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Paper:

Mental health problems in children and adolescents referred to a national epilepsy center

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Abstract

This study aimed to investigate the occurrence of psychiatric morbidity in children and adolescents referred to a tertiary national epilepsy center (inpatient unit) and the extent of the unmet need for psychiatric services in this group. Participants were 74 children and adolescents aged 9–15 years referred from February 2001 to October 2002 (67% response rate). The multi-informant (parent, teacher, self-report) Strengths and Difficulties Questionnaires (SDQ) were answered before or at admission. Patients with severe mental retardation or pervasive developmental disorder were excluded. We found a high proportion (77%) with a possible or probable psychiatric disorder. The parents, teachers, and the adolescents themselves had higher mean SDQ scores than a British community sample on total difficulties, emotional symptoms, conduct problems, hyperactivity-inattention, peer problems, and impairment, except self-reported conduct problems. Nearly 80% of the children who probably had a psychiatric disorder had no contact with the psychiatric service.

Keywords: children, adolescents, epilepsy, mental health, Strengths and Difficulties Questionnaires (SDQ).

1. Introduction

Children with epileptic seizures are at increased risk of behavioral, emotional, and academic problems. They appear to have risks associated both with a chronic illness and a CNS disorder. The classical community-based Isle of Wight study demonstrated higher rates of behavioral problems in children with uncomplicated epilepsy (29%) than children with other chronic non-neurological conditions (12%), and those in the general population (7%) [1,2]. This is in accordance with recent community based studies from Britain [3] and Norway [4,5]. An even higher prevalence, 21%–60%, is found as one moves from community-based samples to hospital-based cohorts [6–13].

Some studies have focused on whether, and to what extent, children with epilepsy receive mental health services. Based on a review of medical records and parental interviews of 44 children with epilepsy, Ettinger et al. [9] found that 26% had significantly increased depression scores and 16% had significant symptoms of anxiety. However, none of these children had previously been identified or treated for their psychiatric symptoms. Ott et al. [14] reported a disconcerting discrepancy between the high rate of psychiatric diagnoses (60%) and the low rate of mental health service use (33%) in youths with epilepsy.

The interpretation of psychiatric symptoms as a natural consequence of epileptic seizures or as side effects of AEDs might be responsible for inadequate psychiatric assessment and treatment of these children [15]. However, apart from seizure control, cognition and behavior are the two most important factors in determining how well a child with epilepsy progresses towards independence [16].

The Strengths and Difficulties Questionnaires (SDQ) are new multi-informant screening instruments, designed to assess mental health problems and impairment in children and adolescents [17,18]. The SDQs have been used in a large number of studies during the last ten years, including the 1999 British Child and Adolescent Mental Health Survey [19], the US National Health Interview Survey [20], and in some large Norwegian epidemiological studies [21]. Davies et al. [3] investigated a non-selective sample of children with epilepsy from The British Child and Adolescent Mental Health Survey. Their study provides representative data on mental health in children with epilepsy. Lossius et al. [4] studied adolescents with epilepsy who took part in a large Norwegian epidemiological self-report SDQ study [22].

There is strong evidence for increased validity when multiple informants are used to assess mental health problems in children and adolescents [23]. However, different informants' ratings of problem behavior in children with somatic diseases may be different from those of healthy children. In a population based study of children with epilepsy, mothers and teachers reported increased problem rates compared to controls, while the adolescents themselves did not [5].

The main aim of our study was to make a survey of mental health problems and impairments in children and adolescents referred to a tertiary epilepsy center: The National Centre for Epilepsy in Norway. We used the SDQs to obtain and compare information from parents, teachers, and adolescents. A second aim was to investigate if there are unmet needs for mental health services among these children.

