population of children were screened so that all children with the disorders specified were investigated, without the need to rely on clinic attendance to define groups.

Method

The Isle of Wight survey has been concerned with a wide range of handicapping conditions in schoolchildren. With each condition the same general plan has been followed (Rutter and Graham, 1966; Graham *et al.*, 1967; Rutter *et al.*, 1967, 1968a, 1968b). First, the total population was studied by means of multiple screening procedures. On this basis children were selected if the findings suggested that they might have the condition under consideration. Then in the second stage this group of selected children was studied intensively by means of individual examinations by physicians with neurological training, psychiatrists, psychologists, and social scientists, and reports were obtained from parents, schools, hospitals, and other agencies. On the basis of these individual examinations a final diagnosis was made for each child. By this means an accurately diagnosed group of children with a handicapping condition was obtained in which there were detailed neurological, social, psychological, medical, and psychiatric findings. As the methodology has been described in detail in the publications noted above, only a brief account is given here.

Children aged 5-14 years inclusive suspected of suffering from neurological or epileptic disorders were identified from a register compiled on the basis of routine school medical examinations (Ashley-Miller, 1965), a scrutiny of hospital and speech therapy records, and examination of all children attending the local spastics day unit or the local junior training centre, of all inpatients at the local mental subnormality hospital, of all children known to the Isle of Wight education, medical, or school welfare authorities as too incapacitated to attend school, of all those attending special residential schools for the blind, deaf, spastic, or physically handicapped, and of those known to be wearing hearing-aids.

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Children in any of the above groups were then given a standardized neurological examination of known reliability (Rutter *et al.*, 1968a), a medical and social history was obtained from the parents, and all relevant hospital and clinic records were examined. The medical data were then considered by the two of us and all dubious cases excluded from further consideration. Cases were divided into those with cerebral palsy (following the criteria of Mitchell (1961) and Ingram (1964)), those with other pathological syndromes of the brain (for example, craniostenosis or cerebral lipoidosis), those with disorders involving lesions *below* the brain stem (for example, paralysis following poliomyelitis, muscular dystrophy, or Erb's palsy), and those with uncomplicated epilepsy. To be included the child must have had a current disorder (epileptic children must have had a fit or been on regular anticonvulsants during the previous 12 months). Children with developmental motor or language disorders, dubious neurological signs, or the miscellaneous group of disorders included under the term "minimal brain damage" were excluded.

Various checks were available on the completeness of the sample obtained. In a survey of educationally handicapping conditions carried out the previous year (1964) over 500 mothers had been individually interviewed about the health of their children. A study of the responses revealed no additional cases. Head teachers were given lists of children in their schools who were known to be handicapped and then asked to add the names of any other children known to them who were suffering from a number of specified conditions. This, too, produced no additional cases of epilepsy or neurological disorder.

The psychiatric state of the children was studied by means of behavioural questionnaires completed by teachers (Rutter, 1967) and parents (Rutter *et al.*, 1968b), further information from teachers about the children's behaviour at school (Rutter and Graham, 1966), a systematic interview with the parent (lasting one to two hours) about the child's behaviour, relationships, and emotions (Graham and Rutter, 1968), and a psychiatric examination of the child (Rutter and Graham, 1968). The reliability and validity of all parts of the psychiatric assessment were examined and shown to be satisfactory. The psychiatric data, which were recorded on sheets separate from the medical data, were rated without knowledge of the child's neurological condition. If a psychiatric disorder was found to be present a diagnosis was made according to the classification outline described by Rutter (1965).

Information was also obtained from an interview with the parents on the nature and extent of the child's disability, the composition of the home, the health and social circumstances of the family, and the impact of the child's condition on family life. The mothers were asked to complete self-rating check lists containing questions about emotional and minor physical symptoms (providing a "malaise" score). The child was given a psychological examination which included a short form of the Wechsler (1949) intelligence scale for children and the Neale (1958) analysis of reading ability test.

The findings for children with neuro-epileptic disorders were compared with three other groups of children:

(1) Children aged 10 to 12 years inclusive with a chronic handicapping physical disorder not involving the central or peripheral nervous system (for example, asthma, diabetes, heart disease, talipes). These children were selected in the same manner (total population screening and individual study of possible cases) as that used for children with neuro-epileptic disorders. Individual interviews with parents about the behaviour of these children, parental questionnaires, together with questionnaires and other information from teachers, were used in the same way as for the neuro-epileptic children to study the prevalence of psychiatric disorder in this group.

