



Review article

Hypnosis and suggestion as interventions for functional neurological disorder: A systematic review

Michael H. Connors^{a,b,*}, Lena Quinto^c, Quinton Deeley^d, Peter W. Halligan^e,
David A. Oakley^{e,f}, Richard A. Kanaan^b

^a Centre for Healthy Brain Ageing, UNSW Sydney, Sydney, Australia

^b Department of Psychiatry, University of Melbourne, Austin Health, Melbourne, Australia

^c Forensic & Analytical Science Services, NSW Health, Sydney, Australia

^d Cultural and Social Neuroscience Research Group, Institute of Psychiatry, Psychology, and Neuroscience, King's College London, London, UK

^e School of Psychology, Cardiff University, Cardiff, UK

^f Division of Psychology & Language Sciences, University College London, London, UK



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ABSTRACT

Objective: Functional neurological disorder (FND) involves the presence of neurological symptoms that cannot be explained by neurological disease. FND has long been linked to hypnosis and suggestion, both of which have been used as treatments. Given ongoing interest, this review examined evidence for the efficacy of hypnosis and suggestion as treatment interventions for FND.

Method: A systematic search of bibliographic databases was conducted to identify group studies published over the last hundred years. No restrictions were placed on study design, language, or clinical setting. Two reviewers independently assessed papers for inclusion, extracted data, and rated study quality.

Results: The search identified 35 studies, including 5 randomised controlled trials, 2 non-randomised trials, and 28 pre-post studies. Of 1584 patients receiving either intervention, 1379 (87%) showed significant improvements, including many who demonstrated resolution of their symptoms in the short-term. Given the heterogeneity of interventions and limitations in study quality overall, more formal quantitative synthesis was not possible.

Conclusions: The findings highlight longstanding and ongoing interest in using hypnosis and suggestion as interventions for FND. While the findings appear promising, limitations in the evidence base, reflecting limitations in FND research more broadly, prevent definitive recommendations. Further research seems warranted given these supportive findings.

1. Introduction

Functional neurological disorder (FND) is characterised by the presence of neurological symptoms that cannot be explained by neurological disease [1,2]. Symptoms instead appear to arise from altered functioning of a structurally intact or largely intact nervous system. Symptoms often have a psychological contribution [3], such as dissociation [4–6] or distorted bodily awareness [7]. Patients can experience, for example, weakness, paralysis, sensory loss, involuntary movements, and/or seizures without a clearly defined organic pathology. Such symptoms are typically experienced as distressing and disabling. FND is common in neurology clinics, with around 15–30% of patients in this

setting having symptoms inconsistent with or not fully explained by neurological disease [8]. The condition has also been known as “hysteria” and “conversion disorder”, reflecting historical beliefs about its aetiology [9]. It has likewise been subject to various misconceptions, such as conflating it with malingering or assuming a simple dichotomy between organic and functional disorders [10,11]. Regardless of such issues, FND has been the subject of great theoretical interest for more than a century given its implications for understanding agency, selfhood, the mind-body relationship, and possible overlap with hypnosis and suggestion [5,12,13].

Hypnosis is a process in which one person gives suggestions to another person for imaginative experiences involving alterations in

* Corresponding author at: Centre for Health Brain Ageing, Level 3, AGSM Bldg (G 27), University of New South Wales, NSW 2052, Australia.

E-mail address: m.connors@unsw.edu.au (M.H. Connors).

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perception, memory, or action [14–18]. The process may be explicitly marked as hypnotic by the presence of a hypnotic induction – an initial set of suggestions for the subject to enter a hypnotic state [14,15]. Such an induction appears to confer a small, but noticeable, increase in responsiveness [19–22], though suggestions can be given without it, in what has been termed “direct verbal suggestion” [23]. Historically, suggestions have also been given after administering a sedative drug, variously referred to as “abreaction”, “narcotherapy”, and “narcosuggestion” [24]. Regardless of approach, suggestions can, for a proportion of people, result in experiences that are subjectively perceived to be both highly compelling and involuntary [14–17]. As such, suggested experiences can sometimes mimic the symptoms of FND, though in a time-limited and reversible manner [16,17,25]. Given such phenotypic similarities, theorists have long suggested that hypnosis and FND might share common underlying mechanisms, including, in particular, dissociation [5,6,12,18,25–27]. Consistent with this overlap, research has found that people with FND are typically more hypnotisable and suggestible than the general population [28–30]. Research has also found that FND and hypnotically-suggested neurological symptoms resemble each other in functional neuroimaging [31,32].

Against this background, hypnosis and suggestion have long been used to treat FND [33,34]. Seminal figures in psychiatry and neurology – such as Charcot, Freud, Janet, and Babinski – used such interventions to treat what was then termed “hysteria” [12]. Both interventions also continue to be used clinically [34–36]. The two general strategies that have been used to treat FND are (i) suggestions designed to treat specific symptoms (symptom-oriented) and (ii) suggestions designed to uncover and address psychological factors, such as trauma or interpersonal or intrapsychic conflict, that might contribute to the symptoms (insight-oriented) [36,37]. Specific techniques for both strategies vary and include direct suggestion (explicitly stated instructions), indirect suggestion (implied instructions), post-hypnotic suggestion (instructions for experiences to occur after hypnosis is terminated), and self-hypnosis (where the patient administers suggestions to themselves) [36–38]. Specific techniques can also be tailored to individual patients and adapted to different theoretical paradigms (e.g., cognitive-behavioural, psychodynamic), reflecting hypnosis’ and suggestion’s status as broad treatment modalities, rather than as uniform interventions in their own right [38].

Despite such longstanding theoretical and clinical interest, there is currently no systematic review of hypnosis or suggestion as interventions for FND. We sought to address this, conducting a review of studies that assessed the efficacy of hypnosis or suggestion as treatments for FND over the last century.

2. Method

The protocol for this systematic review was registered at PROSPERO (registration number CRD42022366435).

