Seizure 18 (2009) 167–175

Contents lists available at ScienceDirect

Seizure

journal homepage: www.elsevier.com/locate/yseiz

Factors associated with health-related quality of life, anxiety and depression among young adults with epilepsy and mild cognitive impairments in short-term residential care

Michael Endermann [a,*], Friederike Zimmermann [b,1]

[a] von Bodelschwinghsche Anstalten Bethel, Psychosozialer Dienst im Stiftungsbereich Behindertenhilfe, Remterweg 58, 33617 Bielefeld, Germany
[b] University of Bielefeld, Department of Psychology, 33615 Bielefeld, Germany

ARTICLE INFO

Article history:
Received 20 November 2007
Received in revised form 11 June 2008
Accepted 22 August 2008

Keywords:
Epilepsy
Cognitive impairment
Health-related quality of life
Emotional disorders
Neuroticism
Age at epilepsy onset

ABSTRACT

Introduction: This study examined associations of health-related quality of life (HRQOL), anxiety, and depression with medical and psychosocial variables. Participants were young adults with epilepsy and additional mild cognitive impairments in short-term residential care of the Bethel Institute, Germany. *Methods:* Thirty-six individuals were interviewed using the Quality of Life in Epilepsy Inventory 31 (QOLIE-31), the Hospital Anxiety and Depression Scale (HADS) and the neuroticism scale of the Neo-Five-Factor Inventory (NEO-FFI). Medical as well as socio-demographic data were assembled from client files. *Results:* Regression analyses revealed neuroticism as the strongest predictor of HRQOL, anxiety and depression. The only variables that additionally explained a substantial proportion of variance counting for 6–10% in the three criteria were age at epilepsy onset and sex: epilepsy onset after the age of 10 years was associated with lower HRQOL and higher anxiety, men suffered from more depression than women. *Discussion:* Neuroticism as a personality disposition seems to be most influential on HRQOL and anxiety in people with epilepsy and mild cognitive impairment. The impact of sex and age at epilepsy onset on HRQOL, anxiety and depression of this epilepsy subpopulation should be further clarified.

1. Introduction

Health-related quality of life (HRQOL) and affective disorders of patients with epilepsy are the subject of scientific discussions for a long period of time. A relationship between epilepsy and affective disorders is well-known and depression and anxiety were shown to be the most frequent psychological disorders in epilepsy.[1–5] In the last decade HRQOL has been established as a new outcome measure in addition to seizure control in treatment studies.[6–8]

The question of identifying determinants of affective disorders and HRQOL is of particular interest. Hermann and Whitman hypothesized three groups of variables that contribute to understanding psychological problems of people with epilepsy: neuro-epilepsy variables such as seizure frequency, seizure type, age at onset or duration of epilepsy; medication variables such as medication type and number; psychosocial variables such as adjustment to the epilepsy or perceived stigma.[9] Unfortunately only few conclusions can be drawn based on empirical data: regarding epilepsy parameters, many studies showed a substantial impact of seizure control on HRQOL, especially when groups without seizure control were compared with groups with seizure control.[10–15] An impact of seizure control on affective disorders was demonstrated less consistently.[16] As regards medication factors, effects of some antiepileptic drugs (AEDs) on HRQOL and affective disorders were documented.[11,17–20] In comparison to disease or iatrogenic parameters, psychosocial variables were usually found to be even stronger related to HRQOL[21–24] and to affective disorders.[3] But their significance remains doubtful: for example, HRQOL, depression and anxiety correlate with each other. Today, associations between HRQOL and depression are mostly regarded as influences of depression on HRQOL.[22,23] In the past, parameters of psychosocial adaptation to epilepsy were more often discussed as risk factors for psychiatric disorders such as depression.[9] Many of these parameters are nowadays incorporated in the HRQOL construct. Altogether, the role of psychosocial factors on adjustment and treatment outcome in epilepsy is still far from clear. Among the psychological variables the potential of personality traits to determine psychopathology of patients with epilepsy or patients with psychogenic non-epileptic seizures has only recently gained attention: the role of neuroticism, one of the

* Corresponding author. Tel.: +49 521 144 2802; fax: +49 521 144 6274.
E-mail address: michael.endermann@bethel.de (M. Endermann).
[1] Present address: University of Heidelberg, Department of Psychology, 69117 Heidelberg, Germany.

1059-1311/$ – see front matter © 2008 British Epilepsy Association. Published by Elsevier Ltd. All rights reserved.
doi:10.1016/j.seizure.2008.08.013

dimensions of the five-factor model of personality, was examined in some studies and an influence of neuroticism on general well-being in patients with epilepsy was documented.[21,25–29] In contrast to relatively little research in epilepsy, studies from the general population or from psychiatric patients indicate that neuroticism is a strong risk factor for manifest psychiatric disorders[30] and a potential general underlying vulnerability factor for psychopathology.[31] It was shown that high neuroticism scores predict poor outcome in depression[32,33] and are also associated with lower quality of life.[34]

The aim of this cross-sectional study was to analyze the relationships of HRQOL, depression and anxiety with psychosocial and medical variables in a very special "epilepsy plus" group of the Bethel Institute, Germany. We assumed HRQOL, depression and anxiety to be changeable over time and therefore examined them as dependent target variables. Based on theory, we chose neuroticism as a more time-stable personality trait and possibly determining independent psychological variable for the three criteria. We were interested to find out the relative impact of neuroticism on HRQOL, anxiety and depression in comparison with disease and socio-demographic variables.

Studies on factors associated with HRQOL and psychological symptoms regularly concentrate on groups of people with epilepsy that are essentially defined by medical parameters: categories may be epileptic syndromes such as temporal lobe epilepsy or juvenile myoclonic epilepsy, treatments such as epilepsy surgery or "epilepsy only" groups without co-morbidity. In contrast, we were interested in detecting possible associations in clients of the "Wohnheimverbund für junge Erwachsene mit Epilepsie" (WJE), which is a short-term residential unit for young adults with epilepsy and additional disabilities from all over Germany. The WJE provides training over approximately 3 years in order to achieve a more autonomous life. WJE clients are – besides the diagnosis of difficult-to-treat-epilepsy – selected with respect to psychosocial indicators.[35]

Criteria for admission to this "epilepsy plus" group in Bethel are the following:

(a) Age: Clients are generally 18–35 years old.
(b) Epilepsy: All of the clients have a diagnosis of difficult-to-treat-epilepsy but vary considerably with respect to syndromes, drug treatment and anamnestic features.
(c) Cognitive impairment: In addition to epilepsy all of the clients have a diagnosis of more general or more specific cognitive limitations due either to the epilepsy or underlying brain dysfunction itself, to the complications of epilepsy or to antiepileptic drugs. Nevertheless, they are able to communicate verbally and are not severely mentally retarded.
(d) Psychosocial functioning: Chronic epilepsy and/or cognitive limitations have resulted in significant problems of psychosocial functioning. Clients had difficulties at school or job training and were unable to find a job on the general job market. Many had also experienced problems in the family home such as overprotection or felt socially isolated.

