



Using evidence-based psychotherapy to tailor treatment for patients with functional neurological disorders



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ARTICLE INFO

Article history:

Received 16 June 2021

Revised 22 August 2021

Accepted 24 August 2021

Available online 03 September 2021

Keywords:

Guidelines

Evidence-based medicine

Functional neurological disorder

Conversion disorder

ABSTRACT

Functional neurological disorder (FND) frequently presents with comorbid psychopathology (e.g., anxiety, depressive, post-traumatic stress disorders (PTSD), somatic symptom and pain syndromes, and dissociative and personality disorders). It can become chronic and lead to unemployment and disability for many patients. Psychosocial factors play an important role in the onset and perpetuation of symptoms. Consequently, psychotherapy is recommended for the treatment of FND in general, and especially for the single symptom-based subtype of functional seizures (FS). Some of the psychotherapy approaches that have been utilized for FND include cognitive-behavioral therapy (CBT), third wave approaches, and psychodynamic psychotherapies as well as group therapeutic and psychoeducational interventions. For patients with FS and PTSD, prolonged exposure therapy, a CBT-based treatment has been implemented. The purpose of this manuscript is to describe and analyze specific elements (e.g., theoretical foundations, tools, targets, definitions of success) of the main psychotherapeutic approaches used in patients with FND. Our premise is that these modalities will overlap considerably in some respects. We will conclude by discussing how discrete differences may render them more suitable for subgroups of patients with FND or for patients at different timepoints of their recovery process.

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Introduction

Functional neurological disorder (FND) is characterized by disruptive and disabling neurological symptoms that do not conform to the known pathophysiology of neurological disease [1]. FND frequently presents with comorbid psychopathology, can become chronic and lead to unemployment and disability for many patients [2,3]. Psychosocial factors play an important role in the onset and perpetuation of symptoms [4]. FND can present with many symptoms, either in isolation or combined. Common phenotypes include seizures (known as psychogenic nonepileptic seizures [PNES], dissociative seizures or functional seizures [FS]), gait difficulties, weakness, abnormal movements, sensory deficits, and cognitive complaints

Numerous patients with FND report exposure to life adversities and psychologically traumatic events [5]. Past exposure to traumatic events is a risk factor for FS, with frequency reports ranging widely from 9 to 100% [6]. Additionally, comorbid psychiatric diagnoses are frequent in patients with FND (e.g., anxiety, depressive, post-traumatic stress disorders [PTSD], somatic symptom and pain syndromes, and dissociative and personality disorders) [7,8].

Consequently, psychotherapy is recommended for FNDs and is considered the main treatment modality for patients with FS [9]. The American Psychological Association defines psychotherapy as “the informed and intentional application of clinical methods and interpersonal stances derived from established psychological principles for the purpose of assisting people to modify their behaviors, cognitions, emotions, and/or other personal characteristics in directions that the participants deem desirable” [10]. As for the utility of psychotherapy for treating FS, in 2017, Carlson and Perry [11] conducted a meta-analysis of 13 FS studies and found that 82% of patients who completed psychological treatment had a reduction in seizures of 50% or more. A growing body of controlled and uncontrolled treatment studies and case series show that, in varying degrees, psychotherapy can result in a reduction in seizure frequency, improved mental health, quality of life (QOL), and decreased medical service utilization [12–15]. Psychotherapy has proven effective in reducing symptom burden or severity in other FND phenotypes [16].

Some of the psychotherapy approaches that have been utilized for FNDs include cognitive-behavioral therapy (CBT), third wave approaches (which incorporate mindfulness), and psychodynamic psychotherapies [12,15,17,18] as well as group therapeutic and psychoeducational interventions [19–22]. For patients with FS and PTSD, prolonged exposure therapy, a CBT-based treatment designed to treat PTSD, has been implemented [23].

FND presents with a wide variety of etiological, predisposing and perpetuating factors [24,25]. Developing a standardized psychological intervention for all patients is therefore challenging. For instance, Rusch et al [26] recognized the heterogeneity in clinical presentations in FS, and therefore the need to choose psychotherapeutic treatments based on certain clinical characteristics.

The purpose of this manuscript is to describe the main psychotherapeutic approaches used in patients with FND, all of which have been included in meta-analytic reviews [11]. Most of the data

comes from a single symptom-based subtype of FND: FS. Each treatment modality has demonstrated improvements on specific outcome measures (e.g., physical symptoms including seizure frequency, mental health, QOL, work and social function, and resource use); Reporting on sustained remission of symptoms has been variable. Our premise is that these modalities will overlap considerably in some respects; we will discuss how discrete differences may render them more suitable for subgroups of patients with FND or for patients at different timepoints of their recovery process. The latter is consistent with an emerging comprehensive patient-oriented theory of psychotherapy rather than distinct psychotherapeutic partisanship from the 20th Century [27]. Granted, clinicians who work with children have been utilizing multimodal approaches for much longer and with positive results [28].

Psychotherapies for the treatment of FND

Next, we will review the different psychotherapy modalities that have been studied in FND. Table 1 points out the modalities, their theoretical foundations, targets, tools, and empirical evidence based on clinical trial results Table 2.

Theoretical foundations and empirical evidence

Cognitive Behavioral Therapy (CBT)

Although there is no single model of CBT for patients with FS, the two approaches described in most detail in the literature are LaFrance et al.’s [12] and the approach in Goldstein et al.’s [14,15] CODES study.