2.1. Eligibility criteria

The review examined primary research that assessed either hypnosis and/or verbal suggestion as treatment interventions for people with FND. The review also included studies evaluating these interventions as adjuncts to other treatments. Studies examining placebo response were not considered unless specific mention was made of verbal suggestion. Only studies involving aggregate results of groups of patients ($n \geq 5$) were considered given the focus on assessing efficacy (case studies and case series were excluded unless group data for ≥ 5 patients could be extracted). There were no other restrictions on study design and no requirements for a comparator group. Only studies since 1920 were included due to the difficulty in reliably identifying relevant studies in databases prior to this. There were no restrictions on language or clinical context.

2.2. Search strategy

The search identified studies through bibliographic databases and trial registers, including Medline, PubMed, EMBASE, Scopus, Web of Science, PsycInfo, PsycBooks, CINAHL, and the Cochrane library. The search strategy used only population and intervention terms to maximise the likelihood of identifying relevant studies (comparator and outcome terms were not used).

The population was people with FND and identified using the following search terms: conversion disorder*, conversion syndrome*, functional neurologic*, functional disorder*, functional movement, functional motor, functional seizure, hysteri*, non*epileptic, psychogenic movement, psychogenic motor, (“psychogenic” within three words of “seizure”), (“dissociative” within three words of “seizure”), and (“unexplained” within one word of “neurolog*”; the last three terms completed using proximity operators). Interventions were any treatment involving hypnosis and/or verbal suggestion and identified using the following terms: hypno*, suggestion, trance, mesmerism, and animal magnet*. Searches were conducted on 10 October 2022 and repeated on 25 April 2023. In addition to database searches, the reference lists of included papers and previous reviews on FND and/or hypnosis were checked for relevant studies.

2.3. Study selection

Two reviewers (MC and LQ) independently assessed search results for inclusion by title and abstract. All articles deemed relevant by either reviewer were obtained in full. Both reviewers then independently evaluated full-text articles for inclusion. Any disagreements were resolved through discussion or, if necessary, with a third reviewer (RK).

2.4. Data extraction

The same two reviewers independently extracted relevant data from publications using a standardised form. This included patient details (e.g., demographics, number, recruitment, clinical context), intervention type, study design, measures, and results. Qualitative data were also collated. The primary outcomes were measures of symptoms, adjustment, distress, quality of life, associated psychiatric disturbances, and healthcare usage. The secondary outcomes were measures of any other clinically-relevant outcomes, such as perceived acceptability, reported side-effects, and dropout rates.

2.5. Quality assessment

The two reviewers independently assessed study quality and risk of bias using the Effective Public Health Practice Project Quality Assessment Tool for Quantitative Studies [39,40]. Any disagreements were resolved through discussion.

2.6. Data synthesis

Although a quantitative synthesis of findings using meta-analytic techniques was originally intended, this was not possible due to the poor quality of most studies and the heterogeneity of samples, interventions, and measures. As a result, only a descriptive synthesis was provided.

3. Results

3.1. Search results

The search identified 6402 publications, of which 4689 were unique and 1713 were duplicates. Of these, 427 were considered by one or both reviewers to be potentially relevant and obtained in full. Four papers obtained in full-text were found to be duplicates, three of which reported

Table 1
Randomised controlled trials using hypnotic and/or non-hypnotic suggestion.

Study	FND Symptoms	n	Intervention	Findings
Loriedo et al. (2010) [47]	Mixed (mostly psychogenic seizure and motor disturbances; 1 patient with sensory, 1 patient with mixed symptoms)	23	Outpatients received either hypnotic treatment following a standardised protocol (1–3 sessions involving insight-oriented suggestions tailored to address the conflict underlying individual’s symptoms with 15–30 days between sessions) or treatment as usual. Outcomes were assessed after one year.	<ul style="list-style-type: none"> • Patients who received the hypnosis treatment improved at one year follow-up relative to both baseline and the control group in terms of overall FND symptoms, overall functioning, and measures of psychopathology (alexithymia, dissociation, and somatic symptoms). • Findings were limited by the fact that the control group had significantly greater impairments at baseline.
Moene et al. (2002) [48]	Mixed motor (weakness/paralysis, other movement disturbances, speech disturbances, and psychogenic seizures)	45	Inpatients undergoing a multidisciplinary rehabilitation program (including individualised exercise, physiotherapy, and group psychotherapy) received either additional hypnotic treatment over 8 weekly sessions with suggestions tailored to the individual (using both symptom and insight-oriented strategies) and training in self-hypnosis or treatment as usual.	<ul style="list-style-type: none"> • Both conditions improved in terms of their FND symptoms (assessed by independent raters blinded to treatment and study aim) and overall level of functioning; and overall psychopathology. • There was no benefit of the hypnotic treatment on any of the outcome measures either after treatment or at a six month follow-up. • There was no association between patients’ hypnotisability and clinical outcomes.
Moene et al. (2003) [49]	Mixed motor (weakness/paralysis, other movement disturbances, speech disturbances, and psychogenic seizures)	44	Outpatients either received hypnotic treatment over 10 weekly sessions with suggestions that were tailored to the individual (using both symptom and insight-oriented strategies) and training in self-hypnosis or were placed on a waitlist control.	<ul style="list-style-type: none"> • Patients who received the hypnotic treatment improved in terms of their FND symptoms (assessed by independent raters blinded to treatment and study aim) and overall level of functioning (assessed by a blinded, independent interviewer) relative to both baseline and the waitlist control group. • These improvements were maintained at a 6-month follow-up. • There was no change over time or difference between groups in terms of overall psychopathology. • In the treatment group, patients’ expectations and hypnotisability were not associated with clinical outcomes (though findings were limited by low power).
Mousavi et al. (2008) [50]	Mixed (aphonia, paresis, tremor, blindness, and paraesthesia)	80	Outpatients received a single two-hour treatment session of either: (i) suggestion focused on symptom relief; (ii) intravenous diazepam; (iii) muscle relaxation (involving instructions to contract and relax muscles); or (iv) hypnosis (details not specified).	<ul style="list-style-type: none"> • Most patients improved within the single treatment session (71% overall). There was no difference between groups in terms of the proportion who improved. • Patients in the muscle relaxation group improved more quickly (mean 16.5 min) than patients in other groups (mean > 22.5 min; though differences were only statistically significant relative to the hypnosis and diazepam groups). • There was no difference between groups in terms of the proportion who relapsed over one month (21% overall).
Zhang (1986) [51]	Not-specified (patients met criteria for DSM III conversion or dissociative disorder)	58	Patients, while attached to electromyography, received eight daily 30 min sessions involving either suggestions for systematic desensitisation (progressive tensing and relaxing of muscles while recalling stressful triggers) or suggestions that their symptoms would improve due to the electromyography machine while similarly recalling stressful triggers (control group).	<ul style="list-style-type: none"> • Patients in both groups improved in terms of clinician-rated impression; frequency and severity of symptoms (rated by family member); and patient-rated measures of anxiety, depression, and other psychological symptoms. • The groups did not differ in these measures after treatment. The systematic desensitisation group, however, had lower scores on these measures compared to controls at a follow-up 4–5 months later. • The systematic desensitisation group had lower scores on electromyography measures after treatment and at follow-up compared to controls.

