

Paper III

Psychosocial problems and seizure-related factors in children with epilepsy

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In this study we describe psychosocial functions and seizure-related factors in a population-based sample of children with epilepsy. Psychosocial problems (Achenbach scales), cognitive function, and socioeconomic status were studied in 117 children with epilepsy aged between 6 and 13 years (mean age 11y [SD 2y 1mo] and 10y 8mo [SD 2y]; 71 males, 46 females) and in randomly selected controls matched with 117 children for sex and age (mean age 11y 2mo [SD 2y 1mo] and 10y 5mo [SD 2y 4mo]; 69 males, 48 females). The children had partial ($n=67$), generalized ($n=43$), or undetermined ($n=7$) epilepsy syndromes, and partial ($n=68$), generalized ($n=47$), or other ($n=2$) main seizure types. Psychosocial problems were more common among children with epilepsy than controls (odds ratio 5–9) and significantly related to epilepsy syndrome, main seizure type, age at onset, and seizure frequency. Mothers and teachers reported males with epilepsy as having more problems than females. Females self-reported psychosocial problems, males did not. Psychosocial problems were common in childhood epilepsy. Females appreciated the problems more realistically than males. Psychosocial problems should be considered an integral part of epilepsy management.

There has been a remarkable lack of epidemiological studies on behaviour problems in children with epilepsy between the Isle of Wight study (Rutter et al. 1970) and a recent investigation by Davies et al. (2003). Both studies emphasized increased risk for mental health problems in children with epilepsy compared with the general population. In hospital-based studies, children with epilepsy were reported to have increased frequencies of problems such as being dependent, withdrawn, tense, socially isolated, anxious, hyperactive, or depressive (McDermott et al. 1995, Dunn 2003). Research on sex and psychopathology in children with epilepsy has not been conclusive (Austin et al. 2000). Information about psychosocial problems in childhood epilepsy has most often been collected by proxy (McEwan et al. 2004).

The relationship between seizure-related factors and psychosocial problems have been the subject of several studies (Hermann et al. 1989, Schoenfeld et al. 1999, Austin et al. 2000, Sabaz et al. 2003). Such studies have been inconclusive and for the most part not population-based (Besag 2002).

The aims of the present work were to study: (1) behaviour problems in a population-based sample of children with epilepsy compared with controls; (2) possible sex differences in such problems; (3) the relationship between problems reported by teachers, mothers, and children themselves; and (4) the relationship between behaviour problems and seizure-related factors.

Method

STUDY AREA AND POPULATION

The study was conducted in Hordaland County in Western Norway. The study population and control group have been described previously (Waaler et al. 2000, Høie et al. 2005). As of January 1 1995, the county had 416 184 inhabitants and 38 593 of them were born between January 1 1982 and December 31 1988. Demographic characteristics of the county are similar to those of Norway as a whole. Norway has relatively small differences in socioeconomic conditions and public access to the official health services.

DEFINITIONS

An epileptic seizure was defined as a clinical manifestation apparently from abnormal and excessive discharge of neurons in the brain. Epilepsy was defined as two or more seizures occurring at least 24 hours apart, unprovoked by any immediate identifiable cause, regardless of antiepileptic drug treatment. The epilepsy was defined as active if at least one seizure had occurred during the last 4 years. Epileptic seizures and syndromes were classified according to the Commission on Classification and Terminology of The International League Against Epilepsy (1989). Classification of seizures was based on seizure descriptions and electroencephalogram (EEG), including video-EEG recordings when available.

For children with more than one seizure type, seizure frequency was categorized by the most frequent seizure type during the preceding year. Main seizure type was defined as the one most accurately describing the clinical condition and most important for classification of the epileptic syndrome. Remote symptomatic etiology was reserved for epilepsy with obvious etiological factors responsible for brain dysfunction, e.g. cerebral malformation, infection or haemorrhage, acute or progressive encephalopathy, traffic accident injury, etc.

See end of paper for list of abbreviations.