(2) A control group of 159 children randomly selected from the total population of 9- and 10-year-old children resident on the Isle of Wight. Of these children 147 were assessed psychiatrically, the same questionnaires and interview with the child as those in the neuro-epileptic group being used.

(3) In the same year as the neuro-epileptic survey, the prevalence of psychiatric disorder among 10- and 11-year-old children had been studied with the same combination of multiple screening procedures and individual examinations.

Prevalence of Neuro-epileptic Disorders

In July 1965 there were 11,865 children aged 5-14 years inclusive who were resident on the Isle of Wight and not attending private schools. Of these, 51 (4.3 per 1,000) had had an epileptic fit in the previous year and an additional 34 (2.9 per 1,000) had been on regular anticonvulsants during that year, making the total prevalence rate of epilepsy 7.2 per 1,000. There were 35 cases of cerebral palsy (3.0 per 1,000, or 2.6 per 1,000 if only congenital cases are included), 18 children with other pathological disorders of the brain (1.5 per 1,000), 14 with severe visual defects (1.2 per 1,000), and 14 with severe hearing defects (1.2 per 1,000). Further details of prevalence as well as the social, psychological, intellectual, and educational correlates of neuro-epileptic disorders have been considered (Rutter *et al.*, 1968a). The present paper is solely concerned with psychiatric aspects of the problem.

Prevalence of Psychiatric Disorder in Children with Neuro-epileptic Disorders

The rate of psychiatric disorder in the general population of children aged 10 and 11 years resident on the Isle of Wight was 6.8% (Table I). Psychiatric disorder was nearly twice as common (11.5%) among children with chronic physical disorders not involving the brain¹ ($P<0.05$). No differences in the rate of psychiatric disorder were found in relation to the diagnosis of the physical condition.

TABLE I.—Prevalence of Psychiatric Disorder in Neuro-epileptic Children Aged 5-14 Years Attending School

	With Psychiatric Disorder		Total
	No.	%	
General population (10- and 11-year-old children)	144	6.6	2,189
Physical disorders not involving brain	16	11.5	139
Blind only	1	16.6	6
Deaf only	2	15.4	13
Lesion at or below brain stem	2	13.3	15
Miscellaneous other physical disorders*	11	10.3	107
Brain disorder	34	34.3	99
Uncomplicated epilepsy	18	28.6	63
Lesion above brain stem (but no fits)	9	37.5	24
" " " " (with fits)	7	58.3	12

* This group includes 2 children who also have lesions below the brain stem.

While non-cerebral disorders were accompanied by some increase in psychiatric disability, the rate of psychiatric disorder among children with neuro-epileptic conditions was very much higher. Over a third (34.3%) showed psychiatric disorder; a rate five times that in the general population ($P<0.001$) and three times that in children with physical disorders not involving the brain ($P<0.01$). The rate was highest in children with neurological disorders accompanied by fits and least high in those with uncomplicated or "idiopathic" epilepsy, but these differences fell well short of statistical significance. The rate of psychiatric disorder was similar in children with cerebral palsy and in those with other pathological brain disorders.

Physical Handicap or Brain Lesion

The finding that psychiatric disorder was much commoner when the physical condition involved the brain than when it affected some other organ or other part of the body suggests

¹ In all these comparisons attention is confined to children attending school; mentally subnormal children outside the educational system were excluded.

that the very high rate of psychiatric disorder in children with neuro-epileptic disorders was associated specifically with a lesion of the brain rather than merely the presence of physical handicap. This difference could not be accounted for in terms of age or sex differences or in terms of the severity of physical handicap. However, the groups did differ in terms of their I.Q. distribution, and this may have been relevant to some extent in that both within the neuro-epileptic groups (see below) and in the general population (Rutter *et al.*, 1968b) low I.Q. has been shown to be associated with a higher rate of psychiatric disability. On the other hand, I.Q. differences could not explain the high rate of disorder in the epileptic children, who showed a normal distribution of I.Q. Furthermore, when attention was confined to children whose I.Q. was at least 86, the rate of disorder in the neuro-epileptic group as a whole was still over twice (24%) that in the group of children with physical disorders not involving the brain (9% rate of psychiatric disorder), the difference being statistically significant ($P < 0.01$).

