PAPER

Ictal symptoms of anxiety, avoidance behaviour, and dissociation in patients with dissociative seizures

L H Goldstein, J D C Mellers

J Neurol Neurosurg Psychiatry 2006;77:616–621. doi: 10.1136/jnnp.2005.066878

See end of article for authors' affiliations

Correspondence to:
Dr L H Goldstein, Institute of Psychiatry, Department of Psychology, PO77 The Henry Wellcome Building, De Crespigny Park, London SE5 8AF, UK; l.goldstein@iop.kcl.ac.uk

Received 7 March 2005
In revised form
17 November 2005
Accepted 4 January 2006

Objective: To examine anxiety related seizure symptoms and avoidance behaviour in adults with dissociative (psychogenic non-epileptic) seizures (DS) in comparison with a group suffering from partial epilepsy.

Methods: 25 DS and 19 epilepsy patients completed an attack symptom measure, the hospital anxiety and depression scale, the dissociative experiences scale, and the fear questionnaire.

Results: DS patients reported the presence of significantly greater numbers of somatic symptoms of anxiety during their attacks than the epilepsy group, despite not reporting subjectively higher levels of anxiety. The DS patients also reported higher levels of agoraphobic-type avoidance behaviour than the epilepsy group. Measures of dissociation were higher in the DS group, who also reported greater symptoms of depression.

Conclusions: The findings support a model whereby DS occur as a paroxysmal, dissociative response to heightened arousal in the absence of raised general anxiety levels. The model has practical implications for clinical assessment and treatment: in clinical practice, inquiry about these symptoms may help in the diagnosis of DS; with respect to treatment, the anxiety related symptoms and avoidance behaviour prevalent in DS are a potential focus for a cognitive behavioural approach analogous to that used in the treatment of other anxiety disorders.

There is now a substantial literature on seizure-like events which, while strongly resembling epileptic seizures, have no epileptic or other organic basis. Such events have been variously referred to as psychogenic non-epileptic seizures, pseudoseizures, non-epileptic seizures, non-epileptic attack disorder, conversion non-epileptic seizures, and psychogenic non-epileptic seizures.^{1–3} Some of these labels are pejorative; others lack precise definition. A more satisfactory approach is to use formal psychiatric classification systems. Thus within DSM-IV⁴ such attacks are classified within somatoform disorders, while under ICD-10⁵ they are classified as dissociative convulsions (seizures) within the group of conversion disorders; it is this latter terminology that will be adopted here, as elsewhere.^{3–6} We recognize, however, the continuing debate over terminology, driven partly by differences between DSM and ICD, and also that there is disagreement about whether dissociation is an appropriate term for all patients with this disorder.

It is generally thought that the vast majority of these patients are not deliberately feigning their attacks. Instead, DS are postulated to arise through involuntary or unconscious processes. In ICD-10 the term “dissociation” is used to describe the mental state (also a hypothetical mechanism) underlying these symptoms whereby a psychologically mediated altered state of awareness is associated with impaired voluntary control over neurological function. Implicit in this definition is the notion that psychological factors play a causal role: both DSM-IV and ICD-10 diagnostic criteria require that psychosocial aetiological factors are suspected. In constructing a model of DS that might inform approaches to treatment, it is helpful to conceptualise two different levels at which psychological factors might have aetiological significance: first, as triggers for individual attacks, and second, as factors that predispose to, precipitate, or maintain the disorder. The first level of causation is essentially a mechanistic one that hypothesises a role for stress or more specifically psychophysiological arousal as triggering individual episodes of dissociation. The

second, more general level, concerns background factors that may be associated with the disorder but which do not readily account for the timing of individual seizures (nor, necessarily, the precise onset of the disorder). Background factors highlighted by several studies as potentially significant for DS have included psychiatric comorbidity,² personality profiles,^{3–7} neuropsychological deficits and low IQ,⁹ a history of physical or sexual abuse in childhood or adulthood,^{10–11} a general tendency towards somatisation,^{12–13} and family characteristics.^{14–16}

