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Implicit and explicit self-esteem discrepancies in people with psychogenic nonepileptic seizures

Lian V. Dimaro [a,*], Nicole A. Roberts [b], Nima G. Moghaddam [c], David L. Dawson [c], Ian Brown [d], Markus Reuber [e,1]

[a] University of Nottingham, Institute of Work, Health & Organisations, Yang Fujia Building, Jubilee Campus, Wollaton Road, Nottingham NG8 1BB, UK
[b] School of Social and Behavioral Sciences, Arizona State University, 4701 W. Thunderbird Road, MC 3051, Glendale, AZ 85306, USA
[c] Trent Doctorate in Clinical Psychology, Health, Life and Social Sciences, University of Lincoln, Brayford Pool, Lincoln, Lincolnshire LN6 7TS, UK
[d] Clinical Psychology Unit, Department of Psychology, University of Sheffield, Western Bank, Sheffield S10 2TN, UK
[e] Academic Neurology Unit, University of Sheffield, Royal Hallamshire Hospital, Glossop Road, Sheffield S10 2JF, UK

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ABSTRACT

Purpose: Self-esteem (SE), or one's sense of competence and worth, is reduced in many mental and physical disorders. Low SE is associated with perceived stigma and disability and poor treatment outcomes. The present study examined implicit and explicit SE (automatic and deliberate views about the self) in people with epilepsy and people with psychogenic nonepileptic seizures (PNESs). Discrepancies between implicit SE and explicit SE have been found to correlate with psychological distress in disorders often associated with PNESs but are relatively unexplored in PNESs. We hypothesized that, compared with epilepsy, PNESs would be associated with lower self-reported SE and greater discrepancies between implicit SE and explicit SE.

Methods: Thirty adults with PNESs, 25 adults with epilepsy, and 31 controls without a history of seizures were asked to complete the Rosenberg Self-esteem Scale as a measure of explicit SE and an Implicit Relational Assessment Procedure as a measure of implicit SE. The State–Trait Anxiety Inventory and Patient Health Questionnaire—15 (a somatic symptom inventory) were also administered.

Results: We found significant group differences in explicit ($p < 0.001$) but not implicit SE. Patients with PNESs reported lower SE than the other groups. No group differences were found in implicit SE. Implicit–explicit SE discrepancies were larger in the group with PNESs than in the other groups ($p < 0.001$). Higher frequency of PNESs (but not epileptic seizures) was associated with lower explicit SE ($r_s = -.83$, $p < 0.01$) and greater SE discrepancies (i.e., lower explicit relative to implicit SE; $r_s = .65$, $p < 0.01$). These relationships remained significant when controlling for anxiety and somatization.

Conclusion: Patients with PNESs had lower explicit SE than those with epilepsy or healthy controls. In keeping with our expectations, there were greater discrepancies between implicit SE and explicit SE among patients with PNESs than in the other groups. Our results, including the strong relationship between PNES frequency, anxiety, and explicit–implicit SE discrepancies, support the interpretation that PNESs serve to reduce cognitive dissonance, perhaps protecting patients' implicit SE.

1. Introduction

Psychogenic nonepileptic seizures (PNESs) bear a superficial resemblance to epileptic seizures. However, whereas the experiences and behaviors associated with epileptic seizures are caused by abnormal electrical activity in the brain, most PNESs are considered a dissociative reaction to threatening situations, sensations, emotions, thoughts, or memories [1].

Psychogenic nonepileptic seizures are best conceptualized as a biopsychosocial condition with a psychological profile which, on a range of dimensions, is quite different from that found in patients with epilepsy: many studies have demonstrated that individuals with PNESs report a higher prevalence rate of trauma and PTSD relative to people with epilepsy [2] as well as higher levels of somatization [3]. Compared with epilepsy, individuals with PNESs are also more likely to have personality disorders, especially the borderline type [4]. On the other hand, studies have not found clear differences between patients with PNESs and those with epilepsy in terms of the prevalence of anxiety and depression [5], alexithymia (i.e., difficulty experiencing and expressing affect) [6], or self-reported levels of dissociation [3].

* Corresponding author at: University of Leicester, Maurice Shock Medical Sciences Building, University Road, Leicester LE1 9HN, UK. Tel.: +44 116 252 2969.
E-mail addresses: lian.dimaro@gmail.com (L.V. Dimaro), Nicole.A.Roberts@asu.edu (N.A. Roberts), nmoghaddam@lincoln.ac (N.G. Moghaddam), ddawson@lincoln.ac.uk (D.L. Dawson), ianbrownemail@yahoo.co.uk (I. Brown), markus.reuber@sth.nhs.uk (M. Reuber).
[1] Tel.: +44 114 226 8688.

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Nevertheless, the prevalence rates of such disorders are higher than those seen in healthy controls.

One construct that is underexplored with respect to understanding PNESs is self-esteem (SE). There are strong links between SE, which is typically defined as a sense of competence and worth, and psychological disorders including depression, anxiety disorders, personality disorders, and eating disorders [7]. One hypothesis is that low SE creates vulnerability to stress (e.g., [8]). Although SE has been criticized for not consistently moderating the impact of daily hassles on mood, it has been shown to significantly lessen the impact of such stressors on physical symptoms [9]. Self-esteem has also been found to mediate the relationship between insecure attachment and PTSD symptomatology in survivors of interpersonal trauma, emotional abuse, and psychopathology [10,11]. Despite these links and the documented association of PNESs with trauma and increased rates of insecure attachment [12], there is only limited evidence of SE levels in PNESs.