Specific Type of Psychiatric Disorder

As the high rate of psychiatric disorder was particularly related to the effects of dysfunction of the brain it might also be expected that brain disorders would be associated with specific types of psychiatric problems. However, the available evidence suggests that this was not the case except for a few relatively uncommon conditions.

As in the general population, the majority of the neuro-epileptic children with psychiatric disorder suffered from neurotic or antisocial disorders (Table II). The hyperkinetic syndrome and childhood psychosis were diagnosed more often than expected on the basis of the diagnostic distribution of psychiatric disorders in the general population, but the numbers were too small for this finding to be reliable. Furthermore, at least in neuro-epileptic children attending school, these conditions accounted for only a small proportion of psychiatric disorders.

TABLE II.—*Diagnosis of Psychiatric Disorder in Neuro-epileptic Children Attending School*

Children with uncomplicated epilepsy:	No. of Cases
Neurotic disorder	8
Antisocial disorder	6
Mixed disorder	3
Hyperkinetic syndrome	1
Children with lesions above brain stem (with or without fits):	
Neurotic disorder	4
Antisocial disorder	3
Mixed disorder	4
Hyperkinetic syndrome	3
Psychosis	1
Other	1

These diagnostic groupings represented only broad categories of disorder, and it was still possible that brain disorders might be found to be associated with specific types of psychiatric abnormality if individual symptoms or signs were examined. Tables III and IV show individual items for the neuro-epileptic children,² children with psychiatric disorder (but *without* an

TABLE III.—*Behaviour as Judged from Psychiatric Interview with Child (9-12-Year Age Group)*

	Brain Disorder (%)	Epileptic (%)	Control (%)	Neurotic (%)	Antisocial (%)
Activity { High ..	12	3	1	7	8
Low ..	18	12	5	0	0
Fidgetiness ..	47	48	51	63	71†
Poor attention span ..	30*	16	4	34†	43†
Distractability ..	30†	12	10	22	23
Disinhibition ..	12	18	12	10	33†
Total No. of cases	17	33	147	41	39

* Difference from control group significant at 1% level.

† Difference from control group significant at 5% level.

² In order to eliminate possible age differences attention was confined in these tables and in Table V to children aged 9 to 12 years.

organic brain condition), and the randomly selected control group for the general population. For the purposes of this analysis attention was confined to items of behaviour said to be typical of the brain-damaged or epileptic child.

TABLE IV.—*Behaviour as Judged from Teacher's Questionnaires (9-12-Year Age Group)*

	Brain Disorder (%)	Epileptic (%)	Control (%)	Neurotic (%)	Antisocial (%)
Very restless	24	28*	13	31*	63*
Squirmy, fidgety	30	37*	16	34*	61*
Poor concentration	68	50	33	67*	86*
Irritable	24	22*	8	21*	37*
Fights	30*	15	9	24*	61*
Total No. of cases	17	32	147	41	39

* Difference from control group significant at 5% level.

In the psychiatric interview with the child there was a systematic assessment of many different individual aspects of behaviour, emotions, and relationships as well as a global rating of psychiatric disorder. As shown in Table III, motor and cognitive abnormalities tended to be commoner in the neuro-epileptic group than in the control group, but they were *not* more frequent than in the groups of children with neurotic or antisocial disorders. Teachers' ratings (Table IV) also showed that children with brain disorders and epilepsy were more restless and fidgety, and, in addition, were more irritable and more inclined to fight. However, again these characteristics were also present in children with neurotic and antisocial disorders. In view of the high rate of these conditions in the neuro-epileptic group, it was possible that the motor, cognitive, and aggressive abnormalities were associated less with the brain disorder itself than with the psychiatric disorder from which so many of the children with organic brain disorder suffered.

