Brigham and Women's Hospital
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HARVARD MEDICAL SCHOOL

Mass General Brigham

Functional Neurological Disorder

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UPDATE ON NEUROLOGY AND PSYCHIATRY OF WOMEN
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Disclosures

Dr. Dworetzky

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- No relevant financial disclosures

Objectives

Using a clinical case:

- Understand how to diagnose FND
- Know some of the brain mechanisms involved in FND
- Learn a team approach to manage/treat FND

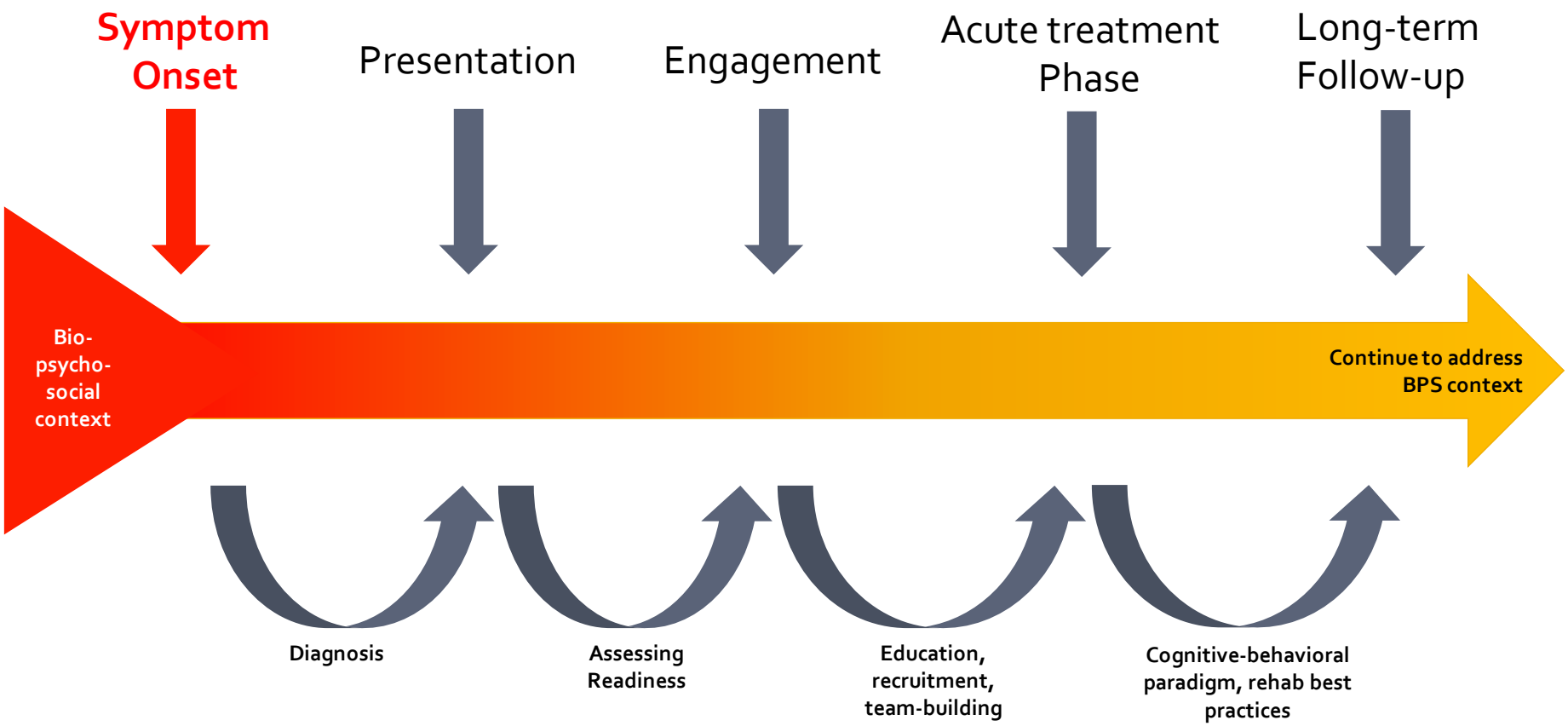
Case: Introduction

At the time of index presentation…

- DD was a 40-year-old woman, living locally with her family, employed as group therapist at ALF
- Refractory focal epilepsy* since teens s/p TBI, MRI w/L MTS, s/p L ATL c/b cognitive sxs, ↑affect
- Presented to ED for ?new szs 3 wks. after surgery

