Clinical, Psychological and Neuropsychological Profiling Indicators of Patients Diagnosed with Psychogenic Non-Epileptic Seizures

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Abstract

Psychogenic non-epileptic seizures (PNES) are clinically discernible changes in behaviour that are not accompanied by the typical electrophysiological brain discharges manifested in epilepsy. The equivocal findings on the specific impairments in patients with PNES and how these differ from patients with epilepsy creates difficulties for differential diagnosis and hence there is a high rate of misdiagnosis of PNES. The aim of the present study was to explore the profile of the distinct clinical, neuropsychological and psychological characteristics of patients with PNES compared to patients with epilepsy, and to identify comparatively the specific impairments in the neuropsychological functioning of these two groups of patients, in relation to normative data for non-clinical populations. The sample included 30 patients (18 patients with PNES, and 12 patients with epilepsy) who were referred for V-EEG monitoring to the Netcare Milpark Epilepsy Monitoring Unit (EMU). The neurocognitive tests included: MOCA, subtests of the WMS-IV and WAIS-IV, RCFT, RAVLT, TMT, STROOP, and Raven SPM. The psychological questionnaires completed included: BFI, BDI-II, BAI, TEC, SDQ-20, DES-II, and AIQ-IV. Results indicated that patients with PNES demonstrated higher overall level of cognitive functioning and flexibility, impairments in visual memory, and compromised fluid intelligence capacities. Patients with epilepsy manifested impairments in long term verbal recall and verbal working memory, particularly in relation to heterogeneous (letters and numbers) material. Patients with PNES had a wider scope and intensity of traumatic experiences, while patients with epilepsy reported a higher collective identity. The proximity of the clinical, neuropsychological and psychological profiles of the two patient groups could be suggestive of a cross-over movement between the impairments in PNES and epilepsy. These findings present further challenges for the differential diagnosis and add to the complexity of identifying reliable and valid diagnostic tools for PNES.

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

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Chapter Overview

Chapter 1

Chapter 1 introduces the research topics and discusses the rationale of this study, incorporating a wide-ranging literature background. An overview of the clinical, neuropsychological, psychological profiling indicators of patients diagnosed with psychogenic non-epileptic seizures are conceptualised and discussed, leading to the formulation of the aims and research questions.

Chapter 2

Chapter 2 described the methodology of the study and offers a description of the research process including the materials, data collection procedures and the design of the study.

Chapter 3

Chapter 3 contains the analysis of the data and presents the findings on the profile of the distinct clinical, neuropsychological, and psychological characteristics of patients with PNES compared to patients with epilepsy, and to identify comparatively the specific impairments in the neuropsychological functioning of these two groups of patients, in relation to normative data for non-clinical populations.

Chapter 4

Chapter 4 discusses the results with reference to the research questions. In the formulations proposed, the advancements of the extant research and the South African context are taken into consideration. The chapter further explores the implications, limitations, and contributions of the study to theory, research, and practice in the area of psychogenic non-epileptic seizures.

Clinical, Psychological and Neuropsychological Profiling Indicators of Patients Diagnosed with Psychogenic Non-Epileptic Seizures

Psychogenic non-epileptic seizures (PNES) are defined as clinically discernible paroxysmal changes in behaviour with altered movements, sensation, and consciousness which resemble epileptic seizures, but are not accompanied by the typical electrophysiological brain discharges evident in epilepsy (Baslet, 2011; Bodde et al., 2013). Contrastingly, epilepsy is a disorder of the brain characterised by an enduring predisposition to generate epileptic seizures which are accompanied by neurobiological, cognitive, psychological, and social consequences (Fisher et al., 2005). Epilepsy is one of the top ten neurological conditions globally, and PNES are ranked among the top three neuropsychiatric issues worldwide (Kerr et al., 2011; Reuber, 2008). Despite difficulties in estimating the prevalence of PNES, approximately 2 to 33 per 100,000 persons per year are reported to suffer from PNES in the general US population, (Benbadis & Hauser, 2000), making the diagnostic incidence as common as multiple sclerosis. International studies (Bodde et al., 2013) have documented that 25-30% of patients referred to tertiary epilepsy centres have PNES. The epidemiological profile of patients with PNES indicates that 75 to 85% of patients are female (Bodde et al., 2013). Typically PNES begin in young adulthood, but occurs in a wide range of age groups. The prevalence of PNES is increased in patients with head injuries, learning disabilities, and neuropsychological deficits. These patients manifest a higher than average rate of abnormal EEG's, as well as exacerbated symptomology which contribute to the delay in diagnosis (Alessi, Vincentiis, Rzezak, & Valente, 2013).

The misdiagnosis of PNES is high and there are long delays from seizure onset to accurate diagnosis (Baslet, 2011; Reuber, Mitchell, Howlett, & Elger, 2005). This is

particularly concerning when considering the results of a recent study, which revealed that the misdiagnosis of PNES in patients referred to a Johannesburg based epilepsy diagnostic centre was as high as 50% (Anderson, Damianova, Hanekom, & Lucas, 2017). Delays are largely due to poor diagnostic accuracy leading to patients' referral to innumerable medical professionals prior to their receiving a PNES diagnosis. Accurate diagnosis is further complicated by concomitant occurrence of PNES and epileptic seizures in some patients, which contributes further to the overlap between the neuropsychological characteristics of the two conditions (Alsaadi & Shahrour, 2014; Mostacci et al., 2011). The search for rigorous, cost-effective tools for distinguishing and identifying PNES from epileptic seizures is a continuous challenge for neurologists and health care practitioners (Devinsky, Gazzola, & LaFrance, 2011). The "gold standard" of PNES diagnosis is the use of integrated data based on patient history, seizure semiology and primarily V-EEG monitoring (Goldstein & Mellers, 2012; LaFrance, Baker, Duncan, Goldstein, & Reuber, 2013). However, V-EEG availability can be scarce in developing countries, especially outside of epilepsy centres, which can negatively affect the diagnosis of PNES (Strutt, Hill, Scott, Uber-Zak, & Fogel, 2011).

The most expedient features which distinguish PNES from epileptic seizures are the objective alterations in consciousness and/or motor behaviour. These include: the onset, ictal duration, eye closure, ictal movements, vocalisations, self-injury, tongue-biting, and post-ictal features (Mostacci et al., 2011; Widdess-Walsh, Mostacci, Tinuper, & Devinsky, 2012). In contrast to the abrupt onset of epileptic seizures (Meierkord, Will, Fish, & Shorvon, 1991; Seneviratne, Reutens, & D'Souza, 2010) the onset of PNES is generally gradual and primarily occurs during wakefulness (Raymond, Gilmore, & Scott, 1999). Ictal movements found to be strongly predictive of PNES include: preserved consciousness, out-of-phase limb movements, absence of whole-body rigidity throughout the event, pelvic thrusting (especially forwards),

side-to-side head and body turning, and a fluctuating course (Mostacci et al., 2011; Widdess-Walsh et al., 2012).

Prior to the increased practice of using V-EEG for differential diagnosis, alternative diagnostic tools were utilised. Among these were psychological and neuropsychological (or neurocognitive) measures, hypnotic procedures, placebo interventions, linguistic analyses of the patients' discourse during clinical interview, as well as physiological measures. Evaluations of the psychometric properties of various psychological tests have been carried out particularly with reference to their sensitivity (a test's ability to accurately identify PNES patients) and specificity (a test's ability to exclude patients without PNES). Mixed findings and controversy on the measures' specificity and sensitivity has been documented (Cuthill & Espie, 2005; Kuyk, Swinkels, & Spinhoven, 2003), raising questions about the utility of these measures for accurate differential diagnosis.

In an attempt to increase the reliability and validity of diagnostic processes, LaFrance et al. (2013) formulated a strategic staged approach of diagnosis of suspected PNES with the aim of providing clear guidance on standards for the accurate diagnosis and the differential diagnosis of PNES (LaFrance et al., 2013). The strategic staged approach entails the application of a step-wise diagnostic process. First, the factors raising suspicion of PNES (for instance the background factors and the patterns of triggering events) should be investigated using a fully detailed clinical patient history. Thereafter, the clinical semiology of the event is explored, using V-EEG (if available) or alternative techniques, to differentiate between PNES and epileptic seizures. Due to the overlap of semiologic features of PNES and epileptic seizures, it is suggested that not only the neurologic (namely the semiology and EEG results) but also the psychological characteristics (namely psychosocial and emotional features) should be evaluated to allow for greater accuracy and internal consistency (LaFrance et al.,

2013). In most cases, the finding of an absence of ictal EEG changes with the presence of normal awake EEG rhythms before, during, and after a seizure event, can positively confirm the diagnosis of PNES. However, the authors (LaFrance et al., 2013) cautioned that the corroboration between clinical evidence and EEG data should be taken into consideration when confirming the diagnosis, as the absence of EEG change is not always indicative of PNES.

A distinguishing feature of the strategic staged approach is the interaction of different types of data (obtained from both clinical assessment and V-EEG results) including: patient personal history, psychological and neuropsychological indicators, and neurological information (seizure semiology). This diagnostic approach is widely accepted worldwide (LaFrance et al., 2013). In compliance with this approach the need for accurate identification of psychological and neuropsychological differential features of PNES has become even more salient.

The diagnostic complexity of PNES is also reflected in the specifications included in the standard diagnostic tools used for determining the epidemiology, health management and clinical diagnosis of clinical conditions. In the International Classification of Diseases (ICD-10) (World Health Organisation, 2015), the diagnosis of PNES can be found under the group of Mental and Behavioural Disorders, in the category Dissociative (conversion) Disorders (Section V, F 44). PNES events are classified as Dissociative Convulsions (Section V, F 44.5), and are defined as convulsions that may mimic epileptic seizures in terms of movements. However, in contrast to epileptic seizures, during psychogenic seizure episodes consciousness is maintained or replaced by a state of stupor of trance.

On the other hand, in the Diagnostic Statistical Manual of Mental Disorders version 5 (American Psychiatric Association, 2013), PNES fall under the category Somatic Symptoms

and Related Disorders (conversion disorder – specifically functional neurological symptom disorder). Controversy exists as to the underlying mechanisms in the process of conversion suggesting either dissociation, somatisation, or both are involved in the process (Widdess-Walsh et al., 2012). These two mechanisms have been consistently acknowledged in the literature (Widdess-Walsh et al., 2012), explaining the differing classification of PNES in the two main diagnostic manuals used by health professionals. Somatisation is defined as the tendency to experience, seek medical assistance, and communicate psychological distress in the form of physical somatic symptoms which have no physiological basis (Akyuz, Kugu, Akyuz, & Dogan, 2004; Alsaadi & Shahrour, 2014). Dissociation is a conscious and/or unconscious separation of mental processes (e.g., perceptions, cognition, motivation, emotions, memories, and identity) which are ordinarily integrated in and accessible to conscious awareness (Ebrinc et al., 2008). The theoretical accounts of these mechanisms are based on the premise that dissociation and somatisation occur as a response to emotionally threatening experiences and trauma. Thus, in PNES due to the experiences of trauma, heightened anxiety, and depression, dissociation is proposed to occur between the patient's emotional and cognitive experiences, in turn leading to the occurrence of somatised semiology (Beghi et al., 2015; Brown & Trimble, 2000; Nijenhuis, 2009).

It is widely recognised that PNES have psychological origins, and are hence interpreted as an experiential or primal motor behavioural response to emotional, psychological, or social distress (Reuber, 2008). Aetiological factors often include abuse (typically in childhood), trauma, and neglect (Widdess-Walsh et al., 2012). Moreover, patients with PNES have consistently reported significantly more prevalent and stressful negative life events and stressors in both childhood and adulthood, which can often trigger or precipitate PNES symptom onset (Tojek, Lumley, Barkley, Mahr, & Thomas, 2000). The psychodynamic account of PNES places emphasis on the conflict between the components of

personality (the Id, the Ego, and the Superego) which causes offensive thoughts and memories to be repressed to avoid conscious awareness and distress (Freud & Freud, 2001). These repressed thoughts may find an outlet in physical symptoms which allows relief to the unconscious self (i.e., the Id). The principal pathology proposed by the psychodynamic theory of PNES is that of unresolved intrapsychic conflict, which may lead to a secondary gain (obtaining attention and avoiding responsibilities), which further exacerbates the symptoms (Widdess-Walsh et al., 2012). Contemporary psychological models (Labate et al., 2012) suggest that PNES are frequent clinical manifestations of conversion disorder and are representative of the unconscious production of neurological symptoms, not attributable to organic brain trauma. A low frustration tolerance in patients with PNES can lead to the development of comorbid disorders, such as personality disorders, anxiety and mood disorders, and post-traumatic stress disorder (Kanner et al., 2012; Owczarek & Jedrzejczak, 2012), further prolonging the PNES symptoms. Such emotional dysregulation factors influence and perpetuate the mechanisms of dissociation and somatisation (de Araujo Filho & Caboclo, 2007). Furthermore, it is suspected that due to the high occurrence of a history of emotional, physical, and sexual abuse of patients with PNES (Proenca, Castro, Jorge, & Marchetti, 2011), their ability to form functional intimate relationships and attachments is compromised.

Recent neuroimaging studies have generated a shift from a psychological model to a neurobiological paradigm in the understanding of the aetiology and mechanisms involved in PNES (Ding et al., 2013; Ding et al., 2014; Labate et al., 2012). In patients with PNES, abnormalities have been identified in functional connectivity of particular brain structures, with stronger connectivity values shown between areas involved in emotion (insula), executive control (inferior frontal gyrus and parietal cortex), and movement (precentral sulcus) (van der Kruijs et al., 2012). Other brain abnormalities identified in patients with

PNES include cortical atrophy of the motor and premotor regions of the right hemisphere and the cerebellum bilaterally (Labate et al., 2012), and importantly markers of structural abnormalities featuring more frequently in the right hemisphere (Reuber, Fernandez, Helmstaedter, Qurishi, & Elger, 2002). Decreased functional connectivity between the right frontal cortex, responsible for cognitive attention and executive control, and parietal cortex, has been reported (Barzegaran, Carmeli, O Rossetti, Frackowiak, & Knyazeva, 2016). In addition, increased functional connectivity has also been found in the insula, sensorimotor and occipital cortices, which are important areas in the integration of multisensory information from the body, emotional regulation, visceral sensory perception, and self-awareness (Baslet, 2011). In summary, the neuroimaging studies have revealed that patients with PNES exhibit abnormalities in structural connectivity networks, involving attention, sensorimotor subcortical and default-mode networks, and alterations of functional connectivity networks in the frontal cortex, sensorimotor cortex, cingulate gyrus, insula and occipital cortex (Ding et al., 2013; Ding et al., 2014). These neuroimaging data are in keeping with the neurocognitive findings that PNES are associated with altered attention, sensorimotor networks and brain systems responsible for emotions (Ding et al., 2014).

Significant impairments in patients with PNES have been identified in the following functions: mental flexibility, attention, the ease of learning in novel problem solving situations, spatial localisation memory, auditory perception and discrimination, motor speed and coordination, as well as visual and verbal working memory (Kalogjear-Sackellareas & Sackellares, 1999; Portugues, da Costa, Marroni, Pagliarini, & Vieira, 2007). However, these results are inconsistent across different investigations (Strutt et al., 2011). Some studies highlight the presence of intellectual disability in patients with PNES (Sackellares et al., 1985), while other results suggest that these patients fall into the lower quartile ranges of the IQ scores (Fargo et al., 2004; Locke, Berry, Fakhoury & Schmitt, 2006). Previous research

(Locke et al., 2006) suggests that confounding variables such as effort, motivation, and psychopathology may account for the differences between patients with PNES and patients with epilepsy on IQ and other neuropsychological measures. Extant literature demonstrates disparate and conflicting neuropsychological results (Turner et al., 2011) with some studies suggesting increased neurocognitive performance of patients with PNES compared to patients with epilepsy (Drane et al., 2006); while others showing no significant differences (Drake, Pakalnis, & Phillips, 1992). Among the features consistently documented in the neuropsychological profile of patients with PNES are inadequate effort or motivation, anxiety, and a negative response bias (Drane et al., 2006; Griffith, Smith, Schefft, Szaflarski, & Privitera, 2008; Prigatano & Kirlin, 2009; McNally et al., 2009). However, when compared to age-related non-clinical populations both groups of patients have demonstrated decreased neuropsychological performance on measures of intelligence, memory, language, and motor functioning (Cragar, Berry, Fakhoury, Cibula, & Schmitt, 2002; Locke et al., 2006). These equivocal findings on the specific impairments of patients with PNES and patients with epilepsy have introduced further difficulties for differential diagnosis. In an attempt to facilitate more reliable and valid methods for differentiating between the two groups of patients Bodde et al. (2013) proposed an explanatory model of PNES which incorporates five levels.