Thus in Table V the same comparisons are made again after controlling for the presence of psychiatric disorder. In order to avoid unduly small numbers the epilepsy and brain disorder groups were combined into one neuro-epileptic group. It can be seen that the neuro-epileptic children without psychiatric disorder closely resembled children in the general population while the neuro-epileptic children with psychiatric disorder closely resembled other children with psychiatric disorder (but no known organic brain condition). The data tend to confirm the suggestion that the motor and cognitive abnormalities in children with a brain disorder are more a function of the high rate of psychiatric disability in the group than a function of brain damage per se. Children with an organic brain condition do not as a rule exhibit a specific type of psychiatric disorder.

TABLE V.—*Behaviour in Neuro-epileptic and Control Children Controlled for Presence of Psychiatric Disorder (9-12-Year Age Group)*

	Neuro-epileptic (Non-psychiatric) (%)	Control (%)	Neuro-epileptic (Psychiatric) (%)	Psychiatric (%)
Interview with child:				
Activity { High ..	6	1	5	7
Low ..	10	5	21	3
Fidgetiness ..	42	51	58	74
Poor attention span ..	6	4	37	43
Distractability ..	12	10	26	27
Disinhibition ..	15	12	16	23
Teachers' questionnaire:				
Restlessness ..	13	13	48	52
Fidgetiness ..	20	16	58	57
Poor concentration ..	47	33	69	80
Irritability ..	7	8	47	34
Fighting ..	7	9	42	46
Total No. of cases ..	31	147	19	108

It should be added that in making a diagnosis of psychiatric disorder cognitive abnormalities were not taken into account, and motor abnormalities were considered relevant to a diagnosis of psychiatric disorder only on the rare occasions when hyperkinetic syndrome was diagnosed.

Features Associated with Development of Psychiatric Disorder

Epilepsy

With the epileptic group psychiatric disorder was associated with features of the epilepsy, of the child's intellectual/educational status, and of his family and social background (Table VI).

TABLE VI.—Factors Associated with Psychiatric Disorder in 5-14-Year-Old Epileptic Children Attending School

	Psychiatric Disorder		No Psychiatric Disorder		Total
	No.	%	No.	%	
Epilepsy:					
“Psychomotor attacks”	6	33*	2	4	8
Other focal attacks	4	22	6	13	10
Onset of fits before 2 years .. .	5	28	10	22	15
More than 10 attacks (other than psychomotor) in last year .. .	2	11	3	7	5
Activities restricted or handicapped .. .	9	50	15	33	24
Intellectual/educational:					
I.Q. 85 or less	5	28	5 (out of 41)	12	10
Reading at least 2 years retarded .. .	5 (out of 14)	36	4 (out of 35)	11	9
Familial:					
“Nervous breakdown” reported by mother	7	39†	5	12	12
Mother's “malaise” score 6 or more .. .	12	67†	11	26	23
“Broken home”	4	22	9	20	13
Sex of child: boys	10	56	23	51	33
Social class: non-manual occupation .. .	1	6†	15	34	16
Total	18		45		63

* Difference between groups significant at 1% level.

† Difference between groups significant at 5% level.

The high rate of psychiatric disorder in the children with psychomotor epilepsy is particularly striking, the difference reaching statistical significance ($P < 0.05$) in spite of the very small numbers. This group of children with psychomotor epilepsy showed a normal distribution of intelligence, so that the association between psychiatric disorder and type of fit is meaningful and specific. Little can be said about association with the frequency of fits, as only five children had had more than 10 fits (other than psychomotor attacks) during the previous year, but there was no indication that frequency of fits was related to the development of psychiatric disorder. Just over a third of the children were restricted in their activities (in most cases this consisted of a prohibition on certain sports), but this showed no significant association with psychiatric disorder.

Psychiatric disorder was twice as common in children whose I.Q. was 85 or less, but the numbers involved were small and the difference fell short of statistical significance. Psychiatric disorder was also three times as common among children whose reading was at least two years retarded in relation to that expected on the basis of their chronological age and intelligence.³ This difference fell just short of significance at the 5% level of confidence.

Only very limited information was available on the children's family background. Nevertheless, adverse familial factors were found to be more frequent among the epileptic children with psychiatric disorder. Children with psychiatric disorder were more likely to have mothers who scored more than six items on the self-rating questionnaire listing various emotional and “psychosomatic” complaints ($P < 0.05$). Furthermore, on the same questionnaire, 39% of the mothers of epileptic children with psychiatric disorder stated that they had had a “nervous breakdown” compared with only 12% of the mothers of the other epileptic children ($P < 0.05$). “Broken home” (defined as the child living other than with his two natural parents) was unassociated with psychiatric disorder.