2. Methods

Procedures

Children and adolescents, who were admitted to one of the inpatient units (mainly for the age group 10–14 years) at The National Center for Epilepsy (NCE) in the period February 2001 to October 2002, were included in the study. At least one parent was staying with the child in hospital. The reasons for referral were difficult-to-treat epilepsy, epilepsy and behavior problems, epilepsy and school difficulties, or diagnostic assessments. Patients with severe mental retardation or pervasive developmental disorders were mainly treated at another unit at the NCE, but could be admitted to the study unit due to capacity reasons. If that happened they were excluded from the study. Data were collected as part of the clinical procedures, and the parents gave informed consent for their child to participate in the study. The study was approved by the Regional Committee for Medical Research Ethics and the Data Inspectorate. Medical and diagnostic data (including psychiatric and behavioral assessments) were obtained from the medical records. The International Classification of Diseases (ICD-10) [24] was used to report mental retardation (F70-F79) and specific developmental disorders (F80-F89). These assessments were based on neuropsychological testing, but the procedures were not part of the study protocol. Parent, teacher, and self-report questionnaires (SDQs) were sent to the families and completed either before or when the children were admitted to the epilepsy center.

Study sample

Seventy-four out of 110 hospitalized patients participated, giving an overall 67% response rate. The sample comprised 41 boys and 33 girls aged 9–15 years (9 years $n=1$, 15 years $n=1$), mean age 12.0 years, SD 1.4. The mean length of the stay was 22.7 days (SD 11.3, range 4–50). We obtained SDQ data from parents for 73 (98.6%) of the patients, from teachers for 38 (51.4%), and from both parents and teachers for 37 (50.0%). Of the 61 patients who were 11 years or older we obtained self-reports from 47 (77.0%), parent reports from all, both self-reports and parent reports for 47 (77.0%), teacher reports for 31 (50.8%), both self-reports and teacher reports for 26 (42.6%), and reports from all three informants for 26 (42.6%).

The Strengths and Difficulties Questionnaires

The SDQs are brief behavioral screening questionnaires developed by Goodman [17,23,25] and include versions for parents, teachers, and a self-report for adolescents ≥ 11 years old. The questions concern both children's mental health difficulties, psychological strengths, and the impact of emotional and behavioral difficulties. The questionnaires have 25 questions (rated 0–2; "not true", "somewhat true", or "certainly true") with five scales consisting of five items each, generating scores for emotional symptoms, conduct problems, hyperactivity, peer problems, and prosocial behavior; all but the last one are summed to generate a total difficulty score. In addition, an impact supplement contains questions as to whether the respondent thinks the child has difficulties in one or more of the following areas: emotions, concentration, behavior or ability to get on with other people. If so, it enquires further about duration, distress, social impairment, and burden to others. The items on overall distress and social

6

impairment generate an impact score that ranges from 0–10 for the parent and self-report versions, and from 0–6 for the teacher version. An impact score ≥ 2 is defined by Goodman as abnormal [17].

Since there are no available Norwegian population based norms for parent and teacher SDQ in this age group, we compared our results to British normative data [18] and used the cutoffs from those data to identify how many children in our sample scored in the borderline and abnormal range (parental data only). The British cutoffs are defined as the scores closest to the 80th (for the borderline score) and 90th percentile (for the abnormal score) [18]. To contrast our tertiary epilepsy center sample, we compared parental data from our sample with parental SDQ data from a British pediatric outpatient clinic sample [26].

We also used a predictive algorithm based on multi-informant SDQ scores (child, parent, and teacher) described by Goodman et al. [18,23,27]. This algorithm indicates whether the four broad diagnostic groups (conduct disorders, emotional disorders, hyperactivity disorders, or any psychiatric disorder) are unlikely, possible, or probable. The result "probably any psychiatric disorder" had a sensitivity of 63.3% and a specificity of 94.6% in identifying individuals with any psychiatric disorder in a community sample [23].

If the child was found to have "probably any psychiatric disorder", but had not been in contact with a child and adolescent psychiatry service before attending the epilepsy center, this was defined as a child with unmet needs.

Statistical analysis

Ordinary descriptive and test statistics were performed by using SPSS 13.0 for Windows. Effects of gender, epilepsy, and the interaction gender x epilepsy on group means (SDQ) were first examined using the General Linear Model's Multivariate Analysis and then Univariate Analysis, both with gender and epilepsy (yes/no) as fixed factors. Age had no effect and was not included in the model. Group means for each gender were compared with normative SDQ data from Britain for the age group 11–15 years [18] using Student's two sample t test. The t values were computed from the means, standard deviations, and numbers. Associations between potential risk factors for psychopathology as type of epilepsy, age of onset (under/above 6 years), number of AED (one or less/two or more), seizure-free or not, comorbid developmental problems and mental retardation were independently assessed in relation to "prediction of any psychiatric disorder" by Chi square. A level of significance of $P < 0.05$ was used. Inter informant agreement was analyzed by Pearson correlations.