Clients or their relatives regularly ask for admission to the WJE. Very often their neurologists or other institutions of social or medical rehabilitation arrange the first contact. The epilepsy clinic Mara I of the Bethel Institute plays a special role with a substantial proportion of inquiries for admission. An executive committee of the WJE decides about admission according to the above-mentioned criteria based on available school records, medical files and further biographical material. Members of the committee are the administrative head of the WJE, staff members, and three responsible experts: a medical specialist in neurology and psychiatry, a clinical psychologist and a social worker. The WJE is funded by the German social welfare system.

2. Materials and methods

2.1. Characteristics of the sample

Thirty-six of 40 WJE clients, i.e. 90% of the population, took part in the study. The sample consisted of 14 female (38.9%) and 22 male (61.1%) clients. None of them were married. Their mean age was 25.6 years (S.D. = 6.0; median = 24.0; range = 18–40). All of the following data on (1) epilepsy and treatment, (2) psychiatric co-morbidity and (3) education, cognitive functioning and work were drawn solely from client files.

1. The mean number of different seizure types was 3.0 (S.D. = 1.1; median = 3.0; range = 1–5) and the most frequent seizure types were primarily or secondary generalized tonic–clonic seizures, complex partial and simple partial seizures. During the 6 months prior to data collection, 28 clients (77.8%) had seizures; the remainder were seizure-free. This relatively high percentage of seizure-free clients may be surprising considering a sample with difficult-to-treat-epilepsy. As data were not gained at admission to the WJE, they eventually indicate successful medical interventions during the time already spent in the rehabilitation unit. An idiopathic generalized epilepsy was diagnosed in only four clients (11.1%), whereas 32 (88.9%) suffered from symptomatic or cryptogenic partial epilepsy. Among these were 12 persons with a definite temporal lobe origin (TLE). Mean age at onset of epileptic seizures was 7.6 years (S.D. = 7.2; median = 5.0; range = 0–23). Twenty-four clients had their first epileptic seizure before the age of 11 years, 12 clients had an epilepsy onset in adolescence. Mean duration of epilepsy was 18.0 years (S.D. = 9.2; median = 17.0; range = 2–39). Clients were treated with 2.2 AEDs on average (S.D. = 1.0; median = 2.0; range = 1–5). Lamotrigine and valproate were most frequently prescribed, followed by oxcarbazepine. Eight patients (22.2%) had been treated surgically prior to residential care without reaching complete seizure control. Two patients (5.6%) were treated with vagus nerve stimulation in addition to AEDs and three (8.3%) had a ventricle drainage (shunt).
2. Psychiatric diagnoses based on ICD-10 or DSM-IV were not available. Nevertheless, the following data indicate current psychiatric symptomatology: seven clients (19.4%) were treated with psychotropic medication in addition to AEDs and nine clients (25.0%) had psychogenic non-epileptic seizures in addition to epileptic seizures.
3. Eighteen persons (50%) had attended special education schools for people with learning or physical disabilities. As it is possible to achieve a basic education equivalent in special education schools in Germany, altogether 28 persons (77.8%) achieved mainstream basic education certification. Previous IQ reports were available for only 12 persons (IQ range = 71–108): according to them seven clients scored between 70 and 80, three between 81 and 100 and two had IQ scores >100. At the time of data collection, two clients did not work, the other 34 worked in sheltered workshops of the Bethel Institute. While no client was classified as mentally retarded ($IQ < 70$), the school type attended as well as the comparatively smaller portion of people having completed basic education clearly indicates an altogether sub average IQ sample profile. Mild cognitive impairments were also indicated by staff-observations: 14 persons (38.9%) had been rated with more severe memory deficits in everyday situations.

2.2. Measures

HRQOL and personality dimensions such as neuroticism are usually measured by self-rating scales. Self-rating scales are also often used as indicators of psychiatric disorders. With regard to clients of the WJE we were interested in choosing questionnaires easily to understand and commonly used in medical and psychological research. We decided to administer the questionnaires in face-to-face interviews in order to motivate individuals with a limited attention span, little reading experience or reading difficulties. Additionally, it sought to guarantee participation with a minimum of missing values. The application of self-rating scales in face-to-face interviews seemed suitable as there are no indications of a general relationship between the presentation of questionnaires (e.g. face-to-face interview vs. postal inquiry) and response tendencies.[36] Moreover, studies of people with mild intellectual disabilities have demonstrated the utility of self-rating scales to measure quality of life[37] and psychiatric symptoms[38,39] when administered in face-to-face interviews. Promising results with regard to reliability and validity have also been gained with other epilepsy patients of the Bethel Institute.[40–42]

2.2.1. Health-related quality of life: QOLIE-31

The Quality of Life in Epilepsy-31 Inventory (QOLIE-31) by Cramer et al.[43] was chosen to measure epilepsy-specific HRQOL. We used a German version previously tested psychometrically.[44] The QOLIE-31 has been shown to be a valid and reliable questionnaire and is internationally recognized as one of the best studied instruments to measure HRQOL in epilepsy.[45] The questionnaire consists of 30 items that are subsumed to seven subscales with two to six items in each case. An additional item covers the general health status. Raw scores are transformed to a 0–100 scale. Higher scores indicate better HRQOL. This study exclusively refers to the total score which is the result of subscale means under consideration of regression analytic subscale weightings. The total score also ranges between 0 and 100.

The Portuguese/Brazilian version of the QOLIE-31 inventory had already shown good reliability and validity when administered in face-to-face interviews.[46] Interviews were conducted as there was concern over the low educational and socioeconomic level of the respondents. Besides, interviews are a common method of questionnaire studies in Brazil.

2.2.2. Anxiety and depression: HADS

The German version of the Hospital Anxiety and Depression Scale (HADS) was used to screen for anxiety and depression.[47] It is a brief and internationally used self-rating scale with 14 items,[48] which seeks to identify anxiety and depression as the most common secondary psychiatric disturbances in persons with primarily somatic complaints. All items are to be answered on four-point scales between 0 and 3. Two subscale scores are computed by simply adding the raw scores of each scale (range = 0–21). Our patients were requested to answer all items according to their experience during the past week. The HADS had also previously been used in face-to-face interviews: according to expectations, Nigerians with epilepsy scored higher on anxiety and depression.[49] An interviewer read the questions for illiterate subjects.

2.2.3. Neuroticism: NEO-FFI

The Neo-Five-Factor Inventory (NEO-FFI) by Costa and McCrae[50] is a screening instrument to gain data on the five personality dimensions neuroticism, extraversion, agreeableness, conscientiousness and openness to experience. Each dimension is represented by 12 items that have to be answered on five-point scales between 0 and 4. Means are computed for subscales so that their maximum score is 4 as well. Only the subscale neuroticism from the German NEO-FFI version[51] was used.