Table 2
Non-randomised controlled trials using hypnotic and/or non-hypnotic suggestion.

Study	FND Symptoms	n	Intervention	Findings
Drost & Brouwer (1996) [52]	Functional dysphonia	246	Outpatients at a speech clinic received one of three treatments: (i) visualisation suggestions for the recovery of their voice (recalling themselves speaking normally in the past, visualising counting, and then gradually incorporating actual speech), (ii) manual therapy (physical movement of throat and jaw), or (iii) standard treatment (including breathing and speech exercises).	<ul style="list-style-type: none"> • Patients in the visualisation and manual therapy groups showed better recovery (79% and 85% respectively) than patients receiving standard treatments (45%). • Patients in the visualisation group had a lower rate of relapse (12%) than patients receiving either manual therapy (25%) or standard therapy (23%).
Lambert & Rees (1944) [53]	Mixed (motor and speech disturbances, sensory loss, amnesia, psychogenic seizures)	247	Inpatients received either (i) intravenous barbiturate with verbal suggestions for removal of symptoms, (ii) hypnosis (details not specified), or (iii) treatment as usual.	<ul style="list-style-type: none"> • Patients across all groups improved (overall 63% recovered completely and 21% improved considerably). • Treatments did not differ in effectiveness. • The authors suggested treatment with intravenous barbiturate and verbal suggestion might lead to quicker responses than other approaches but did not provide data supporting this.

Table 3
Pre-post studies using hypnotic suggestion.

Study	FND Symptoms	n	Intervention	Findings
Carter (1949) [54]	Mixed (amnesia, aphonia, blindness, seizures, paralysis, and tremor)*	94*	Civilian inpatients or outpatients received either: (i) direct suggestion (that symptoms would resolve); (ii) indirect suggestion (implied by ignoring the symptoms or noting that they were unimportant); (iii) hypnotic suggestion (details not specified); or (iv) intravenous thiopentone and suggestions for symptom resolution.	<ul style="list-style-type: none"> Overall, 90% of patients recovered by discharge and 67% were well at 4–6 years follow-up. Patients with fits (33%) or paralysis (78%) appeared to have lower rates of recovery compared to patients with amnesia, aphonia, blindness, tremor (all 100%). Results for the different interventions were not reported separately.
Gironell et al. (2021) [55]	Mixed (weakness, paralysis, tremor, dyskinesia, ataxia, dystonia, psychogenic seizures, aphonia, and cognition)	50	All patients received hypnotic treatment following a standardised protocol: 1–3 sessions involving insight-oriented suggestions tailored to the conflict underlying individuals' symptoms with 15–30 days between sessions.	<ul style="list-style-type: none"> Patients' symptoms improved according to clinicians' ratings: median severity score 5 (markedly ill) at baseline, 3 (mildly ill) at 1 month after treatment, and 2 (marginally ill) at 12-month follow-up (differences from baseline were statistically significant). Most patients reported subjective improvement: 60% at 1 month (25% reported complete recovery) and 68% at 12 months (40% reported complete recovery). Demographics and illness duration did not predict outcome.
Hoogduin et al. (1990) [56]	Paralysis (all involved lower limbs)	8	Patients received a varying number of sessions of hypnotic treatment with suggestions involving both symptom and insight-oriented strategies. Patients also received physiotherapy and training in self-hypnosis with audio recordings.	<ul style="list-style-type: none"> All patients improved after one month: 3 completely recovered and 5 were greatly improved (all 8 patients required mobility aids prior to the intervention and were able to walk unaided afterwards). All patients remained well at 6 months' follow-up.
Kampman & Kuha (1974) [57]	Motor symptoms (paralysis/paresis, torticollis; one patient had comorbid seizures)	7	Patients received a varying number of sessions of hypnotic treatment involving free association of past events with the same emotional valence as their symptoms evoked. Suggestions were used to intensify these experiences, process the resulting emotions, and address identified underlying psychological conflicts (insight-oriented).	<ul style="list-style-type: none"> All patients improved: 6 (86%) recovered completely, 1 (14%) almost completely. The one patient who did not fully recover had a relapse several months later and remained symptomatic; the other 6 (86%) patients remained asymptomatic over 2–5 years of follow-up.
Maurice-Williams & Marsh (1985) [58]	Functional paraplegia or tetraplegia	14	Two patients received hypnosis, six patients received amyltal abreaction, and seven patients received reassurance and placebo injections (details of hypnosis and abreaction not provided; some patients received multiple interventions).	<ul style="list-style-type: none"> All patients improved: 9 fully recovered <1 month; 3 fully recovered >1 month; 2 had a partial, fluctuating recovery. At six months, 7 patients remained well, 1 patient relapsed, 1 had ongoing symptoms, and 5 were lost to follow-up. Results of interventions were not reported separately.
Moene & Hoogduin (1996) [59]	Mixed (weakness, paralysis, tremors, seizures)	16	Patients, as part of either an inpatient multidisciplinary rehabilitation program (including physiotherapy, and group psychotherapy) or outpatient treatment, received a varying number of weekly hypnotic sessions with suggestions tailored to the individual (using both symptom and insight-oriented strategies) and additional training in self-hypnosis. ^a	<ul style="list-style-type: none"> All 15 patients that engaged in the treatment improved: 6 (38%) recovered completely, 6 (38%) were much improved, and 3 (19%) were moderately improved. One (6%) further patient declined to participate. Four (25%) patients had a brief relapse and 2 (13%) had more protracted symptoms in the subsequent months. The setting of treatment (inpatient vs. outpatient) and other interventions were not explicitly controlled for.
Moene et al. (1998) [60]	Mixed (weakness, paralysis, gait disturbance, tremors, seizures)	8	Patients undergoing an inpatient multidisciplinary rehabilitation program (including physiotherapy, and group psychotherapy) received a varying number of weekly hypnotic sessions with suggestions tailored to the individual (using both symptom- and insight-oriented strategies) and additional training in self-hypnosis. ^a	<ul style="list-style-type: none"> Seven (88%) were judged to have completely or almost completely recovered by independent assessors. One (13%) patient dropped out of treatment after 1 week. Two (25%) patients had a brief relapse and one (13%) had a treatment-refractory relapse in the subsequent months.
Motoda (1987) [61]	Functional blindness	7	Patients (children aged 7–12 years) were admitted to hospital and were hypnotised throughout the day (excluding meal times) and given suggestions to relax and remain hypnotised until they believed that they could see clearly. Patients were not permitted to contact or receive visits from their family during their admission.	<ul style="list-style-type: none"> All patients recovered and showed normal visual acuity after periods ranging from 20 min to 18 days.
Rubinstein (1948) [62]	Mixed (weakness, tremor, dyskinesia, deafness, multiple symptoms)	7	Patients received a varying number of sessions of hypnotic treatment with suggestions tailored to the individual and involving both symptom and insight-oriented strategies.	<ul style="list-style-type: none"> 6 (86%) patients improved with treatment: 5 (71%) recovered completely and 1 (14%) almost completely. The treatment outcome was not reported for the last patient, though the author noted that hypnosis helped identify a psychological conflict driving the symptoms.