Level 1 (psychological aetiology) includes the psychogenic causation such as traumatic experiences. Level 2 (vulnerability) comprises of the emotional correlates and neuropsychological impairments. Level 3 (shaping) involves factors that shape the symptoms into seizures, which are all involved in the development of PNES. Level 4 (triggering) is related to the provocation of PNES, and level 5 (prolongation) is linked to the persistence and prolongation of PNES symptoms. In accordance with the strategic staged approach (LaFrance et al., 2013), Widdess-Walsh et al. (2012) proposed that the precipitants of PNES include:

abuse, trauma, neglect, bereavement, family dysfunction, health anxiety, social stress, and a history of insecure attachment. In the same vein, Stone, Carson, and Sharpe (2005) argued that the predisposing factors (i.e., genetic/biological, childhood events or abuse, trauma, and comorbid conditions) combined with the precipitating events (i.e., sickness, emotional stressors, and major life events), lead to the development of PNES. Furthermore, perpetuating factors (i.e., conditioning through primary and secondary gain, emotional disorders and illness beliefs) result in recurrent PNES (Stone et al., 2005).

These findings support a biopsychosocial account of PNES aetiology (Brown & Reuber, 2016; Perez & LaFrance, 2016), which postulates that PNES occur as a result of the interplay between biological (brain) and psychological factors. The brain abnormalities in PNES identified in neuroimaging studies pertain to abnormalities in multiple structural connectivity networks (Ding et al., 2013; Ding et al., 2014) involving the limbic (brain system involved in processing emotions) and motor (sensorimotor cortex) systems, and the interactions between them (Labate et al., 2012). The psychological factors stem from the dissociation or disconnection between emotional and cognitive faculties of the patients' functioning emerging due to traumatic and stressful events. The understanding of the aetiology of PNES from the biopsychosocial perspective has been useful for informing accurate diagnostic methods and treatment approaches. The variables found to be predictive of successful treatment include: no or mildly severe psychiatric history, a short history of PNES or an early diagnosis, absence of concomitant epilepsy, less dramatic or prevalent seizures, no ongoing anti-epileptic medication use, treatment by a multidisciplinary team experienced in PNES case management, identifiable acute psychological trauma preceding the onset of PNES, adherence to therapy, living independently, an average IQ, higher socio-economic class, younger in age, gender (female), an absence of a past history of violence, and having a secure attachment with a secure social support system (Duncan, 2010; Ettinger,

Dhoon, Weisbrot, & Devinsky, 1999; Iriarte, Parra, Urrestarazu, & Kuyk, 2003; Kuyk, Siffels, Bakvis, & Swinkels, 2008; Reuber & Elger, 2003; Widdess-Walsh et al., 2012).

The debilitating impact of PNES on patients' life is pervasive (Szaflarski et al., 2003) and encompasses, among others, difficulties with work, and with personal and social relationships, along with compromised overall wellbeing. The delayed or inadequate treatment further worsens the quality of patients' life, and the endeavours to identify (for both diagnostic and treatment purposes) the specific clinical, neuropsychological, and psychological characteristics that differentiate these patients are ongoing.

Rationale

To date there are equivocal findings on the specific impairments in patients with PNES and how these differ from patients with epilepsy. This insufficient clarity presents difficulties for differential diagnosis and hence the high rate of misdiagnosis of PNES is widely spread worldwide. Thus, the delineation of a comprehensive profile of patients with PNES, particularly in the South African context, needs to be derived from a simultaneous exploration of their clinical, neuropsychological, and psychological characteristics. Furthermore, the identification of the neuropsychological and psychological impairments that patients with PNES present with when compared to both normative data for non-clinical populations and patients with epilepsy, would pinpoint the profiling indicators distinguishing between these two patient groups. These indicators would then have value for differential diagnosis and for increasing diagnostic accuracy (Locke, Denham, Williamson, & Drance, 2017). The present study was explorative as there are no investigations, both in the global and South African context, that have comparatively explored pre-diagnostically such a wide range of characteristics (including clinical, neuropsychological, and psychological) in the two

patients groups, using two-fold comparisons: to normative data for non-clinical populations and between-group comparisons.

Aims and Research Questions

The aim of the present study was to explore the profile of the distinct clinical, neuropsychological and psychological characteristics of patients with PNES compared to patients with epilepsy, and to identify comparatively the specific impairments in the neuropsychological functioning of these two groups of patients, in relation to normative data for non-clinical populations.

The following research questions were formulated:

1. What are the specific impairments in the neurocognitive functioning of the patients with PNES in relation to the normative data for non-clinical populations?
2. What are the specific impairments in the neurocognitive functioning of the patients with epilepsy in relation to the normative data for non-clinical populations?
3. What are the distinct neurocognitive characteristics of patients with PNES patients compared to epileptic patients?
4. What are the distinct psychological characteristics of patients with PNES compared to patients with epilepsy?

Chapter 2

Method

Participants

The sample was recruited, using convenience sampling, from the Donald Gordon Medical Centre and Netcare Milpark Epilepsy Monitoring Unit (EMU), where the patients were referred for epilepsy monitoring. The primary purpose of the EMU is for differential diagnosis as well as the workup for epilepsy surgery. Patients who were admitted for the purpose of epilepsy surgery were in the minority, and were not included in this study. Only patients who were referred for differential diagnosis using V-EEG monitoring were invited to take voluntarily participation in the study.

The sample consisted of 30 patients, after V-EEG monitoring 18 patients were diagnosed with PNES, and 12 patients received an epilepsy diagnosis. In the total sample, there were 23 (77%) female patients and 7 (23%) male patients and the average age was 37 years (M = 36.5, SD = 14.7) ranging from 18 to 69 years of age.

In the group of patients with PNES, fifteen (83%) patients were female while 3 (17%) patients were male. The average age was 34 years (M = 34.4, SD = 13.7) ranging from 18 to 64 years of age. Seventeen (94%) patients indicated White self-ascribed ethnicity, and 1 (6%) patient indicated Indian self-ascribed ethnicity. All 18 patients were of South African nationality. Fourteen (78%) patients were first language English speakers, 4 (22%) were Afrikaans first language speakers but had advanced English language competencies as they attended school and/or occupations with English language as the medium of instruction. Sixteen (89%) of the 18 patients in the group of patients with PNES, indicated they were of middle class social economic status, 1 (6%) patient indicated they were of high social economic status and 1 (6%) patient indicated they were of low social economic status. Six

(33%) patients indicated they were married, 6 (33%) patients indicated that they were single, 3 (17%) patients were divorced, 2 (11%) patients were in a relationship and 1 (6%) patient was engaged. The group of patients with PNES had an average of 16 (M = 15.6, SD = 2.2) years of education ranging from 12 to 19 years. Sixteen (89%) patients were right hand dominant while 2 (11%) were left hand dominant. Seven (39%) patients did not have any previous psychological assessments, while 11 (62%) patients indicated that they did have previous psychological assessments. However, none of these psychological assessments occurred within the previous 6 to 9 months suggesting that interference with the current testing was unlikely.

In the group of patients with epilepsy, there were eight (67%) female patients and 4 (33%) male patients. The average age was 40 years (M = 39.8, SD = 16.2) which ranged from 20 to 69 years of age. The distribution of self-ascribed ethnicity was as follows: seven (58%) patients assigned White self-ascribed ethnicity, two (17%) patients indicated Asian self-ascribed ethnicity and two (17%) patients indicated Indian self-ascribed ethnicity, while one (8%) patient assigned Black self-ascribed ethnicity. All 12 patients reported that they were of South African nationality. Ten (83%) patients were English first language speakers, while 2 (17%) patients were Afrikaans first language speakers but had advanced English language competencies as they attended school and/or occupations with English language as the medium of instruction. Eleven (92%) of the 12 patients in the group of patients with epilepsy specified that they were of a middle class social economic status, while one (8%) patient indicated that they were of a low social economic status. Five (42%) patients were married, 4 (33%) patients were single and 3 (25%) patients were in a relationship. The average years of education was 14 years (M = 13.9, SD = 2.9), ranging from 12 to 20 years of education. All 12 patients were right hand dominant. Eight (67%) patients did not have any previous psychological assessments, while 4 (33%) patients indicated that they did have previous

psychological assessments. However, none of these psychological assessments occurred within the previous 6 to 9 months suggesting that interference with the current testing was unlikely.

Materials

Demographic questionnaire. A demographic questionnaire (see Appendix 5) was developed to record the patients' demographic information including gender, age, self-ascribed ethnicity, nationality, social economic status, relationship status, years of education, handedness, first language, and psychological assessment history.

Clinical questionnaire. A medical history questionnaire (see Appendix 5) was developed to record the patients' epilepsy-related medical history, seizure descriptions, family history of epilepsy, EEG history, and medication history.

Neuropsychological instruments. A range of neuropsychological tests were administered to assess cognitive functions including attention, verbal and visual working memory, and fluid intelligence. The neuropsychological instruments (see Appendix 5) administered were: the Montreal Cognitive Assessment (MOCA); Logical Memory, Spatial Addition, Symbol Span subtests of the Wechsler Memory Scales-Forth Edition (WMS-IV); Letter-Number Sequencing, Digit Span, and Arithmetic subtests of the Wechsler Adult Intelligence Scale- Fourth Edition (WAIS-IV); the Rey Complex Figure Test and Recognition Trial (RCFT); the Rey Auditory-Verbal Learning Test (RAVLT), the Trail Making Test (TMT); STROOP; and the Raven's Standard Progressive Matrices (SPM).

The Montreal Cognitive Assessment (MOCA). The MOCA was originally developed in 1992 by Dr Nasreddine for use as a cognitive screening test. The test has been optimised and updated and the 2003 version of the test has been validated and normative data collected

(Nasreddine et al., 2005). The test has confirmed discriminatory ability to distinguish between normal controls and mild cognitive impairment. The test consists of different sections that test cognitive functions such as attention, abstraction, memory, visual-spatial skills, language and orientation. The test has shown good construct validity and reliability (Miller, Vogel, & Banks, 2014; Sugarman & Axelrod, 2014; Vogel, Banks, Cummings, & Miller, 2015).

The Wechsler Memory Scales-Forth Edition (WMS-IV). The WMS-IV published in 2009, is the most recent version of the original Wechsler Memory Scale (WMS) published by David Wechsler in 1945. It is used to measure learning and memory abilities for both verbal and visual faculties. The test can be administered to participants from the age of 16 to 90 years. There are 7 subtests in the WMS-IV, of which 3 subtests were utilised in the current study. The WMS-IV has good reliability, utility and validity. Data from the UK standardised sample show average to high subtest internal consistency with Cronbach's alpha coefficients ranging from .74 to .97, and fair test-retest reliability with coefficients ranging from .59 to .77 (Wechsler, 2009). Studies (Groth-Marnat & Wright, 2016) have been conducted assessing the validity of the WMS-IV, with reports from the Wechsler Technical Manual demonstrating high construct validity using confirmatory factor analysis.

Logical Memory subtest. The Logical Memory subtests of the WMS-IV assesses narrative/auditory memory under a free recall condition where two stories are orally presented to the participant. The participant is then asked to recall each story from memory immediately after hearing it. The delayed memory condition assesses long-term narrative/auditory memory with free recall and recognition tasks. The participant is asked to recall both stories and then is asked yes/no questions about the stories they heard in the immediate recall condition. The Logical Memory subtest has high internal consistency with

Cronbach's alpha coefficients ranging from .82 to .85, and good test-retest reliability coefficients ranging from .72 to .67. The Logical Memory subtest has good construct validity with high correlations to alternative measures of auditory memory functioning such as the RBANS immediate and delayed memory index (r =.53 to .57) (Wechsler, Holdnack, & Drozdick, 2009).

Spatial Addition subtest. The Spatial Addition subtest is new to the WMS-IV and assess visual-spatial storage and the manipulation of visual working memory. For five seconds, the participant is shown a 4 by 4 grid with blue and/or red circles and is instructed to remember the location of the blue circles and ignore any of the red circles that appear on the page. The participant is then shown a second page for 5 seconds with blue and/or red circles on it and is instructed to remember the circles on this page. The participant is then given cards with blue, red and white circles on and is instructed to place a blue card on the grid in the location where they saw the blue circles on either page and a white card on the grid in any location in which blue circles appeared on both pages, thus subtracting the images. The Spatial Addition subtest has high internal consistency with Cronbach's alpha coefficients ranging from .89 to .93 and a good test-retest correlation of .77. Furthermore, the Spatial Addition subtest has good concurrent validity with high correlations to the WIAT-II Numerical Operations and Math Reasoning (r = .65 to .70) (Wechsler, Holdnack & Drozdick, 2009).

Symbol Span subtest. The Symbol Span subtest is new to the WMS-IV and assesses storage and manipulation of visual details in working memory. This subtest was developed as a visual analogue to the WAIS-IV Digit Span subtest. The participant is briefly shown a series of abstract symbols on a page and then instructed to select the symbols in the same order as they were previously presented, from an array of symbols presented. The Symbol

Span subtest has good internal consistency with Cronbach's alpha coefficients ranging from .76 to .92 and a good test-retest correlation of .72. The concurrent validity of the Symbol Span subtest is good and shows adequate correlations to the WIAT-II Numerical Operations and Math Reasoning (r = .47 to .62) (Wechsler, Holdnack & Drozdick, 2009).

The Wechsler Adult Intelligence Scale- Fourth Edition (WAIS-IV). The WAIS-IV published in 2008, is the most recent version of the original Wechsler Adult Intelligence Scale (WAIS) published by David Wechsler in 1955. This is a well-established scale and is the gold standard test used to measure intelligence. The test is made up of 5 sections including verbal comprehension, perceptual reasoning, processing speed, working memory and a full-scale IQ score. There are 10 core subtests and 5 supplementary subtests. The test can be administered to participants from the age of 16 to 90 years. Data from the UK standardised sample show average to high subtest internal consistency with Cronbach's alpha coefficients ranging from .87 to .98, and good test-retest reliability with coefficients ranging from .74 to .90 (Pearson Clinical, 2008). Studies (Groth-Marnat & Wright, 2016) have been conducted assessing the validity of the WAIS-IV, with reports from Pearson Clinical (2008) demonstrating high construct validity using confirmatory factor analysis and correlational analyses.

Letter-Number Sequencing subtest. The Letter-Number Sequencing subtest assesses attention as well as sequential processing and short-term auditory memory. The participant is read a sequence of numbers and letters and is asked to recall the numbers in ascending order and the letters in alphabetical order.

Digit Span subtest. The Digit Span subtest is made up of three sections, the Digit Span Forwards, the Digit Span Backwards and the Digit Span Sequencing. The Digit Span Forwards assesses rote learning and auditory memory processing. The Digit Span Backwards

and Digit Span Sequencing assess verbal working memory and mental manipulation. The participant is read a sequence of numbers and the participant is asked to recall the numbers either in the same order (Digit Span Forwards), in reverse order (Digit Span Backwards), or in ascending order (Digit Span Sequencing).