³ The measurement of reading retardation was made after partialling out I.Q. so that this difference cannot be accounted for in terms of I.Q. difference (Yule, 1967).

Psychiatric disorder was as common in epileptic girls as it was in epileptic boys. There were also significantly fewer children whose fathers had a non-manual occupation among those with psychiatric disorder.

Cerebral Palsy and Similar Brain Disorders

The findings in relation to brain disorders other than epilepsy were broadly similar, in that neurological, intellectual/educational, and familial features were again found to be associated with psychiatric disorder, but there were differences in detail (Table VII).

TABLE VII.—Factors Associated with Psychiatric Disorder in 5-14-Year-Old Children with Brain Disorder Attending School

	Psychiatric Disorder		No Psychiatric Disorder		Total
	No.	%	No.	%	
Neurological:					
Strictly unilateral disorder	0	0*	7 (out of 19)	37	7
Presence of fits	7	44	5	26	12
Strabismus	8	50*	3	15	11
Articulation defect speech	11	69	10	50	21
Retarded language	12	75*	6	30	18
At least moderate handicap	11	69	8	40	19
Intellectual/educational:					
I.Q. 85 or less	13	83†	8	40	21
Reading at least 2 years retarded .. .	7 (out of 11)	64†	4 (out of 18)	22	11
Familial:					
“Nervous breakdown” reported by mother	0	0	0	0	0
Mother's “malaise” score 6 or more .. .	3	20	1	5	4
“Broken home”	6	38*	0	0	6
Sex of child: boys	11	69	11	55	22
Social class: non-manual occupation .. .	6	38	8	40	14
Total	16		20		36

* Difference between groups significant at 1% level.

† Difference between groups significant at 5% level.

Psychiatric disorder was significantly commoner when there was evidence of a bilateral brain disorder than when the disorder was strictly unilateral.⁴ Psychiatric disorder was also significantly commoner when the child had strabismus or an impairment of language development. Both these last features were associated with low I.Q. to some extent, and the numbers were too small to differentiate the separate effects of each. Psychiatric disorder was slightly (but not significantly) more frequent in children with at least a moderate physical handicap (see Rutter *et al.*, 1968a for definitions of “handicap”). Though psychiatric disorder was rather commoner in children who also had fits, the difference fell short of statistical significance.

Twice as many children with psychiatric disorder had an I.Q. below 86, and three times as many were at least two years retarded in their reading (after I.Q. had been partialled out); both differences were statistically significant at the 5% level of confidence.

While the mothers' report of a “nervous breakdown” and the maternal malaise score were unassociated with psychiatric disorder, “broken homes” were significantly ($P < 0.01$) associated with psychiatric disorder. Neither the sex of the child nor social class was related to psychiatric disorder.

Discussion

A very high rate of psychiatric disorder (34%) was found for children with epilepsy, cerebral palsy, and other pathological disorders of the brain. There are no comparable studies

⁴ Children with any definite signs on both sides were included in the bilateral disorders group. Thus a child with a hemiplegia but a bilateral positive Babinski response would be classed as having a bilateral disorder.

in the literature, but the present findings are consistent with those of Pond and Bidwell (1960) for epileptic children and with the general impression that psychiatric problems are quite common in cerebral palsied children (Nielsen, 1966; Oswin, 1967). However, the absolute rate of psychiatric disorder (which will vary with the criteria and the severity cut-off point used) is less important than the rate relative to that in the general population. The present findings clearly showed that there was a much increased psychiatric disability in children with neuro-epileptic conditions—the rate of psychiatric disorder was five times that in the general population.

A wide variety of reasons have been previously suggested for such an increased rate of psychiatric abnormality. These include the presence of a visible disability, the frustrations inherent in physical restrictions, adverse parental reactions to the child's handicap, perceptual abnormalities, poor speech and language resulting in the child being unable to express his wants adequately, visual defects, low intelligence, effect of drugs, community prejudices in relation to the disorder, the child's reactions to his disability, and impaired emotional control produced by direct brain dysfunction (Bridge, 1949; Bradley, 1951, 1955; Cruickshank and Raus, 1955; Gibbs, 1965; Oswin, 1967). While some of these factors are shared by children with other physical handicaps (Barker *et al.*, 1953; Pringle, 1964), others are unique to organic disorders of the brain. The present study was designed to determine so far as is possible which were the most important features in relation to the high rate of psychiatric disorder in children with neuro-epileptic conditions.