3. Results

Description of the study sample

Fifty-four patients (73.0%) had a confirmed epilepsy diagnosis and the remaining 20 a tentative epilepsy diagnosis. Ten patients (13.5%) had mental retardation (two moderate and eight unspecified). Twenty-four had specific developmental disorders (speech/language, scholastic skills or mixed). Eleven children had hyperkinetic disorder, based on information from the referral or standardized diagnostic work-up at the epilepsy centre, and seven of these were treated with methylphenidate. One patient was

treated with a SSRI-drug and one with risperidone at admission. Table 1 shows the drug use among the patients. Seventeen patients had no AED; the remaining 57 used a mean of 1.8 AEDs (range 1–4) at admission.

INSERT TABLE 1 HERE

Among the 54 patients with confirmed epilepsy diagnosis, 43 (79.6%) had therapy resistant epilepsy, i.e., they had tried more than two AEDs without becoming seizure free. The remaining 11 patients (20.4%) with a confirmed epilepsy diagnosis had good seizure control, but were admitted due to behavioral or academic problems. Thirty-five patients (64.8%) had epilepsy onset before they were 6 years old. Thirty-nine patients (72.2%) had partial onset epilepsy, 11 (20.4%) had generalized epilepsy, and in four patients (7.4%) the epilepsy could not be classified.

Of the 20 patients with a tentative epilepsy diagnosis, 15 were admitted for evaluation of episodes of altered behavior because it was unclear if they were caused by epileptic seizures or non-epileptic paroxysmal events. The remaining five were admitted due to a previous epilepsy diagnosis, but they had not had any seizures during the previous two years and needed diagnostic reevaluation. There was no difference in parent SDQ total difficulties between the groups with and without teacher reports (t=0.24, df=70, P=0.81) or between the groups with and without self-reports (t=0.95, df=58, P=0.35). Neither did we find any statistically significant differences between these groups in terms of gender, age, number of AED, seizure-free or not, mental retardation or specific developmental disorder, but there was a tendency that more children with mental retardation had not filled in self-report (Chi-square=6.35, df=1, P=0.02, significance level was set to P=0.007 due to multiple comparisons).

Mental health

SDQ scores (mean and SD) for girls and boys with and without epilepsy and effects of gender and epilepsy (including the interaction of them) are reported in Table 2. There were no overall effects (MANOVA) of gender, epilepsy or the interaction gender x epilepsy on any of the informants. Parent SDQ (df=6,62): gender F=0.82, P=0.56; epilepsy F=1.45, P=0.21; gender x epilepsy F=1.15, P=0.35. Teacher SDQ (df=6,23): gender F=1.96, P=0.11; epilepsy F=1.09, P=0.40; gender x epilepsy F=0.86, P=0.54. Self-report SDQ (df=6,36): gender F=1.02, P=0.43; epilepsy F=1.28, P=0.29; gender x epilepsy F=0.22, P=0.97.

The parents and teachers reported more problems (higher mean scores) compared with the normative data from Britain [18] on total difficulties, emotional symptoms, conduct problems, hyperactivity-inattention, peer problems, and the associated impairment (data are not shown for the statistical comparisons with the British sample). The adolescents in our sample also reported more problems on the same indices except on the conduct subscale, which were not significantly different. Parents and teachers reported significantly lower prosocial behavior (indicating more problems) for girls, but this behavior was not significantly different for boys. No significant differences were found in self-reported prosocial behavior for either boys or girls.

In the impact supplement of SDQ a first question was asked to the informants as to whether they think the child has difficulties in one or more of the following areas: emotions, concentration, behavior or ability to get on with other people. Definite or severe difficulties were reported by parents, teachers, and self-reports of 80.0%, 58.8%, and 35.0% for girls, respectively, and 67.5%, 70.6%, and 24.1% for boys, respectively.