Given the prevalence of psychological dysfunction and trauma mentioned above, in addition to the psychosocial impact of the disorder, individuals with PNESs are often characterized as vulnerable to low SE [13]; however, the single study that has examined this construct in this patient group used a measure of explicit SE only—limiting a deeper understanding of attitudes about the self in PNESs. This prior study found that SE was indeed lower in individuals with PNESs compared to healthy controls but that, on this measure, those with PNESs did not differ significantly from those with epilepsy [14]. Furthermore, while no correlations have been found between seizure frequency and SE in epilepsy [15], this relationship has not been studied in PNESs.

In addition to controlled/conscious processing (also referred to as *explicit* cognition), much of information processing, including about the self, occurs automatically unconsciously (implicit cognition; [16]). The term *implicit* refers to hypothetical psychological attributes that are introspectively inaccessible but that can be assessed through reaction times, word associations, or other non-self-report measures. Thus, SE can be either a deliberate evaluation of self (explicit SE) [17] or an impulsive, automatic, and overlearned evaluation (implicit SE) [18]. Implicit SE and explicit SE are considered to be relatively enduring characteristics, shaped by both positive and negative experiences [17,19]. Early trauma or childhood abuse, particularly rejection, critical attacks, contempt, and/or devaluation, can all undermine a child's emerging identity [11], leading to victims adopting a negative self-image. In turn, this can have long lasting effects on their character and behavior [20]. While childhood experiences may have a significant role in shaping SE, both implicit SE and explicit SE are considered vulnerable to events across the lifespan including adulthood. Someone with a relatively high SE, for example, may find themselves with a change of socioeconomic status or decline in physical health and, over a period of time, develop a less positive self-view [21]. Although implicit SE and explicit SE are susceptible to change, Baccus, Baldwin, and Packer [19] suggest that such divergences between the two interfere with a person's ability to benefit from positive social feedback. Notably, discrepancies in either direction are thought to be maladaptive and have been found to correlate with psychological distress in depression [22] and borderline personality disorder [23], both of which are associated with childhood trauma [24,25] and PNESs [3,4].

One explanation for why discrepant self-evaluations are problematic comes from cognitive dissonance theory [26], which proposes that conflicting thoughts, ideas, beliefs, or behaviors produce uncomfortable feelings and tension or anxiety. Because of an innate motivational drive to avoid inconsistency, behaviors can become irrational and maladaptive in an attempt to restore or maintain consonance [26]. Similarly, Steele argues that dissonance is rooted in threats to the self and that individuals engage in processes of dissonance reduction to defend the self from such threats [27]. Utilizing implicit methodology, Rydell, McConnell, and Mackie concluded that dissonance and dissonance-related discomfort increase when there is divergence on implicit and explicit measures [28]. Furthermore, discrepant implicit–explicit SE in either direction is associated with more dissonance-reducing behaviors. For instance, Jordan and colleagues showed that individuals with high explicit but low implicit SE were more defensive and rationalized their decisions more than those with consistent implicit–explicit SE [29]. As implicit–explicit discrepancies may be associated with anxiety, the present study builds on our previous findings examining the relationship between discrepancies in anxiety and PNES frequency [30].

The studies and theoretical rationale discussed above suggest that both implicit SE and explicit SE may play a key part in PNESs, and yet, previous work has only examined explicit SE. This study's primary aim was to compare groups (PNESs, epilepsy, controls) on implicit and explicit measures of SE. The secondary aims were to explore implicit–explicit SE discrepancies and to explore correlations between SE, anxiety, and seizure frequency. We hypothesized that people with PNESs would report lower SE and would show larger discrepancies in implicit and explicit measures of SE than people with epilepsy or nonclinical controls. We also anticipated that discrepancies in implicit and explicit measures of SE would be related to greater frequency of PNESs as PNESs may be conceptualized as an attempt to avoid distress and reduce arousal.

2. Method

2.1. Participants

As part of a larger study [30], 30 adults with PNESs and 25 adults with epilepsy (13 structural/metabolic epilepsy, five genetic generalized epilepsy, and seven unclassifiable epilepsy) were recruited from outpatient seizure clinics at the Sheffield Teaching Hospital NHS Foundation Trust between February and September 2012. All diagnoses were made by neurologists specializing in the treatment of seizures, and only those whose diagnoses were supported by a previous video-EEG recording of a typical seizure were included. Patients with mixed seizure disorders (people with both epilepsy and PNESs) were not included. Thirty-one adults matched on gender, age, and education who reported no history of seizures served as a nonclinical control group. These participants were recruited through a poster advertisement across the hospital and university. All participants were at least 18 years old. Individuals unable to complete self-report questionnaires unaided or not fluent in English and those physically unable to use a computer were excluded.

2.2. Ethical approval

The proposal was approved by Leeds Research and Ethics Committee (REC) and the Research Office of the Sheffield Teaching Hospitals NHS Foundation Trust. All participants provided written informed consent in accordance with the REC guidance and Helsinki Good Clinical Practice.

2.3. Measures

2.3.1. Demographic and medical history

Basic demographic information (age, gender, level of education) and seizure frequency were self-reported. Participants were also asked to specify in an open-ended fashion any current or previous mental health problems.