(continued on next page)

Table 3 (continued)

Study	FND Symptoms	n	Intervention	Findings
Sanyal et al. (2022) [63]	Functional stroke	68	Patients received 1–10 weekly sessions of hypnosis lasting 60–90 min and involving suggestions that first used a symptom-oriented strategy and, if unsuccessful, added an insight-oriented one. Patients were also taught self-hypnosis and asked to practice this twice daily.	<ul style="list-style-type: none"> • 58 (85%) patients improved with treatment: 45 (66%) recovered completely, 13 (19%) had some residual symptoms. • Two (3%) patients were unable to be hypnotised. • Patients showed significant reductions in symptom severity (mean National Institutes for Health Stroke Scale change 4.1) and function (mean modified Rankin change 1.8). • 50 patients (74%) remained well at a 6 month follow-up.
Taib et al. (2020) [64]	Functional tremor	18	Patients were randomised to receive either transcranial magnetic stimulation (TMS) or sham TMS. All patients in both groups had 3 weekly sessions of hypnosis with individualised suggestions for symptom resolution and further instruction in self-hypnosis.	<ul style="list-style-type: none"> • Patients in both groups improved, though differences from baseline were only significant in the TMS group. • Due to the confound of TMS, the authors were unable to assess the efficacy of hypnosis in a pre-post design as they had originally planned.

Note. *Studies contained subgroups of patients with presentations not consistent with FND that are not considered in this table. ^a These studies were conducted at the same sites using the same methods and it is unclear if any participants were included in both.

interim results of a study as abstracts in conference proceedings [41–44]. Two papers [45,46] that reported randomised controlled trials for “hysteria” were excluded because they appeared to recruit patients with somatisation disorder, rather than FND. Finally, 35 were found eligible for inclusion (Tables 1–4, Appendix 2). A flow diagram in PRISMA format is shown in Appendix 1.

The 35 included studies consisted of 5 randomised controlled trials [47–51]; 2 non-randomised trials [52,53]; and 28 pre-post studies [54–81]. Seventeen studies recruited patients with specific FND symptoms – two on functional aphonia, three on functional blindness, five on functional deafness, three on functional paralysis, two on functional weakness, and one each on functional stroke and functional tremor. One study did not specify patients’ FND symptoms, though noted they met criteria for conversion or dissociative disorders. The remaining 17 studies recruited patients with a range of FND symptoms. One study was published between 1920 and 1940; ten studies were published between 1940 and 1960; seven studies were published between 1960 and 1980 (inclusive); nine studies were published between 1980 and 2000; and eight studies were published between 2000 and the time of the search in 2023. Seven studies were conducted on soldiers: one study was conducted during World War I [76] and six were conducted during or after World War II [67,69,74,75,77,78]. The remaining studies were conducted on civilians in psychiatric or medical inpatient or outpatient settings.

3.2. Quality assessment

Of the 35 studies, two randomised controlled trials [48,49] were rated as strong quality and one pre-post study [63] was rated as moderate quality. The remaining 32 studies were rated as poor quality due to potential selection bias, confounders, lack of blinding, limitations in data collection, and patient attrition (Appendix 3). Initial inter-rater agreement for quality ratings was 100% for global ratings and 96.2% for subdomain ratings; all discrepancies were resolved with discussion.

3.3. Participants

The total number of patients across the included studies was 1882. Of these, 508 (27%) patients had a primary motor disturbance – 346 (18%) with functional weakness or paralysis, 46 (2.4%) with functional tremor, 20 (1.1%) with involuntary movements, 6 (0.3%) with functional ataxia, 6 (0.3%) with functional dystonia, and 84 (4.5%) unspecified. Of the remaining patients, 381 (20%) had functional speech disturbances, 59 (3.1%) had functional blindness, 310 (17%) had functional deafness, 78 (4.1%) had other functional sensory loss, 168 (8.9%) had psychogenic non-epileptic seizures, and 108 (5.7%) had functional cognitive

symptoms. A further 94 (5.0%) had mixed primary symptoms (often with a motor component), 15 (0.8%) had other FND symptoms, and 161 patients (8.6%) did not have primary FND symptoms specified. One study [58] recruited 14 patients with what was termed “simulated” paraplegia or tetraplegia: although the authors made no attempt to distinguish FND from malingering, the case descriptions provided suggested that all would have received a diagnosis now known as FND.