*3 types of sz:1. hears voices, cluster all day 2. chewing movements LOC, 3. GTC

Course of treatment in FND

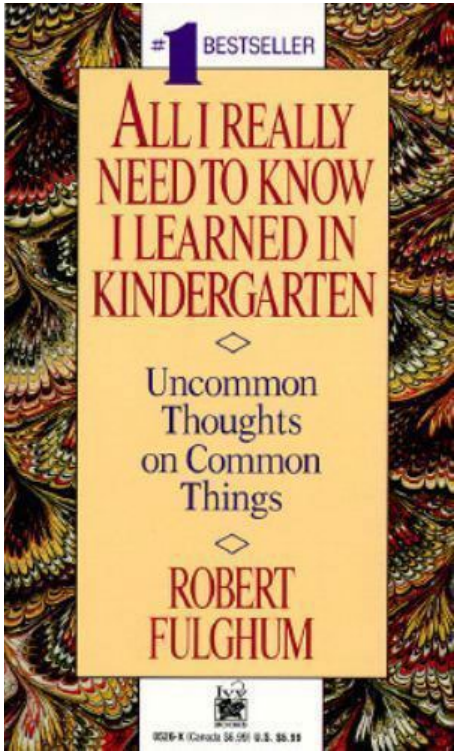


FN(S)D: Functional Neurological (Symptom) Disorder

Adapted from, Baslet et al, *Clin EEG Neurosci*, 2014

Getting all the History

"Listen to your patient; he/she is telling you the diagnosis." Sir William Osler



Ask "what else?"

- **Listen** and obtain **all neuro symptoms***, onset, duration, frequency, warning/trigger?, recall of event? Past syncope, *panic attacks*? Unexplained ED visits?
- **Build rapport** (believe/show empathy, be "curious," what have others thought, what do you think?
- Identify **risk factors-** (neuro/neurosurg dx, concussion, PTSD (childhood adversity), **depression**, anxiety, **migraine**)
- Obtain **social, family hx** : nonjudgmental substance hx
- Do not assume psychiatric disorder or "stress"

***pain, fatigue, brain "fog" are extremely common and may need to be addressed prior to treatment*

Case: New Symptoms?

At 2 mo. Post op, had episode of difficulty reading to her kids w/concern for TIA, new sz. No stroke found. At 5 mo post op, re-presented w/ frequent episodes with same prior aura.

Spell Semiology	Duration and Frequency	Triggers and Warning Signs	Associated Features
• Right-arm shaking • Lip trembling • Tearfulness • Diffuse shaking +/- LOC	• Seconds to minutes →up to 20 minutes • Daily/ multiple daily	• Intense emotional experiences? Same as old aura • Abdominal rush sensation	• Drop attacks • Limb weakness

ADMITTED TO THE EMU FOR SPELL CLARIFICATION

Case: Longitudinal History

Neurological History

- Acute symptomatic GTC w/MVA at age 14 brief coma, 1 wk hospital, ("w/ wrong crowd")
- Many ASMs/combos → Left ant. temp. lobect. 3/21
- Since LATL, challenge w/words/memory, more emotional ("*disappointments*")

Psychiatric History

- Episode of depression in adolescence → near suicide attempt, no rx
- Allusions to 1+ prior sexual trauma → suppression/repression, avoidant coping, longstanding low self-esteem/guilt
- Active depression and anxiety since recurrence of seizures in 8/2021; but no PD, SSD/IAD, DD

General Medical and Social History

- No pain or excessive fatigue
- No substance use
- Supportive family , limited emotional capacity, young active children