2.3.2. Rosenberg Self-esteem Scale (RSS)

The RSS was employed to examine explicit SE [31]. It is a 10-item questionnaire which asks for responses on a 4-point Likert scale from 0 to 3 with endpoints labeled strongly agree and strongly disagree. Scores range from 0 to 30, with higher scores reflecting a greater sense of worth and achievement. This measure is one of the most widely used SE measures. It has been found to have high internal consistency (alpha of .88) and test–retest reliability (r = .82). In the current study, the Cronbach's alpha was .90.

2.3.3. Spielberger State–Trait Anxiety Inventory (STAI)

The STAI is an explicit self-report measure of state and trait anxiety [32]. It is composed of forty questions with response options ranging from 1 (not at all/almost never) to 4 (very much so/almost always) on a Likert scale. Total scores range from 20 to 80, with higher scores reflecting higher levels of anxiety. The STAI was chosen because of its ability to examine both state and trait constructs, with test–retest reliability of .40 and .86, respectively. It also has concurrent validity with other measures of anxiety, having correlations around .80 [33]. The Cronbach's alpha scores for the state and trait measures in this study were .93 and .95.

2.3.4. Patient Health Questionnaire—15 (PHQ-15)

The PHQ-15 was used as a self-report screen for somatization and somatic symptoms [34]. The measure comprises 15 somatic symptoms, each scored 0 ("not bothered at all"), 1 ("bothered a little"), or 2 ("bothered a lot"). Total scores range from 0 to 30 and are classified as reflecting minimum (0–4), mild (5–9), moderate (10–14), or severe (15+) somatization. The measure was not developed as a stand-alone diagnostic tool but was used to supplement other clinical information. The PHQ-15 has good internal consistency (Cronbach's alpha of 0.80) and moderate associations between items.

2.3.5. Implicit Relational Assessment Procedure (IRAP)

The IRAP is a contemporary latency-based measurement of implicit cognition which assumes that the strength of specific relations is reflected in participant response times [35]. The basic IRAP principle is that average response latencies are relatively shorter on blocks that support the participant's impulsive (implicit) beliefs compared to blocks that do not support their beliefs. The SE IRAP ($IRAP_{SE}$) stimulus set (Table 1) was developed by the authors to reflect a model of SE similar to that underpinning the explicit RSS.

Stimuli and responses were presented on a portable laptop and recorded by the IRAP software. Participants read through instructions presented visually by the experimenter (available as web content). These instructions explained the IRAP procedure and how to complete the task and highlighted that accuracy and speed in responding were a prerequisite to progress to the test phase. Participants were specifically informed that it would sometimes be necessary to respond to the stimuli in a manner consistent with their beliefs and sometimes in ways that may be inconsistent with their beliefs. Participants were instructed to derive the correct response style for each block of trials but were not told which trials were considered to be "consistent" or "inconsistent". To ensure understanding of the task and minimize random responding, each participant was administered at least two practice blocks until they achieved an average response time of less than 3 s and an accuracy rating above 80% (in line with previous research [36]).

Each trial was comprised of a category label ("I am" or "Others are") appearing at the top of the screen, one of 12 target words in the center (e.g., "capable", "proud", and "worthless"), and the two response options "True" and "False" in the bottom corners. All the stimuli (label, target, and response options) were presented simultaneously (Fig. 1) and remained on the screen until the participant selected one of the relational terms by pressing the 'D' key for 'true' or the 'K' key for 'false'. Choosing the relational term deemed "correct" for a particular trial removed all stimuli from the screen for 400 ms before the next trial was presented. Choosing the relational term that was deemed "incorrect" for that particular trial produced a red "X" in the center of the screen. To remove the X and proceed to the 400-millisecond intertrial interval, participants were required to select the correct response option.

An accurate response was dependent on whether a "consistent" or "inconsistent" trial was administered. During "consistent" blocks of the $IRAP_{SE}$, participants were required to categorize themselves as valuable (e.g., I am — valuable — True and I am — worthless — False) and others as worthless (e.g., Others are — worthless — True and Others are — valuable — False). During "inconsistent" blocks, the response contingencies were reversed. Trials were deemed to be "consistent" and "inconsistent" based on findings for the 'universality' of self-positive implicit biases (e.g., [37]). Fig. 1 illustrates the two category labels with their respective "consistent" and "inconsistent" stimuli.

During the IRAP, participants were exposed to six test blocks, alternating between "consistent" and "inconsistent" blocks, each with 24 trials. The category label and target stimuli within each block were randomized with the constraint that stimuli were not presented more than three times with each sample. Visual instructions after each test block indicated that the next block would involve reversing the previously correct and incorrect responses.

Table 1
The stimulus arrangements for the $IRAP_{SE}$.

Sample 1: I am	Sample 2: Others are
Response option 1: True	Response option 2: False
Target stimuli consistent with sample 1	Target stimuli consistent with sample 2
Capable	Incompetent
Proud	Ashamed
Valuable	Worthless
Successful	Useless
Clever	Stupid
Attractive	Ugly

2.4. Procedure

Participants first completed the self-report measures (demographics, RSS, STAI, and PHQ-15). The order of the questionnaires was randomized using an online research randomizer (available from http://www.randomizer.org). Participants then completed the IRAP task while their questionnaires were proofread for missing data and were followed up with a debrief.

