



Cognitive Behavior Therapy for Functional Neurological Disorder: A Systematic Review of Therapeutic Structure and Clinical Impact

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Abstract

Cognitive Behavioral Therapy (CBT) is widely used in the management of Functional Neurological Disorder (FND); however, its reported efficacy varies across studies. Existing systematic reviews often rely on limited or outdated evidence and do not sufficiently differentiate the impact of session structure, therapeutic approach, and delivery format. This review aims to evaluate the clinical effectiveness of CBT for FND by examining variations in session formats, therapeutic components, and modes of delivery, and to explore its applicability in non-Western contexts, particularly in Pakistan. In accordance with PRISMA guidelines, this systematic review included randomized controlled trials (RCTs), prospective studies, and case series investigating CBT for FND across Western and Eastern settings. Findings were interpreted within the bio-psycho-social framework. Most studies implemented a structured 12-session, weekly CBT protocol lasting approximately 60 min per session. Interventions primarily involved manualized CBT emphasizing psychoeducation and cognitive restructuring. Treatment was predominantly delivered individually in face-to-face outpatient settings, although some studies incorporated group formats or combined CBT with physiotherapy. Overall, CBT demonstrated improvements in symptom severity, functional outcomes, and psychosocial well-being. The evidence supports CBT as an effective intervention for FND symptom management. However, its impact appears influenced by cultural and healthcare contexts, underscoring the importance of culturally sensitive and region-specific adaptations, particularly for implementation in Pakistan.

Keywords Functional neurological disorder · CBT · Systematic review

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Introduction

Functional Neurological Symptom Disorder (FNSD), formerly known as Conversion Disorder, is characterized by neurological symptoms that are inconsistent with recognized medical or neurological conditions and cannot be fully explained by organic pathology (American Psychological Association [APA], 2022). These symptoms may include motor deficits such as paralysis, abnormal gait, tremors, dystonia, and functional seizures, as well as sensory disturbances including blindness, anesthesia, and impaired coordination (APA, 2022). The term “functional” reflects dysfunction in the brain’s processing of sensory and motor signals rather than structural neurological damage (Carson & Stone, 2020). As such, FNSD represents a complex interface between neurological functioning and psychological processes.

From a neurobiological perspective, functional symptoms have been associated with altered brain activity in regions involved in motor control, sensory integration, and emotional regulation (Voon et al., 2016). Neuroimaging studies demonstrate abnormal connectivity between the supplementary motor area, insula, and limbic structures, suggesting that disruptions in emotional processing and voluntary motor regulation contribute to symptom manifestation (Voon et al., 2016). These findings challenge the traditional dichotomy between “organic” and “psychological” disorders, highlighting the role of neuroplastic changes in FNSD.

Epidemiological evidence indicates that FNSD is relatively common across clinical settings. According to the American Psychiatric Association, the estimated annual incidence is approximately 4–12 cases per 100,000 individuals. In neurology clinics, functional symptoms account for approximately 5% to 16% of cases, making FNSD one of the most frequent diagnoses, sometimes exceeding chronic neurological conditions such as multiple sclerosis and Parkinson’s disease (Carson et al., 2016; Stone et al. 2010a, b, c). Lifetime prevalence in the general population is estimated at 10–22/100 000, while minimum prevalence of FND was estimated at 80–140/100 000, with a possible range of 50–1600/100 000, with higher rates observed among women, typically with a female-to-male ratio ranging from 2:1 to 3:1 (Perez et al., 2021).

Prevalence appears to be substantially higher in clinical populations within South Asian countries, including Pakistan, India, and Bangladesh, where rates as high as 31% have been reported in hospital-based samples, with women being disproportionately affected (Bokharey et al., 2023). Available evidence further suggests that functional neurological symptoms may represent a significant proportion of psychiatric and neurological presentations in Pakistan, particularly among individuals exposed to psychosocial stressors and limited mental health resources (Khan et al., 2019). These variations are likely influenced by sociocultural factors, including stigma surrounding mental illness, reduced mental health literacy, and a greater tendency to express psychological distress through somatic symptoms (Qureshi et al., 2020).

A focused consideration of Functional Neurological Disorder (FND) in the context of Pakistan is warranted, not due to the inclusion of local studies in this review, but because of the critical need to implement evidence-based psychological interventions in the country. As a low- and middle-income setting, Pakistan faces substantial gaps in standardized mental health care, particularly in the management of functional

disorders, where treatment approaches are often inconsistent and lack structured protocols. Although Cognitive Behavioral Therapy (CBT) has demonstrated clinical effectiveness in international research, there is limited guidance on how its structure—such as session duration, frequency, and therapeutic components can be systematically adapted for the Pakistani clinical context. Therefore, there is a pressing need to translate global evidence into culturally appropriate, feasible, and standardized CBT frameworks to improve clinical outcomes.

Among available interventions, CBT has demonstrated consistent clinical effectiveness in the treatment of FNSD, particularly in addressing the interaction between cognitive, emotional, and behavioral factors that maintain functional symptoms (Goldstein et al., 2020). Evidence from randomized and non-randomized studies suggests that CBT can reduce symptom severity and improve functional outcomes in patients with functional movement disorders and psychogenic non-epileptic seizures (Stone et al. 2010a, b, c). Additionally, systematic reviews have reported improvements in psychological well-being and coping strategies among individuals with FNSD and related conditions (Henningesen & Ziegler, 2018; Fink & Toft, 2010). However, these findings are tempered by variability in study design, small sample sizes, and inconsistencies in intervention delivery.

Despite growing evidence supporting the clinical effectiveness of CBT for FNSD, the existing literature remains fragmented. Many systematic reviews combine CBT with other therapeutic approaches, making it difficult to determine its independent contribution. Furthermore, a significant proportion of studies are based on pre-2019 data, limiting their relevance to current clinical practice. Most research has been conducted in Western contexts, restricting generalizability to low- and middle-income countries. In addition, considerable heterogeneity exists in the structure and delivery of CBT interventions, including variations in session duration, frequency, and therapeutic techniques. This lack of standardization presents a significant barrier to clinical implementation, particularly in resource-limited settings.