Functional Symptoms are Ubiquitous

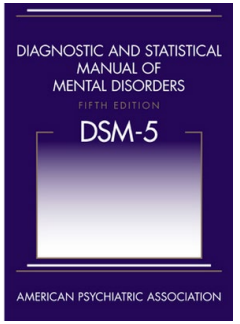
- Gastroenterology: IBS
- Urology: overactive bladder syndrome
- Rheumatology: FBM
- Infectious disease: CFS
- Immunology: multiple chemical sensitivities
- *Cardiology: Atypical CP, syncope
- *Pulmonary: Chronic cough, SOB
- *ENT: Globus
- Gynecology: pelvic pain
- Ophthalmology: functional blindness
- **Neurology: functional szs (PNES), attacks/syncope, sensory, weakness, speech, movement, cognitive disorder, and Persistent Postural-Perceptual dizziness (PPPD)**

FND

Everyone experiences functional symptoms…

Terminology

- **FND is a type of *Somatic Symptom and Related Disorder***
- A. One or more symptoms of altered voluntary motor or sensory function.
- **B. Clinical findings provide evidence of incompatibility between the symptom and recognized neurological or medical conditions.**
- C. The symptom or deficit is **not explained by another** medical or mental disorder.
- D. The symptom or deficit causes **clinically significant distress or impairment** in social, occupational, or other important areas of functioning or warrants medical evaluation
- Specifier: with **weakness or paralysis**, with **abnormal movement**, with **swallowing symptoms, with speech symptom, with attacks or seizures**, with **anesthesia or sensory loss**, with special sensory symptom, **dizziness**, with mixed symptoms.
- Specifier: acute episode (< 6 months), persistent (> 6 months).
- Specifier: with psychological stressor, **or without** psychological stressor.



American Psychiatric Association, 2013
FS: Functional Seizures; FMD: Functional Movement Disorder

Epidemiology and Impact of FND

- Ann. Incid. FND: 10-22 adult, 1-18 ped/100K; min. prevalence: 80-140/100K[1]
- ~30% new neuro visits "unexplained →18% FND[2]
- Seizures (sz), Motor (commonest subtypes)
- >20% have a comorbid neurological d/o (***subspecialty clinics**)[3]
- 7.4% FS [2]; 5.4% syncope clinics[4];
- **Epilepsy Monitoring Unit (EMU) →20-40% FS**[5]
- Female preponderance (3:1 F:M ratio)[6]
- Adolescence → midlife onset; *children/elderly F=M* [7,8]
- ↓QOL (<= other neuro disorders)[9]
- **Increased risk of death (SMR 2.5x gen. pop)**[10-12]

1.Finkelstein, et al, JNNP, 2025; 2. Stone et al, Brain 2009; 3. Stone et al, J. Neurol 2012; 4. Tannemaat et al, Neurology 2013 5. Reuber et al, Neurology 2002; 6. Lesser, Neurology, 1996; 7.Duncan et al, Neurology, 2006; 8. Huang et al, J Chin Med Assoc, 2009. 9. Karakis et al, Seizure 2014;10. Jennum et al, E and B, 2019; 11. Nightscales et al, Neurology 2020; 12. LeZhang et al, JNNP, 2022;

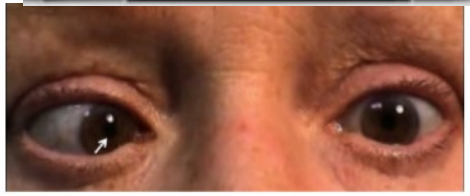
Case: Exam and Data

- Exam is notable w/labile affect, collapsing giveway weakness and sudden falls from an otherwise steady gait, frequent complex tics
- MRI: expected post-op changes from LATL
- vEEG:
  - In 2 days, **dozens** push-button events → arm shaking/flapping, **eye closure**, **covering face with hands and rocking body**, and **tearfulness**, lasting 20+ minutes each.
  - No electrographic correlate, only myogenic artifact

Trick or treat?