CASE ASCERTAINMENT/CRITERIA FOR INCLUSION AND EXCLUSION

The only paediatric department and EEG laboratory in Hordaland County are at The University Hospital of Bergen. Children who have had at least two epileptic seizures are generally referred for EEG or paediatric examination. Nearly all children with active epilepsy in the county are treated in the paediatric department. The following case identification methods were used: (1) review of hospital files of all patients aged 6 to 12 years with a diagnosis of seizure disorder who had been examined in the paediatric department; (2) review of EEG files of all children in the age group in question registered at the EEG laboratory within the last 5 years; and (3) contact with the county's general practitioners, department of child psychiatry, special institutions for children with disabilities, and other hospitals.

Children with single or isolated seizures (i.e. one or more seizures occurring in 24h), febrile or other provoked seizures, and non-epileptic events were excluded. We identified 198 children born between January 1 1982 and December 31 1988, who had active epilepsy and lived in Hordaland County during the prevalence period, which was between October 1 1994 and March 31 1996, 69.2% having current seizures. Of the 15 who refused to participate in psychological studies, four had current seizures. After exclusion of children with a Wechsler Intelligence Scale for Children – Revised (Undheim 1978) score of 70 or below or Raven score (Raven 1965) at the 25th centile or below, 133 eligible children remained. The Child Behavior Checklist (CBCL; Achenbach and Edelbrock 1983) was completed by 104 mothers and Teachers Report Forms (TRF; Achenbach 1991a) obtained from 94 teachers. Valid Youth Self-Reports (YSR; Achenbach 1991b) were obtained from 41 of 79 children aged 11 years or older.

CONTROL CHILDREN

One hundred and thirty-nine control children from Hordaland County matched for age and sex were randomly selected from the Norwegian Birth Registry. In 117 of the 139 controls, at least one questionnaire was answered. CBCL was answered by 109 mothers and TRF by 95 teachers. Valid YSR was answered by 46 of the 85 control children who were aged 11 years or older.

PSYCHOLOGICAL INVESTIGATIONS

Psychological investigations were performed by one of the authors (BH) and a test technician. Mothers answered questions regarding socioeconomic status (SES) and behaviour problems (CBCL). TRF forms were given to the mothers to hand over to children's teachers. Children who were 11 years of age or older filled out the YSR form. Internalizing (36 items) and externalizing (34 items) groupings of behavioural/emotional problems have been identified by performing second-order factor analyses. The eight syndrome scales were scored separately for each instrument for each age/sex group. The sum scores for internalizing problems score (IPS) and externalizing problems score (EPS) and total problems score (TPS) were calculated. Achenbach instruments (CBCL and TRF) can be used from four to 18 years of age. The cross-informant core syndromes (CBCL, TRF, and YSR) tap emotional and conduct disorders and a direct comparison between CBCL and TRF has shown similar psychometric qualities and excellent reliability and validity (Achenbach 1991a). Cognitive function was evaluated using Raven Matrices or WISC-R.

SOCIOECONOMIC STATUS

SES was computed as a metric variable with years of education, income level, and occupational level taken into consideration for the mothers and fathers (Cronbach's alpha = 0.63). People in Norway have a relatively even income level, and income level might not, therefore, be associated with educational level or occupation in a linear fashion. Consequently, all three indicators were considered when evaluating SES. Low value on the ranking of all three factors was defined as equivalent to low SES. For two-income families, the SES score was calculated as the mean score for both parents.

NEUROPAEDIATRIC EXAMINATIONS

Children with epilepsy had a neuropaediatric examination and an EEG investigation. Collected data included epilepsy aetiology, epilepsy syndrome classification, main seizure type, age at onset of seizures, seizure frequency, and treatment. Six brain areas were evaluated with regard to past and/or present areas of epileptogenic activity: right and left frontal, right and left middle, and right and left posterior areas. Epileptogenic activity (spikes and spike-and-slow-wave discharges) was regarded as present in an area if it had been observed in at least one EEG recording.

STATISTICAL METHODS

SPSS (version 10.0) was used for statistical analyses. The TPS from CBCL and TRF were calculated as bivariate dichotomous variables with cut-off scores at the 90th centile for each sex separately for both instruments in the control group.