Demographic information was not consistently reported. Twenty-three studies reported data on patients’ ages. In these, ages ranged from 7 to 71 years. In the 17 studies reporting a mean age, the pooled mean age of patients was 27.7 years; in the 14 studies reporting both a mean and standard deviation, the pooled mean was 29.7 years (pooled SD 10.5). Twenty-seven studies reported data on sex. A further six studies [67,69,74–76,78] – involving 343 patients in total – were conducted on soldiers who had served during World War I or World War II, so were likely to have recruited only men. Accepting this assumption, studies overall recruited 933 (58%) women and 678 (42%) men. Excluding these six studies left 933 (72%) women and 335 (28%) men.

Only five studies assessed hypnotisability using standardised scales [48,49,56,59,60]. All five used the Stanford Hypnotic Clinical Scale [82] (total $n = 121$) and found moderate hypnotisability scores (pooled mean 2.7 from a total score of 5; pooled SD 1.5 from available studies).

3.4. Interventions

Sixteen studies examined hypnosis, 17 studies examined direct verbal suggestion, and 10 studies examined narcosuggestion (Table 1–4, Appendix 2). These totals include five studies that examined a combination of these three types of intervention: three studies examined all three interventions, one study examined both hypnosis and direct verbal suggestion, and one study examined both narcosuggestion and direct verbal suggestion.

The interventions varied considerably, even within these broader categories. Across studies, 10 studies used suggestions involving both symptom-oriented and insight-oriented strategies, 21 used suggestions involving a predominantly symptom-oriented strategy, one study used suggestions involving a predominantly insight-oriented strategy, and three did not specify the approach used. Fourteen studies used protocols with largely standardised suggestions across patients; 13 studies used protocols involving suggestions tailored to individual patients; and 8 studies did not report the degree of standardisation.

Studies varied further in terms of specific suggestions; the clinical setting (e.g., outpatient vs. inpatient; neurological vs. psychiatric department); the duration, number, and frequency of treatment sessions; follow-up period; the theoretical orientation adopted (cognitive-behavioural, psychodynamic, or unspecified); the presence of

Table 4
Studies using verbal suggestion without hypnosis.

Study	FND Symptoms	n	Intervention	Findings
Gardner (1971) [65]	“Hysterical popping knee syndrome”: weakness (“giving way”), pain, and popping sound/sensation	5	All patients received suggestion and group psychotherapy (details not specified).	<ul style="list-style-type: none"> All patients recovered completely.
Hafeiz (1980) [66]	Mixed* (motor disturbance, aphonia, fits, blindness, speech disturbance, urinary retention)	39*	Patients received suggestions that their symptoms would resolve in conjunction with one of four procedures: (i) faradic stimulation to their limbs; (ii) Somlec electrosleep machine applied to their head; (iii) intravenous sodium amylobarbitone; or (iv) intravenous methylamphetamine. Patients received a procedure 3–4 times before another was undertaken.	<ul style="list-style-type: none"> All patients improved: 24 (62%) showed a rapid response after their first treatment; 15 (38%) showed a delayed response requiring repeated treatment within 3 months. Suggestion with faradic stimulation (90% response rate), Somlec electrosleep machine (84% response rate), and intravenous methylamphetamine (81% response rate) appeared superior to suggestion with intravenous amylobarbitone (20% response rate; this last procedure was abandoned after five patients). 9 (23%) patients had a relapse over the following year.
Knapp (1948) [67]	Functional deafness	39	Soldiers received suggestions that they would recover with Faradic stimulation to their mastoids and intravenous barbiturate. ^a	<ul style="list-style-type: none"> 25 (65%) patients were cured after the intervention and 8 (20%) improved significantly; the remaining 6 (15%) remained unchanged (the results for the two techniques used were not reported separately).
Lal & Sharma (1979) [68]	Mixed* (fits, bodily symptoms, involuntary movements, mutism, monoplegia, blindness, aphonia)	180*	Patient received intravenous thiopentone and suggestions over 30–60 min that their symptoms would resolve as a result of this treatment. The procedure was repeated until symptoms resolved.	<ul style="list-style-type: none"> Most patients improved: 87 (48%) showed a good response; 45 (25%) showed a fair response; and 21 (12%) showed modest improvements according to ratings by patients and family members. 24 (13%) showed no response.
Martin (1946) [69]	Functional deafness	75	Soldiers (i) received suggestions over ≥3 interviews that they would recover; (ii) were introduced to other patients who had recovered; (iii) had a session involving intravenous sodium pentothal, suggestions that their hearing would recover, ethyl chloride being sprayed on their external ear as a placebo, and repeated questioning with one ear being blocked at a time; and (iv) were engaged in conversation as they recovered from narcosis. ^b	<ul style="list-style-type: none"> 61 (81%) had complete return of hearing to normal or substantial improvement (on auditory testing, patients with pure psychogenic deafness improved 56 dB on average; patients with combined psychogenic and organic deafness improved 32–42 dB on average). 14 (19%) did not show a significant improvement (on auditory testing, these patients improved 0–6 dB on average).
Mouriaux et al. (1997) [70]	Functional blindness	25	Patients were fitted with lens that were intentionally blurry and told that they would be able to see but that it would be blurry and that they would need to force their eyes. Lens were then gradually adjusted to reduce the blurriness.	<ul style="list-style-type: none"> 23 (92%) patients recovered normal visual acuity after the intervention. All patients had normal visual acuity at a follow-up 4–12 months later (one patient had a brief, rapidly resolving relapse 3 months later).
Prokhorova (1964) [71]	Functional paralysis	24	All patients received (i) regular exercise and lifestyle measures (e.g., sleep); (ii) passive movement of their paralysed limbs; and (iii) verbal suggestions for symptoms to resolve.	<ul style="list-style-type: none"> 22 (92%) patients improved. The author provided an example of one patient whose longstanding functional leg paralysis and psychogenic seizures completely resolved with treatment.
Pu et al. (1986) [72]	Mixed (fits, paralysis, paresis, blindness, aphonia, and involuntary movements)	100	Patient received psychotherapy involving explanation, education, and suggestion to remove the symptom (55% received additional anxiolytic or antidepressant for 1–6 weeks; 7% received electrical stimulation to their paralysed leg or arm).	<ul style="list-style-type: none"> All patients improved: 97% completely recovered after treatment; 3% did so spontaneously before treatment. Systematic follow up was not possible, though the authors noted that >5 patients had relapses (further details were not provided).
Pula (2015) [73]	Functional blindness	8	Patients were told that their vision would recover with visual exercises at home. Patients were given a small “Tumbling E” eye chart (displaying the letter “E” in different sizes and orientations) and told to determine the orientation of the E when the chart first when it was 1 ft away, then at increasing distances over consecutive days.	<ul style="list-style-type: none"> All patients improved: 5 were assessed in clinic and showed significantly improved visual acuity (60% had normal tests); 3 were telephoned 3–6 months later and reported they had recovered vision.
Rosenberger & Moore (1946) [74]	Functional deafness	45	Soldiers (i) received suggestions over ≥3 interviews that they would recover; (ii) were introduced to other patients who had recovered; (iii) had a session involving intravenous sodium pentothal; suggestions that their hearing would recover; ethyl chloride being sprayed on their external ear as a placebo; and repeated questioning with one ear being blocked at a time; and (iv) were engaged in conversation as they recovered from narcosis. ^b	<ul style="list-style-type: none"> The authors reported that the “results were spectacular” (p. 669) but did not provide data. The authors provided five case histories in which all patients demonstrated significant hearing improvements after the intervention.
Semenov (1947) [75]	Functional deafness	50 ^c	Soldiers at an army rehabilitation hospital were told that they would receive a treatment and be cured. Patients were then given intravenous sodium penthal as they counted backwards from 100 to 1. A further 22 patients with organic deafness received the same treatment. ^b	<ul style="list-style-type: none"> 45 (90%) patients with functional deafness recovered. Patients with functional deafness showed an average improvement of 55 dB in hearing on audiograms. Other patients with organic deafness also improved, albeit to a lesser extent (76% recovered, average improvement 42 dB), suggesting the presence of functional overlay.