Arithmetic subtest. The Arithmetic subtest assesses short and long term verbal memory as well as numerical reasoning ability. The participant mentally solves a series of arithmetic problems that have been verbally administered.

The Rey Complex Figure Test and Recognition Trial (RCFT). The Rey-Osterrieth Complex Figure (RCF) was originally devised by André Rey in 1941, and standardised by Osterrieth in 1944. The Rey Complex Figure Test and Recognition Trial (RCFT) developed and standardised by Meyers and Meyers in 1995 includes the original complex figure and an additional recognition trial. The RCFT assesses perceptual organisation, visual-spatial construction and nonverbal memory while the recognition trial assesses visual recognition memory. The test consists of four conditions: Copy, Immediate Recall, Delayed Recall and Recognition. Initially, the participant is given the RCFT stimulus card and asked to draw the same figure. Then the stimulus card is removed and they are asked to draw what they remember. After a 30-minute delay, the participant is required to draw the same figure once again. Then the participant is given the recognition sheets which include pictures of the different parts of the RCFT and foils, and the participant is instructed to identify which pictures were part of the original figure. The RCFT uses the objective and standardised 36-point scoring system to score each of the drawings applying the criteria of location and accuracy. The RCFT has good reliability and good construct validity as shown with high inter-correlations between the RCFT and other measures as well as confirmatory factor analysis (Meyers & Meyers, 1995).

The Rey Auditory-Verbal Learning Test (RAVLT). The Auditory-Verbal Learning Test was initially developed by Claparède in 1916 which was later standardised by André Rey in 1964 forming the Rey Auditory-Verbal Learning Test (RAVLT). This test is easily administered and assesses verbal memory, learning and retention using a five-trial presentation of a 15-unrelated word list, a single administration of an interference list, and one immediate and one delayed recall post-interference. Furthermore, a recognition trial allows for recognition of target words presented with distractor words. The internal consistency of the RAVLT is variable with Cronbach's alpha coefficients ranging from .38 to .70, and moderate test-retest reliability coefficients ranging from .55 to .60 (Snow, Tierney, Zorzitto, Fisher, & Reid, 1988). The RAVLT demonstrates good construct and concurrent validity with inter-correlations ranging from .50 to .65 with other measures.

The Trail Making Test (TMT). The TMT is extensively used in many neuropsychological test batteries for example the Halsten-Reitan Battery. It assesses processing speed and fluid cognitive abilities (Salthouse, 2011). Performance on the task is evaluated using two different timed visual conceptual and visual-motor tracking conditions. Trial A involves connecting numbers in ascending order without lifting the pen and Trial B involves connecting numbers and letters in alternating and ascending order without lifting the pen. The internal consistency of the TMT is variable, with Cronbach's alpha coefficients ranging from .60 to .90 (Spreen & Strauss, 1998). The TMT is shown to correlate highly with the Wisconsin Card Sorting Test demonstrating good concurrent validity (Korrte, Horner, & Windham, 2002).

STROOP. The STROOP test was first developed by Stroop in 1935 with test variations being developed over time. The STROOP test is based on the finding that it takes longer to call out the colour names of coloured patches than it does to read words, and that it

takes longer to name the colour of the ink in which a colour name is printed when the print ink is a different colour to the colour name. The STROOP Word Colours Inference Test (Trial 2 and 3) developed by Golden in 2002 assesses cognitive processing. The test is applicable for participants between the ages of 15 to 90 years of age.

The Raven's Standard Progressive Matrices (SPM). The SPM (Raven, 1998) is for use with the general population and assesses general nonverbal cognitive abilities, especially fluid intelligence. The SPM is appropriate for participants from the ages of 8 to 65 years and consists of 60 problems which involve completing a pattern or figure with a part missing, by choosing the correct missing piece. The patterns are arranged in order of increasing difficulty. The SPM has good internal consistency with split-half correlations ranging from .60 to .98 and variable test-retest reliability ranging from .46 to .97. When evaluated using factor analysis, loadings are reported ay .75 and higher on the general factor. Concurrent validity coefficients range from .54 to .88 when correlating the SPM and Stanford-Binet and Wechsler Intelligence Scales (The Psychological Corporation, 2007).

Psychological measures. A variety of self-reported questionnaires were administered to yield information on a range of psychological variables including personality, depression and anxiety symptoms, traumatic experiences, somatisation, dissociation, and self-identity. The psychological measures (see Appendix 5) administered included: The Big Five Inventory (BFI), the Beck Depression Inventory – II (BDI-II), the Beck Anxiety Inventory (BAI), the Traumatic Experiences Checklist (TEC), the Somatoform Dissociation Questionnaire (SDQ-20), the Dissociative Experiences Scale-II (DES- II), and the Aspects of Identity Questionnaire (AIQ-IV).

The Big Five Inventory (BFI). The BFI is a self-reported inventory designed to measure the Big Five dimensions of personality developed by John, Donahue, and Kentle

(1991). It consists of 44 items that contain short phases scored on a Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). The BFI is scored by summing the items relevant to each facet of personality. Of the 44 items, 18 are reverse scored. The five facets of personality considered in the BFI include: Extraversion (sociability, positive emotions and gregariousness), Agreeableness (prosocial, tender-mindedness and altruism), Conscientiousness (order, dutifulness and goal-directed behaviour), Neuroticism (emotional stability, negative emotionality and even-temperedness), and Openness to experience (originality, creativity, and complexity of mental and experiential life – hereafter referred to as Openness). The internal consistency of the BFI is high with a Cronbach's alpha coefficient of .83. The Cronbach's alpha coefficients for the facets of personality are as follows: .88 for Extraversion, .79 for Agreeableness, .82 for Conscientiousness, .84 for Neuroticism, and .81 for Openness. The BFI has good convergent validity with a .81 correlation with the NEO-PI and showed good factor loadings using confirmatory factory analysis (John & Srivastava, 1999).

The Beck Depression Inventory – II (BDI-II). The BDI-II was developed by Aaron Beck in 1996 and is used to assess state depression. The test is self-administered and can be administered to participants between the ages of 13 to 80 years of age. The BDI-II consists of 21 items to assess the intensity of depression in clinical and non-clinical participants. Each item lists four statements, arranged in increasing severity, about a symptom of depression occurring over the past two weeks. Symptoms include weight loss, changes in body image, appetite changes, and somatic preoccupation, to name a few. The BDI-II has high internal consistency reporting a Cronbach's alpha coefficient of .92. The BDI-II shows high construct validity and good convergent validity with positive correlations (r = .71) with the Hamilton Depression Rating Scale (Beck, Steer, & Garbin, 1998).

The Beck Anxiety Inventory (BAI). The BAI was developed by Aaron Beck in 1993 and is used to assess state anxiety. The test is self-administered and can be administered to participants between the ages of 17 to 80 years of age. The BAI contains 21 items rated from 0 (*Not at all*) to 3 (*Severely*) indicating the intensity of the symptom occurring over the past month. An example of items includes: "Fear of the worst happening" and "heart pounding/racing". The BAI has good internal consistency with a Cronbach's alpha coefficient of .94, and a correlation of .67 demonstrating acceptable test retest reliability. The BAI demonstrates good convergent validity when correlated against state-trait anxiety inventories (Beck, Epstein, Brown, & Steer, 1988; Fydrich, Dowdall, & Chambless, 1992).

The Traumatic Experiences Checklist (TEC). The TEC developed by Nijenhuis, Van der Hart and Kruger (2002), is a self-report measure of potentially traumatic events. The TEC is a 33-item questionnaire which asks participants if they have experienced 29 types of traumatic events such as "Divorce of your parents", "Family Problems" and "Emotional Neglect". The age participants experienced the trauma is recorded, and the impact of the trauma are noted on a 1 (*none*) to 5 (*an extreme amount*) scale. From these answers a cumulative trauma score is calculated by summing the impact scores. The criterion-related validity is supported by moderate to strong associations of the TEC cumulative score and trauma area severity scores when studying patients with dissociative disorders. The reliability of the TEC is high with Cronbach's alpha coefficients ranging from .86 to .90. The concurrent validity is good between the TEC and the stressful life events screening questionnaire (SLESQ) (r = .77) (Nijenhuis et al., 2002).

The Somatoform Dissociation Questionnaire (SDQ-20). The SDQ-20 developed by Nijenhuis, Spinhoven, Van Dyck, Van der Hart, and Vanderlinden, (1996) evaluates the severity of somatoform manifestations of dissociation of the personality. The SDQ-20 is a

self-reported questionnaire with 20 items that asks participants to rate on a scale from 1 (*not at all*) to 5 (*extremely*) the extent to which the symptom or experience is applicable. Secondly the participant is asked if the physical cause is known and to elaborate on the cause. Items include "attacks that resemble an epileptic seizure", "dislike tastes that I usually like", and "I have trouble urinating". The SDQ-20 has high internal consistency with a Cronbach's alpha coefficient of .95. The SDQ-20 has good convergent validity demonstrated by high inter-correlations between the SDQ-20 and the dissociation questionnaire (DIS-Q) total score (r = .82) (Nijenhuis et al., 1996).

The Dissociative Experiences Scale-II (DES- II). The DES-II developed by Carlson and Putnam in 1986, quantifies the degree of dissociative symptoms in individual patients. The DES-II is a self-reported questionnaire with 28 items that describe common dissociative experiences and the percentage of time that the symptom is experienced (from 0: *never* to 100: *always*). The DES-II has three subscales which are scored by summing the scores of the relevant items. The Amnesia Factor subscale assesses memory loss and includes items such as "Some people have the experience of finding themselves in a place and have no idea how they got there. Circle a number to show what percentage of the time this happens to you". The Absorption Factor subscale assesses preoccupation and absorption into recalling traumatic experiences and includes items such as "Some people find that they become so involved in a fantasy or daydream that it feels as though it were really happening to them. Circle the number to show what percentage of the time this happens to you". Lastly the Depersonalisation/Derealisation Factor subscale assesses depersonalisation (the recurrent feeling of detachment or unreality from one's self and mental processes) and derealisation (the recurrent feeling of a loss of reality of the immediate environment). An example of an item in this subscale would be "Some people sometimes find that they hear voices inside their head that tell them to do things or comment on things that they are doing. Circle the number

to show what percentage of the time this happens to you." The DES-II has good internal consistency with Cronbach's alpha coefficients ranging between .96 to .97 and test retest reliability ranging between .93 and .95 (Dubester & Braun, 1995). The DES-II has good construct and concurrent validity as demonstrated by high factor loadings onto the subscales and significant correlations between the DES-II and other measures of dissociation (Frischholz et al., 1991; van Ijzendoorn & Schuengel, 1996).

The Aspects of Identity Questionnaire (AIQ-IV). The AIQ-IV was developed by Cheek and Briggs in 2013 and measures the relative importance that individuals place on various identity characteristics associated with personal and social identity. The AIQ-IV is a self-reported 45 item questionnaire that participants score on a 1 (*not important to my sense of who I am*) to 5 (*Extremely important to my sense of who I* am) scale of applicability of the item to themselves. Items include "my emotions and feelings", "my race or ethnic background", and "the things I own, my possessions". There are four scales that are scored by summing the scores given for the relevant items. The four scales are: Personal Identity (traits, values and abilities), Relational Identity (the effect of other peoples' validation or regard), Social Identity (the experience of public recognition, social roles and reputation) and Collective Identity (the experience of pride in one's social categories or grouping). The reliability of the scales of the AIQ-IV are high and the Cronbach's alpha coefficients ranged from .80 to .83 for the Personal Identity scale, .82 to .91 for the Relational Identity scale, .80 to .82 for the Social Identity scale and .67 to .77 for the Collective Identity scale (Del Prado et al., 2007). The AIQ-IV has good construct validity when administered in a South African population demonstrated by a good model fit when using confirmatory factor analysis (Cheek, Smith, & Tropp, 2002; Els, 2010).

Procedure

This prospective study was granted ethical approval from the Monash University Human Research Ethics Committee (MUHREC), certificate number CF15/2614 – 2015001071 (see Appendix 5). Patients at the EMU, who had been admitted for diagnostic monitoring, were informed of the study through the explanatory statement (see Appendix 4), which was given to them on arrival at the EMU by a third party who was not associated to the research team. The patients' informed consent (see Appendix 4) was then given to the researcher in a sealed envelope indicating the patients' voluntarily agreement to partake in the study. Consenting patients completed all tests and measures during their stay at the EMU, prior to receiving their diagnosis from the treating medical team. The assessments were completed over two to three sessions, lasting on average three hours per session, following a predetermined protocol order. The testing protocol was designed using information from previous studies (O'Brien et al., 2015; Willment, Hill, Baslet, & Loring, 2015) as a guiding outline, while the alternation between visual and auditory test modalities and completion time variables were included to ensure good testing practice (Laher & Cockcroft, 2014). The testing protocol order was as follows: the demographic questionnaire and clinical questionnaire, the MOCA, the WMS-IV Symbol Span subtest, the WMS-IV Logical Memory I subtest, the Rey Complex Figure Copy, the Rey Complex Figure Immediate Recall, the RAVLT, the Trail Making Test, the WMS-IV Logical Memory II subtest, the Rey Complex Figure Delayed Recall and Recognition, the RAVLT Delayed Recall, the WMS-IV Spatial Addition subtest, the WAIS-IV Letter Number Sequencing subtest, STROOP, the WAIS-IV Digit Span subtest, the WAIS-IV Arithmetic subtest, and the SPM. The patients were then given the following self-report measures to complete in the duration of their stay at the EMU:

the BFI, the BDI-II, the BAI, the TEC, the SDQ-20, the DES-II, and the AIQ-IV. The completed questionnaires were sealed in an envelope by the patient and given to the researcher upon patient discharge at the EMU. The process did not interfere with any of the medical monitoring. The data was then scored and de-identified by the researcher and aggregated into a data set for further analyses. All the data was stored in accordance with the MUHREC policy.

Design

The patients were divided into two groups based on their diagnosis received after completion of the V-EEG monitoring: group 1- patients with PNES and group 2 – patients with epilepsy. One-sample t-tests were conducted to determine the difference between the test scores of patients with PNES and patients with epilepsy in relation to normative test data for non-clinical populations. One-sample Wilcoxon tests were used in instances where the violation of normality was present. Independent samples t-tests were used to determine the difference between the two groups on each of the variables tested. Mann-Whitney U-tests were used to determine the difference between the two groups on the variables where the assumptions of normality were violated.

Chapter 3

Results

The completed questionnaires, neuropsychological instruments, and psychological measures were scored and then analysed using Statistical Program for the Social Sciences (SPSS, v21). There were no outliers or out of range scores found necessitating exclusion of cases, and hence all analyses were performed on a sample of 30 patients, of which 18 were patients with PNES and 12 were patients with epilepsy. Reliability analyses for the psychological measures were conducted using Cronbach's alpha coefficients. Data were analysed using: descriptive analyses (means, frequencies, assumption testing), one-sample t-tests and Wilcoxon tests to assess the test scores of each patient group against normative test data, and independent sample t-tests and Mann Whitney U-tests to assess the differences between the two groups.