Generally, CBT conceptualizes functional symptoms as stemming from unhelpful or distorted ways of thinking which result in maladaptive learned patterns of behavior. Treatment involves: 1) learning to recognize symptom triggers and distorted thinking, 2) identifying unhealthy responses (i.e., avoidance), and 3) adopting effective problem-solving and coping tools in their place.

LaFrance et al.’s CBT-informed psychotherapy (CBT-ip) is based on modifications from an epilepsy therapy workbook that targets mood-cognition-environment connections, relaxation techniques, healthy communication, and identification of internal and external triggers [12]. A multicenter pilot study randomized participants across 4 arms and showed a significant monthly seizure frequency reduction and improvements in many secondary measures (depression, anxiety, QOL and global functioning) in the CBT-ip and combined (CBT-ip and sertraline) arms. The sertraline-only and treatment as usual arms showed a non-significant reduction in seizure frequency [12].

Goldstein et al [29] conceptualize FS as a symptom that stems from fear avoidance, although awareness of fear may not be present (i.e., “panic without panic”). An initial physiological trigger begins a cycle in which cognitive and attributional factors fuel avoidant behavior. FS is maintained by a combination of behavioral, cognitive, affective, physiological, and social factors. The CODES trial randomized 368 patients into standardized medical treatment (SMT) or CBT plus SMT and is the largest clinical trial for any FND to date. Regrettably, follow up at 12 months revealed

Table 1

Therapeutic modalities used to treat PNES: number of sessions, theoretical foundation, rationale, treatment targets, tools and results.

Treatment modality	Structure (# of sessions, duration)	Theoretical foundation	Targets	Tools	Results
CBT-ip for PNES (LaFrance et al, 2014), for functional tremor (Espay et al, 2019)	1 initial encounter + 11 sessions + 1 final reading (Taking control: an ongoing process)	Fear Avoidance Model: trigger → distorted thinking → maladaptive behavior (recurring cycle)	Emotional dysregulation, distorted views of world and self, avoidance behavior, environmental factors	Seizure/symptom record, workbooks, thought record, trigger charts, relaxation training, goal-setting exercises, medication logs, support person	↓ seizure frequency/severity of functional symptoms, ↓ depression and anxiety, improved QOL, global functioning
CBT for PNES (Goldstein et al, 2020)	12	Fear Avoidance Model (“panic without panic”) - classical and operant conditioning: physiological trigger → cognitive and attributional factors → avoidant behavior (recurring cycle)	Behavioral, cognitive, affective, physiological and social factors	Seizure record, relaxation training, distraction techniques, handouts	No improvement in seizure frequency at 1 year (except first 6 months) Improved QOL, ↓ impairment in psychosocial functioning, ↓ psychological distress, ↓ somatic symptoms and seizures less bothersome
CBT for FMD (Dallochio et al, 2016)	12	Somatic signal misinterpretation and incorrect illness beliefs maintain FMD	Distorted thoughts, physical activity	Distraction techniques, coping strategies, physical exercise prescription	Improved FMD symptoms (self-assessment of incapacitation), depression, anxiety
CBT for FND (Sharpe et al, 2011)	Paced through guided self-help workbook Maximum contact: 4 sessions for guidance (30 minutes)	Functional symptoms are explained as “changes in nervous system functioning that were influenced by psychological and behavioral factors:” avoidance behaviors and distorted thoughts perpetuate symptoms	Lack of information on FND, avoidance behaviors, distorted thoughts	Workbook and self-management techniques	Improved FND symptoms (based on global impression) and less symptom burden.
Mindfulness-based therapy for PNES (Baslet et al, 2020)	5 modules (12 sessions)	Mixes elements of ACT, DBT, MBSR and MBCT. By creating increased awareness and acceptance of internal states, patients purposefully engage in values-based behavior which decreases automatized processes that lead to PNES	Awareness of contexts and vulnerable states, values and behaviors	Seizure record, stress management (relaxation) techniques, crisis survival tools, behavior chain analysis, values identification exercises, mindfulness, emotion recognition logs, relapse prevention plan	↓ seizure frequency and intensity Improved QOL.
Brief psychodynamic interpersonal model for FND/ PNES (Reuber et al, 2007; Howlet and Reuber, 2009; Mayor et al 2010)	2-hour initial interview and 19 (50-minute) sessions	Adaptation of the brief interpersonal psychodynamic therapy model (Hobson, 1985). Symptoms are explained based on generated hypotheses based on an individualized formulation of predisposing, precipitating, perpetuating factors, and triggers.	Unconscious interpersonal relationship patterns, emotional processing, psychological trauma.	Seizure/somatic symptom record, sensory grounding, relaxation techniques, life charts, sensory focusing, emotional freedom technique, EMDR, exposure (linking memories, emotions, symptoms), emotion diary.	↓ seizure frequency. Improvements in psychological distress, somatic symptoms and QOL. Reduced medical resource utilization
Short term psychodynamic psychotherapy for FMD (Hinson et al 2006; Kompolity et al, 2014)	12 (1 hour)/ 3 months	Childhood experiences, family dynamics, and personality traits link to current life experiences and produce symptoms	Unconscious interpersonal relationship patterns, emotional processing/ alexithymia	Insight into unconscious phenomena, working through underlying conflict.	Improvement in depression, anxiety, functioning and severity of functional movements (based on one study).
Psychoeducational Group for PNES (Zaroff et al, 2003)	10 (1 hour)	By learning more about the diagnosis, patients gain more control over their symptoms.	Lack of health information and unfamiliarity with psychological tools	Handouts, relaxation techniques.	No improvement in seizure frequency. Improved posttraumatic, dissociative symptoms and coping strategies.
Psychoeducational group (Chen et al, 2014)	3 (90 minutes)	By learning more about the diagnosis, patients gain more control over their symptoms.	Lack of health information and unfamiliarity with psychological tools	Seizure record, handouts, stress journal, distress tolerance techniques, support group	No improvement in seizure frequency. Improved work and social adjustment scores and reduced medical resource utilization.
Group psychotherapy for PNES (Barry et al, 2008)	32 (90 minutes)	The need for functional symptoms is eliminated by making emotional distress conscious and verbalized.	Similar to other psychodynamic therapies, anger and assertive behavior	Self-hypnosis, coping strategies, assertiveness training, support group	↓ seizure frequency, improved depression, severity of psychological symptoms.