The presence of a chronic physical handicap per se was not a crucial factor in that psychiatric disorder was three times as common in the neuro-epileptic group as it was in the group of other physical disorders. The severity of the physical handicap might have been a factor in the psychiatric difference between the children with cerebral palsy and similar disorders and those with asthma, diabetes, heart disease, etc. (the latter group being on average less handicapped). However, it could not account for the difference between the cerebral-palsied children and the children who were blind or who had lesions below the brain stem (such as muscular dystrophy, paralyses following poliomyelitis), nor could it account for the high rate of psychiatric disorder among the epileptic children, many of whom were very little handicapped. The visibility of the handicap was also not a major factor in that psychiatric disorder was no more frequent in the children with lesions below the brain stem (who had visible disabilities) than in the children with miscellaneous non-neurological disorders (very few of whom had visible disabilities). The rate of disorders in both these groups was only a third of that in the neuro-epileptic group.

The widespread community prejudice against epilepsy was probably an adverse factor in the epileptic child's development and it may have been one reason for the high rate of disorder in the epileptic group. This is suggested by the higher (but not significantly higher) rate of psychiatric disorder in the epileptics whose physical activities had been restricted. On the other hand, in many cases the children had only infrequent nocturnal fits, and the school teachers (and probably other people outside the children's family) were unaware of the epilepsy. Psychiatric disorder was no more frequent when the teachers knew the child had fits than when the teachers did not know the child had had fits in the last year. Furthermore, social prejudice is unlikely to have been a major factor in the high rate of psychiatric disorder in the cerebral-palsied children. There is no reason to suppose that prejudice against cerebral palsy is greater than that, for example, against muscular dystrophy.

Low intelligence was shown to be one important feature in relation to the frequent psychiatric abnormalities shown by the children with lesions above the brain stem, but low I.Q. could not account for the high rate of disorder in the epileptic children. Even when comparisons were restricted to children

whose I.Q. was 86 or more, the rate of psychiatric disorder in the neuro-epileptic children was still more than double that in the group of children with other chronic physical handicaps.

By a process of exclusion it appeared that the most important feature in relation to the much higher rate of psychiatric disorder in the neuro-epileptic children, compared with the other physically handicapped children, was the presence of dysfunction *specifically* of the brain. That is not to say that other factors were unimportant (indeed, several other factors were shown to be related to psychiatric disorder), but rather that the presence of organic brain dysfunction was the main feature associated with the finding that the rate of psychiatric disorder was higher for children with neuro-epileptic disorders than it was for children with other sorts of physical handicaps.

Yet, while organic brain dysfunction had important associations with psychiatric disorder, the results of this study suggest that the association was not with any specific type of disorder. The varieties of psychiatric problems in neuro-epileptic children were on the whole similar to those found in any group of children with psychiatric disorder (and no known organic brain condition). Neurotic and antisocial disorders formed the bulk of the cases found. However, there may have been an excess of the hyperkinetic syndrome and psychosis (the number of cases was too small for the finding to be reliable) among the neuro-epileptic children attending school. There was a greater excess of these conditions among those children with mental subnormality such that they were outside the educational system. While organic brain dysfunction may be more specifically associated with the hyperkinetic syndrome and psychosis, these rare disorders form only a very small proportion of the psychiatric disorders associated with neuro-epileptic conditions.

A consideration of individual items of behaviour confirmed that there were no features examined that proved to be characteristic of organic brain disorders. While motor and cognitive abnormalities were more frequent in the neuro-epileptic group than in the general population it was found that this was a function of the high rate of psychiatric disorder in the group and in no way specific to organic brain dysfunction. These negative findings agree with those of other systematic controlled studies in the literature (Ernhart *et al.*, 1963; Schulman *et al.*, 1965), and it appears that the concept of a specific behaviour syndrome for children with cerebral damage is incorrect. The contrary findings in the literature are most explicable in terms of bias in the judgements made and the highly selected nature of the samples studied. A similar conclusion was reached by Tizard (1962) in relation to the so-called "epileptic personality."