The first aim of the current study was, therefore, to investigate acute anxiety as a trigger for DS as and when they occur. If anxiety triggers individual episodes of DS then it would be predicted that symptoms of anxiety would be experienced immediately before or during DS. Therefore we have used symptom measures developed for panic disorder—the archetypal paradigm for paroxysmal anxiety—to investigate the prevalence of anxiety related seizure symptoms in patients with DS. Indeed the similarities between DS symptoms and those of panic disorder have been noted elsewhere.^{17–18} Alper¹⁹ has elaborated a model of DS in which dissociation is seen as a response to arousal, which serves to protect the individual from the subjective experience of acute anxiety. Accordingly, we predicted that patients with DS would demonstrate a greater prevalence of DS related symptoms of autonomic arousal but similar rates of general anxiety and feelings of panic compared with patients with epilepsy. By using epilepsy patients as a comparison group we had two aims: to explore the value of anxiety related symptoms in distinguishing between DS and epilepsy for diagnostic purposes; and to employ a control group with a paroxysmal (neurological) disorder. Anxiety related symptoms

Abbreviations: DES, dissociative experiences scale; DS, dissociative seizures; DSM-IV, *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition; FQ, fear questionnaire; HADS, hospital anxiety and depression scale; ICD-10, *International Classification of Diseases*, 10th revision

may occur during partial epileptic seizures²⁰ and epilepsy patients typically cite stress as the most common trigger for attacks.²¹ Given the possibility of a type II error that this raises, the inclusion of the epilepsy group therefore represented a relatively stringent test of our hypothesis.

Developing a model of DS should facilitate treatment. Thus the second aim of this study was to examine a selection of factors that might be addressed within a cognitive behavioural approach to treatment,⁶ in addition to potential trait characteristics, which contribute to the general development and maintenance of DS. In terms of the former, we set out to investigate symptoms of general anxiety, depression, and avoidant behaviour. In terms of trait characteristics, we used the dissociative experiences scale (DES),²² regarded as a trait measure of vulnerability to dissociation, to replicate findings of higher levels of dissociation in DS patients than in epilepsy patients or healthy controls.^{13 23 24}

METHODS

The study was approved by ethics committees at the Institute of Psychiatry and King's College Hospital NHS Trust. All patients were attending tertiary referral specialist neuropsychiatry or specialist neurology services at one of two NHS hospitals and provided written informed consent.

Participants

Twenty five participants who, following referral to our service for a review of their clinical history, had a diagnosis of dissociative seizures (DS) were recruited from the Neuropsychiatry Unit, Maudsley Hospital, London. They had received a diagnosis of DS either on the basis of EEG videotelemetry²⁵ ($n = 14$) or, when seizures had been insufficiently frequent for telemetry to be useful ($n = 11$), on the basis of EEGs and the clinical opinion of two consultant neuropsychiatrists/neurologists. Exclusion criteria were a past history or concurrent diagnosis of genuine epilepsy and fulfilling criteria for panic disorder.

Nineteen patients with partial epilepsy (hereafter termed "epilepsy") were recruited from specialist epilepsy neurology clinics at King's College Hospital, London. Individuals were excluded if they had any previous or current psychiatric disorder and were currently receiving psychotropic drugs, so as not to confound reported seizure related symptoms with psychiatric presentations. Participants were also excluded if they had co-morbid DS and if they were taking more than three antiepileptic drugs.

For both groups, potential participants with a history of alcohol or drug abuse or psychosis, or an IQ of <70 , were excluded. All participants were asked about their seizure frequency in the preceding four weeks.

Measures

To ensure that all participants had the ability to complete the questionnaires, a measure of intellectual ability was obtained using the *National Adult Reading Test – 2nd Edition* (NART).²⁶ The upper and lower limits of the scale yield predicted IQs

falling within the range of 69 to 131; this measure was used to confirm that participants had an IQ of ≥ 70 .

Attack symptoms

A measure of ictal symptoms that would typically be associated with anxiety and more specifically panic disorder was derived using ICD-10 research criteria.⁵ Wording of specific items was guided by the panic rating scale²⁷ and the panic attack questionnaire.²⁸ Participants were asked to indicate whether they had experienced a range of symptoms during their attacks, which were presented to them, intermixed, in a list; the questions did not refer to specific types of attacks but referred to attacks in general. Although they completed the scale in the presence of a research assistant who knew their diagnosis, the scale measures subjectively experienced and personally recalled symptoms and involves no rating by the interviewer.