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Table 1 (continued)

Treatment modality	Structure (# of sessions, duration)	Theoretical foundation	Targets	Tools	Results
DBT skills group for PNES (Bullock et al, 2015)	8–10 weeks (90 minutes)	Deficit in implicit-to-explicit processing of emotion generates symptoms. When patients learn emotion and behavior regulation skills, symptoms improve.	Distress intolerance, emotion dysregulation, and interpersonal difficulties	DBT diary cards, mindfulness training, skills training, seizure record.	↓ seizure frequency
Body-centered psychotherapy (Kozłowska et al, 2018; Sawchuck et al, 2020)	Assessment + 2-week inpatient program or 1–3 sessions as part of larger program	Development of somatic awareness is necessary to then use neurophysiological regulation to reduce autonomic arousal and increase upregulate vagal function.	Interoception, proprioception and kinesthesia help develop somatic awareness.	Biofeedback, exercise program, body map.	↓ seizure frequency, reintegration to school
Group CBT for FND (including PNES) (Conwill et al, 2014)	4 for PNES, 5 for other FND (1 hour)	By understanding and changing cognitive and behavioral responses to symptoms, there is improved physical and emotional well-being	Knowledge about diagnosis, isolation, thoughts, feelings, physical sensations and actions related to symptoms.	Presentations, handouts, discussion of new behavioral strategies.	Improved emotional well-being.
PE for PNES + PTSD (Myers et al, 2017)	12–15 (90 minutes)	Emotion Processing Theory: Avoidance maintains PTSD and functional symptoms and exposure provides corrective learning experiences; therefore, symptoms are no longer necessary.	Avoidance (thoughts and actions), emotional dysregulation, and distorted views of world and self	Seizure record, breathing retraining, workbook, in vivo and imaginal exposure, sensory grounding (if needed)	↓ seizure frequency, improved depression, PTSD symptoms, improved work adjustment
ReACT (Fobian et al, 2020)	8	Integrated Etiological Summary Model: FS result from catastrophic symptom expectations and/or classically conditioned responses	catastrophic symptom expectations, low sense of control over symptoms	Goal setting, identification of reinforcers and use of “punishers”	↓ seizure frequency
Group psychotherapy for PNES + epilepsy (Barros et al, 2018)	8	Mixes elements of CBT, PIT, MBT. Improved knowledge about illness and identification of thoughts and emotions and effective body monitoring lead to lower risk of symptoms.	Lack of health information, distorted thoughts and emotions, body monitoring, identification of stressors and triggers.	Seizure log, relaxation training	↓ seizure frequency. Improved QOL, depression, anxiety, alexithymia.

CBT-ip: cognitive behavioral therapy-informed psychotherapy; DBT: dialectical behavioral therapy; PIT: Psychodynamic interpersonal therapy; EMDR: eye movement desensitization and reprocessing; MBT: Mindfulness-based therapy; PE: prolonged exposure; QOL = Quality of life; ReACT: retraining and control therapy.

no significant difference in the primary outcome measure of seizure frequency between groups. However, the CBT plus SMT group rated FS as less bothersome, had a longer period of seizure freedom prior to follow up, reported better health related QOL, less impairment in psychosocial functioning, less overall psychological distress, and somatic symptoms [15].

Dallochio et al [30] randomized patients with functional movement disorder (FMD) into one of three arms: CBT-alone, CBT and adjunctive physical therapy, or a control group. Treatment with CBT focused on somatic misinterpretations and identification of thoughts/beliefs maintaining functional movement symptoms. Patients in the active treatment group showed improvement on a functional movement disorder scale, depression and anxiety scores.

The CBT-informed psychotherapy protocol mentioned above was modified for functional tremor and used in an uncontrolled study. The protocol emphasized thought monitoring, identification of thought distortions and thought restructuring. Periods of tremor exacerbation between sessions were identified to capture thought distortion leading to symptom exacerbation. At the end of 12 weeks of CBT, there was significant reduction in tremor severity based on a rating scale for functional movement disorder [16].

Sharpe et al [31] randomly assigned patients with FND (with a variety of phenotypes) to a CBT-based guided self-help (GSH) group or to a treatment as usual (TAU) group. At 3 and 6 months, those in the GSH group reported significant improvement in presenting symptoms and reduced symptom burden compared to the TAU group.