2.3. Data collection

In 2005 the three questionnaires were read aloud to each client by one of the authors (F.Z.) who worked at that time for the Psychological Service of the Bethel Institute. The interviewee did not know the clients before the time of the interviews and was not involved in any further professional assistance for them. Clients were volunteers. The interviewee found no evidence for clients being unable to understand the questions or the measurement with multi-point scales. Therefore data analyses included all WJE clients who had been willing to participate in the study. Nevertheless, the time of the interviews varied considerably (mean time = about 1 h; range = 0.5–2.5 h). Some clients reacted slowly on the questionnaires, some easily paid attention to special aspects brought up by single items and then carefully had to be led back to the remaining questions. Altogether, time-consuming interviews were attributable to motivational problems of some clients or to problems with alertness. A standardised rephrasing of items was neither planned nor necessary.

2.4. Data analysis

SPSS for windows, Version 12.0, was used for data analysis. At first the assumption of rating scales' normal distribution was checked. Kolmogorov–Smirnov tests failed to find significant deviations (rejection at $p < .20$) so that further analyses were performed using parametric two-tailed statistics. Cronbach's α was regularly calculated as a measure of internal consistency. For the weighted QOLIE-31 total score reliability was estimated according to Mosier.[52] Pearson correlation coefficients or point-biserial correlation coefficients were performed to look for the relation between variables and *t*-tests to look for group differences. Fisher's exact tests were computed to detect possible differences between binary variables. As the sample size was small and the data analysis was heuristic in nature, no α error correction was conducted despite of some variables incorporated in multiple comparisons. In addition to bivariate analyses, three stepwise regression analyses were performed in order to predict the QOLIE-31 total score and the HADS-scores anxiety and depression.

3. Results

3.1. QOLIE-31, HADS and NEO-FFI: distribution of scores, internal consistency, comparisons with reference samples

The internal consistencies of the self-rating scales always exceeded Cronbach α scores of .70 in the WJE sample. In comparison to the larger US-American epilepsy sample by Cramer et al.[43] the WJE clients scored significantly higher on the QOLIE-31 total score, i.e. they reported a better HRQOL on average. Furthermore, the range of the QOLIE total score was smaller. NEO-FFI-neuroticism scores did not differ between the WJE clients with epilepsy and a German reference group.[51] Finally, in comparison to a sample of the German general population[47] HADS-anxiety scores were significantly elevated (see Table 1).

3.2. Relations between scores of self-rating scales and socio-demographic as well as disease variables

Table 2 demonstrates the relation of socio-demographic variables, disease and medical treatment variables with questionnaire scores on HRQOL, anxiety, depression and neuroticism.

Table 1
QOLIE-31, NEO-FFI-neuroticism and HADS: comparison of WJE scores with larger reference samples

	Number of items	*M*	S.D.	Range	Internal consistency	*M*	S.D.	Range	Internal consistency	*p* (*t*-test)
		WJE clients of this study ($N = 36$)								
QOLIE-31						Cramer et al. [43] ($N = 298–304$)[a]				
Total score	30	69.32	12.52	48–96	.84[b]	63.00	16.00	15–97	.93[b]	*
NEO-FFI						Borkenau and Ostendorf [51] ($N = 2112$)[c]				
Neuroticism	12	1.74	0.83	0.33–3.33	.85[d]	1.84	0.70		.85[d]	*ns*
HADS						Hermann et al. [47] ($N = 152$)[e]				
Anxiety	7	6.89	3.60	0–13	.74[d]	5.80	3.20		.80[d]	*
Depression	7	3.94	3.68	0–16	.85[d]	3.40	2.60		.81[d]	*ns*

M: mean, S.D.: standard deviation; *ns*: non significant, $^{*}p \leq .05$ (two-tailed).
[a] US-American patients with epilepsy.
[b] Reliability estimation according to Mosier.
[c] German sample with overrepresentation of university students.
[d] Internal consistency according to Cronbach's α.
[e] German general population, but Cronbach's α according to German cardiac patients ($N = 5338$).

At first, high correlations were found between the essentially psychological variables neuroticism, anxiety, depression and HRQOL. Neuroticism, anxiety and depression were positively correlated with each other and were negatively correlated with HRQOL.

Among variables on disease and medical treatment, only age at epilepsy onset was associated with two questionnaire scores: clients with epilepsy onset after the age of 10 scored lower on the QOLIE total score and higher on the HADS anxiety score. We distinguished two categories instead of analyzing age at onset as a continuous variable. The age of 11 years was chosen as the cutoff point according to developmental psychology that describes adolescence as the life span between the age of 11 and 21 years.[53]

No significant relation could be detected between scores on HRQOL, anxiety, depression and disease parameters such as seizure control, number of AEDs or memory impairments.

Two socio-demographic parameters were associated with HADS scores: a moderate positive correlation coefficient was detected between anxiety and age. Furthermore, men had significantly higher depression scores than women.

3.3. Prediction of the QOLIE-31 total score and HADS scores

We computed three stepwise regression analyses to identify predictors for the QOLIE-31 total score and the HADS scores anxiety and depression. Due to the assumptions mentioned above and due to the high inter-correlations of the rating scales, we chose neuroticism as a possible psychological predictor for the three criteria HRQOL, anxiety and depression. In addition to neuroticism those socio-demographic and disease parameters were included as independent variables that had also demonstrated a substantial relationship ($p < .05$) with the QOLIE-31 total score and the HADS scores in bivariate analyses as shown in Table 2.

Table 3 demonstrates that neuroticism remained as independent predictor throughout all analyses. Neuroticism alone explained 46–54% of the variance of anxiety, depression and HRQOL. The incorporation of age at epilepsy onset in addition to neuroticism improved variance explanation for 7% in HRQOL and for 6% in anxiety. The incorporation of sex improved variance explanation for additional 10% in depression with men being at special risk.

No significant correlations were found between those variables that were entered as independent predictors for HRQOL, anxiety or depression, neither between neuroticism, age and age at epilepsy onset nor between neuroticism and sex.

3.4. Relationship between age at disability onset and socio-demographic as well as disease variables

Bearing the fact that the influence of age at epilepsy onset on HRQOL and anxiety could have been a mere artefact based on other smaller effects of disease parameters, we looked for possible differences between the groups with early and later epilepsy onset concerning all socio-demographic, disease and treatment variables outlined in Table 2. We only found two differences: significantly more young men were among those with later epilepsy onset. Additionally, the duration of epilepsy was shorter in the group with later onset (see Table 4).