Reliability analyses

Cronbach's alpha coefficients for the five scales of the 44-item Big Five Inventory were as follows. For the 8-item Extraversion scale Cronbach's alpha coefficient was .40, and closer examination of the questionnaire item-total statistics indicated that Cronbach's alpha coefficient would increase to .76 if item 1 was removed from questionnaire and subsequent analysis. The item asked patients to rate how talkative they perceive themselves to be. As such, item 1 was removed from further analysis. The Cronbach's alpha coefficient for the 9-item Agreeableness scale was .60, and upon examination of the item-total statistics it was revealed that the removal of items would not improve the Cronbach's alpha coefficient, and hence all the items were retained. For the 9-item Conscientiousness scale the Cronbach's

alpha coefficient was .66, and after inspection of the item-total statistics it was found that the coefficient would increase to .72 after the removal of item 43. This informed the removal of the item from the subsequent analyses. The item asked patients to rate how easily distracted they are, as this item is reverse scored the possibility for misunderstanding of the rating for the item was high and a negative corrected item total correlation was found. The Cronbach's alpha coefficient for the 8-item Neuroticism scale was .83, and upon examination of the item-total statistics the removal of items would not improve the Cronbach's alpha coefficient, hence all the items were retained for further analysis. For the 10-item Openness scale to Cronbach's alpha coefficient was .75, which after inspection of the item-total statistics increased to a coefficient of .76 once item 15 was removed. The item required patients to rate their perceived thinking abilities ("Is ingenious, a deep thinker") and the word ingenious has multiple meanings and was potentially ambiguous for a substantial portion of the sample. Consequently, this item was removed from the questionnaire and all subsequent analyses. The total Cronbach's alpha coefficient for the 44-item Big Five Inventory was .74, indicating good internal consistency, after the removal of items 1, 15 and 43.

The 21-item Beck Depression Inventory II (BDI-II) was found to have high internal consistency with a Cronbach's alpha coefficient of .90. The 21-item Beck Anxiety Inventory (BAI) was found to have a Cronbach's alpha coefficient of .93, indicating a high internal consistency. The 29-item Traumatic Experiences Checklist (TEC) was found to have high internal consistency indicated by a Cronbach's alpha coefficient of .89. The 20-item Somatoform Dissociation Questionnaire (SCD-20) had good internal consistency with a Cronbach's alpha coefficient of .75.

The Cronbach's alpha coefficient for the total 28-item Dissociative Experiences Scale – II (DES-II) was .92, indicating high internal consistency for the measure. The Cronbach's

alpha coefficients for the three subscales were as follows. The 6-item Amnesia Factor subscale had a high Cronbach's alpha coefficient of .81, and upon examination of the item-total statistics it was found that the removal of items would not improve the Cronbach's alpha coefficient. For the 6-item Absorption Factor subscale the Cronbach's alpha coefficient was .82, indicating high internal consistency. The 6-item Depersonalisation/Derealisation Factor subscale had a good Cronbach's alpha coefficient of .77, and upon examination of the item-total statistics, it was revealed that the removal of items would decrease the Cronbach's alpha coefficient. Therefore, no items were removed in this measure and the subsequent analyses took place using all the items.

The Cronbach's alpha coefficient for the 45-item Aspects of Identity Questionnaire (AIQ-IV) was .89, indicating high internal consistency. The Cronbach's alpha coefficients for the four subscales were as follows. For the 10-item Personal Identity subscale, the Cronbach's alpha was .77, upon examination of the item-total statistics alpha increased to .80 after the removal of item 21. This item asked patients to rate the importance of their uniqueness to their sense of self ("My feeling of being a unique person, being distinct from others"). The item was removed from the questionnaire and subsequent analyses. The 10-item Relational Identity subscale demonstrated high internal consistency with a Cronbach's alpha coefficient of .87. After examination of the item-total statistics, it was found that the removal of items would decrease the Cronbach's alpha coefficient and hence no items were removed. The 7-item Social Identity subscale had a high Cronbach's alpha coefficient of .85, which increased to .90 after the removal of item 20 based on the examination of the item-total statistics. The item asked patients to rate the importance of their sociability to their sense of self ("My social behaviour, such as the way I act when meeting people"). As such the item was removed from further analyses. Lastly, the 8-item Collective Identity subscale had a high Cronbach's alpha coefficient of .80, demonstrating high internal consistency. Upon

evaluation of the item-total statistics, the Cronbach's alpha coefficient increased to .82, after the removal of item 10. This item asked patients to rate the importance of their religious affiliations to their identity ("My religion"). This may have been an ambiguous question as some patients may not have religious affiliations and as such were unsure of how best to respond. This informed the removal of this question from subsequent analyses.

Demographic characteristics

The distributions of the demographic characteristics of the total sample and the two patient groups are reported in Table 1. As seen in Table 1, the sample consisted of 30 patients, after V-EEG monitoring 18 patients were diagnosed with PNES, and 12 patients received an epilepsy diagnosis. In the total sample the average age was 37 years (M = 36.5, SD = 14.7) ranging from 18 to 69 years of age. In the group of patients with PNES, the average age was 34 years (M = 34.4, SD = 13.7) ranging from 18 to 64 years of age. While, in the group of patients with epilepsy, the average age was 40 years (M = 39.8, SD = 16.2) which ranged from 20 to 69 years of age. All 30 patients were of South African nationality. In both groups, the Afrikaans first language speakers had advanced English language competencies as they attended school and/or had occupations with English language as the medium of instruction. The group of patients with PNES had an average of 16 (M = 15.6, SD = 2.2) years of education ranging from 12 to 19 years. In the patients with epilepsy, the average years of education was 14 years (M = 13.9, SD = 2.9), ranging from 12 to 20 years of education.

In the total sample, fifteen (50%) patients [11 (62%) in the group of patients with PNES and 4 (33%) in the group of patients with epilepsy], indicated that they did have previous psychological assessments. However, none of these psychological assessments

occurred within the previous 6 to 9 months suggesting that interference with the current testing was unlikely.

Table 1

Distributions of Demographic Characteristics of the Total Sample, PNES and Epilepsy Patients

Variables	Frequency and Percentage		
	PNES Patients	Epilepsy Patients	Total Sample
Gender			
Females	15 (83%)	8 (67%)	23 (77%)
Males	3 (17%)	4 (33%)	7 (23%)
Self-Ascribed Ethnicity			
White	17 (94%)	7 (58%)	24 (80%)
Black	0 (0%)	1 (8%)	1 (3%)
Indian	1 (6%)	2 (17%)	3 (10%)
Asian	0 (0%)	2 (17%)	2 (7%)
Coloured	0 (0%)	0 (0%)	0 (0%)
Language			
English	14 (78%)	10 (83%)	24 (80%)
Afrikaans	4 (22%)	2 (17%)	6 (20%)
Socio-Economic Status			
Low	1 (6%)	1 (8%)	2 (7%)
Middle	16 (89%)	11 (92%)	27 (90%)
High	1 (6%)	0 (0%)	1 (3%)
Relationship Status			
Single	6 (33%)	4 (33%)	10 (33%)
Married	6 (33%)	5 (42%)	11 (37%)
In a Relationship	2 (11%)	3 (25%)	5 (17%)
Divorced	3 (17%)	0 (0%)	3 (10%)
Engaged	1 (6%)	0 (0%)	1 (3%)
Handedness			
Right	16 (89%)	12 (100%)	28 (93%)
Left	2 (11%)	0 (0%)	2 (7%)

The assumption of expected frequencies was violated and as such a Fisher's exact test (with $\alpha = .05$) was used to evaluate whether gender was related to patient diagnosis. The Fisher's exact test was not significant ($p = .39$) however, there was a higher prevalence of female patients in the group of patients with PNES ($n = 15$, 83%) than male patients ($n = 3$, 17%). An independent samples t-test was used to compare patients' age to the patients' diagnosis (PNES and epilepsy). The Shapiro-Wilk statistic was insignificant, indicating that the assumption of normality was not violated. Levene's test of equal variances was not significant, therefore the assumption of homogeneity of variance was not violated. The independent samples t-test was not significant, $t\ (28) = .97$, $p = .34$, two tailed, indicating that there was no significant difference between the two groups in relation to their age. A Pearson's chi-square test of contingencies (with $\alpha = .05$) was used to evaluate whether self-ascribed ethnicity was associated to patient diagnosis. The chi-square test was not significant, $\chi^2\ (1, N = 30) = 6.56$, $p = .09$, indicating that the two patient groups displayed similar distributions in relation to self-ascribed ethnicity, with the majority of the patients in each group falling into the white self-ascribed ethnicity category ($n = 17$, 94% in the group of patients with PNES; $n = 7$, 58% in the group of patients with epilepsy). A Fisher's exact test (with $\alpha = .05$) was used to evaluate whether handedness was associated to patient diagnosis. The Fisher's exact test was not significant ($p = .50$). The majority of the patients were right handed ($n = 16$, 89% in the group of patients with PNES, and $n = 12$, 100% in the group of patients with epilepsy).

Clinical characteristics

An independent samples t-test was used to compare the number of medications reported by each group (patients with PNES and patients with epilepsy) (see Appendix 1). The Shapiro-Wilk statistics were insignificant, indicating that the assumption of normality

was not violated. Levene's test of equal variances was not significant, therefore the assumption of homogeneity of variance was not violated. The independent samples t-test was significant, t (28) = -2.11, p = .04, two-tailed, d = .35 indicating a medium effect size, demonstrating that there was a significant difference between the two groups in relation to the number of medications. The patients with PNES (M= 4.33, SD = 2.33) reported 1.75 more medications than the patients with epilepsy (M= 2.58, SD = 2.07).

On the self-report epilepsy history questionnaire, loss of consciousness during seizures was reported as follows: In the group of patients with PNES, 8 patients (44%) indicated loss of consciousness and 10 patients (56%) indicated no loss of consciousness during seizure attack. In the group of patients with epilepsy, 9 patients (75%) reported loss of consciousness during seizures and only 3 (25%) reported no loss of consciousness. A Pearson's chi-square test of contingencies (with $\alpha = .05$) was used to evaluate whether loss of consciousness during an attack was associated to the patient diagnosis (see Appendix 1). The chi-square test was not significant, χ^2 (1, N = 30) = 2.74, p = .10, indicating that loss of consciousness during seizures was not associated with the diagnosis.

Ten patients (56%) with PNES reported confusion after a seizure attack, while 9 (75%) patients with epilepsy reported confusion after a seizure attack. A Pearson's chi-square test of contingencies (with $\alpha = .05$) was used to evaluate whether confusion after an attack was associated to patient diagnosis (see Appendix 1). The chi-square test was not significant, χ^2 (1, N = 30) = .49, p = .48, indicating that confusion after a seizure attack was not associated with the diagnosis.

Neurocognitive characteristics

Neurocognitive impairments of patients with PNES. One-sample t-tests (with α = .05) and one-sample Wilcoxon tests (non-parametric equivalent test) were used to compare

the test scores of the patients with PNES on neurocognitive measures to normative test data for non-clinical populations. The patients' total scores on the MOCA were compared to the normative cut off score of 26 (Nasreddine et al., 2005). The patients' scaled score results on the subtests of the WMS-IV and the WAIS-IV were compared to the normative mean standard score of 10 (Pearson Clinical, 2008; Wechsler, 2009). The results on the RCFT were compared to the normative standard *T*-score of 50 (Meyers & Meyers, 1995). Based on the mean age of 34 years (M = 34.4, SD = 13.7), the results on the RAVLT Trials were compared to the normative age score for the age group 30 years 0 months 0 days to 34 years 11 months and 31 days as follows: 6.7 for Trial 1, 9.9 for Trial 2, 11.4 for Trial 3, 12.2 for Trial 4, 12.7 for Trial 5, 53.6 for Total, 11.2 for Trial 6, 11.1 for Trial 7, and 14.2 for Recognition (Schmidt, 1996). The results on the TMT were compared to the normative standard percentile score of 50 (Spreen & Strauss, 1998). The results on the STROOP were compared to the normative standard *T*-score of 50 (Golden & Freshwater, 2002). The results on the Raven Standard Matrices were compared to the normative standard percentile score of 50 (Raven, 1998). The mean difference, *t*-test statistic and significance values are reported in Table 2.

Table 2
Means, standard deviations, mean difference, *t*-test statistics, and the significance values for the neurocognitive profile of patients with PNES.

Tests	Mean (*SD*)	Mean Difference	*t*-test	*Sig.* value (*p)*
MOCA	26.60 (3.94)		**	.19
WMS-IV				
WMS-IV Logical Memory Trial 1	9.72 (3.56)		**	.69
WMS-IV Logical Memory Trial 2	9.72 (3.44)	-.28	-.34	.74
WMS-IV Spatial Addition	7.50 (3.20)	-2.50	-3.31	.004*
WMS-IV Symbol Span	7.89 (3.29)	-2.11	-2.72	.01*
WMS-IV Visual Working Memory Index	84.50 (22.95)		**	.01*
WAIS-IV				
WAIS-IV Letter Number Sequencing	8.83 (3.38)		**	.24
WAIS-IV Digit Span Total	8.56 (2.91)	-1.44	-2.10	.05*
WAIS-IV Arithmetic	9.89 (3.94)	-.11	-.12	.91
WAIS-IV Verbal Working Memory Index	95.33 (18.09)	-4.67	-1.09	.29
RCFT				
RCFT Immediate Recall	39.94 (14.96)	-10.06	-2.85	.01*
RCFT Delayed Recall	37.44 (12.52)	-12.56	-4.25	.001*
RCFT Recognition	37.17 (18.22)	-12.83	-2.99	.01*
RAVLT				
RAVLT Trial 1	6.06 (2.21)		**	.26
RAVLT Trial 2	8.72 (2.72)	-1.18	-1.83	.08
RAVLT Trial 3	10.56 (3.05)	-.84	-1.17	.26
RAVLT Trial 4	11.56 (2.48)	-.64	-1.10	.29
RAVLT Trial 5	12.39 (2.30)	-.31	-.57	.57
RAVLT Total	49.28 (11.40)	-4.32	-1.61	.13
RAVLT Trial 6	10.00 (3.36)	-1.20	-1.52	.15
RAVLT Trial 7	10.11 (3.56)	-1.00	-1.18	.26
RAVLT Recognition	12.50 (3.40)		**	.14
TMT				

TMT Trial A	27.78 (23.90)		**	.002*
TMT Trial B	29.44 (28.59)		**	.01*
STROOP				
STROOP Word	38.78 (13.04)	-11.22	-3.65	.002*
STROOP Colour	35.50 (12.83)	-14.5	-4.80	.000*
STROOP Colour-Word	41.06 (9.01)	-8.94	-4.21	.001*
STROOP Inference	48.83 (6.02)	-1.17	-.82	.42
Raven Standard Matrices	25.00 (28.50)		**	.004*

*Note: standard deviations (SD) are presented in parentheses; * significant at α=.05;** one-sample Wilcoxon tests conducted*

There was a significant difference between the patients' mean scores and the normative scores on the WMS-IV Spatial Addition (t= -3.31, p = .004, d = .78, indicating a large effect), and the WMS-IV Symbol Span (t= -2.72, p = .014, d = .64, indicating a medium effect). There was a significant difference between the patients' mean scores and the normative scores on the WMS-IV Visual Working Memory Index (p = .01). There was a significant difference between the patients' scores and the normative mean on the WAIS-IV Digit Span (t= -2.10, p = .05, d = .49, indicating a medium effect). Additionally, there was a significant difference between the patients' scores and the normative means on the RCFT Immediate Recall (t= -2.85, p = .01, d = .67, indicating a large effect), the RCFT Delayed Recall (t= -4.25, p = .001, d = 1.00, indicating a large effect), and the RCFT Recognition (t= -2.99, p = .008, d = .70, indicating a medium effect). There was a significant difference between the patients' scores and the normative mean on the TMT Trial A (p =.002) and Trial B (p =.01). Furthermore, there was a significant difference between the patients' scores and the normative mean on the STROOP Word *T*-score (t= -3.65, p = .002, d = .86, indicating a large effect), the STROOP Colour *T*-score (t= -4.80, p = .001, d = 1.13, indicating a large effect), and the STROOP Colour-Word *T*-score (t= -4.21, p = .01, d = .99, indicating a large effect). There was a significant difference between the patients' scores and the normative percentile score on the Raven Standard Matrices (p = .004). In summary, the patients with

PNES scored below the normative mean on: WMS-IV Spatial Addition, WMS-IV Symbol Span, WMS-IV Visual Working Memory Index, WAIS-IV Digit Span total, RCFT, TMT, STROOP Word, STROOP Colour, and STROOP Colour-Word, and the Raven Standard Matrices (see Table 2).