Mean group differences (MGD) in *t*-scores between children with epilepsy and controls (Table III) were calculated as unstandardized regression coefficients obtained from linear regression analyses. The *t*-scores ranged from 0 to 100, the mean *t*-score being 50 with a standard deviation (SD) of 10. The mean *t*-scores were used in 66 separate bivariate linear regression analyses, 11 for each instrument, and 33 for each sex separately. To test the hypothesis that the effect of epilepsy on all Achenbach scales was dependent on sex, we formulated an interaction model as follows: $Y = a + b_1X_1 + b_2X_2 + b_3(X_1 \times X_2)$, where *Y* is Achenbach score, *b*₁ effect of epilepsy, *X*₁ group (epilepsy vs control), *b*₂ effect of sex, *X*₂ sex, *b*₃ the interaction term (sex by epilepsy, 0 males, 1 female). Column 3 gives symbols indicating sex differences in epilepsy effects on Achenbach scores. B indicates that the effect of epilepsy on Achenbach scores is stronger for males than females, G indicates the opposite. If these interaction effects were significant they were marked as such. Pearson's correlations were calculated for CBCL in relation to TRF, CBCL in relation to YCL, and TRF in relation to YCL. These factors were defined as dummy variables in ANOVA analyses (Table IV). As seizure-related factors contain overlapping categories, only TPS were used in these calculations.

Ethics

The study protocol was approved by The Norwegian Data Inspectorate and The Regional Committee on Medical Research Ethics. Written informed consent was obtained from all parents in both study groups.

Results

Demographic data and participation in the study for patients and controls are shown in Table I. The groups were comparable

with regard to age and sex.

Table II shows that children with epilepsy had increased risk for behaviour problems as reported by mothers odds ratio (OR) 9 and teachers (OR 5). Self-reports for both sexes combined did not disclose significant difference between the study groups. Adjusting for WISC-R, Raven, and SES did not affect the results.

Table III shows, for each sex separately, MGD in *t*-scores for all sum scales and subscales of YSR, CBCL, and TRF for children with epilepsy and controls. With exception of the TRF scores EPS, anxious/depressed, delinquent, and aggressive behaviour in females, all CBCL and TRF scales for both males and females with epilepsy were significantly elevated compared with controls with MGD being about half SD, i.e. a moderate to strong effect. The highest CBCL subscale scores were those relating to social problems, attention problems and somatic complaints (both sexes), and aggressive behaviour and thought problems (males). The highest TRF subscale scores were social problems and somatic complaints (both

sexes). Self-reports showed that males with epilepsy did not report significant increase of psychosocial problems, whereas females with epilepsy reported significant increase of all internalizing problems except anxious/depressed.

The last column in Table III shows the interaction effect of sex by epilepsy. Mothers and teachers reported more problems for males than females, but this was significant only for a few scales. YSR showed a tendency for females to report more problems than males, but this was significant only for the withdrawn scale.

Pearson's correlations calculated for TPS of both sexes combined were 0.55 ($p < 0.001$) between CBCL and TRF, (0.35 $p < 0.001$) between CBCL and YSR, and 0.27 ($p < 0.02$) between TRF and YSR. For each sex separately, Pearson's correlations between TPS for CBCL and TRF were 0.57 ($p < 0.001$) in males and 0.52 ($p < 0.001$) in females. Pearson's correlation between TPS for CBCL and YSR was 0.34 ($p < 0.01$) in males and 0.42 ($p = 0.02$) in females. Pearson's correlations between TPS for TRF and YSR were 0.10 (*ns*) in males and 0.67 ($p < 0.001$) in females.

Table I: Participation and demographic characteristics of children with epilepsy and controls^a

	Youth (YSR) ^b		Mothers (CBCL)		Teachers (TRF)	
	Epilepsy	Control	Epilepsy	Control	Epilepsy	Control
Total <i>n</i>	41	46	104	109	94	95
YSR	–	–	37	45	28	39
CBCL	37	45	–	–	81	87
TRF	28	39	81	87	–	–
Males/Females	25/16	32/14	63/41	65/44	56/38	58/37
Mean age	12y 8mo	12y 9mo	11y	10y 10mo	10y 8mo	11y
SD	1.1	0.9	2.0	2.2	2.0	2.2

^aOf 133 eligible children with epilepsy, 117 (88%) responded, and of 139 controls, 117 (84%) responded to at least one questionnaire. Numbers of children within each subcategory of various seizure-related factors are given in Table IV. ^bYSR, only children 11 years or older. Forty-one (52%) responded in epilepsy group, 85 (53%) in control group. YSR, Youth Self-Report; CBCL, Child Behavior Checklist; TRF, Teacher Report Form.