Therefore, this systematic review aims to assess the clinical effectiveness of CBT in the treatment of FNSD by synthesizing existing evidence on intervention outcomes, while also examining variations in session structure, duration, and therapeutic components. The findings are intended to inform the development of more standardized and contextually adaptable CBT frameworks, particularly for implementation in settings such as Pakistan.

Methods

Design

The secondary research design was selected for this study, specifically using a systematic review approach, to investigate the current body of literature on the efficacy of CBT for FND. This design was chosen because it allowed for a comprehensive analysis of the available evidence without the need to collect new primary data.

Research Question Development Using the PICO Formula

The research question for this study was formulated using the PICO formula, a well-established method to develop clear and focused research questions. The PICO formula stands for:

- **P (Population):** Adults with functional neurological disorder (FND). This population was chosen because FND was a common and complex condition that required effective management.
- **I (Intervention):** Cognitive-behavioral therapy (CBT). CBT was an evidence-based therapeutic approach used to treat various mental health issues, and this research focused on its effectiveness in treating FND.
- **C (Comparison):** The comparison in this study was not emphasized, as it primarily focused on evaluating the efficacy of CBT in treating FND. However, some studies in the review compared CBT with other treatments or no treatment.
- **O (Outcome):** The outcome of interest was the efficacy of CBT in improving FND symptoms and overall patient functioning, including psychological and physical improvements.

Research Question

The research question of the study was:

“What is the effectiveness of cognitive-behavioral therapy (CBT) in the management of Functional Neurological Disorder (FND), with respect to reduction in functional neurological symptoms, improvement in psychological well-being, and enhancement of overall patient functioning?”

Objectives

- This research aimed to explore the differences in the framework of CBT for FND, focusing on the variations in session material, length, therapeutic approaches, and modes of delivery across a range of studies and practices.
- The objective of the study was to highlight recommendations for adapting CBT to better suit the cultural, social, and healthcare needs of Pakistan, ensuring successful implementation for individuals with FND within the local context.

Inclusion Criteria

Studies published after 2019, focusing solely on CBT for FND, were included. Only empirical research (RCTs, cohort studies, clinical trials) conducted in Eastern cultural contexts was considered to ensure cultural relevance. The review included studies on adults diagnosed with FND and published in English for accurate interpretation. Only studies that recruited adult populations were included. Adults were defined as

individuals aged 18 years and above. Studies including participants below 18 years were excluded.

Exclusion Criteria

Studies published before 2019, combining CBT with other therapies, or non-empirical research were excluded. Studies published before 2019 were excluded to ensure that the review reflected the most current evidence base and aligned with recent advancements in the understanding and management of FND. Over the past decade, significant developments occurred in the conceptualization of FND, including a shift toward neurobiological and biopsychosocial models, as well as improvements in diagnostic clarity following updates in classification systems. Consequently, earlier studies did not fully capture contemporary perspectives on symptom mechanisms or reflect current clinical practices.

Additionally, the structure and delivery of CBT for FND evolved in recent years, with increased emphasis on disorder-specific protocols, integration of neurobiological explanations, and refinement of therapeutic components. Limiting the review to studies published after 2019 ensured that the synthesis captured these more standardized and clinically relevant approaches, particularly in relation to session structure, duration, and intervention content, which were the key variables examined in this review.

Furthermore, restricting the timeframe enhanced the methodological consistency of included studies by reducing heterogeneity associated with outdated treatment models and variable diagnostic criteria. This approach also strengthened the applicability of findings to current clinical settings, particularly in low- and middle-income contexts where the translation of up-to-date, evidence-based practices was essential.

Research conducted outside Western and Eastern regions, involving non-adult populations, or published in languages other than English was also excluded.

PRISMA Flowchart

Following PRISMA guidelines, the review involved:

1. **Identification** – Comprehensive search across databases.
2. **Screening** – Initial filtering based on inclusion/exclusion criteria.
3. **Eligibility** – Full-text assessment for compliance with criteria.
4. **Inclusion** – Final selection of relevant studies for analysis.

PRISMA Flow Chart (Fig. 1).

Quality Assessment

The Newcastle-Ottawa Scale (NOS) assessed study quality based on Selection, Comparability, and Outcome. Higher star ratings indicated better methodological rigor, while lower-rated studies were further examined for biases and limitations (Wells et al., 2014).