4. Discussion

Summarizing our main findings: psychological variables such as neuroticism, anxiety, depression and HRQOL highly correlated with one another. Thus, it was not surprising that regression analyses revealed neuroticism to be the strongest predictor of HRQOL, anxiety and depression. Among the disease-related variables, only age at epilepsy onset had a substantial influence on two criteria which adds independently to neuroticism: epilepsy onset in adolescence was associated with reduced HRQOL and with anxiety. In addition to neuroticism, sex had an influence on depression: men were at greater risk. Other disease or treatment variables such as seizure control or number of AEDs showed no striking effects on HRQOL, anxiety and depression in this study.

With respect to methodological aspects: the observations during the interviews did not argue against the application of the scales. We regard the expected correlations between the questionnaires and their internal consistencies as indicators for the reliability and validity of the self-rating scales in our sample of people with epilepsy and additional mild cognitive impairments. Furthermore, we have already compared the QOLIE-31 interview data of our clients with QOLIE-31 ratings of their carers and found that their caregivers systematically underrated our clients' HRQOL.[54] These results are in line with most data on relations between self-reported HRQOL and proxy reports. Thus they do not point to a special response tendency in our sample due to the presentation of the scales. Nevertheless, such findings cannot finally clarify if and in how far responses of the WJE clients to the questionnaires were influenced or distorted by face-to-face interviews.

Table 2
Relations between QOLIE-31 total score, neuroticism, anxiety, depression and socio-demographic as well as disease and treatment variables ($N = 36$)

I. *t*-tests for independent samples	QOLIE-31: total score		HADS: anxiety		HADS: depression		NEO-FFI: neuroticism	
	M (S.D.)	*p*	*M* (S.D.)	*p*	*M* (S.D.)	*p*	*M* (S.D.)	*p*
Sex								
Female ($n = 14$)	72.88 (13.17)	*ns*	6.71 (3.60)	*ns*	2.64 (1.95)	*	1.77 (0.77)	*ns*
Male ($n = 22$)	67.05 (11.83)		7.00 (3.68)		4.77 (4.29)		1.72 (0.88)	
Basic education certification								
No ($n = 8$)	67.85 (11.86)	*ns*	6.75 (3.62)	*ns*	6.00 (3.86)	*ns*	2.02 (0.84)	*ns*
Yes ($n = 28$)	69.74 (12.88)		6.93 (3.66)		3.36 (3.48)		1.66 (0.82)	
Seizure control[a]								
No seizures ($n = 8$)	74.38 (13.75)	*ns*	6.38 (3.34)	*ns*	3.13 (3.27)	*ns*	1.53 (0.87)	*ns*
Seizures ($n = 28$)	67.87 (12.01)		7.04 (3.72)		4.18 (3.81)		1.80 (0.82)	
Psychogenic non-epileptic seizures								
No ($n = 27$)	70.51 (13.10)	*ns*	6.41 (3.81)	*ns*	3.45 (2.98)	*ns*	1.64 (0.77)	*ns*
Yes ($n = 9$)	65.74 (10.42)		8.33 (2.55)		5.33 (5.24)		2.03 (0.96)	
Epilepsy onset								
$\geq$11 years ($n = 12$)	63.60 (9.21)	*	8.42 (2.19)	*	5.17 (4.45)	*ns*	1.83 (0.96)	*ns*
$<$11 years ($n = 24$)	72.18 (13.13)		6.13 (3.95)		3.33 (3.16)		1.69 (0.77)	
Epilepsy syndrome								
Partial ($n = 32$)	69.46 (12.70)	*ns*	6.88 (3.60)	*ns*	3.69 (3.20)	*ns*	1.70 (0.82)	*ns*
Generalized ($n = 4$)	68.24 (12.67)		7.00 (4.08)		6.00 (6.78)		2.06 (0.92)	
TLE								
No ($n = 24$)	69.49 (12.87)	*ns*	7.21 (3.88)	*ns*	3.71 (3.86)	*ns*	1.78 (0.94)	*ns*
Yes ($n = 12$)	68.98 (12.32)		6.25 (3.02)		4.42 (3.40)		1.65 (0.55)	
Memory impairments								
No ($n = 22$)	71.48 (13.95)	*ns*	6.73 (4.06)	*ns*	4.09 (4.25)	*ns*	1.73 (0.90)	*ns*
Severe ($n = 14$)	65.93 (9.33)		7.14 (2.85)		3.71 (2.67)		1.75 (0.73)	
Epilepsy surgery								
No ($n = 28$)	69.37 (12.29)	*ns*	7.39 (3.10)	*ns*	4.04 (3.80)	*ns*	1.78 (0.87)	*ns*
Yes ($n = 8$)	69.16 (14.18)		5.13 (4.82)		3.63 (3.46)		1.59 (0.67)	
Shunt								
No ($n = 33$)	69.33 (12.70)	*ns*	7.03 (3.71)	*ns*	3.97 (3.85)	*ns*	1.74 (0.86)	*ns*
Yes ($n = 3$)	69.25 (12.78)		5.33 (1.53)		3.67 (0.58)		1.78 (0.19)	

II. Correlations	QOLIE-31: total score (*r*)	HADS: anxiety (*r*)	HADS: depression (*r*)	NEO-FFI: neuroticism (*r*)
Age	−.07	.35*	.14	.17
Number of different seizure types	−.18	.24	.01	.26
Duration of epilepsy	.17	.05	.06	.12
Number of AEDs	−.07	.03	−.01	.08
NEO-FFI: neuroticism	−.75****			
HADS: anxiety	−.74***			.69***
HADS: depression	−.62***	.53***		.72***

[a] Seizures during the past 6 months.
r: Pearson correlation coefficients, *M*: mean, S.D.: standard deviation; *ns*: non-significant, $^{*}p \leq .05$, $^{**}p \leq .01$, $^{***}p \leq .001$ (two-tailed).

4.1. Preliminary analyses

A basic requirement for discussion of results was fulfilled: the internal consistency of the self-rating scales was acceptable in our small sample. Furthermore, we found that comparisons of self-rating scales' means did not indicate a special vulnerability to emotional disorders or reduced HRQOL in the WJE clients with epilepsy and additional disabilities. The QOLIE-31 total score turned out to be even higher than in the US-American sample with epilepsy by Cramer et al.[43]. In comparison to Germany's general population,[47] only HADS-anxiety scores were significantly elevated in the WJE clients whereas depression scores were not. There was merely a trend in this direction ($p < .10$).