INSERT TABLE 2 HERE

Table 3 shows parental SDQ data from our sample compared with parental data from a British pediatric outpatient clinic sample and a British community sample reported by Glazebrook et al. [26]. Fifty-six percent of girls and 45% of boys had scores in the abnormal range for total problems, compared with 19% and 21% of girls and boys in the pediatric outpatient sample and 8% and 12% in the community sample, respectively. The prevalence of abnormal scores was high for all subscales. When the SDQ results from the different informants were combined by a predictive algorithm [18,27], 45.2% of the sample probably would qualify for a psychiatric diagnosis; in addition, 31.5% would possibly qualify, while 23.3% would be unlikely to have a psychiatric diagnosis (Table 4). There were no significant differences in the prediction of the three types of disorders: hyperactivity disorder, conduct disorder, and emotional disorder (Pearson Chi-square 8.34; df = 4; P = 0.08).

INSERT TABLE 3 HERE

INSERT TABLE 4 HERE

None of the epilepsy-related risk factors for psychopathology (type of epilepsy, age of onset, number of AED, seizure-free or not, comorbid developmental problems and mental retardation) were found to be significantly associated with prediction of "any psychiatric disorder".

Inter-informant agreement

Inter-informant correlations for SDQ scores in our sample were high (Table 5). Correlations on total difficulties were r = 0.68 between parent and teacher, r = 0.85 between parent and self-report, and r = 0.58 between self-report and teacher.

Correlations on the subscales and impact scores ranged from $r = 0.39$ between parent and teacher on conduct problems and $r = 0.79$ between self-report and parent on emotional symptoms.

INSERT TABLE 5 HERE

Unmet needs of mental health service.

Thirty-three of 73 patients (45%) probably had a psychiatric disorder, based on prediction by a multi-informant algorithm (data from one patient was incomplete). Twenty-six (79%) of these 33 patients had not been in contact with a child and adolescent psychiatry service before attending the epilepsy center (Table 6).

INSERT TABLE 6 HERE

4. Discussion

In this study of children from a tertiary national in-patient epilepsy center, the rates of mental health problems were high, although children with severe mental retardation or pervasive developmental disorder were not in the sample. We found high mean scores for all the SDQ difficulty subscales (emotional symptoms, conduct problems, hyperactivity-inattention, and peer problems) as rated by all informants (parents, teachers, and the adolescents themselves), except self-reported conduct problems. We also found high mean scores for associated impairment (impact score). Norwegian normative data for parent SDQ for this age group have not yet been published. As extensive research has been performed in Great Britain based on the SDQs, we have compared our results with results from the 1999 British Child and Adolescent Mental

Health survey [18,19,23], as well as to an epilepsy subsample from that survey [3], and a UK pediatric outpatient sample [26].

Norwegian results from epidemiological studies indicate that self-report results from Norway are comparable with British results [21,22,28], while Norwegian parents tend to report less difficulties than parents from Great Britain [21]. Results for teacher SDQ have not yet been published in Norway. We have analyzed the data in three different ways according to the literature regarding the SDQ: the mean scores in different subgroups; the proportion in normal, borderline, or abnormal ranges defined from community samples; and the proportion predicted to have a psychiatric disorder. All of these analyses show that our patient group had substantially increased mental health problems. The rates of both externalizing and internalizing difficulties, as well as hyperactivity were elevated. This is consistent with other studies [5,29]. The Norwegian study of adolescents with epilepsy [4] as a subsample in a large epidemiological study [22] found higher self-reported SDQ scores than in adolescents without epilepsy. As rated by parents, peer problems were prevalent in our sample and were in the abnormal range for 65.6% of girls and 62.5% of boys, compared with 10.1% and 13.4% of girls and boys in the British community sample [23], and 18.0% and 21.2% in a pediatric outpatient sample [26], respectively. The study by Davies et al. [3] of a British representative sample with epilepsy compared the subgroup with 'uncomplicated' epilepsy (42 out of 67 patients) to those with 'complicated' epilepsy (25 out of 67). Children with severe learning difficulties were not excluded in that study. About 26% of the children with uncomplicated epilepsy, and 56% of those with complicated epilepsy, had a psychiatric disorder, while in our sample the multi-informant SDQ algorithm