(continued on next page)

Table 4 (continued)

Study	FND Symptoms	n	Intervention	Findings
Sokolowsky and Junkermann (1944) [76]	Functional aphonia	34	Soldiers during World War I were given verbal suggestions that their symptoms would resolve whilst being examined using a laryngoscope mirror. Gag responses with accompanying vocalisations were induced to provide evidence of this. Resistant cases received short open drop anaesthesia, placebo injection to their throat region, feigned throat manipulations, and/or compression of their thyroid cartilage.	<ul style="list-style-type: none"> • 33 (97%) patients were cured (32 within the first treatment, 1 after a second treatment). • The author noted that the only patient (3%) who did not respond had a strong motivation to not recover (the patient was aware from an official letter that his condition prevented him from returning to combat).
Sutherland (1941) [77]	Mixed (motor symptoms, tics, aphonia, visual or auditory disturbance)	14	Soldiers, after being removed from combat, received persuasion and suggestion that their symptoms would resolve. Resistant cases had seizures induced with intravenous cardiazol.	<ul style="list-style-type: none"> • All patients recovered (the author reported that only “a few” required cardiazol convulsions). • An unspecified number had relapses when faced with the prospect of returning to combat.
Truex (1946) [78]	Functional deafness	100 ^d	Soldiers (i) received suggestions and encouragement from all clinic staff that they would recover; (ii) met patients who had recovered; (iii) had group sessions with otologist and psychiatrists providing education and expectation of recovery; and (iv) had individual psychiatric interviews involving barbiturate narcosynthesis and suggestions for both recovery and insight. ^a	<ul style="list-style-type: none"> • 69% of patients recovered completely, 20% improved, and 11% remained unchanged.
Weiser (1976) [79]	Functional paralysis (of dominant arm)	7	Patients received suggestions (using both symptom-focused and insight-based approaches) and other unspecified forms of persuasion that their symptoms would resolve over a varying number of sessions. Patients also received education, exercise and/or other support.	<ul style="list-style-type: none"> • All improved initially: 5 (71%) completely, 2 (29%) partially. • The 5 (71%) patients who recovered completely showed no disability at a follow-up between 1 month and 5 years later. • The other 2 (29%) patients, after initial improvement, had ongoing symptoms and impairment. Both declined further treatment after 2–4 weeks.
Yarosh and Shulga (1965) [80]	Mixed (motor, speech, and combined sensory and motor disturbances)	86	After education about their symptoms, patients received verbal suggestions that they would recover in combination with Faradic stimulation to their muscles and strong encouragement to move or speak without their symptoms. The session continued until symptoms resolved, for up to more than an hour.	<ul style="list-style-type: none"> • 80 (93%) recovered, including 54 of 57 (95%)^c patients with functional motor symptoms; 8 of 11 (73%) with functional overlay; and 18 of 18 (100%) with speech disorders. • In the large majority, recovery was within 2–10 min. • 4 (5%) patients had relapses, which the authors attributed to unfavourable family dynamics.
Yaskin (1936) [81]	Mixed (“motor, sensory, visceral and episodic phenomena”)	12	Patients received combinations of different treatments: 9 (75%) received suggestion; 4 (33%) encouragement; 4 (33%) partial analysis; 3 (25%) tonic medication; 3 (25%) attempt at compromise formation; 2 (17%) rationalisation and persuasion; 2 (17%) regimen (treatment details not provided).	<ul style="list-style-type: none"> • All patients improved: 9 (75%) recovered completely and 3 (25%) improved. • 2 (17%) patients had a recurrence of symptoms over an unspecified follow-up duration. • The outcomes associated with individual treatments were not reported.