2.5. IRAP data preparation

Raw latency data from the IRAP (time in milliseconds from trial onset to participant response) were converted into a D measure (D-IRAP) consistent with current implicit measurement research outlined by Barnes-Holmes and colleagues [35] (also available as web content linked to this article). The D transformation serves to minimize the impact of individual variability relating to extraneous variables such as age, cognitive ability, and/or motor skills, offering a cleaner response-latency paradigm measurement [38]. To facilitate interpretation of the results and comparability of evaluative responses toward self vs. others, the computed D-IRAP 'others are' trial scores were reverse-scored prior to statistical analysis. Consequently, in analyses reported below, positive scores are indicative of high regard and negative scores reflect the reverse. Scores reflecting implicit 'esteem for others' are thus tuned in the same direction as implicit and explicit SE scores: i.e., higher positive scores indicate greater SE/more positive self-evaluations.

2.6. Statistical analysis

Statistical analysis was completed with IBM SPSS for Windows version 20.0. As the explicit data violated the assumption of homogeneity of variance–covariance, several analyses of variance (ANOVAs) were conducted. To conservatively protect against multiple testing errors, the alpha criterion for these separate ANOVAs was adjusted using sequential Holm–Bonferroni correction (from the smallest to largest observed p-value, the threshold for significance of omnibus F statistics consequently ranged from $p < 0.0167$ to $p < 0.05$). Analyses of variance

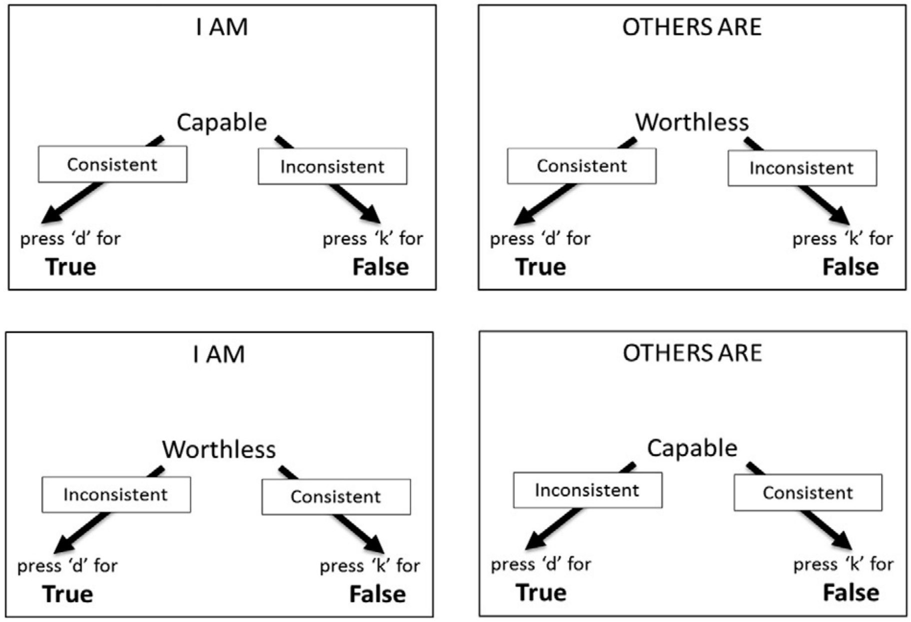

Fig. 1. Examples of the four trial types in the $IRAP_{SE}$. Arrows with text boxes showing "Consistent"/"Inconsistent" did not appear on-screen and are shown for illustrative purposes only.

were followed by Tukey's HSD tests to determine pairwise differences with correction for multiple comparisons.

For the purpose of computing implicit–explicit discrepancy scores and in line with previous work [19], both explicit (RSS) and implicit (D-$IRAP_{SE}$ self trial) indices of SE were first transformed into z-scores (enabling direct comparability) using the appropriate whole sample mean and SD. For example, individual explicit SE z-scores were computed as: z-RSS = (observed RSS score − grand mean RSS / grand SD). Computed z-scores were then used to compute discrepancy scores by subtracting the explicit z-score (z-RSS) from the implicit z-score (z-transformed D-$IRAP_{SE}$ self trials). In this way, higher positive discrepancy scores were indicative of lower explicit relative to implicit SE. Transformed z-scores were only used in computation of the SE discrepancy scores; untransformed scores were used in analyses of the variables from which these discrepancy scores were derived (preserving original scaling).

To ensure a sufficient sample size, an a priori power calculation was performed. The estimated effect size was based on relevant findings by Moore et al. [14]: these authors examined differences in explicit self-esteem between (1) individuals with PNESs, (2) individuals with epilepsy, and (3) healthy controls and found a large effect size (Cohen's $f = .43$). Power analysis using the G*Power software [39] indicated that, given the number of groups in the study (3) and an alpha level of .05, a sample size of at least 57 (19 per group) was required to provide sufficient power (80%) to detect an effect of similar magnitude ($f = .43$). To account for planned multiple testing, we further computed the sample size that would be required after applying Holm–Bonferroni correction to control the familywise error rate — i.e., after adjusting the alpha level from .05 to .0167. At the adjusted alpha level of .0167 (with other parameters held constant), a sample size of at least 75 (25 per group) was required to retain 80% power.