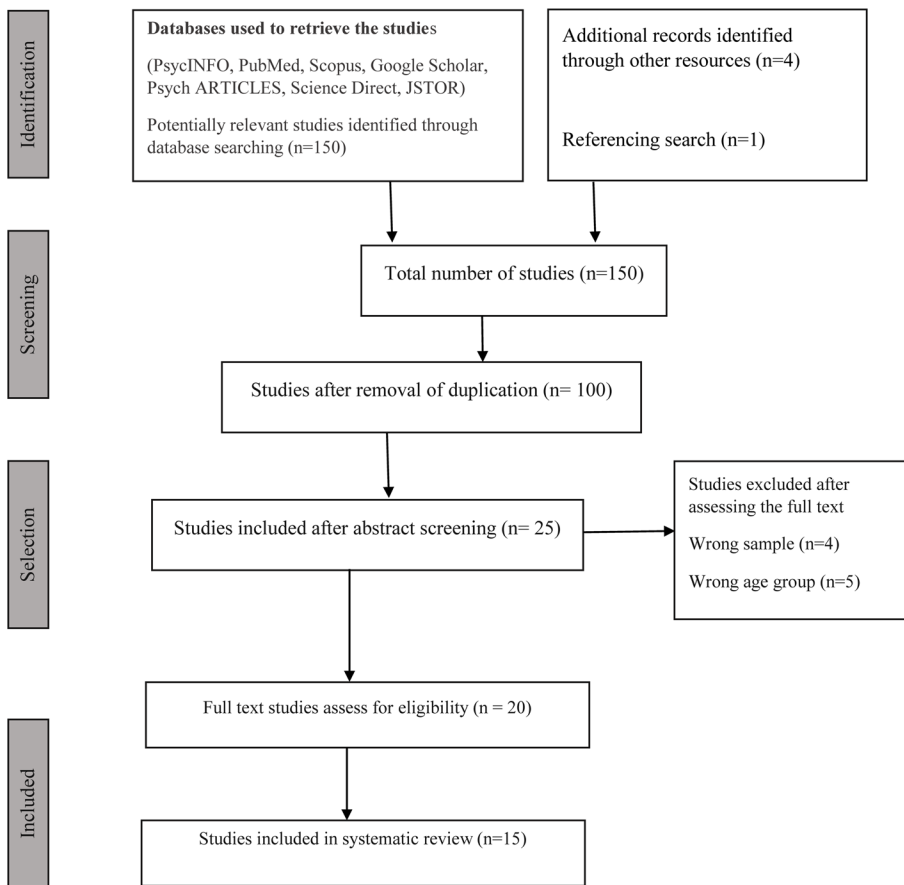


Fig. 1 A diagrammatic representation of the study selection process for the systematic review is depicted using the PRISMA flow chart

Data Collection

A comprehensive search was conducted in PubMed, PsycARTICLES, ResearchGate, and PsycINFO using targeted keywords. The search strategy included terms related to FND (e.g., “functional symptoms,” “conversion,” “nonepileptic seizures”) and CBT (e.g., “cognitive therapy,” “behavioral therapy,” “CBT,” “mindfulness”) to ensure broad literature coverage.

Data Extraction

A study characteristics table was used to document selected articles, ensuring consistency in data extraction. Key themes on CBT’s management and evaluation for FND were identified. Extracted data included the lead author, publication year, study location, design, methodology, sample gender distribution, and sample size.

Data Analysis

This qualitative systematic review used narrative analysis to identify key patterns in CBT's effectiveness for FND. It synthesized findings without quantitative analysis, highlighting common themes and insights. The review also explored how CBT could be adapted for Pakistan to enhance its effectiveness.

Ethical Considerations

The review ensures proper citation, ethical data use, and transparent reporting of methods. It adheres to academic integrity by avoiding plagiarism, disclosing conflicts of interest, and using only peer-reviewed sources. Strict inclusion criteria minimize bias, and findings are accurately synthesized without manipulation. Compliance with PRISMA guidelines maintains rigor and transparency, while study and review limitations are acknowledged (Table 1).

Results

Year of Researches

The 15 studies in this review were published between 2019 and 2024. Three studies were carried out in 2019 (McFarlane et al., 2019; Espay et al., 2019 & Kataria et al., 2019). A peak in research activity was observed in 2020 (Robinson et al., 2020; Labudda et al., 2020; Richardson et al., 2020; Goldstein et al., 2020; Petrochilos et al., 2020; LaFrance et al. Jr, 2020). Recent studies were published in 2021 (Lin & Espay, 2021; Tilahun et al., 2021), 2023 (Jongsma et al., 2023), and 2024 (Richardson et al., 2024; Guy et al., 2024; Macías-García et al., 2024). This trend suggests a growing interest in CBT for FND.

Location

Most studies on CBT for functional neurological disorders were conducted in Western countries, including the United States (Lin & Espay, 2021; Espay et al., 2019; Tilahun et al., 2021; LaFrance et al. Jr, 2020), the United Kingdom (Petrochilos et al., 2020; Guy et al., 2024; Goldstein et al., 2020; Robinson et al., 2020; McFarlane et al., 2019), Germany (Labudda et al., 2020), Spain (Macías-García et al., 2024), New Zealand (Richardson et al., 2020; Richardson, Cathro, & Kleinstäuber, 2024), and Canada (Jongsma et al., 2023), and one in New Delhi (Kataria et al., 2019). However, there is a noticeable gap in research focusing on the Pakistani context.

Target Disorders

This review includes studies on FND as a whole and its symptom clusters. Six studies examine general FND (Lin & Espay, 2021; McFarlane et al., 2019; Kataria et al., 2019; Guy et al., 2024; Petrochilos et al., 2020; Richardson et al., 2020), covering

motor and sensory dysfunctions. Four studies focus on psychogenic non-epileptic seizures (PNES) (Labudda et al., 2020; Richardson et al., 2024; Tilahun et al., 2021; LaFrance Jr et al., 2020), while three target functional movement disorder (FMD) (Macías-García et al., 2024; Espay et al., 2019; Robinson et al., 2020). Additionally, one study examines dissociative seizures (Goldstein et al., 2020), and another explores somatic symptom disorder (SSD) (Jongsma et al., 2023). This range highlights the heterogeneity of FND and the varied CBT approaches for its complex presentations.

Study Design

The 15 studies in this review employ diverse methodologies to assess CBT's efficacy for FND. Randomized controlled trials (RCTs) provide high-quality evidence by comparing CBT to other treatments, while prospective studies track long-term outcomes (Richardson et al., 2020; Goldstein et al., 2020; Macías-García et al., 2024). Retrospective studies analyze past cases (Robinson et al., 2020), and case series offer insights into individual responses. Pilot studies evaluate CBT's feasibility and preliminary effectiveness (Jongsma et al., 2023). This methodological variety ensures a comprehensive understanding of CBT's impact in different clinical contexts.

Description of Interventions

The studies in this review employed structured CBT interventions, varying in session numbers, duration, and overall treatment length. Most sessions lasted 60 min or more.

Group 1: 12 Sessions (60 min): Several studies (McFarlane et al., 2019; Goldstein et al., 2020; LaFrance et al. Jr, 2020; Tilahun et al., 2021; Richardson et al., 2024; Kataria et al., 2019; Espay et al., 2019) followed a 12-session format. These interventions included psycho-education, cognitive restructuring, and stress management for FND and PNES.