predicted a probable psychiatric disorder in about 45% of the children. The parental perception of problems and their impact on their child's life were also consistent between our study sample and the subsample with complicated epilepsy in the Davies et al. [3] study. In our study, 80.0% of the parents of girls and 67.5% of the parents of boys reported a definite or severe difficulty with emotions, behavior, concentration, or ability to get on with other people, compared to approximately 70% of those with complicated epilepsy in the British sample [3].

The findings show that the problem load in our study sample was in accordance with or even heavier than for the 'complicated' epilepsy group from the British Child and Adolescent Mental Health Survey [3]. This high problem rate indicates that those who are referred to a tertiary epilepsy center do not just have therapy resistant epilepsy, but also a heavy burden of mental health difficulties that has a serious impact on their lives. In another study from tertiary epilepsy centers Sabaz et al [30] reported increased behavioral and social problems and reduced health-related quality of life in children with symptomatic and idiopathic epilepsy. In the Norwegian national epilepsy center, psychiatric problems were not a common reason for referral (11/74 were referred because of epilepsy and academic or epilepsy and behavioral problems), and no specific psychiatric diagnostic procedures or psychiatric treatment were provided.

We did not find any effect of epilepsy diagnosis compared with the subsample that did not have a confirmed epilepsy diagnosis. The twenty non-epileptic children were referred to the epilepsy center for diagnostic assessment either because they had symptoms indicating epilepsy (fifteen children) or had known epilepsy without seizures

the last two years (five children). These children also had a surprisingly high burden of mental health problems.

As the size of the sample was rather small and heterogeneous, and we lacked standardized data on a relevant set of possible predictors of mental health problems we did not conduct more elaborate analyses of possible risk factors in relation to mental health. However, we found that none of the risk factors were significantly associated with prediction of "any psychiatric disorder". Høie et al found that seizure related factors influenced psychosocial problems in their community based epilepsy sample [5]. A recent review on the development of mental health dysfunction in childhood epilepsy emphasizes that there is a lack of knowledge about the mechanisms for known risk factors[31]. The following causes or conditions for the development of psychopathology are assumed: direct symptomatic effect of the underlying CNS pathology and of seizure activity, side effects of AEDs, secondary effect of neurocognitive impairment, cumulative coping failure with epilepsy-associated stressors, contextual environmental risk factors, and additional biological and psychosocial vulnerabilities [31].

Inter-informant agreement

Parents, teachers, and adolescents all reported high difficulty scores, and inter-informant correlations between all informants were high. Inter-informant correlations are usually low, in particular in epidemiological samples [32], for many reasons: a low rate of problems, different perceptions of the problems and the threshold for defining a problem, different contexts, and different relations between the informant and the child. However, more parents (80%) reported difficulties than teachers (59%) and adolescents (35%) to the question of whether the child has difficulties in one or more of the

15

following areas: emotional, behavioral, concentration, or ability to get along with people.

These findings are in accordance with Høie et al [5] who also found that mothers reported most problems and the adolescents least problems and teachers in between. The high inter-informant correlations in this study may reflect that these children and adolescents have more severe difficulties, and also that the problems are pervasive and generally acknowledged. Still, the use of several informants, including teachers, provides a more comprehensive picture and is recommended.

Use of mental health service

The finding that most (78.8%) of the children who probably had a psychiatric disorder had not been in contact with child and adolescent psychiatric services indicates that a large proportion of the patients had an unmet need for these services. Other studies have reported similar results for children with epilepsy and psychiatric problems [14,33]. The child and adolescent psychiatric services in Norway are quite well developed, covering 2.9% of the child and adolescent population below 17 years old in 2002 [34]. An important challenge is how and where the children with epilepsy and psychiatric comorbidity should receive their psychiatric help: in ordinary child and adolescent psychiatry, by improving the recognition and referral of children with these problems, or by psychiatric services as an integrated part of pediatric and epilepsy services?