Mindfulness-based psychotherapy (MBT)

MBT refers globally to psychotherapies in which the primary intervention is rooted in the practice of mindfulness (“paying attention in a particular way: on purpose, in the present moment and non-judgmentally”). These mindfulness-based approaches are also known as “third wave” behavioral therapies (with classical behavioral being the “first” and Beckian CBT being considered the “second” waves). MBT differs from CBT in that rather than changing the content of the thought, the goal is to accept thoughts and emotions in their context without judgement.

An uncontrolled trial that assessed the efficacy of a manualized MBT 12-session protocol for FS resulted in a significant reduction in seizure frequency and intensity by the end of treatment, along with improvement in QOL. At treatment conclusion, most participants endorsed a reduction in seizure frequency of at least 50%, of which most reported remission of FS. At a 6 month follow-up after completion of treatment, seizure frequency remained decreased from baseline [17].

Psychodynamic Therapies

The goal of brief psychodynamic therapies is to increase the patient’s functionality by ameliorating unconscious conflicts, strengthening the ego, increasing self-awareness, and producing lasting changes to the personality structure. Psychodynamic Interpersonal Therapy (PIT) is a short-term treatment that starts by establishing rapport and engagement and then targets illness perception while seeking to enhance symptom control, independence,

and improved self-care. Treatment encourages processing of emotions and psychological trauma from whence symptoms are seen as originating.

Psychodynamic interpersonal therapy for FND [32–34] hypothesizes that the patients' symptoms originate from dysfunctional interpersonal relationships and patterns from early life. PIT focuses on unresolved trauma and utilizes trauma-specific interventions as part of the treatment. Grounded in psychodynamic interpersonal therapy, it also includes elements from CBT. One of such ingredients consisted of a somatic trauma therapy and involves significant others in the treatment. Results from a pilot uncontrolled study revealed significant improvements on measures of well-being and mental health symptoms, general health and QOL, and severity of somatic symptoms. Follow-up at 6 months showed that improvements were maintained and about 50% of patients remained improved in at least one measure.

Another study using brief PIT resulted in reduced seizure frequency/severity. These gains were maintained over time. Additionally, a decline in health care utilization from baseline to follow-up was noted [35].

Psychodynamic psychotherapy has been explored in FMD with mixed results. Kompolti et al examined short-term weekly psychodynamic psychotherapy in patients with FMD who were randomized to receive the intervention immediately after the diagnosis versus 3 months after the diagnosis. While there was improvement in functional symptom severity (based on a clinical improvement scale) at 3 and 6 months after diagnosis, the difference was not significant between the two allocation groups [36].

Hinson et al conducted a single-blind uncontrolled trial of short-term psychodynamic psychotherapy in FMD. Significant improvements were noted in a functional movement rating scale at treatment end, in addition to improvements in depression, anxiety, and functioning [37].

Body-centered psychotherapies

Body-oriented or somatic psychotherapies encompass clinical approaches that explicitly focus on body techniques as a means of neurophysiological regulation, therapeutic communication and exploration. Examples of those therapies include structured modalities such as sensorimotor psychotherapy, somatic experiencing, acupoint tapping therapies, healing/ therapeutic touch therapies. The common premise of these approaches is that development of somatic awareness through sensory (rather than cognitive) resources (such as interoception, proprioception, kinesthesia), lead to reduction in psychological distress through neurophysiological regulation techniques [38,39]. These therapies rely less on verbal cognitive approaches and more on regulatory body systems such as the autonomic, arousal and limbic systems as the main therapeutic mediators [39]. These 'bottom-up' approaches may be considered complementary to traditional 'top-down' modalities [40]. There is still limited but growing evidence of effectiveness of these therapies in depression, anxiety, PTSD, somatic distress (including pain) [38].

The pediatric literature on treatment of FS has emphasized body-oriented approaches. For instance, Kozłowska et al studied an assessment procedure and a 2-week mind–body program that trains pediatric patients to identify and manage changes in body state and increase physical resilience, using biofeedback and physical therapy training. At one-year follow-up, 75% of 60 participants regained normal function and returned to school full-time, with full control of FS or with only brief relapses [41]. Sawchuck et al described a stepped care approach for pediatric patients with FS which included various therapeutic components. One of such ingredients consisted of a psychophysiology assessment with subsequent biofeedback training (1–3 sessions) to improve respiratory stability. Since this stepped care program had multiple other ther-

apeutic components, it is difficult to determine to what degree the body-oriented training contributed to the positive results which included remission of FS in more than half of the participants by treatment end [42].

Group modalities

Group psychotherapy originated in the 1940s and since that time has evolved from its early psychodynamic foundations to include CBT, mindfulness-based as well as other eclectic approaches [43]. Psychoeducational groups integrate didactic information about a target health condition/illness and provide support and tools [44].

One of the first studies exploring psychoeducational group interventions reported significant decreases in posttraumatic and dissociative symptoms and improved coping mechanisms at termination of the uncontrolled trial [19]. A more recent 3-month psychoeducational intervention that compared an active with a control intervention showed improved outcome on work and social adjustment, and a trend toward diminished seizure-related emergency room visits in the active arm [21]. Neither study resulted in significant improvements in seizure frequency/intensity.

A pilot psychodynamic group therapy found significant post-treatment improvements in measures of overall psychopathology and depression. Most patients reported seizure frequency reduction [20].

In a Dialectical-Behavior Therapy Skills Training (DBT-ST) group for FS, patients experienced a significant reduction in seizure frequency [22].