Note. ^aThe study contained subgroups of patients with presentations not consistent with FND excluded from this table. ^bThese two studies were conducted at the same hospital (Deshon General Hospital); it is unclear if any patients were included in both studies. ^cThese three studies were conducted at the same hospital (Hoff General Hospital); it is unclear if any patients were included across studies. ^dThe study recruited 81 patients with psychogenic deafness but appears to only report the results for 50 patients. ^eThe number of patients was reported as approximately 100 in a cited paper [67]. ^fThe main text in Russian reported that 54 patients recovered, whereas the English abstract reported that 55 recovered.

concurrent interventions (e.g., education, physiotherapy, exercise, psychotherapy, medication, physical psychiatric therapies, use of placebo); and, if hypnosis was used, the type of hypnotic induction procedure and use of self-hypnosis and post-hypnotic suggestion.

The two best quality studies used similar procedures to assess hypnosis, one conducted in an outpatient setting [49], the other in an inpatient rehabilitation setting [48]. These studies used suggestions with both symptom-oriented and insight-oriented strategies tailored to individual patients. To illustrate symptom-oriented strategies, patients with functional paralysis were given suggestions to experience sensations related to movement, including tingling and muscular spasms, and eventually suggestions for movements. By contrast, patients with functional dyskinesias were given suggestions for catalepsy. Insight-oriented strategies were used when a distinct psychosocial stressor appeared to contribute to symptoms and included suggestions for age regression to recall and reprocess distressing memories. Other notable aspects of the procedure included emphasising signs of progress; offering targeted posthypnotic-suggestions; training patients in self-hypnosis using audio recordings; using suggestions to prepare patients for reactions from partners and family; and, given the potential for rapid resolution of symptoms, ensuring patients could save face by framing the intervention as arduous and requiring continual effort.

3.5. Outcome measures

Outcomes measures varied across studies (Appendix 2). The two best quality studies relied on two blinded, independent raters to evaluate pretreatment and posttreatment videos of patients; a measure of functional impairment administered by an independent interviewer; and a self-report measure of psychopathology [48,49]. Of the remaining studies, one used blinded raters, 31 used non-blinded clinicians' impressions, four studies administered patient-completed scales of functional symptoms, functioning, and/or psychopathology; and seven studies used more objective measures of patient performance (three measured visual acuity, two used audiological testing, one used a standardised neurological assessment, and one measured skin conductance, electromyography, heart rate, and blood pressure).

3.6. Effectiveness of interventions

Given the heterogeneity of interventions and the poor quality of the research overall, no quantitative synthesis was possible. A descriptive summary of individual studies is provided in Tables 1–4.

All studies reported some improvement in patients over time, though not all studies concluded that there was a specific contribution from the

interventions used. Of the 35 studies, 31 reported benefits of hypnosis, direct verbal suggestion, and/or narcosuggestion as interventions; 1 study reported no additional benefit of hypnosis compared to a control group [48]; and 3 studies had findings that were unclear due to confounding from concurrent interventions [58,64,81].

Thirty-two studies reported results in terms of the proportion of patients who demonstrated a clinically significant improvement. Across these studies, 1584 patients received either hypnosis, direct verbal suggestion, or narcosuggestion, of whom 1379 (87%) showed clinically significant improvements. Twenty-eight studies reported these results according to the specific type of intervention (four reported only aggregate results across interventions). Across these studies, 217 (83%) of 263 patients who received hypnosis, 491 of 552 (89%) patients who received direct verbal suggestion, and 490 of 570 (86%) patients who received narcosuggestion exhibited clinically significant improvements. Comparable data for a waitlist control group was only available from one study [49], which reported that only 6 (25%) of 24 patients improved. Appendix 4 depicts the proportion of patients who improved across studies.

Twenty-six studies reported results in terms of the proportion of patients who demonstrated complete or almost complete resolution of symptoms. Across these studies, 882 of 1158 (76%) patients exhibited a complete or near complete resolution, at least in the short-term. Twenty-five studies reported these results by the specific type of intervention. Across these studies, 141 of 219 (54%) patients who received hypnosis, 340 of 401 (85%) patients who received direct verbal suggestion, and 224 of 315 (71%) patients who received narcosuggestion exhibited a complete or near complete resolution.

Seventeen studies reported follow-up data over time periods ranging from several weeks to several years. Twelve studies did so for periods of six months or more. Across the thirteen studies that reported these outcomes as a percentage, relapse rates varied between 0 and 43%. Further analysis was not possible given the different methods and follow-up periods.

The strongest quality evidence on the efficacy of hypnotic suggestion came from two randomised controlled trials. One [49] of these focused on outpatients and found that patients receiving hypnosis improved more than waitlist controls and that benefits were maintained at 6-month follow-up. The other [48] focused on inpatients undergoing intensive inpatient rehabilitation and found that both the hypnosis and control groups improved over time with no additional benefit of hypnosis either after treatment or at a six-month follow-up. Other randomised controlled trials [47,50,51] were limited by potential confounds (e.g., one involved a control group with greater impairments at baseline but did not statistically control for this) [47]; potential selection bias and weakness in data collection [50,51]; and the lack of information provided, including not reporting baseline severity [50], types of symptoms [51], or summary statistics of important results [47].

Uncontrolled studies – involving 1139 patients in total – reported benefits of both hypnosis and suggestion. One pre-post study offered promising findings of hypnosis as an intervention in functional stroke using suggestions tailored to the individual and their symptoms and adopting both symptom and insight-oriented strategies [63]. This study was conducted in a representative sample of patients using standardised measures and considering potential confounds, though was limited by lack of blinding and a control group. For all other uncontrolled studies, design limitations – including potential selection bias, confounding, weaknesses in data collection, and attrition – meant that it was not possible to exclude other factors as being responsible for reported effects.

Only two studies [50,53] explicitly compared hypnosis and direct verbal suggestion. Neither found differences between groups, though were limited by low statistical power. These studies also did not specify key details of their procedures, including whether the same suggestions were given across conditions and if safeguards were used to avoid non-hypnotic suggestion being construed as hypnotic. Only one study [53]

explicitly compared direct verbal suggestion and narcosuggestion; this study was also the only one to compare hypnosis and narcosuggestion. This study, however, did not find differences between the three types of intervention. A further two studies [54,58] used all three types of interventions and a third study [66] used both direct verbal suggestion and narcosuggestion, though only reported aggregate results across interventions.