Strengths and limitations of the study

The study included all consecutive referrals to a tertiary epilepsy center in-patient unit. The use of multiple informants and a well established questionnaire for mental health

difficulties and impairment are strengths of the study. It had a fairly high response rate for parents, but the lower response rate for self-reports and teachers could give a selection bias. However, we did not find that those not providing teacher or self-report SDQ had different parental SDQ results or were different regarding gender, age, epilepsy or cognitive related issues. The use of British and not Norwegian norms is a limitation to the interpretation of the findings. The selected study sample, which depended on Norwegian referral practices, is a limitation in generalizability of the findings. The fact that all patients in this study were going to be hospitalized can have contributed to the findings. The SDQs were filled in before or at admission and this situation can have colored the answers. The lack of more systematic and standardized data on possible risk and protective factors in relation to mental health problems limits the penetration of the understanding of the findings.

Conclusion

By using a short screening instrument for mental health difficulties (SDQ), we found that 77% of children aged 9–15 referred to a tertiary epilepsy centre had probable (45%) or possible (31%) mental health problems. Mental health problems in children with epilepsy are probably underdiagnosed and should be identified and addressed in a comprehensive service given to all children and adolescents with epilepsy and a psychiatric comorbidity.

Acknowledgments

Table 1. Number of patients on different drugs at admission to the National Centre for

Epilepsy.

Drug type (AED, SSRI, or stimulant)	Number of patients using drug (some use more than one)
Valproate	33
Lamotrigine	25
Clonazepam	9
Carbamazepine	7
Acetazolamide	5
Topiramate	4
Oxcarbazepine	4
Tiagabine	3
Clobazam	3
Levetiracetam	3
Vigabatrine	2
Ethosuximide	2
Nitrazepam	1
SSRI	1
Methylphenidate	7
Risperidone	1
Number of drugs	
0 AED	17
1 AED	22
2 AED	28
3 AED	5
4 AED	2
Total N	74

AED: Antiepileptic drug; SSRI: Selective serotonin reuptake inhibitor.

Table 2. SDQ results reported by parents, teachers, and self-reports in different subgroups in the sample from the National Centre for Epilepsy.