Table II: Odds ratios (OR) for high^a Achenbach total problems scores, and internalizing and externalizing problems sum scores in children with epilepsy versus controls

	Crude effects			Adj. for Raven			Further adj. SES			Cut-offs ^b		Crude prevalences	
	OR ^c	<i>p</i>	95% CI	OR	<i>p</i>	95% CI	OR	<i>p</i>	95% CI	Males	Females	Epilepsy, %	Controls, %
Mothers (CBCL)													
Total problems score	8.9	<0.001	4.3–18.5	7.3	<0.001	3.4–16.0	7.1	<0.001	3.3–15.6	57.0	55.3	50	10
Internalizing	5.1	<0.001	2.5–10.4	4.8	<0.001	2.2–10.4	4.8	<0.001	2.2–10.4	64.0	56.9	39	11
Externalizing	6.9	<0.001	3.4–14.1	6.3	<0.001	3.0–13.5	6.3	<0.001	3.0–13.6	53.0	54.6	46	11
Teacher (TRF)													
Total problems score	5.0	<0.001	2.3–11.0	6.0	<0.001	2.4–14.8	5.3	<0.001	2.1–13.4	56.0	58.0	37	11
Internalizing	5.4	<0.001	2.3–12.4	6.1	<0.001	2.3–15.9	6.1	<0.001	2.3–16.0	60.0	58.0	33	8
Externalizing	3.1	0.008	1.3–7.1	3.1	0.011	1.3–7.3	2.8	0.023	1.2–7.0	57.0	60.0	25	10
Youth self-report (YSR)													
Total problems score	1.1	0.85	0.30–4.3	1.4	0.63	0.35–5.7	1.3	0.68	0.3–5.5	53.6	57.5	12	11
Internalizing	2.3	0.17	0.70–7.6	2.6	0.13	0.74–9.4	2.7	0.14	0.7–9.5	55.0	56.5	22	11
Externalizing	1.5	0.59	0.36–5.8	1.8	0.44	0.41–7.8	1.5	0.60	0.3–6.8	58.2	58.5	12	9

^aHigh Achenbach total problems score was defined as at or above 90th centile as defined in control group. ^bSex-specific cut-off score (90th centile) for total problems score in controls. ^cRatio of the odds for behaviour problems in children with epilepsy divided by corresponding odds for control children. Adj., adjusted; CBCL, Child Behavior Checklist; TRF, Teacher Report Form; YSR, Youth Self-Report; SES, socioeconomic status; CI, confidence interval.

Table IV shows seizure-related factors and behaviour problems expressed as TPS for CBCL and TRF. Epilepsy syndrome, main seizure type, age at onset, and seizure frequency were significantly related to behaviour problems, accounting for 9 to 28% of the negative influence. The results indicate close correspondence between reports by mothers and teachers. With regard to epileptic syndromes, children with generalized symptomatic epilepsies had most problems (the highest average *t*-score), followed by localization-related cryptogenic epilepsies. Idiopathic epilepsy syndromes and localization-related symptomatic epilepsies had the lowest mean TPS scores. Among seizure types atypical absences had the highest mean TPS. Children with early epilepsy onset (<4 years) had higher TPS than those with later onset. Seizure frequency in the

preceding year was significantly related to TPS, but no seizures in the preceding year had the highest TPS. There was no significant relationship between antiepileptic drug treatment or EEG factors and behaviour problems. The YSR instrument did not show significant relationship to any of the seizure-related factors, and will, therefore, not be discussed further (results not shown).

Associations were found between Raven scores and psychosocial problems (TPS) reported by teachers and mothers (Pearson's correlations -0.37 [$p < 0.005$] and -0.19 [$p < 0.005$] respectively). Due to differences in psychosocial function between the epilepsy group and controls, we investigated whether this difference was dependent on Raven scores. Odds ratios remained largely unchanged after having adjusted for

Table III: Mean group differences^a between children with epilepsy and controls in Achenbach *t*-scores on Youth Self-Report (YSR), Child Behavior Checklist (CBCL), and Teacher Report Form (TRF)