2.7. Preliminary analyses

Preliminary analyses were used to determine the validity of the $IRAP_{SE}$. Positive D-IRAP scores suggest a general bias toward positive views, and negative D-IRAP scores suggest a general bias toward negative views. The zero point indicates no bias. As expected, the $IRAP_{SE}$ showed a significant effect for the self-positive response bias as indexed by significant one-sample t-tests in all diagnostic groups ($ps \leq 0.001$). This is in line with (1) previous SE IRAP effects (e.g., [40,41]) and (2) findings for the 'universality' of self-positive implicit biases (e.g., [37]). An odd–even split-half procedure (applying the Spearman–Brown formula) was used to assess the reliability of the IRAP [42]. Split-half reliability was 0.85, which is comparable to other IRAP measures [43] and other implicit SE measures [44] and suggested that the $IRAP_{SE}$ reliably detected unintentional self-evaluations (in this case, implicit SE).

3. Results

3.1. Demographics

Demographic variables available for analysis pertained to gender, age, education, seizure frequency, and self-reported mental health difficulties (Table 2). Groups differed significantly in relation to self-reported mental health problems, trait anxiety, and somatic symptoms. Participants who self-reported having a mental health problem all stated that they had either depression or an anxiety disorder or both. However, the groups with PNESs and epilepsy did not differ significantly in terms of the proportion of patients above the STAI psychopathology cutoff. A chi-square goodness-of-fit test revealed no significant difference in the frequency of PNESs or epileptic seizures.

3.2. Explicit SE

A one-way between-groups analysis of variance was conducted to examine differences in explicit SE as measured by the RSS. There was a statistically significant difference for the three different groups ($F(2,83) = 9.71$, $p < 0.001$, $\eta_p^2 = 0.19$). Comparisons using Tukey's HSD test indicated that the mean score for the group with PNESs ($M = 14.70$, $SD = 6.30$) was significantly lower than that for the control group ($M = 20.68$, $SD = 4.82$) and the group with epilepsy ($M = 18.92$, $SD = 4.94$). The scores of the group with epilepsy and the control group did not differ significantly from each other. After controlling for self-reported mental health problems, a one-way analysis of covariance (ANCOVA) revealed that the between-groups difference in SE scores remained significant ($F(2,82) = 5.54$, $p = 0.006$, $\eta_p^2 = 0.12$). Because of the group differences reported above, self-reported anxiety and somatization were controlled using analysis of covariance, yielding a similar result.

Table 2
Demographic characteristics of the three groups.

	Controls (n = 31)	Group with epilepsy (n = 25)	Group with PNESs (n = 30)	p
Gender (%)				
Females	21 (67.7)	16 (64.0)	22 (73.3)	
Males	10 (32.3)	9 (36.0)	8 (26.7)	0.75
Mean age (SD)	42.97 (13.93)	39.40 (16.49)	40.87 (12.88)	0.65
Highest level of education (%)				
Secondary school	6 (19.4)	4 (16.0)	8 (26.7)	
College/sixth form[a]	10 (32.3)	9 (36.0)	12 (40.0)	
Diploma	7 (22.6)	5 (20.0)	5 (16.7)	
Undergraduate degree	7 (22.6)	2 (8.0)	4 (13.3)	
Postgraduate qualification	1 (3.2)	5 (20.0)	1 (3.3)	0.43
Number reporting mental health problems (%)				
None	23 (74.2)	17 (68.0)	14 (46.7)	
Past	6 (19.4)	5 (20.0)	4 (13.3)	
Present	2 (6.5)	3 (12.0)	12 (40.0)	0.02
State anxiety mean (SD)	34.87 (11.19)	36.88 (9.45)	42.10 (13.67)	>0.05
Trait anxiety mean (SD)	38.23 (10.65)	42.84 (8.52)	50.10 (15.09)	.001
Number above STAI psychopathology cutoff (%)	1 (3.2)	2 (8.0)	7 (23.3)	0.16
Somatic symptoms — mean PHQ-15 score (SD)	5.00 (3.33)	6.60 (3.46)	14.80 (6.19)	<0.001
Number of seizures reported per month				
Mean (SD)	–	4.38 (7.48)	7.36 (7.45)	0.09
Median (IQR)	–	1.0 (0.0–7.3)	6.0 (2.0–12.0)	

[a] In the UK 'sixth form' describes school years 12 to 13 which are optional.

3.3. Implicit SE

Nine participants (4 with PNESs, 3 with epilepsy, and 2 controls) were unable to complete the IRAP tasks within the set criterion (median response < 3 s, >80% compliance with response instructions). These data were excluded; data from all other participants were retained following the transformation of raw latencies into D-IRAP scores. Fig. 2 depicts the mean D-IRAPSE self and others scores for the three groups (N = 77). The data show that all groups revealed a bias toward self-as-positive as illustrated by positive scores.

A 3 × 2 mixed repeated analysis of variance (ANOVA) was conducted on the D-IRAP$_{SE}$ scores, with diagnosis as the between-participants variable and evaluative target (self vs. others) as the within-participant variable. There was a significant main effect for evaluative target ($F(1,74) = 6.25$, $p = 0.015$, $\eta_p^2 = 0.08$), indicating that self-evaluative responses (implicit SE; M = 0.29, SD = 0.41) were more positive than evaluative responses toward others (implicit other-esteem; M = 0.11, SD = 0.38). The analysis revealed no significant interaction between diagnosis and evaluative target, with all groups demonstrating similar responses across self- and other-referent trials ($F(2,74) = 2.16$, $p = 0.122$, $\eta_p^2 = 0.06$). The main effect for diagnosis was also nonsignificant, indicating no differences in implicit responding between the three groups ($F(2,74) = 0.32$, $p = 0.725$, $\eta_p^2 = 0.01$).