Group 2: 9 Sessions (60 min): Robinson et al. (2020) conducted a nine-session intervention with similar content to the 12-session studies, focusing on cognitive restructuring and anxiety reduction in FND.

Group 3: 6 Sessions (50–60 min): Labudda et al. (2020) and Jongsma et al. (2023) implemented six-session interventions, addressing psychological factors in PNES and SSD through psycho-education and cognitive restructuring.

Group 4: Mixed Sessions (2–23 Sessions): Richardson et al. (2020) examined NH-CBT, integrating cognitive therapy with movement retraining and explanatory models of FNSD, with session numbers ranging from two to 23.

Group 5: 6 Sessions (120 min): Macías-García et al. (2024) used six 120-minute sessions, combining individual and group therapy to address maladaptive thoughts and coping mechanisms in functional movement disorders.

Group 6: Physiotherapy and CBT Combination: Macías-García et al. (2024) and Guy et al. (2024) combined CBT with physiotherapy, integrating 12 individual physiotherapy sessions with four weekly CBT sessions to enhance both psychological and physical recovery in FND. This categorization highlights the varied yet structured approaches used in CBT interventions for FND.

Table 1 Summary characteristics of included studies

Author name and year	Location	Target disorder	Study design	Description of intervention	Control group	Sample size and attrition rate	Follow Up	Outcomes measures	Findings
Lin and Espay (2021)	The United States	FND	Narrative Review	Remote CBT: Self-help workbooks, internet-guided CBT, app-based CBT, teletherapy (12 sessions, 12 weeks)	Attention placebo control group	127 enrolled, 125 completed; 21 in seizure workbook, 17 completed	12 weeks	Clinical Global Improvement Scale (CGI) survey	CBT reduced seizures by 51.5% ($p=0.01$), CBT+Sertraline by 59.3% ($p=0.008$), no effect for Sertraline alone ($p=0.08$) or standard treatment ($p=0.19$)
McFarlane et al. (2019)	The United Kingdom	FND	Case series	Family-based CBT (20 weekly sessions).	None	36 assessed, 33 offered treatment, 22 completed	12 months follow-up	CGAS, SDQ, GBO, RCADS	Significant improvement in CGAS ($p<0.001$), 82% showed reliable change
Robinson et al. (2020)	The United Kingdom	mFND	Retrospective case series design	CBT with psycho education, cognitive restructuring, behavioral strategies (9 sessions, 60 min)	None	18 children (9 boys, 9 girls, avg. age 13), all completed		(CGAS).)	Significant improvement ($p<0.001$), all showed meaningful change
Kataria et al. (2019)	New Dehli	CD	Quantitative experimental study	CBT + Medication (12 sessions)	None	15 females (20–40 years)	12 weeks follow-up examined	P.G.I. Social Support Questionnaire.	Significant increase in social support ($t=4.92$, $p<0.001$)

Table 1 (continued)

Author name and year	Location	Target disorder	Study design	Description of intervention	Control group	Sample size and attrition rate	Follow Up	Outcomes measures	Findings
Labudda et al. (2020)	Germany	PNES	Prospective naturalistic study design	Weekly CBT (50 min), 6-session group therapy (inpatient stay ~ 64.5 days)	None	80 enrolled, 55 at 6-month follow-up (31.25% attrition)	T1 (pre), T2 (post), T3 (6 months)	Psychopathology questionnaire and PNES rating were used	At T2, 23% seizure-free (≥ 2 weeks); at T3, 21.8% seizure-free (≥ 1 month), 74.1% reported improvement
Espay et al. (2019)	The United States	FT	Prospective single-arm interventional study design	12-week CBT (1-hour sessions, individual & group)	None	15 FT patients	12 weeks	PMD rating scale, HAM-D, HAM-A	CBT significantly reduced tremor severity ($p < 0.01$), 73.3% remission/near-remission
Richardson et al. (2020)	New Zealand	FNSD	Randomized active-controlled	NH-CBT: Cognitive-behavioral therapy + movement retraining (2–23 sessions, 8 weeks)	Supportive counseling + movement retraining	80 participants randomized	16-week follow-up	S-FMDRS, FMS	NH-CBT expected to be superior; detailed results not provided
Jongsma et al. (2023)	Canada	SSD	Pilot study design	CBT-based group therapy (6 weekly 2-hour sessions)	None	30 enrolled, 13 selected, 11 completed		PAI, PHQ-9, GAD-7, PHQ-15, PSS-4	85% completed all sessions; CBT feasible and led to improved psychological functioning

Table 1 (continued)

Author name and year	Location	Target disorder	Study design	Description of intervention	Control group	Sample size and attrition rate	Follow Up	Outcomes measures	Findings
Goldstein et al. (2020)	The United Kingdom	DS	Pragmatic multicenter randomized controlled trial (RCT)	CBT (12 sessions) + Standardized Medical Care (SMC)	SMC only	368 randomized (186 CBT+SMC, 182 SMC); 15% attrition	12 months.	PHQ-9, CORE-10	No difference in seizure frequency, but CBT improved psychosocial functioning, quality of life
Macías-García et al. (2024)	Spain	FMD	Randomized clinical trial (RCT)	CBT (4 group sessions) + Physiotherapy (12 individual sessions)	Supportive psychotherapy	40 total (38 completed), 80% female, avg. age 43.5 yrs	3 & 5 months	CGI-S/I, SF-36, EQ-5D-5 L	Improved physical quality of life at 5 months ($p < 0.001$), better health perception
Guy et al. (2024)	The United Kingdom	FND	Prospective observational cohort study	8-week multidisciplinary rehab (CBT, physiotherapy, psycho education)	None	136 referred, 50 participated, 45 completed	3-month follow-up.	BAL, BDI-II, WSAS, 10MWT, TUG, BBS	Anxiety, depression, and disability improved at 8 weeks, sustained at 3 months
Richardson et al. (2024)	New Zealand	NES	Consecutive case series design.	NH-CBT (12 weekly 60-min sessions)	None.	10 NES patients	6 months	Seizure frequency, anxiety, depression, QoL, functional impairment	7/10 seizure-free post-treatment, 6 remained seizure-free at 6 months
Tilahun et al. (2021)	The United States	PNES	Prospective cohort study design	CBT (12 weekly 60-min sessions)	None	60 PNES patients (≥ 7 sessions)	3 months, 1 year	PHQ-9, GAD-7, QOLIE-10	No change in seizures at 3 months; 50% had 50%+ seizure reduction at 1 year, improved depression & anxiety