Using ICD-10's research classification of Panic Disorder as a framework, symptoms were grouped into the following categories, with the symptom descriptions worded as indicated: (a) *autonomic arousal symptoms* (racing or pounding heart; sweating; trembling or shaking; dry mouth or throat); (b) *symptoms involving chest or abdomen* (shortness of breath or smothering sensation; choking; nausea or abdominal distress/butterflies or knot in stomach; chest pains or discomfort); (c) *symptoms involving mental state* (dizziness, unsteady feelings or faintness; feeling that things are not real; feelings that things around you are strange unreal, foggy or detached; feeling outside or detached from part or all of one's body; feeling cut off from your surroundings); and (d) *general symptoms* (numbness or tingling in arms, legs or face; hot flushes or chills). Given the importance of including cognitive symptoms of panic,²⁹ the following symptoms formed a *cognitive symptoms* scale: thoughts or images that you cannot get rid of; desire to escape from scene of attack; feelings of embarrassment; I'm going to be paralysed; I'm going blind; I'm going to scream; my attack will never end; together with symptoms that might otherwise have been included in the mental state category (c) but which did not involve alterations in or abnormal perceptions of the self or one's surroundings (I'm losing control; I'm going to die; I'm going crazy; I will black out).

For each item a score of 0 indicated the absence of the symptom and 1 indicated its presence during the person's most severe attacks; a total score for each of the five categories (and a total symptom score) was obtained.

Measures of dissociation, affective state, and anxiety related avoidance behaviour

Dissociative experiences scale (DES)

The DES,^{22 30} designed as a trait measure of dissociation, has recently³¹ been thought to measure non-pathological as well as pathological dissociation. The mean score for the subscale of items (DES-T), thought to measure pathological dissociation,³¹ was also calculated.¹³

Table 1 Characteristics of the dissociative seizures and epilepsy groups

	DS	Epilepsy	Comparison statistic
Sex	19F, 6M	14F, 5M	Fisher's exact test, $p = 1.000$
Age (y) (mean (SD))	35.52 (13.49)	35.84 (10.81)	$F(1,42) = 0.007, p = 0.932$
NART predicted FSIQ	100.44 (11.02)	99.47 (13.40)	$F(1,42) = 0.069, p = 0.794$
Time since onset of seizure disorder (m) (mean (SD))	77.92 (62.14)	218.53 (137.82)	$U = 95.50, z = -3.367, p = 0.001$
Median (range)	60.00 (5 to 264)	180.00 (12 to 504)	

DS, dissociated seizures; F, female; FSIQ, full scale IQ; m, months; M, male; NART, National Adult Reading Test; y, years.

Table 2 Semiology of the seizures in the dissociative seizures group and epilepsy type/syndrome in the epilepsy group

DS group		Epilepsy group	
Semiology	n	Seizure type/syndrome	n
Aura/premonitory symptoms	23	Simple partial seizures	7
Loss of awareness and/or unresponsiveness	17	Complex partial seizures	14
Falls	11	Number with documented auras	10
Motor features:		Secondary generalised seizures	11
(a) Movements	22	Epilepsy syndrome:	
(b) Loss of motor function	2	TLE	14
		Extratemporal	2
		Uncertain	3

Of the 19 epilepsy patients, two had both simple partial and complex partial seizures.
DS, dissociative seizures; TLE, temporal lobe epilepsy.

Anxiety and depression

These were measured using the *hospital anxiety and depression scale* (HADS),³² a 14 item scale yielding separate measures of symptoms of anxiety and depression.

To measure specific feelings of panic, scores on the HADS item "I get sudden feelings of panic" were compared between groups (potential range of scores 0–3).

Fear questionnaire (FQ)

This questionnaire³³ samples everyday situations that individuals may avoid as part of a phobic disorder. Individuals rate their avoidance of five situations or stimuli that might be associated with one of three categories of phobic avoidance (agoraphobia, blood/injury phobia, or social phobia) on a scale from 0 to 8.

Statistical analyses

Between-groups differences were analysed using one way analysis of variance (ANOVA) (or the Mann–Whitney U test if data were not normally distributed, unless it was necessary to undertake analyses of covariance). Where substantial between-groups differences occurred on background variables thought potentially to affect outcome measures, these were included as covariates in analyses of covariance (ANCOVA). Categorical variables were analysed using χ^2 or Fisher's exact test. All analyses were two tailed and were undertaken using SPSS v10.0.

RESULTS

Participants' characteristics

The two groups of participants were well matched for sex, age, and estimated IQ (table 1). As the epilepsy group had a significantly longer median duration of their disorder, this variable was used in ANCOVAs to allow for the possibility that the development of anxiety related symptoms and behaviour might reflect different durations of seizure disorder.