3.4. Implicit–explicit discrepancies

A one-way between-groups analysis of variance found a statistically significant difference for the three groups in SE discrepancy scores ($F(2,74) = 4.45$, $p = 0.015$, $\eta_p^2 = 0.11$). Comparisons using Tukey's HSD test indicated that the group with PNESs had significantly larger discrepancies than the control group and the group with epilepsy, who did not differ significantly from each other. These results are illustrated in Fig. 3. Note that the PNES z-score for implicit self-esteem equals zero.

3.5. Relationships between SE and anxiety

Within-group relationships between SE and (trait) anxiety were investigated using Spearman's rank-order correlations (Table 3); significance criteria were adjusted for multiple testing using sequential Holm–Bonferroni correction. In all three groups, anxiety correlated

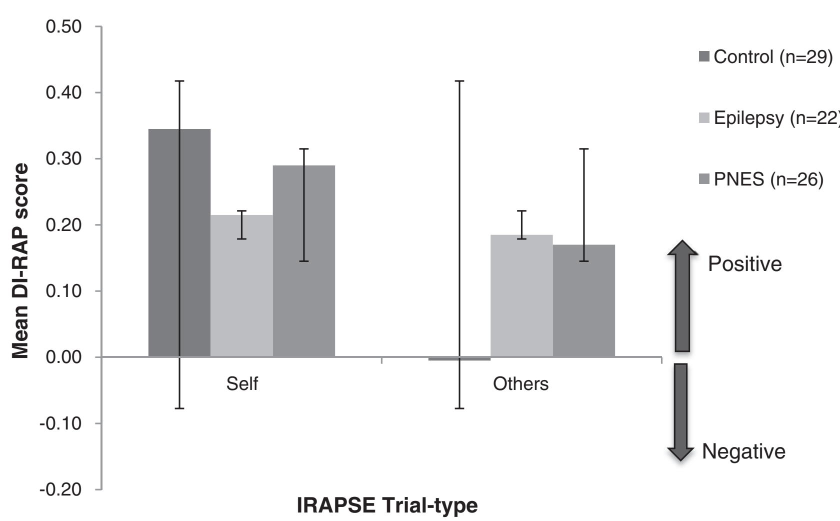

Fig. 2. Mean self and other D-IRAP$_{SE}$ scores for the three groups — controls, epilepsy, and PNESs. Error bars represent one standard deviation.

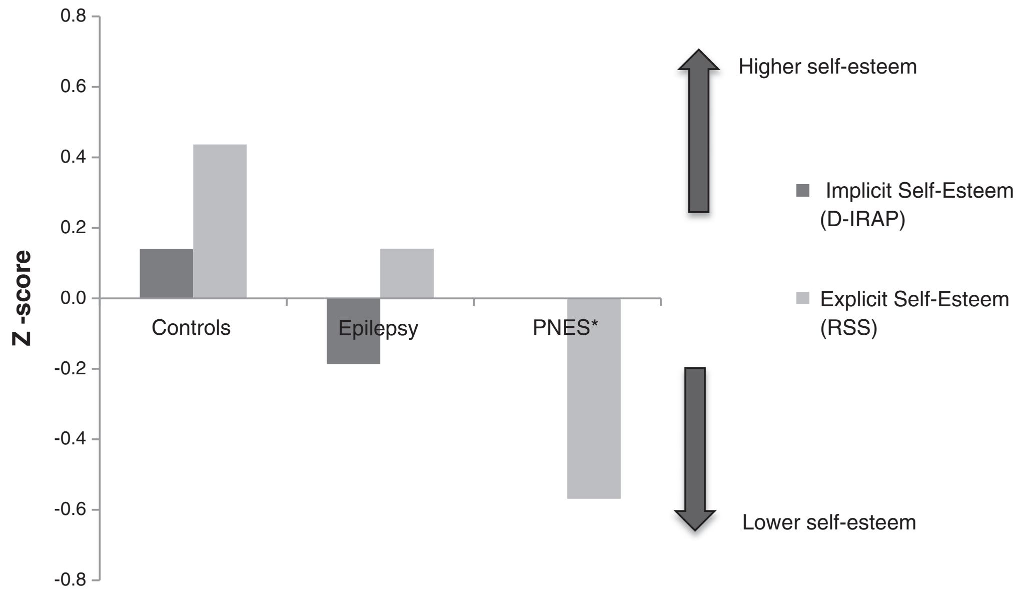

Fig. 3. Mean implicit and explicit SE for the three groups — controls, epilepsy and PNESs. The PNES z-score for implicit self-esteem equals zero; a significant discrepancy between the two scores is illustrated by *p < 0.05.

with both explicit SE and discrepant SE, i.e., greater self-reported anxiety was associated with (1) lower self-reported (explicit) SE and (2) lower explicit relative to implicit SE.

3.6. Relationships between SE and seizure frequency

Within-group relationships between SE and seizure frequency were investigated using Spearman's rank-order correlations (Table 4); significance criteria were adjusted for multiple testing using sequential Holm–Bonferroni correction. In the group with epilepsy, no indices of SE were significantly correlated with seizure frequency. In the group with PNESs, seizure frequency correlated with both explicit SE and discrepant SE, i.e., greater PNES frequency was associated with (1) lower self-reported (explicit) SE and (2) lower explicit relative to implicit SE. These relationships remained significant (and of large magnitude) when using partial correlation to control for anxiety and somatization.