Achenbach	Males		Females		Interaction ^b
	MGD	(95% CI)	MGD	(95% CI)	
Youth Self-Report (YSR)^c					
Withdrawn	0.5	(-0.4 to 1.5)	4.0**	(1.5 to 6.6)	G**
Somatic complaints	0.5	(-2.2 to 3.2)	4.6*	(0.9 to 8.3)	G
Anxious/depressed	1.3	(-0.8 to 3.4)	2.1	(-1.2 to 5.4)	G
Social problems	2.1	(-0.3 to 4.6)	4.0*	(0.0 to 8.0)	G
Thought problems	0.9	(-1.0 to 2.8)	-0.1	(-4.2 to 4.0)	B
Attention problems	0.5	(-1.0 to 2.0)	2.0	(-1.9 to 5.9)	G
Delinquent behaviour	-0.7	(-2.5 to 1.1)	-2.9	(-6.5 to 0.8)	B
Aggressive behaviour	0.3	(-1.8 to 2.4)	0.5	(-2.2 to 3.2)	G
Internalizing problems score	1.0	(-4.0 to 6.0)	7.5*	(1.4 to 13.6)	G
Externalizing problems score	-1.3	(-6.4 to 3.9)	-3.0	(-9.3 to 3.3)	B
Total problems score	1.3	(-3.6 to 6.3)	5.6	(-0.5 to 11.7)	G
Mothers (CBCL)					
Withdrawn	3.8**	(1.4 to 6.2)	3.2**	(0.8 to 5.5)	B
Somatic complaints	5.8**	(3.0 to 8.5)	5.1**	(1.8 to 8.3)	B
Anxious/depressed	4.7**	(2.1 to 7.3)	4.1**	(1.6 to 6.7)	B
Social problems	7.2**	(4.1 to 10.4)	6.3**	(3.1 to 9.4)	B
Thought problems	5.5**	(3.4 to 7.6)	3.0**	(0.8 to 5.2)	B
Attention problems	8.7**	(5.7 to 11.6)	6.4**	(3.2 to 9.6)	B
Delinquent behaviour	4.2**	(2.2 to 6.1)	1.9*	(0.4 to 3.4)	B
Aggressive behaviour	6.3**	(3.9 to 8.7)	2.2*	(0.4 to 4.0)	B*
Internalizing problems score	9.6**	(5.4 to 13.8)	6.6**	(2.2 to 11.0)	B
Externalizing problems score	11.5**	(7.8 to 15.3)	5.5**	(1.6 to 9.5)	B*
Total problems score	13.3**	(9.1 to 17.6)	9.3**	(4.7 to 13.9)	B
Teacher (TRF)					
Withdrawn	3.8**	(1.8 to 5.9)	3.0*	(0.6 to 5.4)	B
Somatic complaints	6.0**	(3.4 to 8.5)	5.3**	(2.1 to 8.5)	B
Anxious/depressed	3.6**	(1.2 to 5.9)	2.2	(-0.2 to 4.6)	B
Social problems	6.0**	(3.6 to 8.5)	5.0**	(2.3 to 7.7)	B
Thought problems	3.8**	(1.6 to 6.0)	3.8**	(1.5 to 6.2)	B
Attention problems	4.5**	(2.5 to 6.5)	2.8*	(0.7 to 4.9)	B
Delinquent behaviour	2.5**	(0.7 to 4.2)	0.1	(-1.8 to 2.0)	B
Aggressive behaviour	4.2**	(1.5 to 6.9)	1.2	(-1.0 to 3.3)	B
Internalizing problems score	8.0**	(3.9 to 12.1)	6.6**	(2.7 to 10.6)	B
Externalizing problems score	6.5**	(3.1 to 9.8)	2.3	(-1.2 to 5.7)	B
Total problems score	9.7**	(5.9 to 13.4)	6.0**	(2.2 to 9.7)	B

* $p < 0.05$ two-tailed. ** $p < 0.01$ two-tailed. ^aNumbers are unstandardized regression coefficients obtained from linear regression analyses indicating mean differences in *t*-scores (standardized to mean 50 and [SD 10]) between epilepsy group and controls. Positive values indicate more problems in epilepsy group. ^bInteraction term (sex by group) in prediction of behaviour problems. B indicates more problems in males, G in females. ^cChildren ≥ 11 years of age only. MGD, mean group differences; CI, confidence interval.