Participants' seizure frequency in the previous four weeks was categorised as ≤ 11 seizures or >11 seizures (irrespective of seizure type). Accordingly, 18/25 (72%) of the DS group had ≤ 11 seizures in the previous four weeks as opposed to 7/25 (28%) who had >11 seizures; in the epilepsy group, 18/19 (95%) had ≤ 11 seizures while one person (5%) had >11 seizures. These proportions were not significantly different (Fisher's exact test, $p = 0.111$). Characteristics of the DS and epilepsy groups' seizures are summarised in table 2.

At the time of interview antiepileptic drugs had not yet been stopped in 10 DS patients. No epilepsy patients were taking psychotropic medication; six DS patients (24%) were taking anxiolytics and five (20%) were taking antidepressant drugs.

Within the DS group, concurrent non-DS-related psychiatric diagnoses included anxiety ($n = 2$); depression ($n = 2$); somatisation disorder ($n = 2$); conversion disorder ($n = 2$); and personality disorder ($n = 1$).

Attack symptoms

The internal consistency (Cronbach's α) of the subscales was as follows: *autonomic arousal symptoms*, $\alpha = 0.738$; *symptoms involving chest or abdomen*, $\alpha = 0.642$; *general symptoms*, $\alpha = 0.621$; *symptoms involving mental state*, $\alpha = 0.883$; *cognitive symptoms*, $\alpha = 0.718$. Having covaried for duration of seizure disorder, the DS group scored significantly higher than the epilepsy group on the *autonomic arousal*, *chest and abdomen*, and *general symptoms* (table 3). They also endorsed a higher mean total number of symptoms than the epilepsy group, although because this score included the mental state and cognitive symptoms, the difference was of a lower level of significance than the separate comparisons for the scores for *autonomic arousal*, *chest and abdomen*, and *general symptoms*. Six individual symptoms were reported significantly more often by the DS than the epilepsy group (table 4).

Table 3 Differences between the dissociative seizures group and the epilepsy group in attack symptoms measures

Symptom group	DS	Epilepsy	F, df, p Value*
Autonomic arousal symptoms (max 4)	2.64 (1.52)	1.63 (1.21)	F(1,41)=7.22, p=0.01
Chest and abdomen symptoms (max 4)	1.96 (1.37)	1.05 (0.97)	F(1,41)=6.85, p=0.012
Mental state symptoms (max 5)	3.32 (1.97)	3.21 (1.99)	F(1,41)=0.79, p=0.379
General symptoms (max 2)	1.28 (0.84)	0.84 (0.83)	F(1,41)=5.83, p=0.020
Cognitive symptoms (max 11)	5.12 (3.44)	4.05 (3.55)	F(1,41)=3.25, p=0.079
Total symptoms (max 26)	14.32 (8.52)	10.78 (6.78)	F(1,41)=4.81, p=0.034

Values are mean (SD).

*Covarying for time since onset of seizure disorder.

df, degrees of freedom; DS, dissociative seizures; max, maximum.

Table 4 Significant differences between the dissociative seizures group and the epilepsy group in reporting ictal symptoms

Symptom	DS	Epilepsy	p Value*
Chest pain	11 (44%)	1 (5%)	0.004
Racing or pounding heart	15 (60%)	5 (26%)	0.026
Shortness of breath or smothering sensation	16 (64%)	6 (32%)	0.033
Sweating	16 (64%)	6 (32%)	0.033
Numbness or tingling in arms, legs or face	17 (68%)	7 (37%)	0.04
Feeling that the person was going crazy	11 (44%)	3 (16%)	0.047

Values are n (%).

*Based on χ^2 with 1 degree of freedom.

DS, dissociative seizures.

Dissociation, affective state, and avoidance behaviour

DES scores

The DS group achieved a significantly higher DES median score than the epilepsy group (table 5) but did not differ in the proportions scoring ≥ 30 (indicating a significant level of dissociation).³⁰ However the DS patients had a higher median DES-T subscale score than the epilepsy group.

Anxiety and depression

The DS and epilepsy groups' HADS scores did not differ (mean (SD): DS, 7.36 (5.53); epilepsy, 7.16 (3.64); $F(1,42) = 0.019$, $p = 0.891$), even after covariation for length of seizure disorder ($F(1,41) = 0.170$, $p = 0.682$). The groups' mean HADS depression scores differed both in an unadjusted ANOVA (DS, 5.72 (3.64); epilepsy, 3.58 (3.19); $F(1,42) = 4.16$, $p = 0.048$), and when using ANCOVA ($F(1,41) = 4.65$, $p = 0.037$).