A CBT-based group intervention that included patients with FS and other FND phenotypes, only showed improvements in selective subscales of a quality-of-life measure. No improvement was noted in overall QOL or depression and anxiety scores and there was a minimal-to-considerable improvement based on a clinical global impression [45].

Treatment modalities for subgroups: Prolonged exposure (PE) for patients with FS and PTSD

PE is a CBT-based on Emotional Processing Theory (EPT) and designed to treat PTSD [46]. The overarching rationale is that trauma produces a fear structure, and avoidance of trauma reminders maintains PTSD symptoms. To change the fear structure, it must be activated and novel, incompatible information must be experienced. In so doing, avoidance behaviors (e.g., dissociation) are replaced with tolerance of emotional distress/dysregulation. [47].

In a case series of 16 subjects treated with PE, most patients reported no seizures by their final session and improvements in depression and PTSD symptoms. Follow-up revealed sustained gains in seizure frequency at variable time intervals [23].

Treatment modalities for subgroups: Patients with pediatric FS and patients with FS and epilepsy

Treatment for pediatric FS: A recent pilot RCT examined the effectiveness of Retraining and Control Therapy (ReACT), a CBT-based therapy for pediatric FS. ReACT retrains classically conditioned, involuntary FS by targeting catastrophic and symptom expectations and a low sense of control over symptoms. In this treatment modality, FS are explained using the "Integrated Etiological Summary Model" in which FS are described as the result of catastrophic symptom expectations and/or classically conditioned responses. [48]. Results seven days after treatment conclusion were exceptionally positive with 100% of patients experiencing no FS, a significantly lower frequency compared to the supportive therapy control group. Sixty days after treatment concluded, 82%

remained seizure-free. Other pediatric approaches have used body-centered psychotherapies and are described in section 2.1.4.

Treatment for FS and epilepsy: Psychotherapy interventions are frequently recommended in patients with epilepsy to target mood, anxiety, and self-management efficacy. Although seizure control is not the main target, some psychoeducation and mindfulness-based approaches have demonstrated benefit in seizure reduction [49].

An 8-session CBT group program for patients with drug resistant temporal lobe epilepsy and comorbid FS resulted in reported improvements in QOL, lower depression, anxiety and alexithymia scores, and a significant reduction in seizure frequency [50].

Characteristics of the therapeutic modalities

CBT-ip [12]

The sessions focus on identification of triggers and pre-seizure auras, learning relaxation techniques, identification and management of life stressors, recognition of internal and interpersonal conflicts as well as isolation. Confrontation of negative states, self-acceptance and wellness are taught and emphasized. A unique feature is a session that is specifically dedicated to medication issues [51].

Goldstein's et al's CBT program consists of 12 sessions over 4–5 months. Key elements include: psychoeducation, treatment engagement, independence reinforcement, distraction, relaxation, and refocusing techniques when an episode is imminent, graded exposure to avoided situations, cognitive restructuring, and relapse-prevention [15].

Guided self-help for FND provides patients with a maximum of 4 half-hour sessions over 3 months, either face-to-face or by telephone by a CBT professional [31]. GSH emphasizes psychoeducation, techniques to minimize avoidance and cognitive restructuring.

Retraining and Control Therapy (ReACT) consists of an 8-session program. The program includes the following components: an etiological explanation, an individually tailored plan to retrain physical symptoms which challenges catastrophic symptom expectations and teaches patients to engage in behaviors incompatible with FS, a family plan to react to FS in which they monitor the patient for safety but otherwise allow the patient to follow their plan and a plan to return to school and social activities [48].

In CBT, by educating and training patients on relaxation techniques, their arousal level decreases, and they can overcome behaviors rooted on fear avoidance. This also allows cognitions to be identified and challenged, therefore decreasing the impact of behavioral and cognitive factors that perpetuate symptoms.

Mindfulness-based therapy

The MBT protocol for FS consists of 5 modules, delivered over 12 sessions. Sessions cover psychoeducation, identification of contextual factors and values; stress management training, mindfulness skills and application of mindfulness on emotion management and cognition [13].

This treatment aims to enhance psychological flexibility through the development and practice of mindfulness skills. There is an initial emphasis on values discovery to help guide behavioral choices. The hypothetical mechanism of action presumes that by creating increased awareness and acceptance of internal states (e.g., thoughts, emotions, and physical sensations), patients purposefully engage in values-based behavior while automatized processes that lead to FS decrease. Relaxation training to reduce baseline arousal levels overlaps with other CBT approaches. However, as mindfulness is incorporated, the focus shifts from identifying and changing cognitions and behaviors to identifying and changing one's relationship to these internal processes [17].

Psychodynamic psychotherapies

PIT for FND/FS highlights the collaborative nature of the therapeutic work. Three types of hypotheses are used to explain the nature of the problems: "Understanding hypotheses" that develop awareness regarding current emotions and feelings in and out of therapy; "linking hypotheses", that connect current feelings with past emotions; and "explanatory hypotheses", that link the patient's symptoms to underlying reasons.

Treatment begins with a 2-hour semi-structured interview, followed by 19, 50-minute sessions (weekly or biweekly). The objectives of the first session are to generate a patient commitment with therapy and a personalized case formulation, modify illness perceptions through a psychological formulation based on predisposing, precipitating, perpetuating factors, and triggers; and provide symptom control techniques. Subsequent sessions aim to improve the patient's independence, encourage self-care behaviors, enlist significant others, improve emotional processing, and process possible traumatic situations [33].

