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Utilization of the Patient Competency Rating Scale in an epileptic and non-epileptic veteran population

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Abstract

Differentiating between epilepsy and psychogenic non-epileptic events (PNEE) can be difficult given similar presentations. PNEE is often misdiagnosed, resulting in unwarranted treatment with anti-epileptic drugs (AED). While the gold standard for differentiating PNEE from epilepsy is video EEG (VEGG) monitoring, self-reported symptomology has also been shown to discriminate between epilepsy and PNEE with high accuracy, particularly in cases where VEEG is difficult to obtain or when there are no observed events during extended monitoring. The Patient Competency Rating Scale (PCRS) was developed to measure the extent to which individuals are able to function in four domains: activities of daily living, emotional, interpersonal, and cognitive competency. Factor analyses validated the underlying factor structure of the PCRS in this seizure disorder sample. Follow-up MANOVA revealed group differences such that those diagnosed with PNEE reported less competence in all areas of functioning as compared to those diagnosed with epilepsy, with the largest difference being emotional competency. Secondary factor analyses were conducted for each diagnostic category. Two items related strongly to emotional competency loaded equally across the factors for those diagnosed with PNEE, indicating that emotional control is highly correlated with all areas of perceived competence for those with PNEE in this sample and may be considered as an intervention target. This was the first study to validate the use of the PCRS for a seizure disorder sample and to examine group differences in self-reported competency between those diagnosed with epilepsy and PNEE.

Keywords Epilepsy · Patient Competency Rating Scale · Psychogenic non-epileptic events · Seizure disorders

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Introduction

Epilepsy is the fourth most common neurologic disorder in the USA, with an incidence rate of roughly 3–4%. As epilepsy is managed with anti-epileptic drugs (AEDs), which include impairing side effects (e.g., drowsiness, inattention, dizziness, and cognitive and behavioral effects) ([15]); accurately, diagnosing epilepsy is paramount. In addition to epileptic events, some patients may present with non-epileptic events that can behaviorally look similar to epileptic seizures. Differentiating between epilepsy and psychogenic non-epileptic events (PNEE) can be difficult given similar presentations [13]. Notably, roughly 75% of PNEE patients are misdiagnosed with a seizure disorder and given anti-epileptic drugs (AEDs) [9], making them the most commonly misdiagnosed condition [3]. The gold standard for differentiating PNEE from epilepsy is video EEG monitoring (VEEG). However, self-reported symptomology has also been shown to discriminate between epilepsy and PNEE with high accuracy [4], which supports the utility of such assessments alongside

VEEG, particularly in cases where there are no observed events during video monitoring.

Individuals with epilepsy tend to have higher ratings on quality of life scales (secondary to epilepsy management) as compared to individuals with PNEE, who have reported significantly lower quality of life than those even with severe treatment-refractory epilepsy [10, 14]. However, less is known about the differences between self-reported competencies in those with epilepsy vs. PNEE.

The Patient Competency Rating Scale (PCRS) was developed to assess competency across several areas (i.e., activities of daily living and interpersonal, cognitive, and emotional competency) and has been validated in several neurological populations [1, 5, 11]. However, to the authors' knowledge, no studies have published on its use seizure-disorder populations. Thus, the purpose of the current study was twofold: examine the underlying factor structure of the PCRS to determine its clinical utility within a seizure-disorder population and to determine if group differences exist between those diagnosed with PNEE vs. non-PNEE.

Methods

Participants

Participants included 291 Veterans referred for inpatient evaluation on an epilepsy monitoring unit (EMU) in Houston, Texas. The majority of participants (83.2%) were male. Participants identified as Caucasian (63.7%), African American (27.4%), Hispanic (7.5%), Native American (0.3%), and Filipino (0.3%). Age at the time of assessment ranged from 22 to 79 ($M = 49.7$, SD = 13.0). Following EMU admission, 40.5% were diagnosed with epileptic or physiologic events (non-PNEE), 45% were diagnosed with psychogenic non-epileptic events (PNEE), and 14.4% were diagnosed with mixed events. Events were classified as epileptic activity when concurrent EEG recordings coincided with EEG patterns indicating electrographic ictus. Events were classified as PNEE when habitual events were captured on VEEG and there was no concurrent epileptiform correlate. The Michael E. DeBakey VA Medical Center