Specific consideration of the experience of feelings of panic revealed no between-group differences (DS, mean (SD), 0.76 (0.78), median = 1.0; epilepsy, mean (SD): 0.790 (0.63), median = 1; $z = -0.284$, $p = 0.777$).

Fear questionnaire

The DS group achieved significantly higher scores on the agoraphobia subscale of the FQ than the epilepsy group (table 6). The groups did not differ significantly on the blood/injury or social phobia subscales.

DISCUSSION

In this study we explored the nature of subjective seizure symptoms in patients with dissociative seizures, based on the premise that DS represent a dissociative response to acute anxiety and heightened arousal in the absence of raised levels of general anxiety and feelings of panic. We also investigated

Table 6 Differences on the fear questionnaire between the groups

	DS	Epilepsy	F, df, p *
Agoraphobia	13.52 (11.09)	5.58 (5.39)	$F(1,41) = 10.81$, $p = 0.002$
Social phobia	12.88 (9.65)	9.89 (6.51)	$F(1,41) = 2.97$, $p = 0.092$
Blood and injury	13.84 (10.70)	8.05 (8.51)	$F(1,41) = 3.55$, $p = 0.066$

Values are mean (SD).

*Covarying for time since onset of seizure disorder.

df, degrees of freedom; DS, dissociative seizures.

differences in factors of potential psychotherapeutic relevance, including avoidance behaviour and depressive symptomatology, as well as possible differences between DS and epilepsy patients in the putative trait characteristic of dissociation. Our samples were well matched for age, sex, and intellectual ability and did not differ in terms of the proportions reporting having had ≤ 11 seizures or >11 seizures in the previous four weeks. Differences in duration of seizure disorder were adjusted for in relevant statistical analyses.

Reports on clinical features that help differentiate DS from epilepsy have focused primarily on the physical semiology of attacks and on features of epilepsy that are lacking in DS.¹ By contrast, the current study identifies several subjective symptoms that are common in DS and of potential diagnostic value. These symptoms, which can be considered as psychiatric phenomenology of DS, are essentially those of a panic attack but without paroxysmal anxiety; that is, *panic attack without panic*. They include experiences associated with autonomic arousal, somatic symptoms, and, to a very much lesser extent, cognitions (feared consequences of the attack). No single subjective symptom reliably distinguished between all DS and epilepsy patients but our study suggests that consideration of these symptoms may contribute to the clinician's diagnostic assessment. Of additional relevance, a previous study comparing DS patients and patients with panic disorder showed that these symptoms occurred with a similar frequency in both groups.¹⁸ We report a higher frequency of these symptoms than documented in a study by Moore and Baker,¹⁷ but the latter was a medical records based study of symptomatology.

Only one cognitive symptom distinguished to some extent between the DS and epilepsy groups: overall cognitive symptoms appeared less important than autonomic and somatic symptoms of anxiety in differentiating the two groups. We are currently investigating a wider range of cognitive symptoms accompanying seizures but of potential relevance to therapy is the possibility that some DS patients

Table 5 Differences between the dissociative seizures group and the epilepsy group in dissociative experiences scale (DES) scores

Test	DS	Epilepsy	Comparison statistic
DES	24.86 (16.54) Median 27.14 Range 6.07 to 65.71	14.45 (10.21) Median 11.07 Range 3.57 to 38.21	$U = 152.50$, $z = -2.015$, $p = 0.044$
N (%) scoring ≥ 30	9 (36%)	2 (10.53%)	Fisher's exact test, $p = 0.081$
DES-T	17.75 (16.49) Median 15.00 Range 0 to 55	6.91 (7.32) Median 5.00 Range 0 to 26.25	$U = 145.0$, $z = -2.198$, $p = 0.028$

Values are mean (SD), median, and range.

DES, dissociative experiences scale; DS, dissociative seizures; DES-T, dissociative experiences scale subscale.

may experience heightened awareness of, and vigilance to, bodily symptoms^{11 34} and—as in panic disorder—may misinterpret bodily symptoms in a catastrophic manner.³⁵

We are not advocating that DS be viewed simply as a variant of panic disorder. First, and most obviously, the motor/behavioural features seen in the majority of DS clearly distinguish the two disorders.¹ Second, the current findings show that the “anxiety related” (autonomic, somatic) symptoms in DS occur in the absence of raised levels of symptoms of general anxiety or more specifically the experience of paroxysmal anxiety, the sine qua non of panic disorder. Overall, our findings lend support to a model whereby the seizure related symptoms reported by the DS patients do not simply reflect more generally raised levels of anxiety symptomatology, or more frequent sensations of panic, but relate to paroxysmal episodes of arousal which act as the underlying mechanism behind their seizures. Whether or not a similar pattern of symptoms could result from other affective states such as anger would be worth considering in further conceptualisations of a psychological model of DS.