HRQOL-results of the general epilepsy population were chosen for comparison as we did not find data of more suitable epilepsy reference samples for our special subgroup. With a mean QOLIE-31 total score of 69 the WJE clients rated their HRQOL as relatively satisfactory. Very often poorer QOLIE-31 total scores between 40 and 60 were found in epilepsy patient groups.[55] Moreover, HADS scores of our special epilepsy sample did not seem to be very dissimilar to data on the general epilepsy population, at least with regard to the HADS total score. When differentiating HADS scores on depression and anxiety other studies in epilepsy showed a tendency to more depression than in our sample with means between 4.6 and 5.2 and a tendency to less anxiety with means between 5.2 and 6.1.[49,56]

Our data may be surprising, as suggestions of more emotional problems among clients with epilepsy and additional disabilities in contrast to epilepsy only groups appear to be reasonable at first glance. As mentioned, it cannot be completely precluded that results were positively distorted by data collection with face-to-face interviews. On the other hand, it seems possible that the transient residential environment positively affected self-reported levels of well-being. Living in the WJE could have had a positive influence through changing peer groups for social comparisons and therefore reducing aspiration levels.[42] Furthermore, unemployment is a well-known general risk factor for psychiatric disorders[57] and is discussed as a specific problem for people with

Table 3
Three stepwise regression analyses to predict HRQOL, anxiety and depression

	B	S.E.	β	R^2	R^2_{adj}
Predictors of HRQOL[a]					
Step 1				.56***	.54***
Neuroticism	−11.28	1.73	−.75**		
Step 2 (ΔR^2 = .07*)				.63***	.60***
Neuroticism	−10.95	1.62	−.72**		
Epilepsy onset	−7.02	2.79	−.27*		
Predictors of anxiety[b]					
Step 1				.48***	.46***
Neuroticism	3.00	.54	.69***		
Step 2 (ΔR^2 = .06*)				.54***	.51***
Neuroticism	2.91	.52	.67***		
Epilepsy onset	1.88	.90	.25*		
Predictors of depression[c]					
Step 1				.52***	.51***
Neuroticism	3.22	.53	.72***		
Step 2 (ΔR^2 = .10**)				.62***	.60***
Neuroticism	3.26	.48	.73***		
Sex	−2.32	.80	−.31*		

B: Unstandardized regression coefficient; S.E.: standard error; β: standardized regression coefficient; ΔR^2: change in R^2. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.
[a] Variables incorporated to predict HRQOL: neuroticism, epilepsy onset (onset < 11 years = 0, onset ≥ 11 years = 1).
[b] Variables incorporated to predict anxiety: neuroticism, epilepsy onset (onset < 11 years = 0, onset ≥ 11 years = 1), age.
[c] Variables incorporated to predict depression: neuroticism, sex (men = 0, women = 1).

Table 4
Relations between age at epilepsy onset and other disease variables as well as socio-demographic variables

	Epilepsy onset		*p*
	<11 years (*n* = 24)	≥11 years (*n* = 12)	*t*-tests
	M (S.D.)	*M* (S.D.)	
Age (years)	24.92 (6.03)	27.08 (5.98)	*ns*
Time spent in WJE (months)	25.89 (19.82)	22.58 (22.57)	*ns*
Number of different seizure types	3.00 (1.06)	3.08 (1.16)	*ns*
Duration of epilepsy (years)	21.75 (7.61)	10.50 (7.44)	***
Number of AEDs	2.08 (0.78)	2.33 (1.30)	*ns*

	Epilepsy onset		Fisher's exact tests
	<11 years (*n*) (%)	≥11 years (*n*) (%)	
Seizure control[a]			
No seizures	6 (25.0)	2 (16.7)	*ns*
Seizures	18 (75.0)	10 (83.3)	
Psychogenic non-epileptic seizures			
No	19 (79.2)	8 (66.7)	*ns*
Yes	5 (20.8)	4 (33.3)	
Epilepsy-syndrome			
Partial	21 (87.5)	11 (91.7)	*ns*
Generalized	3 (12.5)	1 (8.3)	
TLE			
No	15 (62.5)	9 (75.0)	*ns*
Yes	9 (37.5)	3 (25.0)	
Shunt			
No	22 (91.7)	11 (91.7)	*ns*
Yes	2 (8.3)	1 (8.3)	
Epilepsy surgery			
No	17 (70.8)	11 (91.7)	*ns*
Yes	7 (29.2)	1 (8.3)	
Vagus nerve stimulation			
No	23 (95.8)	11 (91.7)	*ns*
Yes	1 (4.2)	1 (8.3)	
Memory impairments			
No	17 (70.8)	5 (41.7)	*ns*
Yes	7 (29.2)	7 (58.3)	
Sex			**
Female	13 (54.2)	1 (8.3)	
Male	11 (45.8)	11 (91.7)	
Basic education certification			
No	5 (20.8)	3 (25.0)	*ns*
Yes	19 (79.2)	9 (75.0)	

ns: non significant, ** $p \leq .01$, *** $p \leq .001$ (two-tailed).
[a] Seizures during the past 6 months.

epilepsy.[58] Contrary, the WJE provides work and nearly all clients were employed at the time of data collection. Employment probably had positive influences on psychiatric symptoms and probably promoted HRQOL, although the WJE does not provide work on the general job market but "supported employment" in sheltered workshops of the Bethel Institute.

4.2. Relationships between the variables and prediction of QOLIE-31 total score and HADS scores

4.2.1. The significance of psychological variables

Correlation coefficients between the variables neuroticism, anxiety, depression and HRQOL turned out to be very high. Absolute values of $r \approx .70$ like in our study were not always found, but HRQOL has consistently been shown to be more strongly related to depression, anxiety or neuroticism than to seizure frequency or neuropsychological variables.[21–24,59,60] High correlations may cast doubt on the distinctiveness of HRQOL, depression, anxiety and neuroticism, but we also detected differential relations that argue for further separating these variables: only HRQOL and anxiety were associated with age at epilepsy onset, but no significant correlation could be found between age at onset and neuroticism and between age at onset and depression. Moreover, Johnson et al.[23] have already demonstrated that anxiety and depression independently of one another co-varied with HRQOL.

The theoretical assumptions mentioned in the introduction led us to choose neuroticism as a psychological predictor of HRQOL, depression and anxiety in regression analyses. Additionally, the high inter-correlations of these variables required a solution: selecting more than one psychological parameter for prediction of another would have been a violation of the premise of independent predictors in regression analyses and would have resulted in intolerable degrees of multicollinearity. Regression analyses finally strengthened the role of neuroticism with its supposed trait-character as the variable with strongest influence on HRQOL, anxiety and depression. These analyses among patients with epilepsy support the general significance of neuroticism for psychiatric disorders mentioned at the beginning. As causal inferences cannot be drawn based on such a cross-sectional design we think that our data form at least a promising base to study the course of neuroticism, affective disorders and HRQOL in longitudinal designs. Testa et al.[61] recently also found that personality factors were related to HRQOL and concluded that the assessment of personality based on the five-factor model might be useful to identify determinants of HRQOL in patients with seizures. In their study only long-standing personality dispositions measured with the Minnesota Multiphasic Personality Inventory-2 (MMPI-2) held as independent predictors of HRQOL in regression analyses whereas more current mood states measured with the Profile of Mood States (POMS) did not.