	Girls (n = 33)						Boys (n = 41)						Effects (two-way ANOVA)[1]		
	All		Not epilepsy		Epilepsy		All		Not epilepsy		Epilepsy		Gender	Epilepsy	Gender × epilepsy
	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)	n	Mean (SD)	F (P)	F (P)	F (P)
Parent SDQ															
Total	32	17.5 (6.4)	8	18.0 (5.5)	24	17.3 (6.7)	40	16.7 (7.2)	12	13.2 (7.0)	28	18.3 (6.8)	1.18 (0.28)	1.50 (0.23)	2.63 (0.11)
Emotional	32	4.8 (2.5)	8	4.9 (2.6)	24	4.8 (2.5)	40	3.7 (2.9)	12	2.2 (2.8)	28	4.3 (2.8)	4.79 (0.03)	2.01 (0.16)	2.53 (0.12)
Conduct	32	2.5 (1.9)	8	2.3 (2.1)	24	2.5 (1.9)	41	2.5 (2.0)	12	1.7 (1.9)	29	2.9 (2.0)	0.05 (0.83)	2.19 (0.14)	0.83 (0.37)
Hyperactivity	32	5.8 (2.4)	8	6.1 (2.1)	24	5.6 (2.5)	40	6.2 (2.7)	12	6.3 (3.0)	28	6.2 (2.7)	0.24 (0.63)	0.17 (0.69)	0.09 (0.76)
Peer	32	4.5 (2.4)	8	4.8 (3.0)	24	4.4 (2.2)	40	4.3 (3.0)	12	3.1 (3.6)	28	4.8 (2.7)	0.69 (0.41)	0.86 (0.36)	2.07 (0.16)
Prosocial	32	7.7 (2.1)	8	8.3 (1.3)	24	7.5 (2.3)	40	7.8 (1.8)	12	8.9 (1.2)	28	7.3 (1.8)	0.28 (0.60)	5.73 (0.02)	0.65 (0.42)
Impact	31	4.6 (2.7)	8	3.5 (3.3)	23	5.0 (2.4)	41	4.3 (2.6)	12	3.7 (3.0)	29	4.5 (2.5)	0.05 (0.82)	2.75 (0.10)	0.21 (0.65)
Teacher SDQ															
Total	19	14.0 (9.0)	5	10.0 (4.1)	14	15.4 (10.0)	19	15.0 (7.8)	6	17.2 (2.9)	13	14.0 (9.2)	0.90 (0.35)	0.14 (0.71)	2.01 (0.17)
Emotional	19	4.4 (3.2)	5	2.4 (1.5)	14	5.1 (3.4)	19	2.6 (2.7)	6	3.0 (2.8)	13	2.5 (2.8)	0.97 (0.33)	1.09 (0.30)	2.42 (0.13)
Conduct	19	1.7 (2.4)	5	1.4 (1.7)	14	1.9 (2.7)	19	2.3 (2.7)	6	2.0 (2.2)	13	2.4 (3.0)	0.36 (0.55)	0.20 (0.66)	0.01 (0.97)
Hyperactivity	19	4.4 (2.7)	5	4.6 (2.3)	14	4.4 (2.9)	19	6.6 (2.7)	6	7.8 (1.7)	13	6.0 (2.9)	6.40 (0.02)	1.16 (0.29)	0.68 (0.42)
Peer	19	3.4 (2.8)	5	1.6 (0.9)	14	4.1 (2.9)	19	3.5 (2.9)	6	4.3 (2.5)	13	3.2 (3.1)	0.83 (0.37)	0.42 (0.52)	3.34 (0.08)
Prosocial	17	7.3 (2.2)	4	8.5 (1.0)	13	6.9 (2.4)	19	6.4 (2.5)	6	6.5 (2.3)	13	6.3 (2.7)	2.08 (0.16)	0.95 (0.34)	0.58 (0.45)
Impact	17	2.3 (2.4)	5	0.6 (0.9)	12	3.0 (2.6)	17	3.0 (2.0)	6	3.5 (1.0)	11	2.7 (2.4)	2.76 (0.11)	1.06 (0.31)	4.02 (0.05)
Self-report SDQ															
Total	19	17.0 (5.7)	7	15.6 (7.7)	12	17.8 (4.3)	28	15.3 (6.7)	8	13.4 (6.8)	20	16.0 (6.7)	1.00 (0.32)	1.47 (0.23)	0.01 (0.93)
Emotional	19	5.4 (2.3)	7	4.3 (2.9)	12	6.0 (1.7)	28	3.4 (2.8)	8	2.8 (3.4)	20	3.7 (2.6)	5.48 (0.02)	2.48 (0.12)	0.24 (0.63)
Conduct	19	2.3 (1.4)	7	2.6 (1.7)	12	2.1 (1.2)	28	3.0 (1.6)	8	2.8 (1.6)	20	3.1 (1.7)	1.48 (0.23)	0.02 (0.89)	0.72 (0.40)

Hyperactivity	19	5.2 (2.3)	7	5.4 (2.6)	12	5.1 (2.2)	28	5.3 (2.8)	8	4.9 (3.2)	20	5.5 (2.6)	0.01 (0.91)	0.02 (0.89)	0.30 (0.58)
Peer	19	4.2 (2.6)	7	3.3 (3.5)	12	4.7 (1.9)	28	3.6 (2.5)	8	3.0 (2.4)	20	3.8 (2.5)	0.52 (0.47)	1.87 (0.18)	0.13 (0.72)
Prosocial	19	8.6 (1.4)	7	9.3 (1.0)	12	8.2 (1.5)	28	7.9 (1.8)	8	8.8 (1.0)	20	7.6 (1.9)	1.35 (0.25)	5.46 (0.02)	0.01 (0.94)
Impact	18	3.2 (3.2)	7	2.9 (3.3)	11	3.5 (3.2)	27	2.2 (2.5)	8	2.1 (2.8)	19	2.2 (2.4)	1.23 (0.27)	0.12 (0.73)	0.10 (0.76)

Higher score indicates more problems in all scales except prosocial behavior, where it indicates fewer problems.
[1] The P-values are not adjusted according to the multiple comparisons made.