Our study provides further evidence^{13 23 24} that, as a group, DS patients show raised median scores on the DES. However, DS patients' scores were not particularly increased in comparison with patients with other dissociative disorders,¹³ and median scores reflected elevation in only a small percentage of patients. The failure to find a convincing increase in DES scores in all DS patients in comparison with epilepsy patients should not detract from the fact that DS involve a temporary loss of behavioural, sensory, or cognitive control occurring in the context of intact neurological function and which may be better assessed using other tools.³⁶

Finally our study replicated a previous finding of increased ratings of symptoms of depression^{24 37} and showed a higher level of avoidance behaviour in DS patients than in epilepsy patients. The agoraphobia and social phobia subscale scores for the DS patients were within the range reported for patients meeting criteria for panic disorder and agoraphobia.³⁸ The current between-groups difference was most marked for situations typically avoided in an agoraphobic disorder, supporting the view that DS are accompanied by a level of avoidance that reflects a restricted lifestyle and serves to maintain the disorder, as patients cannot learn that such places/situations will not necessarily be associated with, or trigger, seizure occurrence.⁶ In this respect DS patients' behaviour contrasts with that of the current epilepsy patients who, despite their chronic seizure disorder, appeared to be better adjusted in terms of everyday activities.

Our results therefore indicate that DS patients experience autonomic and somatic symptoms of heightened arousal during their attacks that are not associated with symptoms of generalised anxiety or more frequent feelings of panic. Treatment may therefore need to be directed towards changing beliefs about the significance of such symptoms, preventing (as in other anxiety related disorders) the undertaking of “safety behaviours”²⁷ and addressing agoraphobic type avoidance behaviours, as well as identifying and dealing with the cognitive and environmental triggers for the arousal when they occur. This may need to take account of such patients' negative coping styles,^{24 39} any traumatic events experienced by the person,⁴⁰ and the extent to which patients show a tendency towards dissociation. Evidence for somatisation, highlighted in other studies as a further, potentially important process underlying DS^{10 11 13} should also be considered. An exploration of patients' attributions and illness related beliefs⁶ may help therapists identify factors which patients use to make sense of their disorder. However, specifically challenging causal beliefs in therapy may be counterproductive,⁶ whereas cognitive restructuring of attack related experiences, dealing with depressive schemata and a

problem solving approach aimed at changing coping styles, may be more effective in improving patients' psychological and psychosocial status.

Our findings are based on relatively small and highly selected samples of patients attending specialist clinics, and would be strengthened if all our DS patients had undergone videotelemetry. By excluding epilepsy patients with comorbid psychiatric diagnoses we may have biased our study in favour of detecting more anxiety related symptoms (including agoraphobic avoidance) and depression in the DS group, especially as some DS patients had other comorbid psychiatric diagnoses, as elsewhere.² Importantly, however, for the current analyses, panic disorder was specifically excluded from both patient groups. Ongoing research will include a larger and more broadly representative group of epilepsy patients. The collection of physiological indices as well as self report symptom measures, including feelings of panic and fear as part of the seizure, might clarify the role DS may play in sublimating the experience of intense anxiety during an attack. Although DS (without any suggestion of comorbid epilepsy) is a relatively uncommon condition, the use of a larger epilepsy group might have enabled a more comprehensive assessment of seizure related symptoms differentiating the two groups. Our study was designed to detect clear and clinically meaningful differences between groups; although our selection criteria made it difficult to identify a greater number of epilepsy patients within the time span of the study, our sample sizes were sufficient to detect large effect sizes (for example, 0.92) with adequate power. The size limitations of our dataset meant that we currently only incorporated duration of seizure disorder as a covariate in our between-group comparisons; a larger sample size would be needed to model further potentially confounding variables. Despite the lack of differences in proportions of each group having had ≤ 11 seizures or > 11 seizures in the previous four weeks, the absolute percentage scores for each group suggest that nonetheless seizure frequency might be of interest in larger studies. The current assessment of symptoms associated with participants' severe seizures was intended to assist participants' recall of symptoms; clinically it would also be valuable to determine the consistency between symptoms experienced during patients' severe and “typical” attacks. The study has involved multiple statistical analyses although to compensate for this we used two tailed rather than one tailed tests; this nonetheless has permitted the identification of factors that can guide hypotheses in future studies. These particular points notwithstanding, the present study points to the potentially important role of anxiety related arousal in DS as well as to likely predisposing and maintaining psychological factors in DS patients.