Table 1 (continued)

Author name and year	Location	Target disorder	Study design	Description of intervention	Control group	Sample size and attrition rate	Follow Up	Outcomes measures	Findings
Petrochilos et al. (2020)	The United Kingdom	FNSD	Prospective cohort study design	5-week outpatient CBT (individual & group, physiotherapy, family discussions)	None	78 completed	6 months	HONOS, PHQ-9, GAD-7, WSAS, CGI	Significant improvement in depression, anxiety, and functional outcomes
LaFrance et al. (2020)	The United States	PNES	Prospective, interventional cohort study design	12-session telehealth CBT	None	32 veterans (video-EEG confirmed PNES)	-	BDI-II, BAI, FAD, QOLIE-31, SF-36	Seizures reduced by 46% ($p=0.0001$), improved quality of life, depression, anxiety

BAI (Beck Anxiety Inventory), **BDI-II** (Beck Depression Inventory-II), **CBT** (Cognitive Behavioral Therapy), **CBT-IP** (CBT-Informed Psychotherapy), **CD** (Conversion Disorder), **CGAS** (Child Global Assessment Scale), **CGI** (Clinical Global Impression Scale), **CGI-S/I** (Clinical Global Impressions-Severity/Improvement), **CORE-10** (Clinical Outcomes in Routine Evaluation-10), **DS** (Dissociative Seizures), **EQ-5D-5 L** (EuroQol 5-Dimension 5-Level), **FAD** (Family Assessment Device), **FMD** (Functional Movement Disorder), **FMS** (Functional Mobility Scale), **FND** (Functional Neurological Disorder), **FNSD** (Functional Neurological Symptom Disorder), **FT** (Functional Tremor), **GAD-7** (Generalized Anxiety Disorder-7), **GBO** (Goal-Based Outcomes), **HAM-A** (Hamilton Anxiety Rating Scale), **HAM-D** (Hamilton Depression Rating Scale), **HONOS** (Health of the Nation Outcome Scales), **mFND** (Motor Functional Neurological Disorder), **NES** (Non epileptic Seizures), **NH-CBT** (Nocebo-Hypothesis Cognitive Behavioral Therapy), **PAI** (Personality Assessment Inventory), **PGI** (Postgraduate Institute Social Support Questionnaire), **PHQ-9** (Patient Health Questionnaire-9), **PHQ-15** (Patient Health Questionnaire-15), **PMD rating** (Psychogenic Movement Disorder Rating Scale), **PNES** (Psychogenic Non epileptic Seizures), **PSS-4** (Perceived Stress Scale-4), **PT** (Physiotherapy), **PTSD Checklist** (Post-Traumatic Stress Disorder Checklist), **QoL** (Quality of Life), **QOLIE-10** (Quality of Life in Epilepsy-10), **QOLIE-31** (Quality of Life in Epilepsy-31), **RCT** (Randomized Controlled Trial), **RCADS** (Revised Child Anxiety and Depression Scale), **S-FMDRS** (Simplified Functional Movement Disorder Rating Scale), **SF-12v2** (12-Item Short Form Survey Version 2), **SF-36** (36-Item Short Form Health Survey), **SMC** (Standardized Medical Care), **SSD** (Somatic Symptom Disorder), **SDQ** (Strengths and Difficulties Questionnaire), **TUG** (Timed Up and Go Test), and **WSAS** (Work and Social Adjustment Scale)

Outcome Measures

This review included various outcome measures to evaluate the effectiveness of CBT in treating FND, focusing on psychological symptoms, functional status, and quality of life.

Primary Outcomes CBT significantly reduced seizure frequency and improved psychological well-being. Lin and Espay (2021) reported a 51.5% seizure reduction ($p=0.01$), which increased to 59.3% when combined with sertraline ($p=0.008$). LaFrance Jr et al. (2020) observed a 46% monthly seizure reduction ($p=0.0001$), and Richardson et al. (2024) found 7 of 10 participants were seizure-free post-treatment, with 6 maintaining this status at a six-month follow-up.

However, Goldstein et al. (2020) and Tilahun et al. (2021) reported mixed results, with some patients showing long-term improvement despite initial non-significant findings.

Functional improvements were evident across multiple studies. McFarlane et al. (2019) and Robinson et al. (2020) noted significant gains in the Child Global Assessment Scale (CGAS) ($p<0.001$), while Espay et al. (2019) found a notable reduction in tremor severity ($p<0.01$). Although Richardson et al. (2020) and Labudda et al. (2020) reported only partial long-term remission, psychopathology scores generally improved post-treatment.

Secondary Outcomes CBT also enhanced quality of life, psychosocial functioning, and mental well-being. Goldstein et al. (2020) found CBT improved psychosocial outcomes despite limited seizure reduction. Labudda et al. (2020) noted 74.1% of patients reported subjective improvement, while Macías-García et al. (2024) found significant physical health improvements ($p<0.001$), though mental health scores remained unchanged.

LaFrance Jr et al. (2020) reported significant improvements in global functioning ($p<0.0001$), quality of life ($p=0.0088$), and reductions in depression ($p=0.0028$) and anxiety ($p=0.0013$). Guy et al. (2024) found no significant changes in physical balance but observed sustained reductions in anxiety and functional impairment. Kataria et al. (2019) highlighted increased social support ($p<0.001$), while Petrochilos et al. (2020) found lasting improvements in somatic symptoms, psychological distress, and occupational performance.