Table 3. Parent reported difficulties at admission to the National Centre for Epilepsy (NCE) compared with a British pediatric outpatient sample and a British community sample [26].

Parent SDQ[*]	Girls			Boys		
	NCE sample (*n* = 32)	Pediatric outpatient sample (*n* = 110)	British community sample (*n* = 5226)	NCE sample (*n* = 40)	Pediatric outpatient sample (*n* = 187)	British community sample (*n* = 5212)
Total						
o Normal	15.6%	68.2%	85.5%	35.0%	69.5%	78.6%
o Borderline	28.1%	12.7%	6.8%	20.0%	9.5%	9.5%
o Abnormal	56.3%	19.1%	7.7%	45.0%	20.9%	11.8%
Emotional						
o Normal	34.4%	60.9%	79.3%	60.0%	65.2%	78.6%
o Borderline	15.6%	10.9%	8.6%	5.0%	10.7%	7.0%
o Abnormal	50.0%	28.2%	12.1%	35.0%	24.1%	10.7%
Conduct						
o Normal	56.3%	72.1%	79.3%	52.5%	69.5%	73.4%
o Borderline	9.4%	10.8%	10.4%	17.5%	9.6%	11.5%
o Abnormal	34.4%	17.1%	10.3%	30.0%	20.9%	15.1%
Hyperactivity						
o Normal	46.9%	72.3%	84.4%	42.5%	64.7%	71.3%
o Borderline	12.5%	8.0%	5.7%	7.5%	9.6%	9.1%
o Abnormal	40.6%	19.6%	9.9%	50.0%	25.7%	19.5%
Peer						
o Normal	21.9%	70.3%	79.7%	32.5%	67.7%	76.2%
o Borderline	12.5%	11.7%	10.2%	5.0%	11.1%	10.4%
o Abnormal	65.6%	18.0%	10.1%	62.5%	21.2%	13.4%

[*] British cutoff values are used for the Normal, Borderline and Abnormal classification [18].

Table 4. Prediction of disorders from multi-informant SDQ using a predictive

algorithm [18] compared with a British community sample.

Prediction from the SDQ:	Unlikely % (n)	Possible % (n)	Probable % (n)	Total % (n)
Hyperactivity disorder	47.9% (35)	34.2% (25)	17.8% (13)	100% (73)
Conduct disorder	61.6% (46)	17.8% (13)	20.5% (15)	100% (73)
Emotional disorder	56.2% (41)	17.8% (13)	26.0% (19)	100% (73)
Any psychiatric disorder	23.3% (17)	31.5% (23)	45.2% (33)	100% (73)
British community sample:				
Any psychiatric disorder [23]	70.1%	19.4%	10.5%	

Table 5. Inter-informant correlations (Pearson) for SDQ scores for children and adolescents in the sample from the National Centre for Epilepsy.

SDQ scores	Parent x teacher	*n*	Parent x self	*n*	Self x teacher	*n*
Total	0.68	37	0.85	53	0.58	31
Emotion	0.65	37	0.79	54	0.62	31
Conduct	0.39	37	0.49	54	0.52	31
Hyperactivity	0.75	37	0.78	53	0.63	31
Peer	0.63	37	0.69	53	0.52	31
Prosocial	0.54	35	0.55	53	0.54	29
Impact	0.65	33	0.61	50	0.57	28

Table 6. Number of patients who had contact with the child and adolescent psychiatry before admission to the National Centre for Epilepsy by prediction of any psychiatric disorder by multi informant SDQ.

		Prediction of any psychiatric disorder			
		Unlikely	Possible	Probable	Total
CAMHS before admission?	No	13 (76,5%)	18 (78,3%)	26 (78,8%)	57 (78,1%)
	Yes	4 (23,5%)	5 (21,7%)	7 (21,2%)	16 (21,9%)
	Total	17 (100%)	23 (100%)	33 (100%)	73 (100%)

CAMHS: Child and Adolescent Mental Health Service. SDQ: Strengths and Difficulties Questionnaire

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