Neurocognitive impairments of patients with epilepsy. One-sample t-tests (with $\alpha = .05$) and one-sample Wilcoxon tests (non-parametric equivalent test) were used to compare the test scores of the patients with epilepsy on neurocognitive measures to normative test data for non-clinical populations. The analyses were carried out using the same procedures as those applied for the analyses of the test data obtained for the patients with PNES. The patients' total scores on the MOCA were compared to the normative cut off score of 26 (Nasreddine et al., 2005). The patients' scaled score results on the subtests of the WMS-IV and the WAIS-IV were compared to the normative standard score of 10 (Pearson Clinical, 2008; Wechsler, 2009). The results on the RCFT were compared to the normative standard *T*-score of 50 (Meyers & Meyers, 1995). Based on the mean age of 40 years ($M = 39.8$, $SD = 16.2$), the results on the RAVLT Trials were compared to the normative age score for the age group 40 years 0 months 0 days to 44 years 11 months 31 days as follows: 6.6 for Trial 1, 9.3 for Trial 2, 10.8 for Trial 3, 11.7 for Trial 4, 12.3 for Trial 5, 51.1 for Total, 10.4 for Trial 6, 10.2 for Trial 7, and 14 for Recognition (Schmidt, 1996). The results on the TMT were compared to the normative standard percentile score of 50 (Spreen & Strauss, 1998). The results on the STROOP were compared to the normative standard *T*-score of 50 (Golden & Freshwater, 2002). The results on the Raven Standard Matrices were compared to the normative standard percentile score of 50 (Raven, 1998). The mean difference, *t*-test statistic and significance values are reported in Table 3.

Table 3
Means, standard deviations, mean difference, *t*-test statistics, and the significance values for the neurocognitive profile of patients with epilepsy.

Tests	Mean (*SD*)	Mean Difference	*t*-test	*Sig.* value (*p)*
MOCA	24.00 (2.52)	-2.00	-2.75	.02*
WMS-IV				
WMS-IV Logical Memory Trial 1	7.83 (4.17)	-2.12	-1.80	.10
WMS-IV Logical Memory Trial 2	7.42 (3.82)	-2.58	-2.34	.04*
WMS-IV Spatial Addition	9.75 (3.47)	-.25	-.25	.81
WMS-IV Symbol Span	7.75 (2.80)	-2.50	-2.79	.02*
WMS-IV Visual Working Memory Index	92.58 (16.31)	-7.42	-1.58	.14
WAIS-IV				
WAIS-IV Letter Number Sequencing	7.67 (1.97)	-2.33	-4.10	.002*
WAIS-IV Digit Span Total	6.92 (2.71)	-3.08	-3.94	.002*
WAIS-IV Arithmetic	9.00 (2.92)	-1.00	-1.19	.26
WAIS-IV Verbal Working Memory Index	86.00 (17.82)	-14.00	-2.72	.02*
RCFT				
RCFT Immediate Recall	44.25 (18.76)	-5.75	-1.06	.31
RCFT Delayed Recall	46.50 (19.69)	-3.50	-.62	.55
RCFT Recognition	43.08 (11.37)	-6.92	-2.11	.06
RAVLT				
RAVLT Trial 1	6.42 (2.23)	-.18	-.28	.78
RAVLT Trial 2	10.08 (2.78)	.78	.98	.35
RAVLT Trial 3	11.08 (2.57)	.28	.38	.71
RAVLT Trial 4	11.42 (3.37)		**	.94
RAVLT Trial 5	11.92 (3.63)		**	.81
RAVLT Total	50.92 (12.46)	-.18	-.05	.96
RAVLT Trial 6	9.25 (4.39)		**	.35
RAVLT Trial 7	9.25 (4.58)	-.95	-.72	.49
RAVLT Recognition	12.92 (3.03)		**	.54

TMT				
TMT Trial A	42.50 (33.34)		**	.34
TMT Trial B	43.33 (32.85)		**	.45
STROOP				
STROOP Word	36.67 (9.01)	-13.33	-5.13	.000*
STROOP Colour	35.83 (4.80)	-14.17	-10.22	.000*
STROOP Colour-Word	44.75 (6.09)	-5.25	-2.99	.01*
STROOP Inference	50.58 (6.22)	.58	.33	.75
Raven Standard Matrices	42.50 (23.21)		**	.25

*Note: standard deviations (SD) are presented in parentheses; * significant at α=.05;** one-sample Wilcoxon tests conducted*

There was a significant difference between the patients' means scores on the MOCA (t = -2.75, p = .02, d = .79, indicating a large effect) and the normative cut off score. There was also a significant difference between the patients' mean scores and the normative scores on the WMS-IV Logical Memory Trial 2 (t = -2.34, p = .04, d = .68, indicating a medium effect), and the WMS-IV Symbol Span (t = -2.79, p = .02, d = .80, indicating a large effect). There was a significant difference between the patients' mean scores and the normative scores on the WAIS-IV Letter-Number Sequencing (t = -4.10, p = .002, d = 1.19, indicating a large effect), and the WAIS-IV Digit Span (t = -3.94, p = .002, d = 1.14, indicating a large effect). There was a significant difference between the patients' mean scores and the normative scores on the WAIS-IV Verbal Working Memory Index (t = -272, p = .02, d = .79, indicating a large effect). There was a significant difference between the patients' mean scores and the normative scores on the STROOP Word *T*-score (t = -5.13, p = .001, d = 1.48, indicating a large effect), the STROOP Colour *T*-score (t = -10.22, p = .001, d = 2.95, indicating a large effect) and the STROOP Colour-Word *T*-score (t = -2.99, p = .01, d = .86, indicating a large effect). In summary, the patients with epilepsy scored below the normative mean on the: MOCA, WMS-IV Logical Memory Trial 2, WMS-IV Symbol Span, WAIS-IV

Letter-Number Sequencing, WAIS-IV Digit Span, WAIS-IV Verbal Memory Index, and the STROOP Word, STROOP Colour, and STROOP Colour-Word tests (see Table 3).

Thus, the results on the comparative analysis to the normative data indicated that the common impairments manifested by the two patient groups pertained to their performances on the WMS-IV Symbol Span, the WAIS-IV Digit Span, the STROOP Word, STROOP Colour, and the STROOP Colour-Word tests. Impairments that were specific to the patients with PNES were shown on the WMS-IV Spatial Addition, the WMS-IV Visual Working Memory Index, the RCFT Immediate, RCFT Delayed, RCFT Recognition, the TMT Trials A and B, and the Raven Standard Matrices. Impairments that were specific to the patients with epilepsy were demonstrated on the MOCA, the WMS-IV Logical Memory Trial 2, WAIS-IV Letter-Number Sequencing, and the WAIS-IV Verbal Working Memory Index.

Comparisons between the patients with PNES and patients with epilepsy on the neurocognitive measures. Independent samples *t*-tests and Mann-Whitney *U*-tests were used to compare the test scores obtained by the group of patients with PNES and the group of patients with epilepsy on the neurocognitive measures (see Appendix 2). The assumptions of independence and measurement scale were met for all the variables. Inspection of the histograms of the two groups and the Shapiro-Wilk tests indicated that both samples were normally distributed for the majority of the variables therefore independent samples *t*-tests were run. In some instances, the samples were not normally distributed and hence the non-parametric alternative of an independent samples t-test, i.e., the Mann-Whitney *U*-test, was used. Levene's test for equality of variances were not significant for many of the variables, however for the RCFT Delayed and the STROOP Colour the assumption of homogeneity of variance was violated and hence a Welch's *t*-test was run instead. The means, standard

deviations, mean rank (where applicable), *t*-test and Mann-Whitney *U*-test statistics, and the significance values for the neurocognitive variables are reported in Table 4.

Table 4

Means, standard deviations, mean ranks, *t*-test and Mann-Whitney *U*-test statistics, and the significance values for the neurocognitive variables.

Tests	Mean (*SD*)		Mean Rank		*t*-test	Mann-Whitney *U*	*Sig.* value (*p*)
	Patients with PNES	Patients with Epilepsy	Patients with PNES	Patients with Epilepsy			
MOCA			18.86	10.46		47.50	.01*
WMS-IV							
WMS-IV Logical Memory Trial 1			17.08	13.13		79.50	.23
WMS-IV Logical Memory Trial 2	9.72 (3.44)	7.42 (3.82)			-1.72		.10
WMS-IV Spatial Addition	7.50 (3.20)	9.75 (3.47)			1.82		.08
WMS-IV Symbol Span	7.89 (3.29)	7.75 (2.80)			-.12		.91
WMS-IV Visual Working Memory Index			14.47	17.04		89.50	.44
WAIS-IV							
WAIS-IV Letter Number Sequencing			17.86	11.96		65.50	.07
WAIS-IV Digit Span Total	8.56 (2.91)	6.92 (2.71)			-1.55		.13
WAIS-IV Arithmetic	9.89 (3.94)	9.00 (2.92)			-.67		.51
WAIS-IV Verbal Working Memory Index	95.33 (18.09)	86.00 (17.82)			-1.39		.18
RCFT							
RCFT Immediate Recall			14.42	17.13		88.50	.42
RCFT Delayed Recall	37.44 (12.52)	46.50 (19.69)			1.41		.18
RCFT Recognition Recall	37.17 (18.22)	43.08 (11.37)			1.00		.33
RAVLT							
RAVLT Trial 1			14.75	16.63		94.50	.57
RAVLT Trial 2	8.72 (2.72)	10.08 (2.78)			1.33		.19
RAVLT Trial 3	10.56 (3.05)	11.08 (2.57)			.49		.63
RAVLT Trial 4			15.28	15.83		104.00	.88
RAVLT Trial 5			15.33	15.75		105.00	.92

RAVLT Total T-Score	49.28 (11.40)	50.92 (12.46)			.37		.71
RAVLT Trial 6			16.11	14.58		97.00	.66
RAVLT Trial 7			16.33	14.25		93.00	.55
RAVLT Recognition			15.25	15.88		103.50	.85
TMT							
TMT Trial A			14.14	17.54		83.50	.31
TMT Trial B			13.97	17.79		80.50	.25
STROOP							
STROOP Word T-Scores	38.78 (13.04)	36.67 (9.01)			-.49		.63
STROOP Colour T-Scores	35.50 (12.83)	35.83 (4.80)			.10		.92
STROOP Colour-Word T-Scores	41.06 (9.01)	44.75 (6.09)			1.24		.23
STROOP Inference T-Scores	48.83 (6.02)	50.58 (6.22)			.77		.45
Raven Standard Matrices			12.36	20.21		51.50	.02*

*Note: standard deviations (SD) are presented in parentheses; * significant at α=.05*

There was a significant difference between the two groups on the MOCA total score (U = 47.50, p = .01), with the group of patients with PNES (*Mean Rank* = 18.86) scoring significantly higher than the group of patients with epilepsy (*Mean Rank* = 10.46), with a large effect size (r = .47). On the Raven Standard Matrices the group of patients with PNES (*Mean Rank* = 12.36), scored significantly lower (U = 51.50, p = .02) than the group of patients with epilepsy (*Mean Rank* = 20.21), with a large effect size (r = .45).

Psychological characteristics

Comparisons between the patients with PNES and patients with epilepsy on psychological measures. Independent samples *t*-tests and Mann-Whitney *U*-tests were used to compare the psychological test scores obtained by the patients with PNES and patients with epilepsy (see Appendix 3). The methodological assumptions of independence and measurement scale were met for all the variables. Inspection of the histograms of the two groups and the Shapiro-Wilk tests, indicated the samples were normally distributed for the

majority of the variables therefore independent samples *t*-tests were run. In some instances, the samples were not normally distributed and the non-parametric alternative of an independent samples t-test, i.e., the Mann-Whitney *U*-test, was used. Levene's test for equality of variances were not significant for all of the variables, therefore the assumption of homogeneity of variance was not violated. The means, standard deviations, *t*-test statistics, and the significance values of the results on the psychological are presented in Table 5.

Table 5

Means, standard deviations, mean ranks, *t*-test and Mann-Whitney *U*-test statistics, and the significance values for the psychological variables.

Tests	Mean (*SD*)		Mean Rank		*t*-test	Mann-Whitney *U*	*Sig.* value (*p)*
	Patients with PNES	Patients with Epilepsy	Patients with PNES	Patients with Epilepsy			
BFI							
Extraversion	22.38 (5.73)	22.17 (5.19)			-.12		.92
Agreeableness	33.17 (5.85)	32.75 (4.14)			-.21		.83
Conscientiousness	30.11 (6.00)	30.83 (4.61)			.35		.73
Neuroticism	28.50 (6.67)	25.83 (6.52)			-1.08		.29
Openness to Experience	32.44 (7.27)	30.33 (4.14)			-.91		.37
BDI – II			17.69	12.21		68.50	.10
BAI	25.28 (13.73)	20.42 (17.20)			-.86		.40
TEC			18.97	10.29		45.50	.01*
SDQ-20			18.00	11.75		63.00	.06
DES							
DES-II Amnesia Factor			15.78	15.08		103.00	.85
DES-II Absorption Factor			16.86	13.46		83.50	.31
DES-II Derealisation/Depersonalisation Factor			14.14	17.54		83.50	.31
DES-II Total			17.36	12.71		74.50	.16
AIQ-IV							
AIQ-IV Personal Identity	37.72 (4.70)	37.00 (5.49)			-.39		.70
AIQ-IV Relational Identity	41.78 (6.47)	40.33 (6.05)			-.62		.54
AIQ-IV Social Identity	19.50 (6.37)	20.08 (4.93)			.27		.79
AIQ-IV Collective Identity	17.11 (5.62)	23.08 (5.60)			2.85		.01*

*Note: standard deviations (SD) are presented in parentheses; * significant at α=.05*

There were no significant differences between the two groups on any of the personality variables (see Table 5). In both groups, the personality features included average Extraversion (with an average score of 22), but high Agreeableness (with an average score of 33), high Conscientiousness (with an average score of 30), high Neuroticism (with an average score of 27), and high Openness (with an average score of 32) facets. Despite no significant differences between the two groups on the emotionality variables, the two group's registered high scores on the measures of depression and anxiety (see Table 5). There was a significant difference between the two groups for the Traumatic Experiences Checklist (TEC), with the group of patients with PNES (*Mean Rank* = 18.97) scoring significantly higher than the group of patients with epilepsy (*Mean Rank* = 10.29), $U = 45.50$, $p = .007$, $r = .48$, indicating a large effect. There was a significant difference in Collective Identity, with the group of patients with PNES ($M = 17.11$ $SD = 5.62$) reporting 5.97 points lower Collective Identity scores, 95% CI [1.69, 10.26], than the group of patients with epilepsy ($M = 23.08$, $SD = 5.60$), $t = 2.85$, $p = .02$, $d = .19$ indicating a small effect. In summary, there were no differences in the BFI, BDI-II, BAI, SDQ-20, DES-II, and the AIQ-IV Personal, Relational and Social Identity Subscales. The patients with PNES had higher scores on the TEC than the patients with epilepsy. The patient with epilepsy scored higher on Collective Identity that the patients with PNES.

Chapter 4

Discussion

The differential diagnosis of PNES presents a continuous challenge to neurologists, psychiatrists and other health care professionals (Devinsky et al., 2011). V-EEG remains the gold standard for diagnosis, however, it is costly and has limited availability, and therefore alternative techniques have been continually searched for and evaluated (Mostacci et al., 2011). Diagnostic methods include psychological and neuropsychological measures, hypnotic procedures, placebo interventions, linguistic analyses of the patients' discourse during clinical interview, as well as physiological measures. However, the findings on the differential features of clinical, neurocognitive and psychological functioning of patients with PNES remain indistinct. There is a high rate of misdiagnosis of PNES, particularly within the South African context (Anderson et al., 2017). Patients are recurrently prescribed antiepileptic medications which typically do not aid in seizure reduction, and accurate diagnosis and treatment are often delayed for an average of 7 years (Baslet, 2011; Reuber et al., 2005). This delay is largely due to poor diagnostic accuracy leading to patients' referral to innumerable medical professionals prior to their receiving a PNES diagnosis. This extensive practice of PNES misdiagnosis additionally contributes to the patients' sense of psychological, emotional and financial distress, and significantly worsens their quality of life (Szaflarski et al., 2003). Hence, there is an increasing need to identify the distinct impairments that patients with PNES and patients with epilepsy present with in order to facilitate accurate differential diagnosis and subsequent successful treatment.