4. Discussion

People with PNESs reported lower explicit SE than people with epilepsy and healthy controls. This is in contrast to one previous study describing lower explicit SE only among those with epilepsy (although means suggested lower SE for those with PNESs as well; [14]). Unique to the present study, explicit SE negatively correlated with PNES frequency; however, consistent with previous reports, SE was unrelated to the frequency of epileptic seizures [15].

Given that both epilepsy and PNESs may be associated with stigma [45,46], the lower explicit SE observed in individuals with PNESs is perhaps more likely to be the product of childhood trauma, emotional abuse or neglect, and insecure attachment than of having a stigmatizing seizure disorder [12,47,48]. Low explicit SE may be relevant in terms of understanding the etiology of PNESs, psychological formulation, and treatment outcome: as reported in patients with PTSD, it may be that low SE contributes to the chronification of PNESs [49] and/or mediates the relationship between attachment and psychopathology [10]; however, these hypotheses have yet to be tested in this patient group.

In addition to explicit SE, uniquely, the present study also examined implicit SE in people with seizures. While we did not find significant group differences in implicit SE, there was a significantly larger discrepancy between implicit and explicit SE scores in the group with PNESs than in the other two groups. Moreover, in the group with PNESs, there was a strong positive correlation between self-reported seizure frequency and discrepant SE scores whereby lower explicit relative to implicit SE was associated with greater seizure frequency. Further, in all three groups, explicit–implicit discrepancies – more specifically, discrepancies reflecting lower explicit relative to implicit SE – were associated with greater reported anxiety. Although causality cannot be determined, in that more frequent PNESs may result from or lead to lower SE, some possible interpretations of the data are discussed below.

The present findings resemble those of a previously reported study [30], which examined the same groups of patients with seizures and healthy controls in terms of implicit versus explicit anxiety. In that study, we found greater explicit–implicit discrepancies for patients with PNESs and a significant relationship between these discrepancy scores and PNES frequency. As in the current study, the direction of

Table 3
Relationships with anxiety.

	Explicit SE	Implicit SE	Discrepant SE
Controls	−.672**	−.115	.53**
Group with epilepsy	−.724**	.056	.47*
Group with PNESs	−.821**	−.173	.49*

* $p < 0.05$, significant r_s value.
** $p < 0.01$, significant r_s value.

Table 4
Relationships with seizure frequency.

	Explicit SE	Implicit SE	Discrepant SE
Epilepsy	.34	.06	−.32
Controlling for anxiety and somatization	.35	.09	−.21
PNESs	−.83**	.04	.65**
Controlling for anxiety and somatization	−.71**	.20	.52*

Positive discrepant SE scores indicate that greater seizure frequency is associated with lower explicit SE relative to implicit SE.
* $p < 0.05$, significant r_s value.
** $p < 0.01$, significant r_s value.

discrepancy was important: greater seizure frequency was specifically associated with higher explicit relative to implicit anxiety. Accounting for the inverse relationship between anxiety and self-esteem, a similar pattern was observed in the present findings. As discussed elsewhere with respect to anxiety [30], the profile of relatively more normal implicit and low explicit SE may reflect what Wilson and colleagues describe as a 'damaged' self. Such a profile may identify people whose SE has diminished later in life [50]. This suggestion is predicated on the theoretical argument that implicit evaluations reflect habitual and more stable tendencies, established much earlier, whereas explicit evaluations may be comparatively more changeable, reflecting current constructions of available information [16]; consequently, explicit SE may be relatively more sensitive to recent experiences such that lower explicit vs. implicit SE may be interpreted as evidence that SE has deteriorated over time. Patients with PNESs, in particular, often have limited understanding and uncertainty about their condition postdiagnosis, report a lack of postdiagnostic support, and experience services as stressful and abandoning [51]. The removal of an erroneous diagnosis of epilepsy may change and unsettle patients' identity. Even though the patients in our sample were not newly diagnosed, it is possible that such events altered the evaluations that individuals with PNESs hold about themselves, which may account for the lower explicit scores.

The pattern of lower explicit and higher implicit SE could also be the result of "successful" dissociation whereby patients are protecting implicit cognitions about the self from the effects of trauma or distress associated with individual PNESs (or the situations giving rise to PNESs). In an attempt to protect against excessive anxiety and maintain SE, it is possible that PNESs serve to "ward off" deeper experiences of distress that might challenge one's view of self, thereby preserving their implicit SE.

Similarly, implicit SE could also be protected because attacks provide patients with a sense of identity or a sense of control, perhaps within a difficult environment, or even rationalizations for failure [52]. Low SE may, nevertheless, be reported either because patients with PNESs superficially feel a low sense of self-worth or because they are conditioned to project such an image. Further, although those with PNESs did not differ from those with epilepsy or controls in implicit SE, both patient groups reported a more positive view of others (relative to controls). Therefore, low SE may not be due to a deep sense of self as flawed as much as a sense that others are faring better (e.g., because others are not experiencing seizures or for other reasons).