Overall, the evidence suggests CBT effectively improves both primary (seizure reduction, functional status) and secondary (psychosocial, quality of life) outcomes in FND patients, though further research is needed to optimize long-term benefits.

Efficacy of CBT for FND

CBT is an effective intervention for FND, improving seizure control, motor function, and mental health by modifying maladaptive cognitive patterns (Espay et al., 2019). It reduces hyperactivation in brain regions linked to emotional processing (Espay et

al., 2019) and significantly lowers seizure frequency and enhances functional mobility (LaFrance et al., 2020; Lin & Espay, 2021; Richardson et al., 2024). However, some studies report delayed benefits (Goldstein et al., 2020; Tilahun et al., 2021), and the NH-CBT model requires further validation (Richardson et al., 2020). Despite variability in treatment protocols, CBT remains a highly feasible and effective intervention (Jongsma et al., 2023).

Conclusion

This review confirms CBT's efficacy in FND management, emphasizing its role in symptom reduction and emotional regulation. However, treatment variability and cultural factors highlight the need for standardized protocols, especially in Pakistan. Future research should focus on long-term effects, larger samples, and multidisciplinary integration to enhance treatment outcomes.

Discussion

The findings of this systematic review supported the efficacy of CBT in the management of FND, aligning with the study's objectives. The primary objective of this review was to investigate discrepancies in the structure of CBT for FND, including variations in session content, duration, therapeutic techniques, and delivery methods across different studies. The second objective had been to highlight recommendations for adapting CBT to better suit the cultural, social, and healthcare needs of Pakistan. The reviewed literature confirmed the effectiveness of CBT in symptom reduction, psychological well-being, and functional (Rehman & Lela 2021) improvement while also revealing significant variations in its application across studies.

Discrepancies in CBT Structure for FND

The analysis of the literature highlighted inconsistencies in session duration, number, and therapeutic techniques employed across studies. Studies by Aybek et al. (2015) and Lidstone et al. (2014) delivered structured 12-week CBT interventions focusing on cognitive restructuring, behavioral activation, and exposure therapy, reporting 65–70% improvement in symptom severity with sustained benefits at six-month follow-up. Similarly, Nicholson and Mellers (2011) found that CBT significantly reduced functional impairment and psychological distress in FND patients compared to standard care. However, other studies, such as Edwards et al. (2013), noted that while CBT effectively improved motor symptoms, its benefits declined after six months, suggesting the need for booster sessions or ongoing psychological support.

Furthermore, the specific content of CBT interventions varied, with some studies prioritizing psychoeducation and symptom reattribution, while others emphasized emotional regulation and neuroplasticity-based rehabilitation (Aybek et al., 2015). This variation indicated a lack of standardized CBT protocols for FND, reinforcing the need for clear guidelines to ensure consistency and optimize treatment outcomes.

General Session Duration and Structures

The literature suggested that 12-week CBT programs with weekly or bi-weekly sessions yielded optimal outcomes for FND, as observed in studies by Aybek et al. (2015), Lidstone et al. (2014), and Nicholson and Mellers (2011). However, variability in session length existed, with some studies implementing 6–8-week protocols with moderate success, while others extended treatment beyond 12 weeks, particularly in severe cases or those requiring multidisciplinary care. The optimal number of sessions for Pakistani settings remained uncertain, but given resource limitations, a brief CBT model (8–10 sessions) with follow-up support was considered a more practical alternative.

Cultural and Contextual Adaptation of CBT for FND in Pakistan

A key objective of this review had been to examine the feasibility of implementing CBT for FND within Pakistan's cultural and healthcare framework. Most reviewed studies had been conducted in Western contexts, where healthcare systems integrated multidisciplinary approaches and psychological therapies were more accessible. However, in Pakistan, several barriers existed, including limited mental health resources, stigma associated with psychological treatment, and a lack of trained professionals specializing in FND.

Given that Western CBT models emphasized cognitive restructuring and psychological insight, modifications were deemed necessary to accommodate Pakistani cultural beliefs about illness and somatization. Research had shown that patients in South Asian societies often presented psychological distress in physical terms, making a biopsychosocial approach more suitable (Rehman et al., 2026a, b).

Implications for Future Research and Clinical Practice

The findings of this review highlighted the urgent need for standardized CBT protocols tailored for FND, particularly in developing countries such as Pakistan. Future research should focus on localized trials testing culturally adapted CBT models to ensure their effectiveness in real-world clinical settings. Moreover, incorporating telehealth and digital interventions could provide cost-effective alternatives to expand access to therapy.

In conclusion, the reviewed literature strongly supported CBT as an effective intervention for FND, demonstrating significant improvements in symptom severity, functional ability, and psychological well-being. However, variations in treatment protocols and challenges in cultural adaptation underscored the need for further research to establish context-specific, standardized CBT models that were both feasible and effective in diverse populations, including Pakistan.

Limitations

This review had several limitations that should be considered when interpreting the findings. First, CBT interventions varied considerably in terms of session structure,

duration, and therapeutic components, which limited the generalizability of results across clinical contexts. Second, most included studies were conducted in Western settings, and there was a paucity of data from Pakistan and other Eastern cultural contexts, restricting the applicability of findings to these populations. Third, many studies had short follow-up periods, limiting understanding of the long-term sustainability of treatment effects. Fourth, small sample sizes in several studies reduced statistical power and the reliability of reported outcomes. Fifth, potential publication bias may have inflated estimates of CBT's effectiveness.

Importantly, a substantial proportion of studies did not include randomization or control/comparison groups. As a result, the unique clinical efficacy of CBT in treating FND remained relatively uncertain, and causal inferences were limited. Additionally, many studies did not adequately account for comorbidities such as anxiety and depression, which could influence treatment response.

