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Review

Alterations of consciousness in psychogenic nonepileptic seizures: Emotion, emotion regulation and dissociation

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ABSTRACT

Impairment of consciousness and reduced self-control are key features of most psychogenic nonepileptic seizures (PNESs), although, compared with patients with epilepsy, those with PNESs demonstrate greater conscious awareness during their seizures. The neurobiological underpinnings of PNESs and of alterations of awareness associated with PNESs remain relatively unknown. We suggest that an understanding of conscious experiences and discrepancies between subjective impairment of consciousness and the lack of objectifiable neurobiological changes in PNESs may benefit from an examination of emotion processing, including understanding sensory, situational, and emotional triggers of PNESs; emotional and physiological changes during the attacks; and styles of emotional reactivity and regulatory capacity. We also suggest that in addition to the typical comparisons between patients with PNESs and those with epilepsy, studies of PNESs would benefit from the inclusion of comparison groups such as those with PTSD, dissociation, and other forms of psychopathology where dissociative and emotion regulatory mechanisms have been explored more fully. We conclude that current evidence and theory suggest that impairment of consciousness in PNESs is only "dissociative" in one subgroup of these seizures, when consciousness is suppressed as a collateral effect of the excessive inhibition of emotion processing. We propose that PNES behaviors and experiences of reduced control or awareness may also represent direct behavioral manifestation of overwhelming emotions, or that minor emotional fluctuations or relatively neutral stimuli may trigger PNESs through conditioning or other preconscious processes. Future studies exploring the neurobiological mechanisms underpinning PNESs are likely to be more fruitful if researchers bear in mind that it is unlikely that all PNESs result from the same processes in the brain.

This article is part of a Special Issue entitled Epilepsy and Consciousness.

1. Introduction

Disruptions in consciousness characterize many types of epileptic seizures, and the nature of these disruptions is a complex topic of investigation [1,2]. Arguably, the nature of disruptions of consciousness in psychogenic nonepileptic seizures (PNESs) is even more complex. In PNESs, patients have experiences and show behaviors which superficially resemble those associated with epileptic seizures but without any identifiable concomitant electrophysiological abnormalities [3,4]. Nearly two-thirds of observers report that patients lose awareness or the ability to react during their PNESs, and over half of observers endorse that patients' attacks "always" involve a "complete loss of consciousness or blackout" [5]. Compared with the observers of PNESs, patients themselves are less likely to state that they lose consciousness, but 30% still endorse that they "always" "have no idea what is happening around them during their attacks" [5]. On the other hand, compared with patients with epilepsy, those with PNESs demonstrate greater general awareness/responsiveness (level of consciousness) and more subjective experiences (content of consciousness) during their seizures [6].

If most patients are not in fact losing consciousness, and their subjective level of awareness is greater than it may appear to observers, this raises the question of how consciousness is in fact altered in PNESs. Here we discuss how an understanding of conscious experience and alterations in consciousness in PNESs may benefit from considering models of dissociative and affective and emotion regulatory processes more broadly.

1.1. PNESs and consciousness

In their review of this topic, Reuber and Kurthen define consciousness broadly as "the interaction and temporal coordination of a wide range of neural subsystems of the human brain (including but not limited to those underpinning sensation, attention, voluntary

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movement, and memory)" [7] (p. 96). As noted above, evaluations of consciousness in PNESs and epilepsy have examined both level and content [8], which are thought to be subserved by different neural systems [2,9]. The study of consciousness is complicated by the fact that there can be different levels of conscious awareness. For instance, Frith and Lau [10] distinguish between (1) *the subject is fully aware of the stimulus*; (2) *the subject claims not to be aware of the stimulus, but can make guesses about the stimulus better than chance*; and (3) *the subject claims not to be aware of the stimulus, guesses at chance levels, but nevertheless responds to the stimulus in terms of brain activity and/or behavior* (p. 761). These levels are, to a large extent, amenable to testing through experimental manipulations. Although they were not developed with patients with seizures in mind, the consideration of these levels may be of particular value in PNESs because they offer ways of testing some of the types of discrepancies mentioned above (e.g., subjective awareness versus behavior or observer perceptions).

Reuber and Kurthen also present the distinction of *phenomenal* consciousness, or what it feels like to have a particular experience, and *access* consciousness, or having access to higher-order cognitive processes [7] (see also [11,12]). Understanding phenomenal consciousness can offer important information (see [10] for a general discussion of consciousness and the value of introspection). For example, phenomenal consciousness in seizures has been examined by analyzing the metaphors patients use for their paroxysmal experiences: whereas patients with epilepsy tended to conceptualize their seizures as an agent/force or event/situation (i.e., as an independently acting entity treating the patient as the target or observer of the seizure), those with PNESs were more likely to conceptualize their attacks as spaces/places that the patient "goes into" or "cannot come out of" [13] (also discussed in [7]). As discussed later, this may be an indication that the seizure-related subjective experience is more dissociative for patients with PNESs than for those with epilepsy. This, in turn, could have treatment implications: examining a patient's seizure metaphors and sense of agency may offer the patient and therapist a linguistic starting point from which to create an acceptable and credible treatment formulation and increase the amount of control the patient has in and over the seizures [14,15].