The aim of the present study was to explore the profile of the clinical, neuropsychological and psychological characteristics of patients with PNES compared to patients with epilepsy, and to identify comparatively the distinct impairments in the

neuropsychological functioning of these two groups of patients, in relation to normative data for non-clinical populations. Thus the analyses informed by this aim focused on delineating the profiling indicators of patients with PNES by comparing the performances of these patients on clinical, neuropsychological and psychological measures to normative data for non-clinical populations, and to patients with epilepsy.

In the present study, the PNES patients had comparable demographic characteristics to patients with epilepsy in relation to gender, age, self-ascribed ethnicity, nationality, social economic status, relationship status, years of education, handedness, first language, and psychological assessment history, despite studies suggesting epidemiological differences between these patient groups (see Table 1) (Alessi et al., 2013). In the South African context however, similarities in the demographic profiles of the patients with PNES and epilepsy have been previously documented (Anderson et. al., 2017) and attributed to the limited access that segments of the population have to private care facilities where patients with PNES and epilepsy can receive V-EEG monitoring.

The first research question explored the specific impairments in the neurocognitive functioning of the patients with PNES in relation to the normative data for non-clinical populations, while the second research question focused on the specific impairments in the neurocognitive functioning of the patients with epilepsy. Linked to these two questions were the questions addressing the distinct neurocognitive and psychological characteristics of patients with PNES in comparison to patients with epilepsy.

Although previous studies have documented differences between the two patient groups in relation to their seizure experiences (Roberts & Reuber, 2014) in the present study the patients with PNES and the patients with epilepsy reported analogous seizure experiences (loss of consciousness and confusion after seizure). The patients with PNES reported a

significantly higher number of medications prescribed prior to admission for V-EEG monitoring, in comparison to the patients with epilepsy. Studies (Anderson et al., 2017; Reuber, et al., 2002) have shown that many PNES patients are on multiple anticonvulsant medications prior to diagnosis that do not aid seizure reduction, which often increases patients' financial and psychological distress, significantly worsening their quality of life (Szaflarski et al., 2003).

When compared to the data for non-clinical populations (Research question one and two), the two groups manifested similar impairments. These pertained to a lowered level of overall cognitive functioning, compromised cognitive flexibility and inhibition (executive control), and working memory capacities (both verbal and visual).

Although limited in the scope, each patient group presented with specific neurocognitive impairments that were manifested by one group but not the other group. Patients with PNES, unlike patients with epilepsy, had significantly lower performances than the normative standards for their age group on the Immediate Recall, Delayed Recall, Recognition trials of RCF, as well as the TMT trials. Despite this, there was no significant difference between the two groups on the RCF and TMT trials. Further to this, patients with PNES performed significantly lower than the normative standards on the WMS-IV Spatial Addition, WMS-IV Symbol Span, and WMS-IV Visual Working Memory Index, demonstrating impaired visual working memory abilities. Jointly, the results on these two-fold comparisons allude to the possibility that although patients with PNES performed on tasks tapping visual memory at a lower level than the normative score for non-clinical population (O'Brien et al., 2015), the impairment of this capacity is not a differentiating feature of PNES when compared to epilepsy.

Patients with PNES, unlike patients with epilepsy, had significantly lower performance than the normative standard on the Raven SPM. Some of the extant studies have highlighted that PNES may be associated with compromised intellectual functioning (Sackellarea et al., 1985). However, it has also been emphasised that confounding variables such as effort, motivation, and emotionality (high depression and anxiety), may potentially account for these findings (Locke et al., 2006). Importantly, the Raven SPM assesses fluid intelligence and taps into capacities for analysing and synthesising complex visual material. The weak performance of patients with PNES on this test is in keeping with their difficulties in retention and recall of complex visual entities and visual-spatial working memory. Jointly these results suggest that among the profiling indicators of patients with PNES are difficulties with mental manipulation of visual-spatial entities (visual-spatial working memory), retention and recall of complex visual material, and lowered fluid intelligence capacities.

Another indicator characterising the neurocognitive profiles of the two groups is the impairment of longer term verbal recall (narrative memory) and mental manipulation of multifarious verbal entities (verbal working memory) which were both evident in the group of patients with epilepsy but not in the group of patients with PNES. Unlike patients with PNES, patients with epilepsy had significantly lower performance that the normative means on Logical Memory Trial 2, Letter-Number Sequencing, and Verbal Working Memory Index. Difficulties with verbal retention and recall, and verbal working memory have been widely documented in patients with epilepsy, and to a lesser extent in patients with PNES. These findings are therefore in support of the previous research (Strutt et al., 2011) which has indicated that epilepsy is associated with impairments in verbal memory. As was the case with the test performances on the RCFT trials, there was no significant difference between the two groups on these two subtests, suggesting that impairment in longer term verbal recall and verbal working memory is not a feature that differentiates between the two groups.

In addition to these specific impairments manifested in relation to the normative data for non-clinical populations, the between-group comparisons further indicate that along with striking similarities, the two groups presented with particular, though very few, dissimilarities in their neurocognitive and psychological functioning. The results of the between-group comparisons (Research question three) indicate that the patients with PNES demonstrated a higher overall level of cognitive functioning than the patients with epilepsy, as seen in the significant difference between the scores of the two groups on the MOCA test. It has been suggested that patients with epilepsy have greater overall cognitive impairments than PNES patients (Sackellares et al., 1985), however these findings are inconsistent as several studies have found that patients with PNES have more cognitive impairments than patients with epilepsy (Dodrill & Holmes, 2000). The results of the present study further illustrate the value of using the MOCA as a cognitive screening tool for many neurological disorders, due to the high sensitivity and specificity of the instrument (Nasreddine et al., 2005; Witt & Helmstaedter, 2012). The results reflecting a higher performance of patients with PNES compared to patients with epilepsy and the respective normative standard on the MOCA test, taken together their lower performance on the Raven SPM test illustrate an interesting phenomenon. On the one hand, patients with PNES showed stronger overall cognitive capacities than patients with epilepsy, but on the other hand, they presented with lowered fluid intelligence capacities. Raven SPM entails primarily manipulation, abstraction and generalisation of complex visual information. In the context of other tasks (e.g., Spatial Addition) these capacities, together with visual memory capacities were also found to be below the population normative mean in patients with PNES, which indicates that difficulties with processing and retention of visual-spatial material of high complexity is a characterising feature of the neurocognitive profile of patients with PNES.

Surprisingly, there were no other significant differences found between the patients with PNES and patients with epilepsy in relation to the other neurocognitive functions assessed. Both groups demonstrated similar performances on the tests measuring visual and verbal memory, working memory, attention, processing speed in naming and reading, inhibition, cognitive flexibility, as well as verbal learning and retention (see Table 4). These findings are in line with previous results revealing that some of the barriers in the accurate differential diagnosis reside in the similarities between patients with PNES and epilepsy across a wide range of variables tapping their neurocognitive functioning (Drake et al., 1992).

In relation to the patients' psychological characteristics (Research question four), patients with PNES and epilepsy demonstrated similarities in their profiles in relation to personality, anxiety, depression, somatisation and dissociation. With the exception of Extraversion, which was within average range, both groups personality traits of Neuroticism, Agreeableness, Conscientiousness and Openness were all within the high ranges (see Table 5). This cluster of high values is congruent with previous reports (Ekanayake et al., 2017; Kuyk et al., 2003) and suggests that patients with PNES and patients with epilepsy are prone to heightened levels of: negative emotionality and emotional instability (Neuroticism); prosocial behaviour, tender-mindedness and altruism (Agreeableness); dutifulness and perfectionism (Conscientiousness); and complexity of mental and experiential life (Openness). Consistent with a wide range of investigations (de Souza & Salgado, 2006; Prigatano & Kirlin, 2009; Tojek et al., 2000), both groups demonstrated exacerbated levels of depression and anxiety (see table 5) as well as high somatisation and high dissociation (O'Brien et al., 2015). The occurrence of somatisation and dissociation has been widely reported in patients with PNES (Cohen, Testa, Pritchard, Zhu & Hopp, 2014). This trend is accounted for by the psychodynamic explanatory paradigm which postulates that unresolved intrapsychic conflicts are typically associated with repression mechanisms. These

mechanisms underlie the dissociation of patients' emotional and cognitive experiences, in turn leading to presentations of somatised semiology (Beghi et al., 2015; Brown & Trimble, 2000; Fiszman, Alves-Leon, Nunes, D'Andrea, & Figueira, 2004; Myers, Perrine, Lancman, Fleming, & Lancman, 2013; Nijenhuis, 2009; Rosenberg, Rosenberg, Williamson & Wolford, 2000). In contrast to the findings of the present study, research to date, though scarce, has shown that patients with epilepsy present with less exacerbated levels of somatisation and dissociation compared to patients with PNES (O'Brien et al., 2015). The comparable elevation of somatisation and dissociation in the two patient groups illustrates that although the underlying mechanisms of PNES and epilepsy are different, their impact on a person's psychological wellbeing is equally debilitating.

Overall, the profiles of psychological characteristics of the two groups, unlike their neurocognitive profiles, contained more enunciated dissimilarities. In keeping with previous studies (Beghi et al., 2015), one of the pronounced distinctions between the two groups found in the present investigation is the elevated scope and severity of traumatic experiences reported by the patients with PNES. This finding supports the view that more prevalent and stressful negative life events and stressors in childhood and adulthood are likely to trigger or precipitate PNES symptom onset (Tojeck et al., 2000; Widdess-Walsh et al., 2012). Furthermore, the exacerbated traumatic experiences reported by the patients with PNES corroborates Bodde et al. (2013) five-level explanatory model of PNES, which postulates that traumatic experiences account for the main psychogenic causation of PNES. At the same time, the finding also substantiate the staged strategic approach (LaFrance et al., 2013) which delineates traumatic experiences as variables that not only contribute to the characterisation of the individual's seizure presentation, but are also integral to attaining diagnostic accuracy and treatment efficacy.

Another explicit psychological difference between the two groups refers to their collective identity. Collective identity denotes how individuals characterise their various reference group identities (Cheek et al., 2002; Els, 2012). In relation to this dimension of identity, patients with PNES were found to experience lower collective identity than the patients with epilepsy. The comparative explorations of identity dimensions in patients with PNES and patients with epilepsy are scarce, and the present study is the one of the first to report on such findings. The proposition put forward is that in PNES, due to repression of traumatic or stressful events, patients' experience dissociation between their mental processes and their emotional control (Ebrinc et al., 2008). These widely acknowledged dynamics of PNES often lead to the occurrence of a strong dependence on somatic symptom manifestations. Repression and dissociation can intensify patients' reliance on either high external locus of health or avoidance coping strategy, or both. By using these means, patients are then likely to attribute their somatic symptom experiences to external rather than internal factors. Subsequently, patients with PNES consult numerous medical health professionals in relation to symptom concerns, which often exacerbate symptomology and increase diagnostic confusion. Consequently, it can be expected that patients with PNES would have a low collective identity because they fail to recognise themselves in a specific communal identity (Bodde et al., 2013; Stone et al., 2005). Conversely, in patients with epilepsy, the medical validity associated with an epilepsy diagnosis often precipitates a positive effect on their collective identity (Fisher et al., 2000; Jacoby, Snape & Baker, 2005; Rhodes, Nocon, Small & Wright, 2008) and hence these patients present with higher collective identity.

Although the neurophysiological mechanisms of PNES and epilepsy are different, their sequelae are comparable. The similarities in the neurocognitive impairments and some of the psychological vulnerabilities of the two patient groups highlight that these two conditions have a comparable debilitating impact.

The results highlighting exacerbated psychological vulnerabilities of patients with PNES are in keeping with the psychological, rather than neurological aetiology of PNES. In light of the finding of the heightened level of traumatic experiences in the group of patients with PNES, it is proposed that these experiences underlie not only the origin (Tojeck, 2000; Widdess-Walsh et al., 2012) but also the subsequent debilitating impact of PNES to such an extent that this approximates the impact of epileptic seizures on a person's neurocognitive and psychological functioning.

The study also revealed the role of the complexity of the target visual material in memory processing. The demand that complex visual memory tasks place on the cognitive resources is taxing, and the deficiencies manifested by the patients with PNES illustrate the insufficiencies of these resources to cope with the heightened demands of memory tasks with high level of complexity.

The link between traumatic experiences, cognitive resources, and processing has not been explored to date, however studies have alluded to the connection (Beghi et al., 2015; Willment et al., 2015). The present investigation raises the question as to whether the need for containment of traumatic experiences, which is exacerbated in patients with PNES, places significant demands on the person's cognitive resources, and depletes these resources from their potential to meet more taxing cognitive tasks.

Limitations and future research

The sample size in the current study was small, however a wide variety of clinical, neuropsychological and psychological tests were administered, allowing for the creation of a holistic understanding of patients with PNES. The study included comparisons of the specific impairments in the neuropsychological functioning of these two groups of patients, in relation to normative data for non-clinical populations. The normative data is based on the UK

normative sample, which has been applied to the present South African population. This disparity has been acknowledged, however the demographic profile of the current sample is similar to the norming profile of the UK normative samples. Additionally, there is not enough normative data for the South African population on neurocognitive tests (Shuttleworth-Edwards, 2012), which could have allowed for conducting the comparisons with reference to South African norms.

Further research needs to elaborate on the holistic approach adopted in the present study, in which clinical, neuropsychological and psychological characteristics were integrated to gain an accurate profile of patients with PNES.

Conclusion

In the present study, patients with PNES and patients with epilepsy were found to have similar demographic characteristics, and analogous seizure presentation experiences (loss of consciousness and confusion after a seizure). Patients with PNES had a higher number of medications prescribed prior to their admission for V-EEG monitoring than patients with epilepsy. The comparisons of the neurocognitive functioning of these two groups of patients in relation to non-clinical populations revealed that both groups had lowered test performances in the domains of verbal and visual working memory, processing speed in naming and reading, cognitive flexibility and inhibition. Unlike patients with epilepsy, patients with PNES demonstrated higher overall level of cognitive functioning and flexibility, impairments in visual memory, and compromised fluid intelligence capacities. On the other hand, patients with epilepsy, unlike patients with PNES, manifested impairments in long term verbal recall and verbal working memory, particularly in relation to heterogeneous (letters and numbers) material. Unexpectedly, in the exploration of the psychological characteristics, no differences were found in the personality traits, levels of depression and anxiety,

somatisation, or dissociation. However, patients with PNES had a wider scope and intensity of traumatic experiences, while patients with epilepsy reported a higher collective identity.

The study is one of the very few that explored concomitantly a wide range of the clinical, neuropsychological and psychological characteristics of patients with PNES and epilepsy. The comparative analyses highlighted that although the two groups present with distinctive features, their similarities are more pervasive. These findings present further challenges for the differential diagnosis and add to the complexity of identifying reliable and valid diagnostic tools for PNES. The results lend support to the strategic staged diagnostic approach and point to the use of V-EEG monitoring as the "gold standard" in PNES diagnosis. The proximity of the clinical, neuropsychological and psychological profiles of the two patient groups could be suggestive of a cross-over movement between the impairments in PNES and epilepsy. Based on the biopsychosocial account of PNES aetiology, it is likely in PNES that the psychological vulnerabilities bring about and exacerbate the neurocognitive impairments, while in epilepsy the associated neurocognitive impairments aggregate psychological vulnerabilities. Future studies need to expand on the integrated holistic approach that was adopted in the present investigation and explore comparatively the pre and post diagnosis and/or treatment profiles of patients with PNES to reveal the congruence or disparities between these profiles.