Showing patients with functional (psychogenic) motor symptoms their physical signs

- Inconsistency
- Variability
- **Positive signs**
- **Give away weakness**
- Pattern



Diagnosis

For details on positive signs for FNDAdapted from Popkirov et al, Stroke, 2020; Syed et al, Ann Neurol, 2011; ***Avbersek and Sisodiya,*** *JNNP 2010;*

Adapted from: Stone and Edwards, Neurology 2012

Ictal crying, eye closure, prolonged, memory recall, mult. types, triggers, frequent

Predisposing, precipitating and perpetuating factors

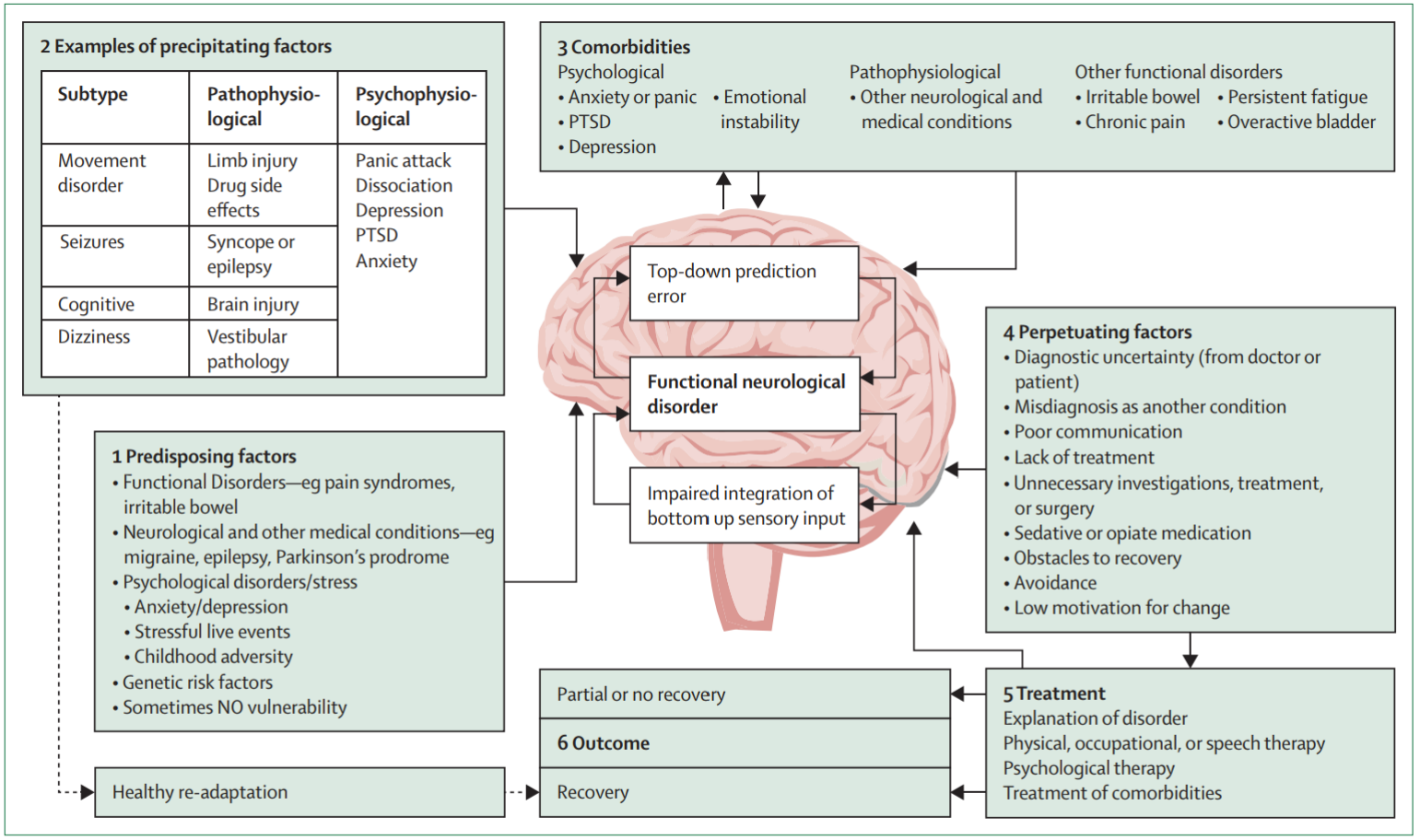


Figure 1: **Pathophysiological and psychophysiological events that might trigger functional neurological disorder**
The aetiology of functional neurological disorder depends on predisposing, precipitating, and perpetuating factors that affect the neural mechanisms of the disorder. The dotted line indicates that in most individuals the presence of these factors does not lead to functional neurological disorder. PTSD=post-traumatic stress disorder.