We cannot disentangle whether it was explicit scores alone or their discrepancy from the implicit measures that accounted for the correlations of the difference between explicit and implicit scores with PNES frequency. However, our findings are consistent with previous reports indicating that discrepancies between implicit SE and explicit SE are detrimental [53], perhaps supporting a cognitive dissonance account of PNESs. Such discrepancies are also associated with greater experiential avoidance (which we previously documented in this patient group [30]) and consistent with reports that many patients with PNESs lack emotional and psychological awareness [1]. Furthermore, the relatively high implicit, low explicit SE profile mirrors that observed in people with a diagnosis of borderline personality disorder and depression with suicidal ideation [22,23] and may be reflective of a fragmented self that is commonly associated with dissociative disorders.

Our data may have significant implications on treatments for PNESs: the fact that higher explicit SE was associated with a lower frequency of PNESs attacks suggests that therapies aiming to change negative self-views and improve self-worth could reduce PNESs. Several previous studies have shown that low self-esteem is a particular risk factor for distress (namely depression) when also accompanied by a self-blaming attributional style [9]. More specifically then, our findings support the idea that in the context of a self-accepting dialogue, modifying negative and discrepant self-evaluations and, therefore, reducing cognitive dissonance or stabilizing one's self-image might represent mechanisms of change in these approaches. While CBT and psychodynamic therapy are the leading published psychological interventions effective for PNESs [54,55], there are a range of therapies which could address these aspects (e.g., compassion-focused therapy or acceptance and commitment therapy), which are evidence-based for a number of comorbidities associated with PNESs, and which may be equally as effective for this population. However, these ideas require further research.

This was a cross-sectional study that examined SE at one time point, and SE stability has been found to have a greater predictive value than SE alone [17]. In addition, it may be useful to examine related constructs such as self-compassion, which is an alternative concept to self-esteem but which correlates moderately with it and with self-worth stability [56]. Although self-compassion has been found to be equivalent to SE in predicting happiness, optimism, and positive affect, unlike SE, it is not associated with narcissism [57]. No previous studies have linked PNESs with elevated levels of narcissism, and while there is no evidence to suggest that our results were the product of any correlation with narcissism, future studies may want to control for this using an appropriate validated measure.

Patients were only recruited to this study if they had a firm diagnosis of either epilepsy or PNESs. Patients with mixed seizure disorders may have a different profile and should perhaps be included in future studies [58]. We also did not record how long patients had been experiencing seizures, making it difficult to draw conclusions about the direction of the relationship between the psychological variables and PNESs. Although we specified the percentage of participants in each group who exceeded the cutoff for psychopathology based on the STAI, we did not record any information of formal psychiatric diagnoses and current or previous psychiatric treatment. In addition, only the relationship between psychological variables and seizure frequency – rather than severity – was explored. Smith and colleagues showed that seizure severity was a predictor of psychological variables in epilepsy [15]; therefore, future studies may want to consider the role of both severity and frequency and use a more objective method than self-report. Moreover, the present study was conducted in patients with refractory seizures receiving current outpatient neurology care. It is uncertain to what extent the results can be generalized to patient groups elsewhere.

By using the IRAP, this study aimed to provide a more contemporary perspective and addressed not only the limitations of relying solely on self-report but also some of the limitations of other measures of implicit cognition. Although manipulation checks were in line with previous research and provided support for its validity, it is, nevertheless, possible that there are differences in implicit SE in people with PNESs and that our measure lacked validity. Other time latency-based measures have also been criticized for not reflecting global self-worth and for measuring implicit affect rather than self-esteem per se [59]. While the IRAP stimuli were developed specifically to reflect dimensions of the explicit scale that we used, future studies may want to consider using alternative stimuli or methods.

One strength of the study was the sample size, which exceeded the calculated minimum sample size of at least 57 to answer our primary research questions. Multiple ANOVAs were subsequently conducted to prevent violating the assumption of analysis of variance–covariance, and while every effort was made to correct for multiple testing, it is entirely possible that results for the explicit SE finding are inflated and future similar studies may benefit from using a larger sample size to answer our secondary research questions more conclusively. This study did not use blinded assessors or any scales of effort or social desirability, and while it seems unlikely that differences in explicit SE were due to exaggerated responses (i.e., "faking bad"), it is possible that the results were due to a response bias [60] or, given that participants opted to take part in the study, a product of selection bias. Further, results were similar when controlling for anxiety and somatization, but there was not a separate assessment of other neuropsychiatric symptoms or depression, which is closely tied to feelings of self-worth and competence.

5. Conclusions

Our findings suggest that although people with epilepsy and PNESs may be similar in terms of implicit self-esteem, those with PNESs have much lower explicit self-esteem and, therefore, there is a greater discrepancy between the two. In keeping with studies in patients with other forms of psychopathology, the discrepancy between explicit self-esteem and implicit self-esteem correlated with markers of distress, i.e., with seizure frequency and anxiety in this patient group with PNES. These findings provide evidence that people with PNESs may have an unstable self-image and support the notion that attacks function to reduce dissonance or facilitate toleration of distress. We propose that therapies which aim to reduce a negative and discrepant self-belief, therefore reducing cognitive dissonance or stabilizing patients' self-image, may successfully reduce the impact of PNESs. Future studies should examine self-esteem over time and the response of explicit and implicit measures of SE to a range of therapeutic modalities.

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Conflict of interest

The authors report no conflict of interest. We confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.yebeh.2015.03.032.

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