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Appendix 1: Clinical Characteristics Results

Appendix Table 1
Independent Measures T-test for the Number of Medications

	t-test for Equality of Means				95% CI	
	t - statistic	*df*	Sig. value	Mean diff.	Lower	Higher
Medication	-2.11	28	0.04	-1.75	-3.45	-0.05

Appendix Table 2

Chi-Square Tests for the clinical variables

	Chi-Square Test		
	Statistic	*df*	Sig. value
Loss of Consciousness	2.74	1	0.1
Confusion after seizure	0.49	1	0.48
N of Valid Cases	30		

Appendix 2: Neurocognitive Characteristics Results

Appendix Table 3

Mann-Whitney U tests for neurocognitive variables that are not normally distributed

	Mann-Whitney U statistic	*Z*	Sig. value
MOCA	47.50	-2.58	.01
WMS-IV Logical Memory I	76.50	-1.22	.22
WMS-IV Visual Working Memory Index	89.50	-.79	.44
WAIS-IV Letter Number Sequencing	65.50	-1.82	.07
RCTF Immediate Recall	88.50	-.83	.42
RAVLT Trial 1	94.50	-.58	.57
RAVLT Trial 4	104.00	-.17	.88
RAVLT Trial 5	105.00	-.13	.92
RAVLT Trial 6	97.00	-.47	.66
RAVLT Trial 7	93.00	-.64	.55
RAVLT Recognition	103.50	-.20	.85
TMT Trial A	83.50	-1.10	.31
TMT Trial B	80.50	-1.22	.25
Raven Standard Matrices	51.50	-2.44	.02

Appendix Table 4

Independent samples tests for neurocognitive variables that are normally distributed

	Levene's Test		t-test for equality of means						
	F	Sig.	*t- statistic*	*df*	Sig. value	Mean diff.	Std. error diff	95% CI	
								Lower	Higher
WMS-IV Logical Memory 2	.10	.76	-1.72	28	.10	-2.31	1.34	-5.05	.44
WMS-IV Spatial Addition	.38	.54	1.82	28	.08	2.25	1.23	-.28	4.78
WMS-IV Symbol Span	1.52	.23	-.12	28	.91	-.14	1.16	-2.51	2.23
WAIS-IV Digit Span Total	.17	.69	-1.55	28	.13	-1.64	1.06	-3.80	.52
WAIS-IV Arithmetic	1.51	.23	-.67	28	.51	-.89	1.33	-3.62	1.84
WAIS-IV Verbal Working Memory Index	.05	.82	-1.39	28	.18	-9.33	6.70	-23.07	4.40
RCFT Delayed Recall	5.48	.03	1.41	16.94	.18	9.06	6.40	-4.46	22.57
RCFT Recognition	3.48	.07	1.00	28	.33	5.92	5.92	-6.21	18.04
RAVLT Trial 2	.08	.78	1.33	28	.19	1.36	1.02	-.73	3.45
RAVLT Trial 3	2.44	.13	.49	28	.63	.53	1.07	-1.67	2.72
RAVLT Total	.002	.96	.37	28	.71	1.64	4.41	-7.39	10.67
STROOP Word	2.44	.13	-.49	28	.63	-2.11	4.33	-10.99	6.76
STROOP Colour	21.64	.001	.10	23.31	.92	.33	3.33	-6.54	7.21
STROOP Colour-Word	1.66	.21	1.24	28	.23	3.69	2.98	-2.41	9.80
STROOP Inference	.001	.99	.77	28	.45	1.75	2.27	-2.91	6.41

Appendix 3: Psychological Characteristics Results

Appendix Table 5

Mann-Whitney U tests for psychological variables that are not normally distributed

	Statistic	*Z*	Sig. value
BDI	68.50	-1.68	.10
TEC	45.50	-2.65	.01
SDQ-20	63.00	-1.91	.06
DES Amnesia Factor	103.00	-.22	.85
DES Absorption Factor	83.50	-1.04	.31
DES Depersonalisation/Derealisation	83.50	-1.06	.31
DES Total	74.50	-1.42	.16

Appendix Table 6

Independent samples tests for psychological variables that are normally distributed

	Levene's Test		t-test for equality of means						
	F	Sig.	*t- statistic*	*df*	Sig. value	Mean diff.	Std. error diff	95% CI	
								Lower	Higher
BFI Extraversion	.07	.80	-.11	28	.92	-.22	2.06	-4.44	3.99
BFI Agreeableness	.89	.35	-.21	28	.83	-.42	2.00	-4.42	3.59
BFI Conscientiousness	.18	.68	.35	28	.73	.72	2.05	-3.47	4.91
BFI Neuroticism	.21	.65	-1.08	28	.29	-2.67	2.46	-7.71	2.38
BFI Openness	3.47	.07	-1.00	28	.37	-2.11	2.32	-6.87	2.65
BAI	.62	.44	-.86	28	.40	-4.86	5.66	-16.46	6.73
AIQ-IV Personal Identity	.89	.35	-.39	28	.70	-.72	1.87	-4.56	3.12
AIQ-IV Relational Identity	.54	.47	-.62	28	.54	-1.44	2.35	-6.26	3.37
AIQ-IV Social Idenitity	.70	.41	.27	28	.79	.58	2.18	-3.88	5.05
AIQ-IV Collective Identity	.04	.84	2.85	28	.01	5.97	2.09	1.69	10.26

Appendix 4: Explanatory Statement and Consent Form

Explanatory Statement

Project: Psychological and neuropsychological characteristics differentiating between patients with epileptic and psychogenic non-epileptic seizures

A/P Maria Damianova
Department of Psychology
Phone: 011 950 4180
Email: maria.damianova@monash.edu

Ms. Skye Hanekom
[redacted]

You are invited to take part in this study. Please read this Explanatory Statement in full before deciding whether or not to participate in this research. If you would like further information regarding any aspect of this project, you are encouraged to contact the researchers via the phone numbers or email addresses listed above.

This research aims to identify the clinical, psychological and neuropsychological characteristics of patients with various types of epilepsy and seizure presentation. The findings of the research study will add substantially to the body of literature, particularly in the South African socio-cultural context. Furthermore the findings will be of benefit to neurologists and medical professionals to assist in accurate diagnosis of patients and to enhance treatment efficacy. This study involves a completion of a Master's thesis focusing on the distinct clinical, neurocognitive and psychological profiles characterising the patients with different seizure presentations.

You will be asked to complete a battery of tests, psychological inventories, questionnaires and to partake in an interview with the researcher while in the Milpark Epilepsy Monitoring Unit. Some of the questionnaires explore your self-perceptions on quality of life, self-identity and personal relationships. Examples of questions included in these inventories include: "My romantic partner makes me doubt myself?"; "My personal self-evaluation, the private opinion I have of myself is important"; "Have you experienced divorce, either your own or your parents?" The testing sessions will be over 2 days, and will not interfere with the medical monitoring. The administration of the inventories will be spread over 2 to 3 sessions and each session will take between 2 and 3 hours. Medical history and intake information will be accessed from your medical file with your consent. For example, information about the frequency and presenting features of the seizures, previous neurological findings and family, educational and employment history will be extracted. Due

to your medical need for epilepsy monitoring, you have been selected as the ideal participant for this research. Participation is entirely voluntary and de-identified research ID's will be used in the testing. Refusal or declining to participate in this research will not affect your current medical treatment at the hospital or your ongoing medical treatment thereafter. The consent form will need to be signed and returned in the sealed envelope provided, to indicate your understanding and willingness to participate in the research study. Please place the envelope in the return box located in the reception area. You have a right to withdraw from this research at any time prior to the end of testing without any implications.

Participants will be given research ID numbers to ensure that the data and test results are de-identified and the data will be aggregated so no individual participant can be identified in the results of the research. Some of the questions asked are of sensitive nature and if you experience any psychological discomfort, please contact the staff at the Milpark Epilepsy Monitoring Unit, who will arrange professional psychological assistance, if required. Additional assistance can also be sought from the South African Depression and Anxiety Group at 0800121314.

Storage of data will adhere to the Monash University Regulations and Policies for data and be stored on the Monash South Africa University campus. The data will be destroyed after 5 years if it is no longer required. The results of this research will be made available through a thesis which was written as part of the masters requirements. Only aggregate de-identified data may be used for other projects where ethics approval has been granted.

Should you have any concerns or complaints about the conduct of the project, you are welcome to contact the Research Coordinator at Monash South Africa.

Hester Stols
Office of the Academic President
Monash South Africa
144 Peter Road, Ruimsig
Tel : +27 11 950 4143
Email: hester.stols@monash.edu

Thank you,

A/P Maria Damianova

Consent Form

Project: Psychological and neuropsychological characteristics differentiating between patients with epileptic and psychogenic non-epileptic seizures

Chief Investigator: A/P Maria Damianova

I have been asked to take part in the Monash University research project specified above. I have read and understood the Explanatory Statement and I hereby consent to participate in this project.

I consent to the following:	**Yes**	**No**
Allowing the researcher access to my medical record history and medical history taking interview information	☐	☐
To take part in the entire background interview, questionnaires and assessment procedure as outlined in the Explanatory Statement	☐	☐
Use of all this information in aggregated de-identified format for a thesis, publications and posters/presentations at conference	☐	☐
The data that I provide during this research may be used by the research team in further research projects	☐	☐
	☐	☐
	☐	☐

Name:
Participant Signature :

Date :

Appendix 5: Questionnaires

Demographic Questions

1 Age of Participant _____

2 Gender

Male Female

3 Self-Ascribed Ethnicity

White Black Indian Coloured Asian Other

4 Nationality _____

5 Relationship Status _____

6 Social Economic Status _____

7 Education Level _____

8 Number of years of education _____

9 Medical Aid Provider _____

10 Primary Care Giver _____

The Big Five Inventory (BFI)

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement.

Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree Strongly
1	2	3	4	5

I see myself as someone who...

____1. Is talkative

____2. Tends to find fault with others

____3. Does a thorough job

____4. Is depressed, blue

____5. Is original, comes up with new ideas

____6. Is reserved

____7. Is helpful and unselfish with others

____8. Can be somewhat careless

____9. Is relaxed, handles stress well

____10. Is curious about many different things

____11. Is full of energy

____12. Starts quarrels with others

____13. Is a reliable worker

____14. Can be tense

____15. Is ingenious, a deep thinker

____16. Generates a lot of enthusiasm

____17. Has a forgiving nature

____18. Tends to be disorganized

____19. Worries a lot

____20. Has an active imagination

____21. Tends to be quiet

____22. Is generally trusting

____23. Tends to be lazy

____24. Is emotionally stable, not easily upset

____25. Is inventive

____26. Has an assertive personality

____27. Can be cold and aloof

____28. Perseveres until the task is finished

____29. Can be moody

____30. Values artistic, aesthetic experiences

____31. Is sometimes shy, inhibited

____32. Is considerate and kind to almost everyone

____33. Does things efficiently

____34. Remains calm in tense situations

____35. Prefers work that is routine

____36. Is outgoing, sociable

____37. Is sometimes rude to others

____38. Makes plans and follows through with them

____39. Gets nervous easily

____40. Likes to reflect, play with ideas

____41. Has few artistic interests

____42. Likes to cooperate with others

____43. Is easily distracted

____44. Is sophisticated in art, music, or literature

Roche

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Beck Depression Inventory

CRTN: _____ CRF number: _____

Baseline

Page 14 patient inits: _____

BDI-II

Date:

Name: _____ Marital Status: _____ Age: _____ Sex: _____

Occupation: _____ Education: _____

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** in each group that best describes the way you have been feeling during the **past two weeks, including today**. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

1. Sadness

0 I do not feel sad.
1 I feel sad much of the time.
2 I am sad all the time.
3 I am so sad or unhappy that I can't stand it.

2. Pessimism

0 I am not discouraged about my future.
1 I feel more discouraged about my future than I used to be.
2 I do not expect things to work out for me.
3 I feel my future is hopeless and will only get worse.

3. Past Failure

0 I do not feel like a failure.
1 I have failed more than I should have.
2 As I look back, I see a lot of failures.
3 I feel I am a total failure as a person.

4. Loss of Pleasure

0 I get as much pleasure as I ever did from the things I enjoy.
1 I don't enjoy things as much as I used to.
2 I get very little pleasure from the things I used to enjoy.
3 I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings

0 I don't feel particularly guilty.
1 I feel guilty over many things I have done or should have done.
2 I feel quite guilty most of the time.
3 I feel guilty all of the time.

6. Punishment Feelings

0 I don't feel I am being punished.
1 I feel I may be punished.
2 I expect to be punished.
3 I feel I am being punished.

7. Self-Dislike

0 I feel the same about myself as ever.
1 I have lost confidence in myself.
2 I am disappointed in myself.
3 I dislike myself.

8. Self-Criticalness

0 I don't criticize or blame myself more than usual.
1 I am more critical of myself than I used to be.
2 I criticize myself for all of my faults.
3 I blame myself for everything bad that happens.

9. Suicidal Thoughts or Wishes

0 I don't have any thoughts of killing myself.
1 I have thoughts of killing myself, but I would not carry them out.
2 I would like to kill myself.
3 I would kill myself if I had the chance.

10. Crying

0 I don't cry anymore than I used to.
1 I cry more than I used to.
2 I cry over every little thing.
3 I feel like crying, but I can't.

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Subtotal Page 1

Continued on Back

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V 0477

Beck Depression Inventory

Baseline

CRTN: _____ CRF number: _____ Page 15 patient inits: _____

11. Agitation

0 I am no more restless or wound up than usual.
1 I feel more restless or wound up than usual.
2 I am so restless or agitated that it's hard to stay still.
3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

0 I have not lost interest in other people or activities.
1 I am less interested in other people or things than before.
2 I have lost most of my interest in other people or things.
3 It's hard to get interested in anything.

13. Indecisiveness

0 I make decisions about as well as ever.
1 I find it more difficult to make decisions than usual.
2 I have much greater difficulty in making decisions than I used to.
3 I have trouble making any decisions.

14. Worthlessness

0 I do not feel I am worthless.
1 I don't consider myself as worthwhile and useful as I used to.
2 I feel more worthless as compared to other people.
3 I feel utterly worthless.

15. Loss of Energy

0 I have as much energy as ever.
1 I have less energy than I used to have.
2 I don't have enough energy to do very much.
3 I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

0 I have not experienced any change in my sleeping pattern.
1a I sleep somewhat more than usual.
1b I sleep somewhat less than usual.
2a I sleep a lot more than usual.
2b I sleep a lot less than usual.
3a I sleep most of the day.
3b I wake up 1–2 hours early and can't get back to sleep.

17. Irritability

0 I am no more irritable than usual.
1 I am more irritable than usual.
2 I am much more irritable than usual.
3 I am irritable all the time.

18. Changes in Appetite

0 I have not experienced any change in my appetite.
1a My appetite is somewhat less than usual.
1b My appetite is somewhat greater than usual.
2a My appetite is much less than before.
2b My appetite is much greater than usual.
3a I have no appetite at all.
3b I crave food all the time.

19. Concentration Difficulty

0 I can concentrate as well as ever.
1 I can't concentrate as well as usual.
2 It's hard to keep my mind on anything for very long.
3 I find I can't concentrate on anything.

20. Tiredness or Fatigue

0 I am no more tired or fatigued than usual.
1 I get more tired or fatigued more easily than usual.
2 I am too tired or fatigued to do a lot of the things I used to do.
3 I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

0 I have not noticed any recent change in my interest in sex.
1 I am less interested in sex than I used to be.
2 I am much less interested in sex now.
3 I have lost interest in sex completely.