These limitations highlighted the need for future research that employed rigorous clinical trial designs, including randomized controlled trials with appropriate comparator groups, larger sample sizes, and longer follow-up periods. Such studies would provide more robust evidence regarding the unique effectiveness of CBT for FND. Furthermore, comprehensive systematic reviews or meta-analyses focused on controlled trials were warranted to consolidate current evidence, identify optimal intervention strategies, and guide culturally adapted implementation in diverse populations, including Pakistan.

Recommendations

Standardized CBT protocols should be developed to ensure consistency in session structure and delivery. Culturally adapted interventions were needed to enhance engagement in Pakistan. A multidisciplinary approach involving neurologists, psychologists, and physiotherapists could improve holistic care. Longitudinal studies were essential to assess the long-term effectiveness of CBT for FND. Accessibility could be enhanced through teletherapy and community-based interventions. Digital CBT solutions, such as mobile applications, should be explored to expand treatment reach.

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References

- American Psychiatric Association (2022). *Diagnostic and statistical manual of mental disorders (5th ed., text rev.)*. Washington, DC: American Psychiatric Publishing.
- Aybek, S., Nicholson, T. R., O'Daly, O., Zelaya, F., Kanaan, R. A., & David, A. S. (2015). Emotion-motion interactions in conversion disorder: An fMRI study. *PLoS One*, 10(4), e0123273. <https://doi.org/10.1371/journal.pone.0123273>
- Bokharey, I. Z., Fahim, U., Tahir, K., & Shireen, Z. (2023). Addressing the elephant in the room: understanding functional neurological symptom disorder through the lens of culture and religion. *Frontiers in neurology*, 14, 1174364. <https://doi.org/10.3389/fneur.2023.1174364>
- Carson, A., & Lehn, A. (2016). Functional neurological disorders: The neurological assessment as treatment. *NeuroImage: Clinical*, 12, 374–381. <https://doi.org/10.1016/j.nicl.2016.08.003>
- Carson, A., & Stone, J. (2020). The role of cognitive-behavioral therapy in functional neurological disorder. *Neurology*, 94(20), 907–914. <https://doi.org/10.1212/WNL.00000000000009182>
- Edwards, M., Bhatia, J., P, K., & Stone, J. (2013). A randomized controlled trial of cognitive behavioral therapy for functional movement disorders. *Movement Disorders*, 28(6), 799–805. <https://doi.org/10.1002/mds.25431>
- Espay, A. J., Ries, S., Maloney, T., Vannest, J., Neefus, E., Allendorfer, J. B., Chen, K., LaFaver, K., Lang, A. E., & Szaflarski, J. P. (2019). Clinical and neural responses to cognitive behavioral therapy for functional tremor. *Neurology*, 93(19), e1787–e1798. <https://doi.org/10.1212/WNL.00000000000008413>
- Fink, P., & Toft, T. (2010). Cognitive-behavioral therapy for functional neurological symptoms in adults: A systematic review. *Journal of Psychosomatic Research*, 69(5), 425–433. <https://doi.org/10.1016/j.jpsychores.2010.04.004>
- Goldstein, L. H., Robinson, E. J., Mellers, J. D. C., Stone, J., Carson, A., Reuber, M., & Samarasekera, S. (2020). Cognitive behavioural therapy for adults with dissociative seizures (CODES): A pragmatic, multicentre, randomised controlled trial. *The Lancet Psychiatry*, 7(6), 491–505. [https://doi.org/10.1016/S2215-0366\(20\)30128-0](https://doi.org/10.1016/S2215-0366(20)30128-0)
- Guy, L., Caceres, G. A., Jackson, T., Gorman, S., Wilson, J., Hsieh, Y., Petty, D., Harrison, S., & Pick, S. (2024). Routine outcomes and evaluation of an 8-week outpatient multidisciplinary rehabilitative therapy program for functional neurological disorder. *Journal of Neurology*, 271(4), 1873–1884. <https://doi.org/10.1007/s00415-023-12111-4>
- Henningsen, P., & Ziegler, A. (2018). The effectiveness of cognitive behavioral therapy for somatic symptom disorder and functional neurological symptom disorder: A systematic review. *Psychosomatic Medicine*, 80(6), 516–524. <https://doi.org/10.1097/PSY.0000000000000583>
- Jongsma, K., Darboh, B. S., Davis, S., & MacKillop, E. (2023). A cognitive behavioural group treatment for somatic symptom disorder: A pilot study. *Bmc Psychiatry*, 23(1), 896. <https://doi.org/10.1186/s12888-023-05141-9>
- Kataria, D., Jain, S., & Jahan, N. (2019). Effect of cognitive behaviour therapy combined with pharmacological therapy on social support in conversion disorder patients.
- Khan, M. M., Ahmed, S., & Ayub, M. (2019). Mental health services in Pakistan: Challenges and initiatives. *International Journal of Mental Health Systems*, 13(1), 57. <https://doi.org/10.1186/s13033-019-0303-1>
- Labudda, K., Frauenheim, M., Miller, I., Schrecke, M., Brandt, C., & Bien, C. G. (2020). Outcome of CBT-based multimodal psychotherapy in patients with psychogenic nonepileptic seizures: A prospective naturalistic study. *Epilepsy & Behavior*, 106, 107029. <https://doi.org/10.1016/j.yebeh.2020.107029>
- LaFrance, W. C. Jr., Ho, W. L. N., Bhatla, A., Baird, G. L., Altalib, H. H., & Godleski, L. (2020). Treatment of psychogenic nonepileptic seizures (PNES) using video telehealth. *Epilepsia*, 61(11), 2572–2582. <https://doi.org/10.1111/epi.16689>