Table 1 Factor loadings and communalities for the PCRS and total sample

| Item | Factor | | | | |
	1	2	3	4	h2
…controlling crying?	0.81	0.00	0.04	− 0.09	0.58
…keeping my emotions from affecting my ability to go about the day's activities?	0.76	− 0.03	− 0.07	0.10	0.74
…keeping from being depressed?	0.74	0.06	− 0.18	0.02	0.67
…accepting criticism from other people?	0.60	− 0.01	− 0.02	0.16	0.50
…controlling my temper when something upsets me?	0.60	0.00	0.03	0.27	0.56
…handling arguments with people I know well?	0.54	− 0.06	− 0.08	0.23	0.58
…washing the dishes?	− 0.02	0.92	0.01	0.01	0.83
…dressing myself?	− 0.05	0.90	0.05	0.01	0.75
…doing the laundry?	0.00	0.88	− 0.05	− 0.09	0.77
…taking care of my personal hygiene?	0.05	0.84	− 0.04	0.08	0.76
…preparing my own meals?	0.01	0.80	− 0.05	0.09	0.74
…remembering my daily schedule?	0.04	− 0.01	0.82	− 0.03	0.76
…remembering important things I must do?	0.04	− 0.07	0.79	0.00	0.72
…remembering names of people I see often?	− 0.22	0.12	0.77	0.18	0.56
…remembering what I had for dinner last night?	− 0.05	0.00	0.74	0.12	0.61
…taking care of my finances?	0.24	− 0.05	0.61	− 0.11	0.52
…scheduling daily activities?	0.18	− 0.15	0.61	0.10	0.71
…keeping appointments on time?	0.21	− 0.16	0.60	− 0.13	0.58
…understanding new instructions?	0.12	− 0.12	0.55	0.01	0.54
…showing affection to people?	0.00	0.01	− 0.02	0.79	0.63
…recognizing when something I say or do has upset someone?	0.12	− 0.06	0.07	0.75	0.63
…participating in group activities?	0.07	− 0.14	− 0.12	0.66	0.67
…starting conversations in a group?	0.06	0.04	− 0.17	0.62	0.53
…acting appropriately when I am around friends?	0.16	− 0.17	− 0.06	0.46	0.44

$N = 291$. All items begin with "How much of a problem do I have in…." Factor 1, Emotional Competency; Factor 2, ADL Competency; Factor 3, Cognitive Competency; and Factor 4, Interpersonal Competency

Table 2 Significant Univariate Effects for PCRS by PNEE and Non-PNEE Groups

Dependent variable	F	df	Error df	Independent variable	Mean	95% confidence interval	
						Lower bound	Upper bound
Emotional comp.	13.90	1	245	Non-PNEE	21.03	20.13	21.92
				PNEE	18.70	17.85	19.55
ADL comp.	5.89	1	245	Non-PNEE	20.96	20.14	21.78
				PNEE	19.56	18.78	20.34
Cognitive comp.	5.43	1	245	Non-PNEE	29.50	28.27	30.72
				PNEE	27.50	26.33	28.66
Interpersonal comp.	5.42	1	245	Non-PNEE	19.17	18.46	19.88
				PNEE	18.02	17.34	18.69

(MEDVAMC) and Baylor College of Medicine Institutional Review Board approved this research.

Measures

Patient Competency Rating Scales The patient competency rating scale (PCRS) is a 30-item measure that was developed to identify how patients perceive their abilities to accomplish various tasks. It consists of a 5-point Likert scale asking individuals to rate how well they believe they can or cannot perform a range of tasks, ranging from "can do with ease" to "cannot do," with lower scores reflecting more impairment

on tasks. Items include activities of daily living (ADL) and interpersonal, cognitive, and emotional competency [14].

Statistical analyses

Preliminary analyses were run to test for demographic differences between the PNEE and non-PNEE groups. Patients with mixed events were excluded from all analyses. An independent samples t test was used to examine for significant differences between mean scores on the original PCRS, according to diagnosis. A principal components analysis with a direct oblimin rotation was performed on the original 30 items of the PCRS.

Table 3 Factor loadings and communalities for the PCRS and non-PNEE Sample

Item	Factor			
	1	2	3	$h2$
…remembering names of people I see often?	0.84	0.04	0.08	0.66
…remembering important things I must do?	0.82	−0.17	0.11	0.73
…remembering my daily schedule?	0.70	−0.17	−0.10	0.74
…starting a conversation in a group?	0.64	−0.12	−0.21	0.53
…remembering what I had for dinner last night?	0.64	−0.26	0.04	0.62
…showing affection to people?	0.60	−0.25	−0.03	0.47
…keeping appointments on time?	0.59	−0.25	−0.03	0.59
…taking care of my finances?	0.51	−0.16	−0.17	0.53
…washing the dishes?	0.04	0.92	−0.01	0.90
…dressing myself?	0.00	0.87	−0.02	0.77
…doing the laundry?	−0.02	0.83	0.13	0.77
…taking care of my personal hygiene?	0.21	0.80	0.03	0.82
…preparing my own meals?	0.06	0.74	−0.19	0.76
…keeping my emotions from affecting my ability to go about the day's activities?	−0.10	−0.17	0.84	0.74
…keeping from being depressed?	0.06	0.05	0.82	0.71
…accepting criticism from other people?	−0.02	−0.09	0.80	0.67
…controlling my temper when something upsets me?	0.05	−0.01	0.77	0.65
…handling arguments with people I know well?	0.16	0.02	0.75	0.70
…controlling crying?	0.00	−0.02	0.72	0.53