The psychodynamically-based treatment for FMD by Hinson et al spanned 12 weeks of weekly one-hour sessions [37]. The intervention linked early experiences, parenting dynamics and personality traits with current life experiences and problematic emotions and behaviors. The intervention studied by Kompoliti et al was not manualized, and the primary goal was for patients to develop insight into unconscious phenomena or to improve alexithymia deficits by making unconscious phenomena conscious and processing underlying conflicts.

In general, psychodynamic modalities theorize that historical interpersonal experiences and dynamics create precipitating and perpetuating factors which generate problematic emotions and symptoms. Exploring this allows the patient to work through early traumas and develop healthier emotion regulation skills.

Body-centered psychotherapies

In Kozłowska's et al approach (2018), the child and his/her family undergo an initial assessment before treatment. The individual assessment starts with a session of slow-breathing training that synchronizes breathing with a picture of the patient's lungs and decreases the rate to the one matched to the highest heart rate variability. The second task of the assessment has the patient complete a body map drawing that documents all somatic symptoms on an outline of a human body. This body map is then used to identify warning signs of impending FS and to monitor clinical progress. Then, an explanation of the diagnosis is provided to the patient and his/her family. A 2-week inpatient Mind-Body program then follows. During this program, patients engage in daily individual therapy to learn how to manage their FS, attend the hospital school to focus on reintegration back to school and complete a physical therapy exercise program to increase their body's capacity to manage changes in body state and to increase physical resilience. Upon discharge, patients continue with outpatient therapy in the community to address stressors with guidance from the Mind-Body program [41].

Group modalities

One psychoeducational group intervention offered ten sessions in lecture format focusing on understanding of FS and triggers, anger/assertiveness, psychological trauma, comorbid psychiatric symptoms, QOL, and relaxation techniques [19]. Another group intervention was in lecture format about FS for the first session, and two subsequent ones focused on specific themes (how physical manifestations can have underlying emotional causes and patient empowerment) [21]. A pilot study on a group psychodynamic therapy spanned 32 weekly sessions and addressed a multitude of topics. [20]. A DBT-ST group modality for FS consisted of weekly 90-minute sessions over three consecutive repeating modules cov-

ering distress tolerance, emotion regulation, and interpersonal effectiveness lasting 8–10 weeks each [22].

A CBT group for FND (including FS) consisted of four or five one-hour sessions, depending on diagnosis of FS (four sessions) versus other FND phenotypes (five). Content focused on psychoeducation, exploration of thoughts, feelings, physical sensations and actions related to the patients' presentations, with the goal of developing effective behavioral strategies to control symptoms [45].

In sum, group interventions in FND have utilized different theoretical approaches and psychoeducation.

Prolonged exposure

Treatment is conducted over 12–15 sessions, 90-minute sessions. The initial session offers a discussion on the “common reactions to trauma” including functional neurological symptoms, breathing re-training and seizure recording. Subsequent sessions focus on in vivo and imaginal exposure. [46].

Treatment for patients with dual diagnosis of epilepsy and FS

Patients with FS can have comorbid epilepsy, with rates ranging from 9.4 to 50% [52]. The evidence to treat comorbid FS and epilepsy is limited, since many studies that evaluate treatments for FS exclude comorbid epilepsy. However, some effective interventions for FS may help aspects of epilepsy management. For instance, the manual used for CBT-ip intervention for FS [12] was an adaptation of a treatment protocol originally developed as a psychobehavioral intervention for epilepsy [53].

An intervention for patients with epilepsy and FS [50] was based on different models of psychotherapy for FS (CBT, PIT, MBT). It consisted of 8 sessions including: group introduction; identification of distortions in thoughts and emotions and of epileptic seizures and FS; relaxation techniques and body monitoring; identification of external stressors and internal triggers, and “preparation for life” at the conclusion of treatment. A key aspect of treatment of comorbid FS and epilepsy involves proper recognition of the type of paroxysmal event. Educating patients and families/caregivers is paramount. Use of objective measurements (including videos for review) helps distinguish the nature of the episodes [54].

Targets, tools and definitions of success

In the remaining part of this article, we will discuss therapeutic tools and targets from the above-described psychotherapies. The goal of this exercise is to emphasize common and different elements across interventions and offer clinicians the possibility to identify those elements better suited for specific patients. Dissecting treatments into different components carries the risk of disrupting the composition used to test their efficacy, but on the other hand offers clinical adaptation. This may be particularly helpful in a clinical population that is highly heterogeneous and requires maximum flexibility during treatment.

Targets

CBT primarily targets functional neurological symptoms, as well as interpersonal issues, negative thoughts, and behavior (socialization, well-being and avoidance) [12]. Goldstein et al's [15] modality explicitly allows for focusing on abuse and family dysfunction. PE primarily targets avoidance behaviors that maintain PTSD symptoms. It also attends to emotional dysregulation, and distorted views of world and self [55].

MBT targets functional neurological symptoms (i.e., seizures) by enhancing awareness of contexts and vulnerable states that promote symptoms. A unique focus of this treatment is the exploration of personal values and how these guide behavior choices [17].