Within the neuro-epileptic group the development of psychiatric disorder was found to be associated with particular neurological features, with intellectual/educational features, and with the social and familial background. Low intelligence and severe reading retardation (independently of low I.Q.) were commoner in the neuro-epileptic children who developed psychiatric disorder. This association is not specific to children with brain disorder; in the general population, too, low I.Q. and reading backwardness are strongly associated with psychiatric disorder (Rutter *et al.*, 1967, 1968b). The mechanisms involved are ill understood, but it has been shown that the association is not due to social class differences (Rutter *et al.*, 1968b). The child's reactions to repeated failure in the school situation, parental rejection in relation to the child's poor mental performance, and the possession of unfavourable temperamental attributes associated with low I.Q. may all play a part.

Psychomotor epilepsy (defined in clinical terms rather than in terms of E.E.G. findings) was strongly and significantly associated with a high rate of disorder, though the number of cases of this type of epilepsy was quite small. The result is in keeping with the systematic studies of temporal lobe epilepsy in children by Nuffield (1961) and Ounsted *et al.* (1966) as well

as by many other less well controlled investigators, though there have also been some negative findings in children (Wilson and Harris, 1966) and in adults (Small *et al.*, 1962, 1966–7). It is not possible to reconcile these differences entirely satisfactorily in view of the substantial differences in definition of cases and in determination of psychiatric disorder, but it appears probable that psychomotor fits (but not necessarily temporal lobe spikes) are associated with a particularly high rate of psychiatric disorder.

Though the connexions of the temporal lobe with rhinencephalic structures important in motivation and affect are well recognized, again the actual mechanism of the association is poorly understood. A neurophysiological mechanism appears most likely, but it should be mentioned that states of partial consciousness may well be more psychologically threatening to a child than a total loss of consciousness. He may also encounter rejecting attitudes from those about him who have not recognized that he is unaware of what he is doing.

Several findings suggest that the extent of brain dysfunction was also a factor in the development of psychiatric disorder. Disorder was more frequent when there were bilateral neurological abnormalities than when the disorder was strictly unilateral. The importance of low I.Q. in the children with lesions above the brain stem may also reflect the factor of organic brain dysfunction, particularly as evidence suggested that low I.Q. was linked to brain damage in the cerebral-palsied children but not in the epileptic children (Rutter *et al.*, 1968a). The association between strabismus and psychiatric disorder and between impaired language and psychiatric disorder could also be regarded in the same way, though it is just as likely that they represent the effect of specific defects.

The strong association between severe reading retardation and psychiatric disorder (independent of I.Q. differences) was as evident in the neuro-epileptic group as it was in the general population (Rutter *et al.*, 1967). It is clear from the strength of their association that it is likely to reflect important basic mechanisms, though quite what these are remains uncertain. It is probable that several processes are relevant, but one of these may be the adverse consequences for emotional development of the experience of educational failure.

The lack of sex difference in relation to psychiatric disorder within the neuro-epileptic group contrasts with the situation in the general population, where psychiatric disorder was found to be considerably commoner in boys (Rutter and Graham, 1966). The association between psychiatric disorder and manual occupation of the father in the epileptic (but not the cerebral palsy) group also contrasts with the findings in the general population, where social class had little or no association with psychiatric disorder.

Though very limited information was obtained on the family background of the children, it was clear that family influences were significantly associated with psychiatric disorder within the neuro-epileptic group. Where the epileptic child showed psychiatric abnormalities the mother was more likely to complain of emotional and psychosomatic symptoms such as irritability, loss of temper, worrying, depression, and headaches, and was also more likely to report having had a "nervous breakdown." In the children with cerebral palsy or a similar disorder a "broken home" was associated with psychiatric disorders. These are the same kinds of adverse family influences associated with psychiatric disorder in the general population. Similar findings have been reported by Grunberg and Pond (1957). Whether the family disturbance represents cause or effect remains uncertain, but indirect evidence from other parts

of the study suggests that, at least in part, the family disturbance can be regarded as one of several influences important in the pathogenesis of the child's disorder.

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