$N = 117$. All items begin with "How much of a problem do I have in…." Factor 1, Interpersonal/Cognitive Competency; Factor 2, Cognitive Competency; and Factor 3, Emotional Competency

Table 4 Factor loadings and communalities for the PCRS and PNEE Sample

Item	Factor				
	1	2	3	4	h2
…remembering important things I must do?	0.85	− 0.01	0.05	− 0.04	0.74
…remembering what I had for dinner last night?	0.84	0.15	− 0.01	0.00	0.62
…remembering my daily schedule?	0.84	− 0.13	0.01	− 0.12	0.76
…scheduling daily activities?	0.74	− 0.14	0.14	− 0.03	0.75
…keeping appointments on time?	0.72	− 0.05	0.07	− 0.03	0.59
…understanding new instructions?	0.66	− 0.10	− 0.16	0.24	0.59
…taking care of my finances?	0.57	0.06	− 0.02	0.14	0.45
…doing the laundry?	0.04	0.88	− 0.05	− 0.04	0.78
…washing the dishes?	− 0.06	0.86	0.08	0.05	0.75
…dressing myself?	0.05	0.81	− 0.10	0.02	0.67
…preparing my own meals?	0.03	0.79	0.17	− 0.05	0.72
…taking care of my personal hygiene?	0.09	0.78	0.03	0.02	0.70
…starting a conversation in a group?	− 0.02	− 0.02	0.83	0.00	0.68
…showing affection to people?	0.05	0.09	0.78	0.00	0.62
…participating in group activities?	0.00	− 0.14	0.75	0.08	0.68
…staying involved in work activities even when bored or tired?	0.15	− 0.27	0.47	0.13	0.55
…controlling crying?	− 0.17	− 0.09	0.05	0.80	0.58
…handling arguments with people I know well?	0.19	− 0.10	− 0.03	0.68	0.58
…controlling my temper when something upsets me?	0.11	0.09	0.12	0.68	0.56
…accepting criticism from other people?	0.11	0.15	0.23	0.56	0.49

$N = 130$. All items begin with "How much of a problem do I have in…." Factor 1, Cognitive Competency; Factor 2, ADL Competency; Factor 3, Interpersonal Competency; and Factor 4, Emotional Competency

After the analysis and data screening, the remaining 24 items fit the following criteria: (a) factor loadings of 0.40 or greater on the pattern matrix and the structure matrix; (b) pattern matrix cross-loadings of less than 0.30; and (c) communality estimates greater than 0.40. Follow-up multivariate analysis of variance (MANOVA) tests was conducted to test for systematically different response patterns on the newly constructed version of the PCRS according to diagnosis (PNEE vs. non-PNEE). Given the general differences between diagnostic groups, secondary factor analyses were conducted to test the factor structure of the PCRS within each diagnostic category. A principle components analysis with direct oblimin rotation was performed comparing those diagnosed with PNEE vs. non-PNEE (those diagnosed with mixed or indefinite event types were excluded).

Results

There were no differences in ethnicity ($\chi(1) = 3.39$, $p = 0.18$) or sex ($\chi(1) = 4.78$, $p = 0.03$) between the two groups. However, there was a significant difference in the total PCRS score, with the PNEE group ($M = 104.47$, SD = 18.9) scoring lower (i.e., indicating lower perceived competence) as compared to the non-PNEE group ($M = 112.73$, SD = 22.3; $t(246) = 3.16$, $p < 0.01$).

The final results indicated a four-factor solution, explaining 64.03% of the variance (KMO = 0.93, Bartlett's test of sphericity [276, 4293.68], $p < 0.01$). See Table 1 for factor loadings and communality estimates for the retained items. The four factors generally aligned with the original structure and; therefore, were named Emotional Competency (6 items, $\alpha = 0.86$), Activities of Daily Living Competency (5 items, $\alpha = 0.92$), Cognitive Competency (8 items, $\alpha = 0.90$), and Interpersonal Competency (5 items, $\alpha = 0.82$). The entire scale had acceptable internal consistency, $\alpha = 0.94$. Results further showed significant differences, such that patients diagnosed with PNEE scored lower on all factors, indicating lower levels of self-reported competency as compared to those not diagnosed with PNEE (Wilks λ [4, 242] = 3.76, $p < 0.01$, $\eta^2 = 0.06$). See Table 2.