Brief psychodynamic therapies resemble traditional psychoanalysis in that their target is the unconscious. PIT aims to identify and address unhelpful patterns of interpersonal relationships, emotional processing, and psychological trauma [33,35,37]. Similarly, psychodynamic group approaches seek “to make emotional distress conscious and verbally expressed,” to identify symptomatic primary and secondary gains, focus on anger and assertiveness, and identify current seizure triggers and significant past events [20].

A DBT-ST group for FS targets distress tolerance, emotion regulation, and interpersonal effectiveness. Pure psychoeducational groups aim to increase the patient's knowledge of FND and sense of community with other patients [22].

ReACT, a CBT-based treatment that was piloted to treat FS in a pediatric sample targeted “catastrophic symptoms expectations and perceived control over symptoms.” [48]

Body-centered psychotherapies target sensory input as interoception, proprioception and kinesthesia. These become the focus of somatic awareness which is then used to facilitate neurophysiological regulation [38,39].

Tools

Psychoeducation and treatment rationale: These two are universal elements in most psychotherapy modalities. Psychoeducation provides information about the targeted symptoms and treatment rationale offers hypothesized etiological mechanisms, generates expectations, and describes a roadmap for recovery [51].

CBT modalities dedicate the first session to psychoeducation and treatment rationale. CBT-ip explicitly discusses the goal of helping the patient “take control of his/her seizures” [46]. MBT for FS dedicates the first session to psychoeducation [17]. PE spends the first three sessions providing psychoeducation on trauma and explaining how exposure therapy can reduce symptoms. Not surprisingly, psychoeducational groups offer education about FS [52]. Zaroff et al [18], instructed patients on FS risk factors, comorbidities, and healthy behaviors. Barry et al.'s [19] pilot group reported an initial “psychoeducational focus.” DBT-ST groups are psychoeducational in nature [21]. Only the brief psychodynamic interpersonal model did not rely on what might be considered traditional psychoeducation [36].

All CBT- based and similar approaches require patients keep a symptom record and provide relaxation training, or distraction techniques, self-care tools, handouts and homework. Thought recording for recognition of negative thinking style and thinking errors, including misattributions, are used. Some treatment modalities use patient workbooks [12,53], trigger charts, goal-setting exercises, medication logs, enlisting a support person, and providing a relapse prevention plan [12,15]. PE is unique in its prolonged use of in vivo and imaginal exposures throughout the course of treatment.

A workbook using existing CBT-based self-help manuals for depression and anxiety was developed for FND. It included self-management techniques and explanations on functional symptoms (e.g., anatomy, physiology, and psychology) and diagnosis [31]. For FMD, CBT and adjunctive physical activity and distraction techniques to treat patients diagnosed with FMD were used [30].

MBT is unique in its use of behavior chain analysis, values identification exercises, mindfulness exercises, emotion recognition logs, with added identification of behavioral tendencies and associated cognition, and identification of behavioral choice [17].

PIT is especially eclectic because of its many multi-modal tools. Life charts, sensory focusing, emotional freedom technique (or tapping), eye movement desensitization and reprogramming (EMDR), and emotional diaries are unique techniques in the therapist's toolkit [33].

Some group modalities utilize unique tools, such as self-relaxation and self-hypnosis [20], DBT diary cards and mindfulness training [22] and scheduled naps [21]. In both group psychotherapies, patients were encouraged to receive concurrent individual psychotherapy.

Body-centered psychotherapies use a number of body-oriented tools to facilitate neurophysiological regulation. These may include biofeedback, exercise programs, use of body maps, posture/ movements, touch/ tapping, massage, autogenic training. Only the first three tools have been explored in FS. Some of these therapies also incorporate relaxation techniques and mindfulness techniques described as part of CBT or MBT Table 2.

Definition of success

With the exception of a few modalities [21], the primary definition of success in these treatments is a reduction in functional neurological symptoms. Secondary indicators of success include reduced symptom burden [31], and unnecessary use of medical resources [21], improved psychosocial functioning [12,23], decreased health anxiety, greater satisfaction with care [12,15], and a positive change in QOL [17]. Success from the MBT perspective involves engagement in values-based activities [17]. Lastly, PIT has as its final objective to “improve identification and change of unhealthy interpersonal patterns and to achieve more effective

Table 2
Therapeutic tools, treatment modalities, and the disorders that are treated using these tools.

Tools	Treatment modalities that make use of these tools	Disorder targeted with these tools
Seizure/somatic symptom record/log	CBT, MBT, PIT, psychoeducational and therapeutic groups, DBT skills group, and PE	FS, FMD, FND
Workbooks	CBT and PE	FS, FND
Thought record	CBT	FS, FND
Relaxation training	CBT, MBT, PIT, psychoeducational approaches, DBT, and PE	FS, FND, epilepsy + FS
Support person	CBT	FS
Distraction techniques	CBT, MBT	FS, FMD
Handouts	CBT, psychoeducational modalities	FS, FND
Physical exercise prescription	CBT, psychoeducational groups, body-centered psychotherapy	FS, FMD
Values identification exercises	MBT	FS
Mindfulness	MBT, DBT	FS
Emotion recognition logs	PIT, MBT	FS
Sensory grounding	CBT, MBT, PE, PIT	FS, FS + PTSD
Life charts	PIT	FS, FND
Exposure	PIT, PE	FS, FS + PTSD
Self-hypnosis	Psychodynamic group therapy	FS
Coping strategies	CBT, MBT, PIT, Psychodynamic/ psychoeducational groups	FS, FND, FMD
Assertiveness training	Psychodynamic/ psychoeducational groups	FS
Prescribed adjunctive support group/therapy	Psychodynamic/ psychoeducational groups	FS
“Punishers” used to increase treatment compliance (if necessary)	ReACT	Pediatric FS
Biofeedback	Body-centered psychotherapy	Pediatric FS
Body map	Body-centered psychotherapy	Pediatric FS