Only one study [51] compared different types of suggestions. This study, conducted in a non-hypnotic context, compared suggestions for systematic desensitisation with suggestions that patients would be cured from being attached to an electromyographic machine. The study found no difference immediately after treatment in patients' symptoms and general psychopathology, but greater improvements in the systematic desensitisation group 4–5 months later. The study, however, did not report key details (e.g., type of FND symptoms; attrition) and potential confounds.

There was no relationship between hypnotisability and treatment outcomes in the five studies that assessed hypnotisability. These studies, however, were limited by small sample sizes ($n \leq 45$) and the restricted range of hypnotisability scores within each sample. One of these studies [49] also reported no relationship between patients' expectations of treatment outcome and treatment response. This study was likewise limited by its small sample size ($n = 22$). Nevertheless, a separately published re-analysis [83] of this study and unpublished data from another included study [48] found that patients' expectations of treatment outcome, as well as short duration of symptoms, predicted patient outcomes at a six-month follow-up (Pearson correlations ≤ 0.32). This re-analysis, however, did not control for symptom severity and other potential confounds. Another study [55] reported no relationship between patient demographics and treatment outcome, though was similarly limited by low statistical power.

4. Discussion

The wide range of studies highlights the longstanding and continued interest in using hypnosis and suggestion as treatments for FND. Studies were identified from across the span of the last century, with 20% published since the millennium. Studies used a wide range of approaches, often tailored to individuals and specific symptoms, and in conjunction with other therapies reflecting the study's historical context. Despite such diverse approaches, studies reported positive findings overall. All studies reported patient improvement and the vast majority inferred specific contributions of hypnosis and suggestion. More than 80% of patients who received these interventions demonstrated clinically significant improvements and more than 75% had complete or almost complete resolution of symptoms, at least in the short-term. Most patients maintained benefits at a later follow-up in the studies that assessed this.

These findings are in contrast to the usual course of FND and the much lower rates of remission observed in longitudinal studies [84]. The outcomes are likewise comparable or superior to more commonly used interventions for FND, such as physiotherapy [85–87], psychotherapy [87–89], pharmacotherapy [90–92], and neurostimulation [93,94]. To illustrate this comparability, patients with functional gait disorders receiving intensive daily physiotherapy for a week or more, often in conjunction with psychological interventions, show improvement rates of around 70% [86]. Likewise, patients with functional seizures receiving cognitive-behavioural therapy [87] or psychological therapies [89] more generally, both over extended periods of time, show improvement rates of around 45% and 82% respectively, reflecting differences in methodologies and the latter having a resolution rate of only around 47%. As such, the current findings appear promising.

Most studies, however, suffered from significant design limitations, including many older studies that had different standards for design and reporting than current practice. The findings may also be affected by publication bias. Importantly, such limitations, including the lack of

well-designed randomised controlled trials, are currently a feature of the evidence base for other interventions for FND and not unique to hypnosis and suggestion [85–93]. The limitations nevertheless restrict the conclusions that can be drawn.

The strongest quality evidence for hypnotic suggestion came from two randomised controlled trials [48,49]. Taken together, these trials found that weekly treatment led to improvements in an outpatient setting relative to a waitlist control [49], but did not provide additional benefits over intensive inpatient rehabilitation, including physiotherapy [49]. These findings suggest that clinical setting and concurrent interventions could moderate treatment effects. It is unlikely, for example, that weekly hypnosis sessions would be as salient for patients in an inpatient context with intensive daily rehabilitation programs as it would be in an outpatient context without a similar schedule. It is also possible that the greater frequency of physical interventions in the inpatient context could have masked hypnosis' treatment effects, particularly given the study's limited statistical power. Other studies found hypnotic interventions to be effective in both outpatient [47,50] and inpatient [61,63] settings, albeit with other limitations in research design and without as intensive concurrent physiotherapy.

Other factors could influence treatment outcomes. These include patient characteristics (e.g., hypnotisability, suggestibility, expectations, type and duration of symptoms); aspects of the intervention procedures (e.g., the use and type of hypnotic induction, the type of suggestions and treatment strategy, the frequency and duration of sessions; concurrent treatments); and interactions between patient and intervention variables (e.g., the relationship between clinician and patient). Such factors have been found to affect response to hypnotic intervention [14,15] and other forms of psychotherapy [38]. Studies, however, only explicitly examined a small number of these factors (namely demographics, hypnotisability, expectations, duration of symptoms, use of a hypnotic induction) and, in all cases, were unable to provide a meaningful verdict due to low statistical power and other limitations. Such variables nevertheless may determine the clinical value of using hypnosis and suggestion as interventions. Future research could examine such factors with modern trial methodology and appropriate controls. Future research could also adapt cognitive neuroscience paradigms, already used in studies of hypnosis and suggestion, to investigate possible neuropsychological and neurophysiological mechanisms [16,17].

Altogether, the systematic review underscores the significant promise and perceived clinical value of both hypnosis and suggestion as treatments for FND. Both forms of intervention showed evidence of substantial efficacy with high remission rates across a wide range of studies with different FND symptoms, clinical contexts, and treatment paradigms. Findings, however, were limited by the relatively weak methodological quality of studies, so overall efficacy and treatment parameters remain unclear. Given the promising findings and FND's significant morbidity, there appears to be a clear need to examine such interventions in carefully controlled clinical trials. Such research has the potential to both inform understanding of the disorder and deliver more effective therapies to patients in the future.

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CRediT authorship contribution statement

Michael H. Connors: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Validation, Writing – original draft, Writing – review & editing. **Lena Quinto:** Data curation, Formal analysis, Investigation, Methodology, Validation, Writing – review & editing. **Quinton Deeley:** Conceptualization, Methodology, Supervision, Writing – review & editing. **Peter W. Halligan:** Conceptualization, Methodology, Supervision, Writing – review

& editing. **David A. Oakley:** Conceptualization, Methodology, Supervision, Writing – review & editing. **Richard A. Kanaan:** Conceptualization, Methodology, Project administration, Supervision, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no competing interests.

Data availability

The data comprise a systematic review and are freely available from the original papers.

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Appendix A. Supplementary data

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