

Table 2.
Studies of Pharmacologic and Nonpharmacologic Treatments for PNES

Study	Design	Treatment/duration	Mechanism of action	Comments
Pharmacologic treatment				
LaFrance et al¹³	Pilot randomized clinical trial	CBT-ip vs CBT-ip + sertraline vs sertraline vs SMC followed for 16 wk		Significant seizure reduction and improved comorbid symptoms and global functioning with CBT-ip for PNES with and without sertraline. No improvements in the sertraline-only or treatment-as-usual arms. Findings support the use of manualized psychotherapy for PNES and the successful training of mental health clinicians in the treatment. Future studies could assess larger-scale intervention dissemination.
Nonpharmacologic treatment				
LaFrance et al¹⁴	Clinical trial	CBT 12 weekly sessions		CBT for PNES reduced the number of PNES and improved psychiatric symptoms, psychosocial functioning, and quality of life.
Goldstein et al¹²	Pilot RCT	CBT 12 weekly/fortnightly hour-long outpatient sessions of CBT		CBT is more effective than standard medical care alone in reducing seizure frequency in PNES patients.
Fobian et al²¹	Pilot RCT	ReACT for pediatric PNES	ReACT is a CBT-based, mind-body intervention that targets novel mechanisms for pediatric febrile seizures including sense of control and catastrophic symptom expectations	(1) ReACT resulted in significantly greater PNES reduction than supportive therapy, with 100% of patients having no PNES in the 7 d after ReACT. (2) In the 60 d after ReACT, 82% remained PNES free, suggesting that ReACT is effective in treating pediatric PNES. (3) ReACT works quickly to reduce PNES, with participants reaching PNES cessation after fewer than 5 sessions on average. The success rate of ReACT is higher than in studies using CBT for PNES in adults.
Mayor et al²²	Retrospective, uncontrolled	20 sessions of brief augmented psychodynamic interpersonal therapy	The goal of therapy was to make the patients aware of events/cues in others or themselves that trigger and terminate seizure episode.	Around 25% of patients were seizure free at follow-up; another 40% achieved more than half seizure reduction. Health care utilization also decreased significantly. Reduction in seizure frequency and health care utilization. There was no control group. Contact with other health care professionals and antidepressant treatment might have influenced seizure cessation. Sample selection bias was present.
Ataoglu et al²³	Randomized controlled	Paradoxical intention therapy sessions in inpatient setting for 3 wk and after 3 wk compared to the control arm (diazepam)	Paradoxical therapy consists of suggesting that the patient intentionally engages in the unwanted behavior such as performing compulsive ritual or wanting a conversion attack. It works on generating insight about the anxiety-arising symptoms and sense of control in patients.	Findings suggest that paradoxical intention is a cost-effective short-term psychotherapy. A study conducted on a larger sample size is needed to validate the efficacy of intervention.
Kelley and Benbadis²⁴	A qualitative uncontrolled multiple revelatory case design	8-phase EMDR protocol for more than 12 mo	The distinguishing feature of EMDR involves using bilateral physical stimulation (such as side-to-side eye movements, alternate hand movements, etc) as the patient focuses mentally on his/her life experiences.	With EMDR targeting trauma and dissociative symptoms, PNES ceased in 2 of 3 patients. These patients continued to be seizure-free at 12–18 mo. This study suggests that EMDR can be used as a treatment modality for trauma-based PNES. Larger sample size is required for establishing the efficacy of this intervention.

(continued)

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Study	Design	Treatment/duration	Mechanism of action	Comments
Moene et al ¹⁰	Randomized controlled	10 weekly sessions of hypnotherapy lasting 1 h		Video-taped therapy sessions were not monitored for treatment integrity. The hypnosis-condition patients were more improved relative to baseline and the waiting-list controls. Improvement was observed in behavioral symptoms associated with the motor conversion and the extent of motor disability. At 6-month follow-up, improvement was sustained. First randomized controlled study with well-defined sample of conversion patients. Standardized and validated evaluation measures were used. Small sample size decreased the power of the study.
Ben-Naim et al ²⁵	Retrospective within-group pre- and post-treatment, uncontrolled study	Therapy included presenting diagnosis, psychoeducation, and seizure reduction behavioral techniques, coping with past and present stressors		36% patients became seizure free at the end of therapy, and another 54% experienced significant seizure reduction (>70%). GAF scores improved from a mean of 43 to a mean of 73 at end of therapy. Utilized individualized treatment approach depending on the patient's coping strategies and stressors. No strict inclusion and exclusion criteria followed. Patients with psychiatric comorbidities and epilepsy were also included, therefore increasing the generalizability of the protocol. Lack of control group.
Baslet ²⁶	Uncontrolled	12 sessions of MBT		70% of participants experienced reduction in PNES frequency to half. Complete cessation reported by 50% at treatment end. VEEG confirmed diagnosis. Individualized MBT-based therapy resulted in decreased seizure frequency and overall improvement in quality of life. Lack of controlled intervention, small sample size, and convenience sample bias limit the study.
Nonpharmacologic treatment - devices				
Peterson et al ¹⁸	TMS	3 wk (15 weekdays, with 2 sessions/d)	3 distinct mechanisms were proposed: rTMS stimulation over the right TPJ (1) decreases seizure frequency by correcting for right TPJ hypoactivity and thereby increasing multisensory integration in this area, allowing a greater capacity for self-agency; (2) increases right IPL/TPJ activity, thereby increasing the intention-movement interval and allowing patients sufficient time to gain awareness of motor intention; (3) placebo effect.	High-frequency rTMS over the right TPJ is a promising strategy for treatment of PNES, which was well tolerated in this study cohort. Additional controlled studies are needed to investigate both the potential efficacy and neural mechanisms through which right TPJ rTMS may be an effective treatment for patients with PNES and other motor functional neurological disorders.
Pick et al ¹⁹	TMS dose/duration not specified			The findings suggest that active (supramotor threshold) sp-TMS to M1 is a safe, efficient, acceptable, and potentially effective treatment for functional limb weakness, leading to improvements in core symptoms and potentially other important outcome domains. A larger pilot RCT is now warranted to obtain a more robust estimate of effect sizes and variability in outcomes for this promising intervention.

Abbreviations: CBT-ip = cognitive-behavioral therapy–informed psychotherapy, EMDR = eye movement desensitization reprocessing, GAF = global assessment of functioning, IPL/TPJ = inferior parietal lobule/temporoparietal junction, MBT = mindfulness-based therapy, PNES = psychogenic nonepileptic seizures, RCT = randomized controlled trial, ReACT = retraining and control therapy, sp-TMS = single-pulse transcranial magnetic stimulation, VEEG = video electroencephalography.