CBT: cognitive behavioral therapy; DBT: dialectical behavioral therapy; PIT: Psychodynamic interpersonal therapy; EMDR: eye movement desensitization and reprocessing; MBT: Mindfulness-based therapy; PE: prolonged exposure; QOL = Quality of life; ReACT: retraining and control therapy; FS: functional seizures; FND: functional neurological disorders; FMD: functional movement disorders.

processing of emotions” [33]. Psychodynamic therapies have ambitious goals including reshaping “the intrapsychic structure of the patient” “to develop conscious and verbal expression of emotional distress, obviating the need for somatic displays of stress”[20,37].

Lastly, the secondary goal in group modalities, is to promote increased universality, socialization, interpersonal learning, and belonging [19,20].

Discussion

In recent years, there has been a healthy proliferation of treatment outcome studies for FNDs. Although they differ in theoretical foundations, treatment rationale and tools, overlap is evident, most likely because they are treating the same disorder.

Nearly all psychotherapeutic modalities for FND explicitly provide some form of psychoeducation and an explanation of treatment rationale. Irrespective of treatment orientation, several similar tools are utilized (e.g., symptom record to increase the patients’ understanding of triggers, emotional dysregulation and symptom expression). Relaxation training, grounding or distraction techniques are also utilized by most, to control symptoms and/or reduce vulnerable states associated with symptoms. Most treatment modalities consider psychological trauma, emotional dysregulation, distorted thoughts, unhelpful concepts of self and others, and dysfunctional behaviors (avoidance, isolation) as relevant targets. Often, explicit recommendations for self-care (e.g., sleep hygiene, physical exercise, relaxation time) are made regardless of treatment orientation.

Unique features of certain treatment modalities include the recruitment of significant-others in the treatment [12,21,33], having patients attend adjunctive support groups [20], overt relapse prevention planning [12,17,50], and the use of negative reinforcements in pediatric treatment [48]. Some modalities use unique tools such as published workbooks [12,30,55,56], DBT diary cards [22], medication logs [12], self-hypnosis [20], prolonged use of in vivo and imaginal exposure [46], prescribed physical activity [30], mindfulness training [17,22], life charts [33], emotional diaries [17,33] behavior chain analysis and values identification exercises [17] and massage, touch or tapping [38]. Furthermore, some treatments have been applied to unique subgroups including patients with specific FND phenotypes (FS, FMS), [30,34,37], patients diagnosed with epilepsy/FS [50] and FS/PTSD [23,57].

The question that now remains is which treatment would be best suited for each patient? Assuming that the patient has embraced the diagnosis of FND, it is likely that treatment rationale will help choose the appropriate modality. For instance, patients with pragmatic tendencies may find it easier to understand their symptoms as resulting from tangible cognitive and behavioral factors (e.g., trigger leads to distorted thinking/emotion which leads to maladaptive behavior) and a present focus may be more comprehensible than historical trauma and past emotional/interpersonal conflicts [58]. Alternatively, a patient who resonates with explanations that increased awareness and acceptance of internal states allow someone to intentionally engage in values-based behavior instead of automatized processes (e.g., FS), might prefer MBT. Some patients who have more difficulties with verbal concepts, such as children, may benefit from body-centered modalities. Furthermore, a patient who fulfills criteria for PTSD and FS, might be amenable to treatment that targets the disorders simultaneously with a trauma-based approach. Lastly, psychoeducational groups seem appropriate for most patients since reliable information on FNDs is hard to come by and these groups can help patients understand their condition and treatment options.

As for tools, most treatment approaches discussed above are already sharing tools, but they might be enhanced with some

unique ones (e.g., inclusion of significant others or adjunctive mindfulness training). The clinician may consider a specific approach based on how therapeutic he/she believes the incorporation of those unique tools will be. In particular, when patients have unresolved trauma, trauma-specific tools and interventions should be offered as soon as possible.

Lastly, it might be useful to choose psychotherapeutic approaches on the basis of clinical formulations that focus on the wide range of biopsychosocial predisposing, precipitating and perpetuating factors [29,30] or to consider different modalities at different timepoints in the patient's recovery path. For example, a particular patient might begin the recovery process with a psychoeducational intervention, followed by CBT targeting fear avoidance and distorted cognitions. Subsequently, mindfulness-based skills could further assist by increasing tolerance of difficult thoughts and emotions and promoting intentional and value-based behavior choices. That same patient might then participate in a more in-depth treatment (i.e., psychodynamic) focusing on historical interpersonal issues and long-standing trauma. In this sequential provision of care, the patient targets the multiple factors in FND using many of the resources that are presently available, and which have proven helpful in symptom management and psychological improvement.

Conclusion

Studying psychotherapy treatments in FND has increased availability of evidence-based effective tools for a clinical population in great need of help. Borrowing from complementary treatment modalities and conceptualizing treatment plans that include specific interventions at different timepoints in the course of the patient's care may increase chances of clinical success. This might be particularly relevant in the naturalistic settings in which patients are receiving treatment.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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