ACKNOWLEDGEMENTS

We are particularly grateful to Dr R S Delamont, consultant neurologist, for his help in reviewing the notes of the patients with epilepsy, and we also thank Leah Holland and Helen Soteriou for their assistance with data collection.

Authors' affiliations

L H Goldstein, King's College London, Institute of Psychiatry, Department of Psychology, London SE5, UK

J D C Mellers, Neuropsychiatry Department, Maudsley Hospital, Denmark Hill, London SE5, UK

Competing interests: none declared

REFERENCES

- 1 Reuber M, Elger CE. Psychogenic nonepileptic seizures: review and update. *Epilepsy Behav* 2003;4:205–16.
- 2 Bowman ES. Psychopathology and outcome in pseudoseizures. In: Ettinger ABE, Kanner AME, editors. *Psychiatric issues in epilepsy: a practical guide to*

- diagnosis and treatment. Philadelphia: Lippincott Williams and Wilkins, 2001:355–77.
- 3 **Brown RJ**, Trimble MR. Dissociative psychopathology, non-epileptic seizures, and neurology. *J Neural Neurosurg Psychiatry* 2000;**69**:285–9.
 - 4 **American Psychiatric Association**. *Diagnostic and statistical manual of mental disorders*, 4th edition (DSM-IV). Washington DC: American Psychiatric Association, 1994.
 - 5 **World Health Organisation**. *The ICD-10 classification of mental and behavioural disorders. Clinical description and diagnostic guidelines*. Geneva: WHO, 1992.
 - 6 **Goldstein LH**, Deale AC, Mitchell-O'Malley S, *et al*. An evaluation of cognitive behavioral therapy as a treatment for dissociative seizures. A pilot study. *Cogn Behav Neurol* 2004;**17**:41–9.
 - 7 **Krishnamoorthy ES**, Brown RJ, Trimble MR. Personality and psychopathology in nonepileptic attack disorder and epilepsy: a prospective study. *Epilepsy Behav* 2001;**2**:418–22.
 - 8 **Reuber M**, Pukrop R, Bauer J, *et al*. Multidimensional assessment of personality in patients with psychogenic non-epileptic seizures. *J Neural Neurosurg Psychiatry* 2004;**75**:743–8.
 - 9 **Reuber M**, Qurishi A, Bauer J, *et al*. Are there physical risk factors for psychogenic non-epileptic seizures in patients with epilepsy? *Seizure* 2003;**12**:561–7.
 - 10 **Reilly J**, Baker GA, Rhodes J, *et al*. The association of sexual and physical abuse with somatization: Characteristics of patients presenting with irritable bowel syndrome and non-epileptic attack disorder. *Psychol Med* 1999;**29**:399–406.
 - 11 **Tojek TM**, Lumley M, Barkley G, *et al*. Stress and other psychosocial characteristics of patients with psychogenic nonepileptic seizures. *Psychosomatics* 2000;**41**:221–6.
 - 12 **Mokleby K**, Blomhoff S, Malt UF, *et al*. Psychiatric comorbidity and hostility in patients with psychogenic nonepileptic seizures compared with somatoform disorders and healthy controls. *Epilepsia* 2002;**43**:193–8.
 - 13 **Reuber M**, House AO, Pukrop R, *et al*. Somatization, dissociation and general psychopathology in patients with psychogenic non-epileptic seizures. *Epilepsy Res* 2003;**57**:159–67.
 - 14 **Krawetz P**, Fleisher W, Pillay N, *et al*. Family functioning in subjects with pseudoseizures and epilepsy. *J Nerv Ment Dis* 2001;**189**:38–43.
 - 15 **Moore PM**, Baker GA, McDade G, *et al*. Epilepsy, pseudoseizures and perceived family characteristics: a controlled study. *Epilepsy Res* 1994;**18**:75–83.
 - 16 **Stanhope N**, Goldstein LH, Kuipers E. Expressed emotion in the relatives of people with epileptic or nonepileptic seizures. *Epilepsia* 2003;**44**:1094–102.
 - 17 **Moore PM**, Baker GA. Non-epileptic attack disorder: a psychological perspective. *Seizure* 1997;**6**:429–34.