3 4 5 6 7 8 9 10 11 12 A B C D E

_____ Subtotal Page 2
_____ Subtotal Page 1
_____ Total Score

NR15645

Beck Anxiety Inventory

Below is a list of common symptoms of anxiety. Please carefully read each item in the list. Indicate how much you have been bothered by that symptom during the past month, including today, by circling the number in the corresponding space in the column next to each symptom. Not At All	Mildly but it didn't bother me much.	Moderately - it wasn't pleasant at times	Severely – it bothered me a lot
Numbness or tingling	0	1	2	3
Feeling hot	0	1	2	3
Wobbliness in legs	0	1	2	3
Unable to relax	0	1	2	3
Fear of worst happening	0	1	2	3
Dizzy or lightheaded	0	1	2	3
Heart pounding/racing	0	1	2	3
Unsteady	0	1	2	3
Terrified or afraid	0	1	2	3
Nervous	0	1	2	3
Feeling of choking	0	1	2	3
Hands trembling	0	1	2	3
Shaky / unsteady	0	1	2	3
Fear of losing control	0	1	2	3
Difficulty in breathing	0	1	2	3
Fear of dying	0	1	2	3
Scared	0	1	2	3
Indigestion	0	1	2	3
Faint / lightheaded	0	1	2	3
Face flushed	0	1	2	3
Hot/cold sweats	0	1	2	3
				Column Sum

Traumatic Experiences Checklist

People may experience a variety of traumatic experiences during their life. We would like to know three things: 1) if you have experienced any of the following 29 events, 2) how old you were when they happened, and 3) how much of an impact these experiences had upon you.

A) In the first column (i.e., Did this happen to you?), indicate whether you had each of the

29 experiences by circling YES or NO.

B) For each experience where you circled YES, list in the second column (i.e., Age) your age when it happened.

If it happened more than once, list ALL of the ages when this happened to you.

If it happened for years (e.g., age 7-12), list the age range (i.e., age 7-12).

C) In the final column (i.e., How much impact did this have on you?), indicate the IMPACT (by circling the appropriate number): 1, 2, 3, 4, or 5.

1 = none

2 = a little bit

3 = a moderate amount

4 = quite a bit

5 = an extreme amount

1. Having to look after

your parents and/or brothers and sisters

when you were a child. no yes 1 2 3 4 5

2. Family problems

(e.g., parent with alcohol

or psychiatric problems,

poverty). no yes 1 2 3 4 5

3. Loss of a family member

(brother, sister, parent)

when you were a CHILD. no yes 1 2 3 4 5

4. Loss of a family member

(child or partner) when

you were an ADULT. no yes 1 2 3 4 5

5. Serious bodily injury

(e.g., loss of a limb,

mutilation, burns). no yes 1 2 3 4 5

6. Threat to life from

illness, an operation, or

an accident. no yes 1 2 3 4 5

7. Divorce of your parents no yes 1 2 3 4 5

8. Your own divorce no yes 1 2 3 4 5

9. Threat to life from

another person (e.g.,

during a crime). no yes 1 2 3 4 5

10. Intense pain (e.g., from

an injury or surgery). no yes 1 2 3 4 5

11. War-time experiences (e.g.,

imprisonment, loss of relatives, deprivation, injury).	no yes	.....	1 2 3 4 5
12. Second generation war-victim (war-time experiences of parents or close relatives)	no yes	.....	1 2 3 4 5
13. Witnessing others undergo trauma.	no yes	.....	1 2 3 4 5
14. Emotional neglect (e.g., being left alone, insufficient affection) by your parents, brothers or sisters.	no yes	.....	1 2 3 4 5
15. Emotional neglect by more distant members of your family (e.g., uncles, aunts, nephews, nieces, grandparents).	no yes	.....	1 2 3 4 5
16. Emotional neglect by non-family members (e.g., neighbors, friends,			

step-parents, teachers). no yes 1 2 3 4 5

17. Emotional abuse (e.g., being belittled, teased, called names, threatened verbally, or unjustly punished) by your parents, brothers or sisters. no yes 1 2 3 4 5

18. Emotional abuse by more distant members of your family. no yes 1 2 3 4 5

19. Emotional abuse by non-family members. no yes 1 2 3 4 5

20. Physical abuse (e.g., being hit, tortured, or wounded) by your parents, brothers, or sisters. no yes 1 2 3 4 5

21. Physical abuse by more distant members of your family. no yes 1 2 3 4 5

22. Physical abuse by non-family members. no yes 1 2 3 4 5

23. Bizarre punishment no yes 1 2 3 4 5

If applicable, please describe:

……

……

……

24. Sexual harassment (acts of a sexual nature that DO NOT involve physical contact) by your parents, brothers, or sisters. no yes 1 2 3 4 5

25. Sexual harassment by more distant members of your family. no yes 1 2 3 4 5

26. Sexual harassment by non-family members. no yes 1 2 3 4 5

27. Sexual abuse (unwanted sexual acts involving physical contact) by your parents, brothers, or sisters. no yes 1 2 3 4 5

28. Sexual abuse by more distant members of your family. no yes 1 2 3 4 5

29. Sexual abuse by non-family members. no yes 1 2 3 4 5

Somatoform Dissociation Questionnaire (SDQ-20)

This questionnaire asks about different physical symptoms or body experiences, which you may have had either briefly or for a longer time.

Please indicate to what extent these experiences apply to you **in the past year**.

For each statement, please circle the number in the first column that best applies to YOU.

The possibilities are:

1 = this applies to me NOT AT ALL

2 = this applies to me A LITTLE

3 = this applies to me MODERATELY

4 = this applies to me QUITE A BIT

5 = this applies to me EXTREMELY

If a symptom or experience applies to you, please indicate whether a **physician** has connected it with a **physical disease**.

Indicate this by circling the word YES or NO in the column "Is the physical cause known?"

If you wrote YES, please write the physical cause (if you know it) on the line.

Sometimes:

1. I have trouble urinating 1 2 3 4 5 No Yes, namely .....
2. I dislike tastes that I usually like (women: at times OTHER THAN pregnancy or monthly periods) 1 2 3 4 5 No Yes, namely .....
3. I hear sounds from nearby as if they were coming from far away 1 2 3 4 5 No Yes, namely .....
4. I have pain while urinating 1 2 3 4 5 No Yes, namely .....

5. My body, or a part of it,
   feels numb 1 2 3 4 5 No Yes, namely .....
6. People and things look bigger
   than usual 1 2 3 4 5 No Yes, namely .....
7. I have an attack that resembles an
   epileptic seizure 1 2 3 4 5 No Yes, namely .....
8. My body, or a part of it, is
   insensitive to pain 1 2 3 4 5 No Yes, namely .....
9. I dislike smells that I usually like 1 2 3 4 5 No Yes, namely .....
10. I feel pain in my genitals
    (at times OTHER THAN
    sexual intercourse) 1 2 3 4 5 No Yes, namely .....
11. I cannot hear for a while
    (as if I am deaf) 1 2 3 4 5 No Yes, namely .....
12. I cannot see for a while
    (as if I am blind) 1 2 3 4 5 No Yes, namely .....
13. I see things around me
    differently than usual (for
    example as if looking through
    a tunnel, or seeing merely a
    part of an object) 1 2 3 4 5 No Yes, namely .....
14. I am able to smell much BETTER
    or WORSE than I usually do
    (even though I do <u>not</u> have a cold) 1 2 3 4 5 No Yes, namely .....
15. It is as if my body, or a part
    of it, has disappeared 1 2 3 4 5 No Yes, namely .....
16. I cannot swallow, or can swallow

only with great effort 1 2 3 4 5 No Yes, namely .....

17. I cannot sleep for nights on end,

but remain very active during

daytime 1 2 3 4 5 No Yes, namely .....

18. I cannot speak (or only with

great effort) or I can only whisper 1 2 3 4 5 No Yes, namely .....

19. I am paralysed for a while 1 2 3 4 5 No Yes, namely .....

20. I grow stiff for a while 1 2 3 4 5 No Yes, namely .....

Dissociative Experiences Scale-II (DES-II)

Directions: This questionnaire consists of twenty-eight questions about experiences that you may have in your daily life. We are interested in how often you have these experiences. It is important, however, that your answers show how often these experiences happen to you when you are not under the influence of alcohol or drugs. To answer the questions, please determine to what degree the experience described in the question applies to you, and circle the number to show what percentage of the time you have the experience.

For example: 0% 10 20 30 40 50 60 70 80 90 100%

(Never) (Always)

1. Some people have the experience of driving or riding in a car or bus or subway and suddenly realizing that they don't remember what has happened during all or part of the trip. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

2. Some people find that sometimes they are listening to someone talk and they suddenly realize that they did not hear part or all of what was said. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

3. Some people have the experience of finding themselves in a place and have no idea how they got there. Circle a number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

4. Some people have the experience of finding themselves dressed in clothes that they don't remember putting on. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

5. Some people have the experience of finding new things among their belongings that they do not remember buying. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

6. Some people sometimes find that they are approached by people that they do not know, who call them by another name or insist that they have met them before. Circle the number to show what percentage of the time this happens to you

0% 10 20 30 40 50 60 70 80 90 100%

7. Some people sometimes have the experience of feeling as though they are standing next to themselves or watching themselves do something and they actually see themselves as if they were looking at another person. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

8. Some people are told that they sometimes do not recognize friends of family members. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

9. Some people find that they have no memory for some important events in their lives (for example, a wedding or graduation). Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

10. Some people have the experience of being accused of lying when they do not think that they have lied. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

11. Some people have the experience of looking in a mirror and not recognizing themselves. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

12. Some people have the experience of feeling that other people, objects, and the world around them are not real. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

13. Some people have the experience of feeling that their body does not seem to belong to them. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

14. Some people have the experience of sometimes remembering a past event so vividly that they feel as if they were reliving that event. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

15. Some people have the experience of not being sure whether things that they remember happening really did happen or whether they just dreamed them. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

16. Some people have the experience of being in a familiar place but finding it strange and unfamiliar. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

17. Some people find that when they are watching television or a movie they become so absorbed in the story that they are unaware of other events happening around them. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

18. Some people find that they become so involved in a fantasy or daydream that it feels as though it were really happening to them. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

19. Some people find that they sometimes are able to ignore pain. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

20. Some people find that they sometimes sit staring off into space, thinking of nothing, and are not aware of the passage of time. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

21. Some people sometimes find that when they are alone they talk out loud to themselves. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

22. Some people find that in one situation they may act so differently compared with another situation that they feel almost as if they were two different people. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

23. Some people sometimes find that in certain situations they are able to do things with amazing ease and spontaneity that would usually be difficult for them (for example, sports, work, social situations, etc.). Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

24. Some people sometimes find that they cannot remember whether they have done something or have just thought about doing that thing (for example, not knowing whether they have just mailed a letter or have just thought about mailing it). Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

25. Some people find evidence that they have done things that they do not remember doing. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

26. Some people sometimes find writings, drawings, or notes among their belongings that they must have done but cannot remember doing. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

27. Some people sometimes find that they hear voices inside their head that tell them to do things or comment on things that they are doing. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

28. Some people sometimes feel as if they are looking at the world through a fog, so that people and objects appear far away or unclear. Circle the number to show what percentage of the time this happens to you.

0% 10 20 30 40 50 60 70 80 90 100%

Aspects of Identity Questionnaire (AIQ- IV)

INSTRUCTIONS: These items describe different aspects of identity. Please read each item carefully and consider how it applies to you. Fill in the blank next to each item by choosing a number from the scale below:

1 = Not important to my sense of who I am
2 = Slightly important to my sense of who I am
3 = Somewhat important to my sense of who I am
4 = Very important to my sense of who I am
5 = Extremely important to my sense of who I am

____ 1. The things I own, my possessions
____ 2. My personal values and moral standards
____ 3. My popularity with other people
____ 4. Being a part of the many generations of my family
____ 5. My dreams and imagination
____ 6. The ways in which other people react to what I say and do
____ 7. My race or ethnic background
____ 8. My personal goals and hopes for the future
____ 9. My physical appearance: my height, my weight, and the shape of my body
____ 10. My religion
____ 11. My emotions and feelings
____ 12. My reputation, what others think of me
____ 13. Places where I live or where I was raised
____ 14. My thoughts and ideas
____ 15. My attractiveness to other people
____ 16. My age, belonging to my age group or being part of my generation
____ 17. My gestures and mannerisms, the impression I make on others
____ 18. The ways I deal with my fears and anxieties
____ 19. My sex, being a male or a female
____ 20. My social behaviour, such as the way I act when meeting people
____ 21. My feeling of being a unique person, being distinct from others
____22. My relationships with the people I feel close to
____23. My social class, the economic group I belong to whether lower, middle, or upper class
____ 24. My feeling of belonging to my community
____25. Knowing that I continue to be essentially the same inside even though life involves many external changes
____ 26. Being a good friend to those I really care about
____ 27. My self-knowledge, my ideas about what kind of person I really am
____ 28. My commitment to being a concerned relationship partner
____ 29. My feeling of pride in my country, being proud to be a citizen
____ 30. My physical abilities, being coordinated and good at athletic activities
____ 31. Sharing significant experiences with my close friends
____ 32. My personal self-evaluation, the private opinion I have of myself
____ 33. Being a sports fan, identifying with a sports team
____ 34. Having mutually satisfying personal relationships
____ 35. Connecting on an intimate level with another person
____ 36. My occupational choice and career plans

_____ 37. Developing caring relationships with others
_____ 38. My commitments on political issues or my political activities
_____ 39. My desire to understand the true thoughts and feelings of my best friend or romantic partner
_____ 40. My academic ability and performance, such as the grades I earn and comments I get from teachers
_____ 41. Having close bonds with other people
_____ 42. My language, such as my regional accent or dialect or a second language that I know
_____ 43. My feeling of connectedness with those I am close to
_____ 44. My role of being a student in college
_____ 45. My sexual orientation, whether heterosexual, homosexual, or bisexual

Ethical Approval

MONASH University

Monash University Human Research Ethics Committee (MUHREC)
Research Office

Human Ethics Certificate of Approval

This is to certify that the project below was considered by the Monash University Human Research Ethics Committee. The Committee was satisfied that the proposal meets the requirements of the *National Statement on Ethical Conduct in Human Research* and has granted approval.

Project Number:	CF15/2614 - 2015001071
Project Title:	Psychological and neuropsychological characteristics differentiating between patients with epileptic and psychogenic nonepileptic seizures (including an investigation of the Clinical, Psychological and Neuropsychological Profiling Indicators of Patients D
Chief Investigator:	Ms Maria Kotzoya Damianova
Approved:	**From:** 26 August 2015 **To:** 26 August 2020

Terms of approval - ***Failure to comply with the terms below is in breach of your approval and the Australian Code for the Responsible Conduct of Research.***

1. The Chief investigator is responsible for ensuring that permission letters are obtained, if relevant, before any data collection can occur at the specified organisation.
2. Approval is only valid whilst you hold a position at Monash University.
3. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval and to ensure the project is conducted as approved by MUHREC.
4. You should notify MUHREC immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
5. The Explanatory Statement must be on Monash University letterhead and the Monash University complaints clause must include your project number.
6. **Amendments to the approved project (including changes in personnel):** Require the submission of a Request for Amendment form to MUHREC and must not begin without written approval from MUHREC. Substantial variations may require a new application.
7. **Future correspondence:** Please quote the project number and project title above in any further correspondence.
8. **Annual reports:** Continued approval of this project is dependent on the submission of an Annual Report. This is determined by the date of your letter of approval.
9. **Final report:** A Final Report should be provided at the conclusion of the project. MUHREC should be notified if the project is discontinued before the expected date of completion.
10. **Monitoring:** Projects may be subject to an audit or any other form of monitoring by MUHREC at any time.
11. **Retention and storage of data:** The Chief Investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.

Professor Nip Thomson
Chair, MUHREC

cc: Dr David Anderson, Ms Skye Hanekom

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