Table IV: Seizure-related factors and Achenbach total problem scores (TPS) in 117 children with epilepsy

Seizure-related factors (n) ^a	Mothers (CBCL), grand mean = 56				Teachers (TRF), grand mean = 56			
	Mean TPS	95% CI	R-sq	p	Mean TPS	95% CI	R-sq	p
Remote symptomatic aetiology			0.026	0.102			0.018	0.173
Not present (107)	54	52–57			55	52–57		
Present (10)	62	54–70			61	53–69		
Epileptic syndrome			0.283	<0.001			0.236	<0.001
Localization related idiopathic (30)	46	42–51			48	43–53		
Localization related symptomatic (16)	53	48–58			54	49–59		
Localization related cryptogenic (21)	64	58–69			62	57–68		
Generalized idiopathic (22)	52	47–57			52	47–57		
Generalized cryptogenic/symptomatic (13)	58	52–65			59	52–66		
Generalized symptomatic (8)	67	60–75			67	59–74		
Undetermined (7)	59	51–67			59	51–67		
Main seizure type			0.213	<0.001			0.168	<0.011
Simple partial seizures (17)	49	43–56			50	44–56		
Complex partial (35)	55	50–59			55	51–59		
Secondary generalized (16)	52	46–58			53	47–60		
Absence (17)	51	45–57			50	44–57		
Atypical absence (14)	69	63–76			67	60–73		
Myoclonic (4)	49	39–60			51	41–62		
Tonic-clonic (12)	58	51–64			59	52–66		
Others (2)	55	39–72			56	40–73		
Age at onset			0.183	<0.001			0.106	<0.022
0–1y (23)	61	56–65			59	56–63		
2–3y (24)	61	56–65			57	53–60		
4–5y (22)	56	51–61			59	54–63		
6–7y (23)	48	43–53			51	47–55		
8–9y (28)	55	50–59			52	48–56		
>9y (13)	45	37–53			54	47–61		
Seizure frequency, preceding year			0.094	0.006			0.132	<0.001
No seizures (32)	61	56–65			62	57–66		
1–12 seizures a year (44)	54	50–58			55	51–58		
>12 seizures a year (41)	51	47–55			50	46–54		
AED treatment, preceding year			0.044	0.099			0.025	0.274
No drugs (28)	58	53–63			58	53–63		
One drug (79)	53	50–56			54	51–57		
Two or three drugs (10)	60	52–68			59	51–67		
AED treatment past and/or present			0.038	0.267			0.039	0.260
No drug (13)	56	48–63			55	48–62		
One drug (50)	52	48–56			52	49–56		
Two drugs (37)	57	53–62			58	54–62		
Three or more drugs (17)	57	51–63			57	51–63		
AEA^b			0.045	0.564			0.042	0.601
Frontal right (54)	57	38–75			52	34–69		
Frontal left (47)	51	32–70			57	39–75		
Middle right (74)	48	39–57			48	40–56		
Middle left (70)	53	47–59			54	48–60		
Posterior right (64)	55	48–63			56	49–63		
Posterior left (50)	57	53–61			56	53–60		
Number of AEs			0.027	0.422			0.031	0.359
No area (17)	56	50–63			57	51–63		
One area (30)	51	46–56			52	47–57		
Two to five areas (28)	56	51–61			57	52–62		
Generalized (42)	56	52–60			56	52–60		

Numbers were obtained from univariate analyses of variance (ANOVA), and are *t*-scores (mean 50 [SD 10]) of Achenbach parent and teacher total problem scores for epilepsy patients (no control group). ^aNumber of children. ^bSubgroups not mutually exclusive. CBCL, Child Behavior Checklist; TRF, Teachers Report Form; CI, confidence interval; AED, antiepileptic drug; AEA, area with epileptic activity located with EEG.

Raven scores on TRF and CBCL (Table II). The discussion will, therefore, be based on the effect of the epilepsy itself.

Discussion

The major findings of the present population-based study were: (1) in children with epilepsy without severe cognitive deficits, psychosocial problems as reported by parents and teachers were five to nine times more common than in controls; (2) psychosocial problems were influenced by seizure-related factors; (3) reports by parents and teachers indicated more psychosocial problems for males than females; and (4) females themselves reported psychosocial problems, whereas males did not.