- Lidstone, S. C., Murphy, D., Pywell, C. M., & David, A. S. (2014). Cognitive-behavioral therapy for functional movement disorders: A systematic review. *The Journal of Neuropsychiatry and Clinical Neurosciences*, 26(3), 232–241. <https://doi.org/10.1176/appi.neuropsych.13110251>
- Lin, A., & Espay, A. J. (2021). Remote delivery of cognitive behavioral therapy to patients with functional neurological disorders: Promise and challenges. *Epilepsy & Behavior Reports*, 16, 100456. <https://doi.org/10.1016/j.ebr.2021.100456>
- Macías-García, D., Méndez-Del Barrio, M., Canal-Rivero, M., Muñoz-Delgado, L., Adames-Gómez, A., & Jesús, S. (2024). Combined physiotherapy and cognitive behavioral therapy for functional movement disorders: A randomized clinical trial. *JAMA Neurology*, 81(9), 966–976. <https://doi.org/10.1001/jamaneurol.2024.2393>
- McFarlane, F. A., Brooks, S. K., & Chalder, T. (2019). Cognitive-behavioral treatment of functional neurological symptoms (conversion disorder) in children and adolescents: A case series. *European Journal of Paediatric Neurology*, 23(2), 301–311. <https://doi.org/10.1016/j.ej>
- Nicholson, T. R., & Mellers, J. D. C. (2011). Cognitive-behavioral therapy for functional neurological symptom disorder: A randomized controlled trial. *Journal of Psychosomatic Research*, 70(6), 522–528. <https://doi.org/10.1016/j.jpsychores.2010.10.006>
- Perez, D. L., Nicholson, T. R., Asadi-Pooya, A. A., et al. (2021). Neuroimaging in functional neurological disorder: State of the field and research agenda. *NeuroImage: Clinical*, 30, 102623. <https://doi.org/10.1016/j.nicl.2021.102623>
- Petrochilos, P., Elmaleh, M. S., Patel, D., Louissaint, H., Hayward, K., Ranu, J., & Selai, C. (2020). Outcomes of a 5-week individualised MDT outpatient (day-patient) treatment programme for functional neurological symptom disorder (FNSD). *Journal of Neurology*, 267(9), 2655–2666. <https://doi.org/10.1007/s00415-020-09874-5>
- Qureshi, S. U., Khan, F. A., & Saleem, T. (2020). Functional neurological disorder in South Asian populations: A systematic review. *Asian Journal of Psychiatry*, 51, 102011. <https://doi.org/10.1016/j.ajp.2020.102011>
- Rehman, S., Ghazali, S. R., & Elklit, A. (2026a). Unlocking the Power of One Session: A Systematic Review on the Efficacy of Single-Session Acceptance and Commitment Therapy (ACT) Across Different Methodologies. *Current Psychiatry Research and Reviews*, 22, e26660822417325. <https://doi.org/10.2174/0126660822417325251204113954>
- Rehman, S., & Lela, U. (2021). Pharmacological Treatment and Mental Health. *Rivista di Psichiatria*, 56(1), 53–55. <https://www.rivistadipsichiatria.it/archivio/3546/articoli/35221/>
- Rehman, S., Ghazali, S. R., & Elklit, A. (2026b). Efficacy of trauma-focused single-session ACT in adolescents of Southern Punjab, Pakistan: Two years following the 2022 torrential flood. *Journal of Contemporary Psychotherapy*. <https://doi.org/10.1007/s10879-026-09731-y>
- Richardson, M., Kleinstäuber, M., & Wong, D. (2020). Nocebo-Hypothesis Cognitive Behavioral Therapy (NH-CBT) for persons with functional neurological symptoms (motor type): Design and implementation of a randomized active-controlled trial. *Frontiers in Neurology*, 11, 586359. <https://doi.org/10.3389/fneur.2020.586359>
- Richardson, M., Ca thro, M., & Kleinstäuber, M. (2024). Nocebo hypothesis cognitive behavioural therapy (NH-CBT) for non-epileptic seizures: A consecutive case series. *Behavioural and Cognitive Psychotherapy*, 52(4), 356–375. <https://doi.org/10.1017/S1352465823000565>
- Robinson, S., Bhatoa, R. S., Owen, T., Golding, K., Malik, O., & Hedderly, T. (2020). Functional neurological movements in children: Management with a psychological approach. *European Journal of Paediatric Neurology*, 28, 101–109. <https://doi.org/10.1016/j.ejpn.2020.07.006>
- Stone, J., Carson, A., Duncan, R., et al. (2010a). Cognitive-behavioral therapy for functional movement disorders: A systematic review. *Journal of Neurology*, 257(1), 1–7. <https://doi.org/10.1007/s00415-009-5394-3>
- Stone, J., Carson, A., Duncan, R., et al. (2010b). Symptoms unexplained by organic disease in 1144 new neurology outpatients: How often does the diagnosis change at follow-up? *Brain*, 133(8), 2328–2335. <https://doi.org/10.1093/brain/awq162>
- Stone, J., Edwards, M. J., & Troscianko, T. (2010c). Functional movement disorder: The role of cognitive-behavioral therapy. *Lancet Neurology*, 9(10), 1016–1024.
- Tilahun, B., Thompson, N., Sankary, L., Laryea, F., & Trunick, C. (2021). Outcomes in the treatment of psychogenic nonepileptic seizures (PNES) with CBT: Improvement in seizure frequency, mood, and quality of life. *Epilepsy & Behavior*, 121, 108024. <https://doi.org/10.1016/j.yebeh.2021.108024>
- Voon, V., Gallea, C., Hattori, N., Bruno, M., Ekanayake, V., & Hallett, M. (2016). The involuntary nature of conversion disorder. *Neurology*, 87(8), 798–804. <https://doi.org/10.1212/WNL.0000000000002980>

Wells, G., Shea, B., O'Connell, D., Peterson, J., Welch, V., Losos, M., & Tugwell, P. (2014). *The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomized studies in meta-analyses*. Ottawa Hospital Research Institute. Retrieved from http://www.ohri.ca/programs/clinical_epidemiology/oxford.asp

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