4.2.2. The significance of disease and treatment variables

Among the disease and treatment variables, only epilepsy onset in adolescence was significantly related to less HRQOL and higher anxiety. Regression analyses underlined its independent role: age at epilepsy onset was the variable apart from neuroticism that held as a predictor with an additional variance explanation of 6–7% in the two criteria HRQOL and anxiety.

Results of the influence of age at epilepsy onset on HRQOL and mood are altogether conflicting due to very different epilepsy samples including different age groups within the epilepsy samples. While recent studies among adolescents with epilepsy failed to find a relationship between age at epilepsy onset and HRQOL[62] as well as psychiatric disturbances,[63] studies among adults with epilepsy have already indicated that an epilepsy onset in adolescence and early adulthood is negatively associated with the QOLIE-89 total score[64] and bears the highest suicidal risk.[65] Others refer to adolescence in and of itself as a period of particular psychological vulnerability without regarding age at onset of epilepsy: adolescence in people with epilepsy was described as a period of high risk for depression,[66] stigma[67] and reduced HRQOL.[68]

The question arises how to explain the influence of age at epilepsy onset in adolescence on HRQOL and anxiety. We did not find evidence in our study for conceptualizing epilepsy onset in adolescence as part of a broader syndrome: no substantial relationship between this variable and other disease parameters emerged. Only duration of epilepsy and sex were related to age of onset: as a matter of course duration was shorter among those clients with epilepsy onset in adolescence and the group was nearly exclusively represented by young men. The preponderance of young men is obviously a sample characteristic. Nevertheless, the possibility cannot be completely refused that age at disability onset in adolescence could have been confounded by the influence of other disease parameters, e.g. of more severe epilepsy and less time to adapt to this condition. Some differences may have failed to reach significance due to lack of statistical power: for example, among clients with onset in adolescence were relatively more individuals with seizures during the past 6 months, relatively more persons with psychogenic non-epileptic seizures in addition to epilepsy and relatively more persons with memory deficits according to caregivers' observations.

Another possible psychological explanation refers to age at onset as a true influential variable. Onset of epilepsy in adolescence could work as an additional stressor with an impact on all of the challenges that are characteristic of adolescence. Adolescence is a period marked by profound developmental changes in biological, social and psychological domains.[66] "Normal" challenges were described as identity formation, self-definition, or achievement of independence.[69] Mastering of these challenges could be especially difficult when additionally coping with new onset epilepsy is demanded and could result in poorer adaptation to epilepsy in later life. Moreover, epilepsy in our sample was accompanied by cognitive impairment. Especially adolescents with cognitive impairment due to new onset epilepsy are demanded to restructure and readjust their pre-existing academic self-concepts and self-perceptions completely. Ongoing conflicts between earlier life expectations and later limitations set by chronic disease could promote worser HRQOL and more anxiety in later life. In this case, epilepsy onset should be better described as disability onset in order to emphasize the importance of the problematic epilepsy-associated conditions.

As mentioned at the beginning of the article, effects of some disease parameters such as seizure control or seizure frequency on HRQOL and psychiatric disorders have often been discussed. Although we did not find significant associations, the distribution of scores shows that means of subgroups often differed as expected (see Table 3): means of subgroups with high seizure control, without psychogenic non-epileptic seizures or without memory deficits in everyday situations were higher on the QOLIE-31 total score and lower on the HADS scores. But these effects were either weak, and therefore not supported statistically in our small sample, or did not emerge due to small variance and very small cell sizes in some subgroups. Furthermore, data on epilepsy treatment show that individuals in the WJE not only treated with AEDs, but with vagus nerve stimulation or epilepsy surgery, did not distort findings with extreme scores on questionnaires.

4.2.3. The significance of socio-demographic variables

Our results on the relationship of socio-demographic variables to anxiety and depression may be surprising at first glance: contrary to general research on depression, we found men with epilepsy to suffer more depression than women. But other authors have already pointed to the higher vulnerability of men with epilepsy to depression[1,70] or to a gender balance with regard to depression in epilepsy.[71] Up to now it seems unclear why many studies in epilepsy found men to be at higher risk for depression than women and what kind of biological or psychosocial factors must be taken into account to understand this relationship.

We also detected a positive correlation between anxiety and age. This relationship seems to be a sample characteristic and a reasonable explanation is difficult to find: possibly some older individuals were already anticipating WJE discharge with unclear options for the future.

4.3. Limitations

Comparisons with other data are complicated by several factors: (1) Clients were a specific subgroup with difficult-to-treat-epilepsy, not representative of the entire population of people with epilepsy. Subjects of this study were only young adults in short-term residential care without integration in the general German job market. (2) Due to a very small sample size, possible effects might have been difficult to secure statistically. (3) Data on questionnaires were gained by face-to-face interviews with risk of distortions, e.g. due to social desirability. We were not the first to conduct interviews with the QOLIE-31 and the HADS among patients with epilepsy. Nevertheless, it has to be mentioned that the psychometric properties of these questionnaires for the specific epilepsy subgroup of this study, including the presentation mode, have not yet been completely evaluated. Our sample seemed to be too small so far. (4) Data on disease parameters were based on residential files and were not specifically generated for this study.

Most importantly, the two major limitations do not admit generalizations: as a result of the special sample, findings cannot be generalized to people with epilepsy in the overall population. As a result of the small sample size, our regression analytic findings seem preliminary: they may be recognized as a tool for further hypotheses testing.

4.4. Consequences

1. This study underlines the importance of the personality trait neuroticism in correspondence to HRQOL, anxiety and depression. For a better understanding of the relation of these variables, they should be further examined in longitudinal studies.
2. Our results suggest that an epilepsy onset in adolescence will have a negative impact on HRQOL and is associated with anxiety. They are restricted to people with epilepsy and

additional cognitive impairments resulting altogether in a psychosocial disability. Future research should be based on larger samples of this epilepsy population with additional disabilities and should clarify if epilepsy onset is generally of major importance for current HRQOL and anxiety. If so, such research should also strive for an improved understanding of underlying mechanisms.

3. With regard to WJE clients, it seems necessary to detect "epilepsy plus" problems more systematically. Moreover, it seems necessary to discuss specific intervention strategies for those clients with high anxiety and depression scores or low scores on HRQOL.