The frequency of psychosocial problems in the present material (OR 5–9) was high compared with observations in the literature. Rutter et al. (1970) found psychiatric disorders with abnormal behaviour in 7% of the general population of 10 to 11-year-old children, 28% (OR 3.6) in uncomplicated epilepsies, and 58% (OR 18) in epilepsy with lesions above the brainstem associated with seizures. Davies et al. (2003) reported psychiatric disorder in 37% of children with epilepsy (OR 5.9), 11% in diabetes, and 9% in control children. McDermott et al. (1995) reported that children with seizures were 4.7 times, and children with cardiac problems three times more likely to have behaviour problems compared with controls. Sillanpaa et al. (2004) found that childhood onset epilepsy may have a long-term impact on the children's health-related quality of life into adulthood. These studies indicate that psychosocial problems are common, may occur early, and have long-lasting effects on the quality of life of children with epilepsy.

The agreement between mothers and teachers' assessments of psychosocial problems suggests that our results were reliable. In a referred sample of 1299 adolescents, Achenbach and Edelbrock (1983) found an average correlation (0.66) between reports from similar informants, such as mother–father or teacher–teacher, and a lower correlation between different informants, such as teacher–parent (0.28) and adolescent–other informant (0.22). In a hospital-based study of adolescents with epilepsy, Huberty et al. (2000) found no statistical difference between CBCL and TRF ratings. Adolescents (YSR) reported significantly fewer problems than mothers, making the investigators concerned that the adolescents might under-report their problems. As in the present study, Huberty et al. (2000) found no significant difference between TRF and CBCL ratings.

The observation that more females than males with epilepsy reported psychosocial problems was in agreement with findings of Austin et al. (2000). In a follow-up study of children with epilepsy or asthma, they concluded that behavioural problems were most prominent in adolescent females with high-severity epilepsy. A possible explanation of the sex differences might be that females are more realistic and males more indifferent or unrealistically optimistic. On the other hand, males might score higher on assessments of quality of life as this measure depends on the individual's own perception in relation to personal expectations.

Children with generalized symptomatic and localization-related cryptogenic epilepsy syndromes had more behaviour problems than those with idiopathic epilepsies. In hospital-based patients, Austin et al. (1992) found no relationship between children's epilepsy syndrome and behaviour problems whereas Sabaz et al. (2003) reported a greater impact of

health-related quality of life in symptomatic than in idiopathic epilepsy.

Children with atypical absences had the highest and those with absences and simple partial seizures the lowest risk for psychosocial problems. Hoare (1984) found that children with complex partial seizures and/or focal EEG abnormalities were particularly vulnerable to psychiatric disturbances. Caplan et al. (1998) reported that children with complex partial seizures or primary generalized epilepsy with absences had significantly increased frequencies of psychiatric diagnoses as compared with controls. The diversity between results of the different studies might be caused by variations in selection of patients studied and differences in classification of seizure types.

In our study, early age at seizure onset was associated with more behaviour problems. Similar results were reported in CBCL studies by Hoare and Kerley (1991), whereas Sabaz et al. (2001) found no significant relationship between CBCL problem scales and age at epilepsy onset.

We found that seizure-free children had more psychosocial problems than children with current seizures. This unexpected observation was in contrast to the significant relationship between behavioural problems and high seizure frequency reported in hospital-based studies (Hermann et al. 1989, Austin et al. 2000). However, in children with refractory epilepsies, Sabaz et al. (2001) found a tendency to more psychosocial problems in those with 1–10 seizures per 4 weeks than in those with higher seizure frequency and those who were seizure-free. Differences in findings between studies could be caused by variations in methods used. The relationship between seizure frequency and psychosocial problems in children with epilepsy needs further investigation.

The Achenbach scales have been widely used and permit comparisons of behavioural problems between children from diverse cultures (Crijnen et al. 1999). In studies of children with epilepsy CBCL has been found to be sensitive to several clinical variables (Dunn 2003, Sabaz et al. 2003). The present results support the usefulness of these tools in evaluating psychosocial problems in children with epilepsy.

Conclusion

When excluding children with severe cognitive deficits, psychosocial problems were highly frequent in children with epilepsy and these problems could only marginally be explained by variations in SES and cognitive function.

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List of abbreviations

CBCL	Child Behavior Checklist
EPS	Externalizing problems score
IPS	Internalizing problems score
TPS	Total problems score
TRF	Teachers Report Form
YSR	Youth Self-Report