Factor analysis results of only those diagnosed with non-PNEE revealed a three-factor solution, explaining 67% of the variance, with 19 of the original 30 items being retained ($\alpha = 0.94$). The identified factors were named Interpersonal/ Cognitive Competency (8 items, $\alpha = 0.90$), ADL Competency (5 items, $\alpha = 0.93$) and Emotional Competency (6 items, $\alpha = 0.90$); see Table 3. Factor analysis results of the PNEE group revealed a four-factor solution, explaining 64.0% of the variance, with 20 of the original items retained ($\alpha = 0.91$). The identified factors were named Cognitive Competency (7 items, $\alpha = 0.90$), ADL Competency (5 items,

$\alpha = 0.90$), Interpersonal Competency (4 items, $\alpha = 0.079$), and Emotional Competency (4 items, $\alpha = 0.71$); see Table 4.

Discussion

The purpose of the current study was to examine the underlying factor structure of the PCRS to determine its clinical utility within a general seizure-disorder population and to examine for group differences between those diagnosed with PNEE vs. non-PNEE. The factor structure that was the best fit for the full sample indicated that a four-factor solution remained appropriate; however, six of the items did not fit criteria for retention, resulting in a 24-item scale. As individuals with seizures are instructed not to drive, it was unsurprising that one of the six items deleted asked participants how much assistance they needed driving. The other five deleted items also loaded poorly onto factors, likely because of the heterogeneity inherent in a seizure disorder population.

Notably, those diagnosed with PNEE scored lower on all factors, indicating lower levels of self-reported competency as compared to those diagnosed with non-PNEE. The largest differences were for the Emotional Competency and Cognitive Competency subscales, respectively. Furthermore, when secondary factor analyses were conducted for each diagnostic category, the two items not retained for the PNEE group were those that were designed to be strongly loaded onto the Emotional Competency subscale ("How much trouble do I have in … keeping from being depressed?;from keeping my emotions from affecting my ability to go about the day's activities?"). These items loaded equally across the factors, indicating that, in a PNEE population, emotional control is highly correlated with all areas of perceived competence, rather than just emotional competence.

A focus in the PNEE literature has been the effect of informing patients of their diagnosis in hopes of decreasing or completely remitting the frequency of events. The results of this intervention have been mixed, with one study finding 20% patients reporting complete remission of PNEE after 11 weeks [6]. However, after 3 years, two thirds of patients with PNEE continued to have events and more than half remained on disability services [12]. While psychotherapy is a common treatment recommendation after a patient receives a diagnosis of PNEE, the attrition rate is high with only 50% of patients remaining in treatment after 5 weeks [2], which may account for poor treatment outcomes. While psychological distress has been shown to account for health-related quality of life and PNEE frequency [8], which aspect of distress specifically (e.g., interpersonal, intrapersonal, emotional, etc.) remained unexamined. Therefore, the findings of the present study have important clinical implications. Our results suggest that poor emotional control is a crucial underlying factor for those with PNEE. Thus, therapies that target emotional regulation (e.g., dialectical behavior therapy, mindfulness-based therapies) may result in better outcomes (i.e., improved treatment compliance, fewer events, and less disability) for those diagnosed with PNEE.

Given the nature of clinical samples, seizure etiology, course, duration, and treatment was largely heterogeneous but otherwise not reliably captured (outside of self-reported history in the medical record, when applicable) during patients' brief admission on the EMU. This heterogeneity is a strength in terms of the generalizability of study results; however, more detailed background information for both PNEE and non-PNEE samples would be useful to further clarify results (keeping in mind the potentially limited validity of self-reported history). Given the importance of psychological distress in PNEE, capturing and comparing the rate and nature of psychiatric diagnoses for those with PNEE as compared to non-PNEE would also be an interesting future direction.

It is important to note that this sample was comprised of a veteran population, which was predominately male, and may not be fully generalizable to the civilian population. However, the percentage of individuals diagnosed with PNEE in the current study is similar to those found in other EMU samples [7]. Previous research has indicated that women are more likely to be diagnosed with PNEE [9]. While gender remains a demographic risk factor, our study makes an important contribution to the literature in demonstrating high rates of PNEE in a predominately male veteran sample. A future direction is to validate the other-reported PCRS form to give insight into whether family members/caregivers observe similar perceived impairments of those with PNEE. Finally, studying the use of the PCRS in conjunction with other measures to develop an PNEE vs. non-PNEE profile may help to improve diagnostic accuracy. Regardless of the aforementioned limitations, the present study contributes significantly to the seizure disorder literature by providing clinicians with a brief and independently validated measure of perceived competency and self-awareness, appropriate for use within seizure disorder clinics, and guidance on treatment targets for those diagnosed with PNEE (i.e., emotional competency).

Compliance with ethical standards The Institutional Review Board of the Michael E. DeBakey VA Medical Center (MEDVAMC) and Baylor College of Medicine approved this research and we have fully complied with the APA ethical standards throughout this research project.

Conflict of interest The authors declare that they have no conflict of interest.

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