References

1. Lambert MV, Robertson MM. Depression in epilepsy: etiology, phenomenology, and treatment. *Epilepsia* 1999;**40**(Suppl 10):S21–47.
2. Torta R, Keller R. Behavioral, psychotic, and anxiety disorders in epilepsy: etiology, clinical features, and therapeutic implications. *Epilepsia* 1999;**40**(Suppl 10):S2–0.
3. Hermann B, Seidenberg M, Bell B. Psychiatric comorbidity in chronic epilepsy: identification, consequences, and treatment of major depression. *Epilepsia* 2000;**41**(Suppl 2):S31–41.
4. Marsh L, Rao V. Psychiatric complications in patients with epilepsy: a review. *Epilepsy Research* 2002;**49**:11–33.
5. Valezquez B, Devinsky O. Epilepsy and anxiety. *Epilepsy & Behavior* 2003;**4**:S20–5.
6. Chavel SM, Westerveld M, Spencer S. Long-term outcome of vagus nerve stimulation for refractory partial epilepsy. *Epilepsy & Behavior* 2003;**4**:302–9.
7. Selai C, Bannister D, Trimble M. Antiepileptic drugs and the regulation of mood and quality of life (QOL): the evidence from epilepsy. *Epilepsia* 2005;**46**(Suppl 4):50–7.
8. Mikati MA, Comair YG, Rahi A. Normalization of quality of life three years after temporal lobectomy: a controlled study. *Epilepsia* 2006;**47**:928–33.
9. Hermann BP, Whitman S. Psychopathology in epilepsy: a multietiologic model. In: Whitman S, Hermann BP, editors. *Psychopathology in epilepsy. Social dimensions*. New York: Oxford University Press; 1986. p. 5–37.
10. Baker GA, Jacoby A, Buck D, Stalgis C, Monnet D. Quality of life of people with epilepsy: a European study. *Epilepsia* 1997;**38**:353–62.
11. McLachlan RS, Rose KJ, Derry PA, Bonnar C, Blume WT, Girvin JP. Health-related quality of life and seizure control in temporal lobe epilepsy. *Annals of Neurology* 1997;**41**:482–9.
12. Baker GA, Gagnon D, McNulty P. The relationship between seizure frequency, seizure type and quality of life: findings from three European countries. *Epilepsy Research* 1998;**30**:231–40.
13. Leidy NK, Elixhauser A, Vickrey B, Means E, Willian MK. Seizure frequency and the health-related quality of life of adults with epilepsy. *Neurology* 1999;**53**:162–6.
14. Birbeck GL, Hays RD, Cui X, Vickrey BG. Seizure reduction and quality of life improvements in people with epilepsy. *Epilepsia* 2002;**43**:535–8.
15. Djibuti M, Shakarishvili R. Influence of clinical, demographic, and socioeconomic variables on quality of life in patients with epilepsy: findings from Georgian study. *Journal of Neurology Neurosurgery and Psychiatry* 2003;**74**: 570–3.
16. Attarian H, Vahle V, Carter J, Hykes E, Gilliam F. Relationship between depression and intractability of seizures. *Epilepsy & Behavior* 2003;**4**:298–301.
17. Ketter TA, Post RM, Theodore WH. Positive and negative psychiatric effects of antiepileptic drugs in patients with seizure disorders. *Neurology* 1999;**53**(Suppl 2):S53–67.
18. Schmitz B. Psychiatric syndromes related to antiepileptic drugs. *Epilepsia* 1999;**40**(Suppl 10):S65–70.
19. Gilliam F. Optimizing health outcomes in active epilepsy. *Neurology* 2002;**58**(Suppl 5):S9–15.
20. Reijs R, Aldenkamp AP, De Krom M. Mood effects of antiepileptic drugs. *Epilepsy & Behavior* 2004;**5**:S66–76.
21. Zhu D-t, Jin L-J, Xie G-J, Xiao B. Quality of life and personality in adults with epilepsy. *Epilepsia* 1998;**39**:1208–12.
22. Boylan LS, Flint LA, Labovitz DL, Jackson SC, Starner K, Devinsky O. Depression but not seizure frequency predicts quality of life in treatment-resistant epilepsy. *Neurology* 2004;**62**:258–61.
23. Johnson EK, Jones JE, Seidenberg M, Hermann BP. The relative impact of anxiety, depression, and clinical seizure features on health-related quality of life in epilepsy. *Epilepsia* 2004;**45**:544–50.
24. Loring DW, Meador KJ, Lee GP. Determinants of quality of life in epilepsy. *Epilepsy & Behavior* 2004;**5**:976–80.
25. Cañizares S, Torres X, Boget T, Rumià J, Elices E, Arroyo S. Does neuroticism influence self-assessment after epilepsy surgery? *Epilepsia* 2000;**41**:1303–9.
26. Cragar DE, Berry DTR, Schmitt FA, Fakhoury TA. Cluster analysis of normal personality traits in patients with psychogenic nonepileptic seizures. *Epilepsy & Behavior* 2005;**6**:593–600.
27. Swinkels WAM, Duijsens IJ, Spinhoven P. Personality disorder traits in patients with epilepsy. *Seizure* 2003;**12**:587–94.
28. Swinkels WAM, van Emde Boas W, Kuyk J, van Dyck R, Spinhoven P. Interictal depression, anxiety, personality traits, and psychological dissociation in patients with temporal lobe epilepsy (TLE) and extra-TLE. *Epilepsia* 2006;**47**:2092–103.
29. Rose KJ, Derry PA, McLachlan RS. Neuroticism in temporal lobe epilepsy: assessment and implications for pre- and postoperative psychosocial adjustment and health-related quality of life. *Epilepsia* 1996;**37**:484–91.
30. Neeleman J, Bijl R, Ormel J. Neuroticism, a central link between somatic and psychiatric morbidity: path analysis of prospective data. *Psychological Medicine* 2007;**34**:521–31.
31. Khan AA, Jacobson KC, Gardner CO, Prescott CA, Kendler KS. Personality and comorbidity of common psychiatric disorders. *British Journal of Psychiatry* 2005;**186**:190–6.
32. Duggan CF, Lee AS, Murray RM. Does personality predict long-term outcome in depression? *British Journal of Psychiatry* 1990;**157**:19–24.
33. Kendler KS, Kuhn J, Prescott CA. The interrelationship of neuroticism, sex, and stressful life events in the prediction of episodes of major depression. *American Journal of Psychiatry* 2004;**161**:631–6.
34. Narud K, Dahl AA. Quality of life in personality and personality disorders. *Current Opinion in Psychiatry* 2002;**15**:131–3.
35. Endermann M, Knoop M. Short term residential care for young adults–transition to independent living. In: Pfäfflin M, Fraser RT, Thorbecke R, Specht U, Wolf P, editors. *Comprehensive care for people with epilepsy*. London: John Libbey; 2001. p. 237–44.
36. Tourangeau R, Rips LJ, Rasinski K. *The psychology of survey response*. Cambridge: Cambridge University Press; 2000.
37. Verri A, Cummins RA, Petito F, Vallero E, Monteath S, Gerosa E, et al. An Italian–Australian comparison of life quality among intellectually disabled people living in the community. *Journal of Intellectual Disability Research* 1999;**43**:513–22.
38. Kellet S, Beail N, Newman DW, Frankish P. Utility of the Brief Symptom Inventory in the assessment of psychological distress. *Journal of Applied Research in Intellectual Disabilities* 2003;**16**:127–34.
39. Kellet S, Beail N, Newman DW, Hawes A. The factor structure of the Brief Symptom Inventory: intellectual disability evidence. *Clinical Psychology and Psychotherapy* 2004;**11**:275–81.
40. Endermann M. Die Erfassung epilepsiebezogener Probleme bei Menschen in Behinderteneinrichtungen mit dem PESOS-Fragebogen. *Zeitschrift für Medizinische Psychologie* 2004;**13**:175–83.
41. Endermann M. The Brief Symptom Inventory (BSI) as a screening tool for psychological disorders in patients with epilepsy and mild intellectual disabilities in residential care. *Epilepsy & Behavior* 2005;**7**:85–94.
42. Endermann M. Quality of life among people with epilepsy and mild intellectual disabilities in residential care. *Epilepsy & Behavior* 2006;**8**:703–12.
43. Cramer J, Perrine K, Devinsky O, Bryant-Comstock L, Meador K, Hermann B. Development and cross-cultural translations of a 31-item quality of life in epilepsy inventory. *Epilepsia* 1998;**39**:81–8.
44. May TW, Pfäfflin M, Cramer JA. Psychometric properties of the German translation of the QOLIE-31. *Epilepsy & Behavior* 2001;**2**:106–14.
45. Privitera M, Ficker DM. Assessment of adverse events and quality of life in epilepsy: design of a new community-based trial. *Epilepsy & Behavior* 2004;**5**:841–6.
46. Da Silva TI, Ciconelli RM, Alonso NB, Azevedo AM, Westphal-Guitti AC, Pascalicchio TF, et al. Validity and reliability of the Portuguese version of the quality of life in epilepsy inventory (QOLIE-31) for Brazil. *Epilepsy & Behavior* 2007;**10**:234–41.
47. Hermann C, Buss U, Snaith RP. *HADS-D. Hospital anxiety and depression scale—Deutsche Version*. Bern: Hans Huber; 1995.
48. Zigmond A, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica* 1983;**67**:361–70.
49. Fatoye F, Mosaku KS, Komolafe M, Adewuya AO. Interictal anxiety and depression symptoms in Nigerians with epilepsy: a controlled study. *Epilepsy & Behavior* 2006;**9**:312–6.
50. Costa Jr PT, McCrai RR. *The NEO PI/FFI manual supplement*. Odessa, Florida: Psychological assessment resources; 1989.
51. Borkenau P, Ostendorf F. *Neo-Fünf-Faktoren Inventar (NEO-FFI) nach Costa und McCrae*. Göttingen: Hogrefe; 1993.
52. Mosier CI. On the reliability of a weighted composite. *Psychometrika* 1943;**8**:161–8.
53. Oerter R, Montada L. *Entwicklungspsychologie*. 4th ed. Weinheim: Beltz; 1998.
54. Zimmermann F, Endermann M. Self-proxy agreement and correlates of health-related quality of life in young adults with epilepsy and mild intellectual disabilities. *Epilepsy & Behavior* 2008;**13**:202–11.
55. Guekht AB, Mitrokhina TV, Lebedeva AV, Dzugaeva FK, Milchakova LE, Lokshina OB, et al. Factors influencing on quality of life in people with epilepsy. *Seizure* 2007;**16**:128–33.
56. Au A, Leung P, Kwok A, Li P, Lui C, Chan J. Subjective memory and mood of Hong Kong Chinese adults with epilepsy. *Epilepsy & Behavior* 2006;**9**:68–72.
57. Albani C, Blaser G, Geyer M, Grulke N, Boiler H, Schmutzer G, et al. Arbeitsplatzbedrohung und psychische Gesundheit. *Psychosozial Nr 109* 2007;**30**(3):55–71.
58. Thorbecke R, Specht U. Berufliche Rehabilitation bei Epilepsie. *Der Medizinische Sachverständige* 2005;**101**:22–32.