 - 18 **Vein AM**, Djukova GM, Vorobieva OV. Is panic attack a mask of psychogenic seizures? A comparative analysis of phenomenology of psychogenic seizures and panic attacks. *Funct Neurol* 1994;**9**:153–9.
 - 19 **Alper K**. Non-epileptic seizures as a paradigm for research on historical theories of conversion. In: Gates JR, Rowan AJ, editors. *Non-epileptic seizures*. Boston: Butterworth Heinemann, 2000:285–94.
 - 20 **Ring HA**, Gene-Cos N. Epilepsy and panic disorder. In: Trimble MR, Schmitz B, editors. *The neuropsychiatry of epilepsy*. Cambridge: Cambridge University Press, 2002:226–38.
 - 21 **Spector S**, Cull C, Goldstein LH. Seizure precipitants and perceived self-control of seizures in adults with poorly-controlled epilepsy. *Epilepsy Res* 2000;**38**:207–16.
 - 22 **Bernstein EM**, Putnam FW. Development, reliability, and validity of a dissociation scale. *J Nerv Ment Dis* 1986;**174**:727–35.
 - 23 **Dikel TN**, Fennell EB, Gilmore RL. Posttraumatic stress disorder, dissociation, and sexual abuse history in epileptic and nonepileptic seizure patients. *Epilepsy Behav* 2003;**4**:644–50.
 - 24 **Goldstein LH**, Drew C, Mellers J, *et al*. Dissociation, hypnotizability, coping styles and health locus of control: characteristics of pseudoseizure patients. *Seizure* 2000;**9**:314–22.
 - 25 **Meierkord H**, Will B, Fish D, *et al*. The clinical features and prognosis of pseudoseizures diagnosed using video-EEG telemetry. *Neurology* 1991;**41**:1643–6.
 - 26 **Nelson HE**, Willison J. *National Adult Reading Test (NART)*, second edition. Windsor: NFER-Nelson, 1991.
 - 27 **Wells A**. *Cognitive therapy of anxiety disorders. A practice manual and conceptual guide*. Chichester: John Wiley and Sons, 1997.
 - 28 **Norton GR**, Dorward J, Cox BJ. Factors associated with panic in nonclinical subjects. *Behav Ther* 1986;**17**:239–52.
 - 29 **Cox BJ**, Swinson RP, Endler NS, *et al*. The symptom structure of panic attacks. *Comp Psychiatry* 1994;**35**:349–53.
 - 30 **Carlson EB**, Putnam FW. An update on the Dissociative Experiences Scale. *Prog Dissoc Dis* 1993;**6**:16–27.
 - 31 **Waller NG**, Putnam FW, Carlson EB. Type of dissociation and dissociative types: a taxometric analysis of dissociative experiences. *Psychol Methods* 1996;**1**:300–21.
 - 32 **Zigmond AS**, Snaitch RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983;**67**:361–70.
 - 33 **Marks IM**, Mathews AM. Brief standard self-rating for phobic patients. *Behav Res Ther* 1979;**17**:263–7.
 - 34 **Carlton S**, Thompson PJ, Duncan JS. Non-epileptic seizures: patients' understanding and reaction to the diagnosis and impact on outcome. *Seizure* 2003;**12**:287–94.
 - 35 **Salkovskis PM**, Clark DM. Affective responses to hyperventilation: a test of the cognitive model of panic. *Behav Res Ther* 1990;**28**:51–61.
 - 36 **Bowman ES**, Coons PM. The differential diagnosis of epilepsy, pseudoseizures, dissociative identity disorder, and dissociative disorder not otherwise specified. *Bull Menninger Clin* 2000;**64**:164–80.
 - 37 **Kuyk J**, Leijten F, Meinardi H, *et al*. The diagnosis of psychogenic non-epileptic seizures: a review. *Seizure* 1997;**6**:243–53.
 - 38 **Cox BJ**, Swinson RP, Shaw BF. Value of the Fear Questionnaire in differentiating agoraphobia and social phobia. *Br J Psychiatry* 1991;**159**:842–5.
 - 39 **Frances PL**, Baker GA, Appleton PL. Stress and avoidance in pseudoseizures: testing the assumptions. *Epilepsy Res* 1999;**34**:241–9.
 - 40 **Ehlers A**, Clark DM. A cognitive model of post-traumatic stress disorder. *Behav Res Ther* 2000;**38**:319–45.