1.2. PNESs as a dissociative disorder?

Psychogenic nonepileptic seizures are classified in ICD-10 as a dissociative disorder [16] and anticipated to become a dissociative/functional disorder in ICD-11 [17], and PNESs are often referred to as dissociative seizures [18–21]. On this basis, it could be argued that, by definition, the apparent alterations in consciousness associated with PNESs must be "dissociative" in nature. However, dissociation is a multifaceted and contested construct, and its relationship to altered states of consciousness has been debated. For example, Nijenhuis and van der Hart [22] propose that dissociation should be defined more precisely along the lines of its early conception as a personality construct [23]. They suggest that "normal" altered states of consciousness (e.g., absorption, feeling "spaced out"), and even the subjective sense of detachment that accompanies depersonalization disorder, are not dissociative per se, as they do not reflect a dysfunctional organization or division of personality (e.g., as is the case with dissociative identity disorder [22]). Brown [24], on the other hand, argues that such states are in fact dissociative but agrees with the need for greater conceptual precision (see below).

Several studies suggest that only a subset of patients with PNESs show dissociative tendencies in general and/or during their nonepileptic events (at least when these tendencies are measured using self-report questionnaires) [5,25]. In this subgroup of patients, the visible manifestations referred to as "seizures"—because they include behaviors such as shaking, spasms, or attentional lapses—may indeed be dissociative. If so, their episodes of dissociation could be a response to intolerable panic, anger, frustration, guilt, fatigue, or other experiences. In addition, the attacks themselves may provide relief not only from aversive emotional experiences but also, paradoxically, from the aversive experience of anticipating the attack itself [21]. Alternatively, as discussed later, a range of emotional stimuli and experiences may serve as direct triggers for PNESs without necessarily invoking dissociative processes. Study designs comparing patients with PNESs with those experiencing dissociative states and other forms of psychopathology—in addition to the typical comparisons with patients with epilepsy and healthy controls—may help to explore these hypotheses.

1.3. Defining and measuring dissociation

The *Diagnostic and Statistical Manual of Mental Disorders Fifth Edition* (*DSM-5*) defines dissociation as "a disruption of and/or discontinuity in the normal integration of consciousness, memory, identity, emotion, perception, body representation, motor control, and behavior" [26] (p. 291). Evidence has been mixed as to whether patients with PNESs do, in fact, show greater dissociation tendencies (see discussion in [27]). Dissociation is typically assessed as a single construct using self-report measures, most commonly the Dissociative Experiences Scale (DES [28]) or Dissociation Questionnaire (DIS-Q [29]). Evaluating dissociation as a single construct has been raised as problematic by many theorists and researchers [22,24,30,31] and may obscure answers regarding PNES mechanisms and differential diagnosis. For example, patients with PNESs reported more dissociative symptoms than those with epilepsy based on an overall dissociation score [20,25]. However, such reports were accounted for by general psychiatric distress [32]. On the other hand, somatoform dissociation, which focuses on symptoms suggesting lack of integration of sensory and motor functioning in particular [33], was greater in patients with PNESs than those with epilepsy; this relationship held even after accounting for general psychiatric distress [32]. Similarly, Alper and colleagues found that overall reports of dissociation did not differ between patients with PNESs and those with epilepsy [34], but a depersonalization/derealization dimension of dissociation (which may be conceptually distinct from somatoform dissociation; see below) was greater in patients with PNESs. Finally, dissociation (measured using the DES and a clinical interview), hypnotizability, and absorption all failed to differentiate patients with PNESs from those with epilepsy, whereas demographic and seizure variables (e.g., age at onset) did show diagnostic differentiation [27]. Therefore, if "dissociative seizures" are in fact dissociative in nature, other methods or conceptualizations—going beyond self-report and including a more systematic examination of emotional and physiological processes—may be needed to capture this.

1.4. Two types of dissociation and PNESs

Brown has proposed two types of dissociation: *detachment*, which involves psychological distancing from one's environment and includes symptoms such as depersonalization in response to a traumatic event, and *compartmentalization*, which involves a compromise in function, as in paralysis or other somatoform conditions including PNESs [31,35]. An empirical study examining this distinction in PNESs offered equivocal results, however [36] (see also discussion in [7]). Patients with PNESs endorsed compartmentalization (measured as somatoform dissociation) to a greater extent than those with epilepsy (similar to Kuyk and colleagues' findings [32]), but this difference was not retained when statistically controlling for anxiety scores. Results also suggested a trend toward greater detachment among patients with PNESs than those with epilepsy (similar to Alper and colleagues' findings [34]). The authors discuss that the use of a single measure of detachment and compartmentalization was a limitation of the study—although even the use of multiple self-report measures may not have provided a clearer insight into the processes of dissociation and the physiological mechanisms underpinning these processes, due to the limitations