59. Lehrner J, Kalchmayr R, Serles W, Olbrich A, Pataraia E, Aull S, et al. Health-related quality of life (HRQOL), activity of daily living (ADL) and depressive mood disorder in temporal lobe epilepsy patients. *Seizure* 1999;**8**:88–92.
60. Perrine K, Hermann BP, Meador KJ, Vickrey BG, Cramer JA, Hays RD, et al. The relationship of neuropsychological functioning to quality of life in epilepsy. *Archives of Neurology* 1995;**52**:997–1003.
61. Testa SM, Schefft BK, Szaflarski JP, Yeh H-S, Privitera MD. Mood, personality, and health-related quality of life in epileptic and psychogenic seizure disorders. *Epilepsia* 2007;**48**:973–82.
62. Adewuya AO. Parental psychopathology and self-rated quality of life in adolescents with epilepsy in Nigeria. *Developmental Medicine & Child Neurology* 2006;**48**:600–3.
63. Hanssen-Bauer K, Heyerdahl S, Eriksson A-S. Mental health problems in children and adolescents referred to an national epilepsy center. *Epilepsy & Behavior* 2007;**10**:255–62.
64. Szaflarski M, Meckler JM, Privitera MD, Szaflarski JP. Quality of life in medication-resistant epilepsy: the effects of patient's age, age at seizure onset, and disease duration. *Epilepsy & Behavior* 2006;**8**:547–51.
65. Nilsson L, Ahlboom A, Farahmand BY, Åsberg M, Tomson T. Risk factors for suicide in epilepsy: a case control study. *Epilepsia* 2002;**43**:644–51.
66. Baker GA. Depression and suicide in adolescents with epilepsy. *Neurology* 2006;**66**(Suppl 3):S5–12.
67. Macleod JS, Austin JK. Stigma in the lives of adolescents with epilepsy: a review of the literature. *Epilepsy & Behavior* 2003;**4**:112–7.
68. Devinsky O, Westbrook L, Cramer J, Glassman M, Perrine K, Camfield C. Risk factors for poor health-related quality of life in adolescents with epilepsy. *Epilepsia* 1999;**40**:1715–20.
69. Lossius MI, Clench-Aas J, van Roy B, Mowinckel P, Gjerstad L. Psychiatric symptoms in adolescents with epilepsy in junior high school in Norway: a population Survey. *Epilepsy & Behavior* 2006;**9**:286–92.
70. Harden CL. The co-morbidity of depression and epilepsy. *Neurology* 2002;**59**(Suppl 4):S48–55.
71. Mensah SA, Beavis JM, Thapar AK, Kerr M. The presence and clinical implications of depression in a community population of adults with epilepsy. *Epilepsy & Behavior* 2006;**8**:213–9.