Hallett, Aybek, Dworetzky, McWhirter, Staab, Stone, Functional Neurological Disorder: New Subtypes and Shared Mechanisms, The LancetNeurology, April 2022

A Disorder of the Brain

Hallett et al, Lancet Neurology, 2022

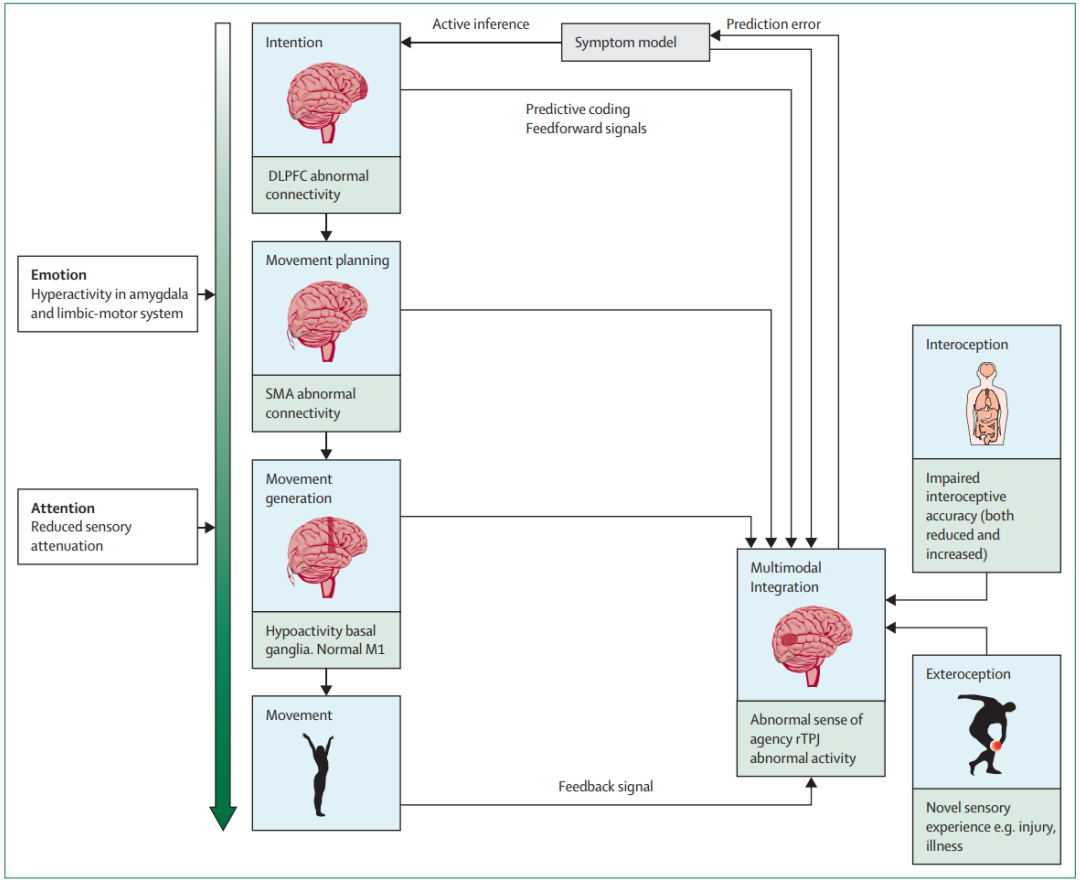


Figure 2: **Neural mechanisms of functional neurological disorder**

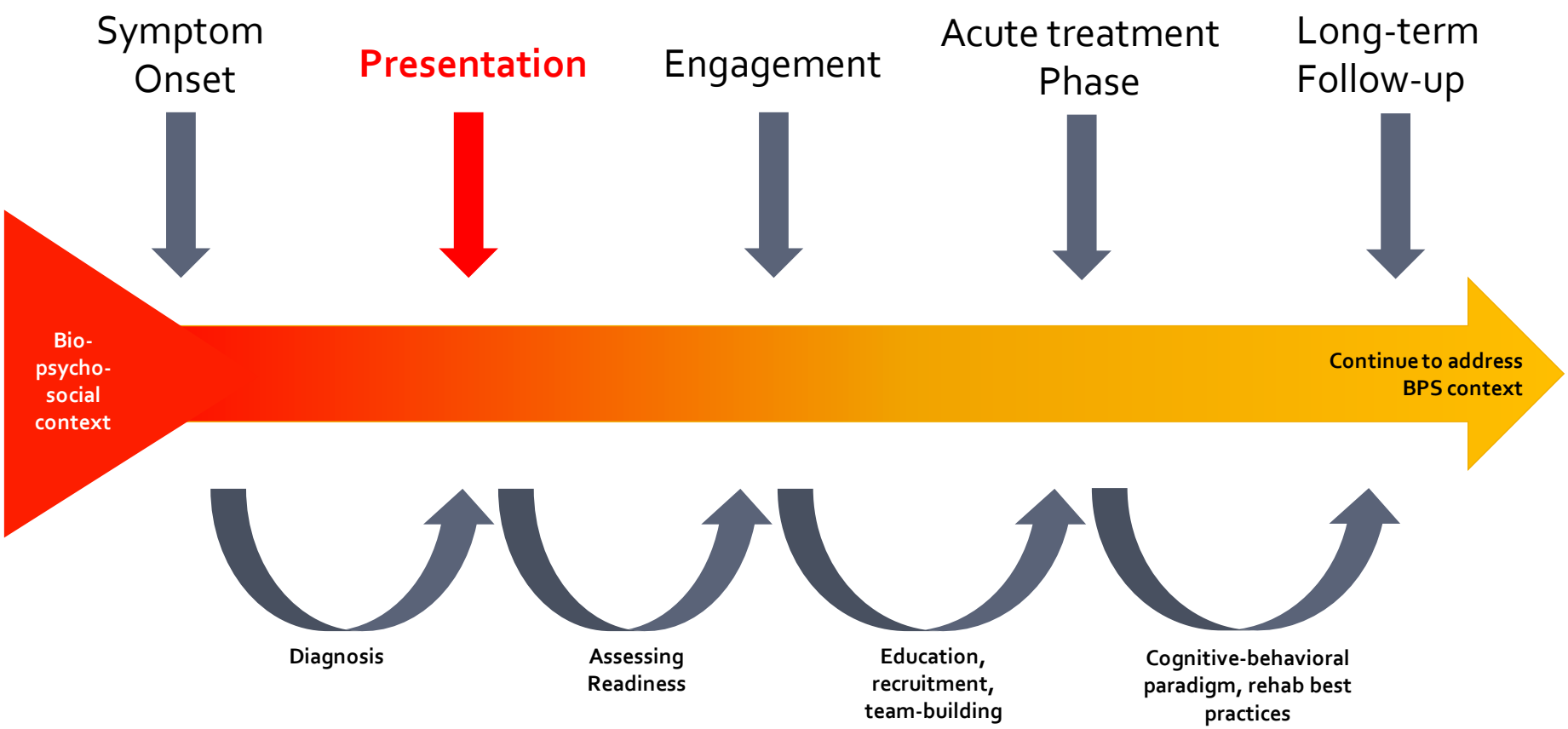
Motor intention[1,2,4]

Self-agency[3]

Connectivity between areas involved in emotion processing and motor preparation[5]

1. Marshall et al; *Cognition* 1997; 2. DeLange et al, *Neuropsychologia*, 2007; 3. Voon et al, *Neurology*, 2010; 4. Labatte et al, *Epilepsia*, 2012; 5. van der Kruijs et al, *JNNP*, 2012.

Course of treatment in FND



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Adapted from, Baslet et al, *Clin EEG Neurosci*, 2014

Communicating the Diagnosis

Item	Say to Patient
Validation	common, real, **not faking**
Label	**Functional disorder**
Diagnostic method	**Positive features** (Hoover's sign, vEEG capture)
Cause & Maintaining factors	**Your brain**'s miscommunication to the body in the context of biopsychosocial risk factors; immediate trigger often not obvious
Treatment	Effective treatments, "**retrain the brain**" by learning new skills
Expectations	takes time, will improve, **can resolve**

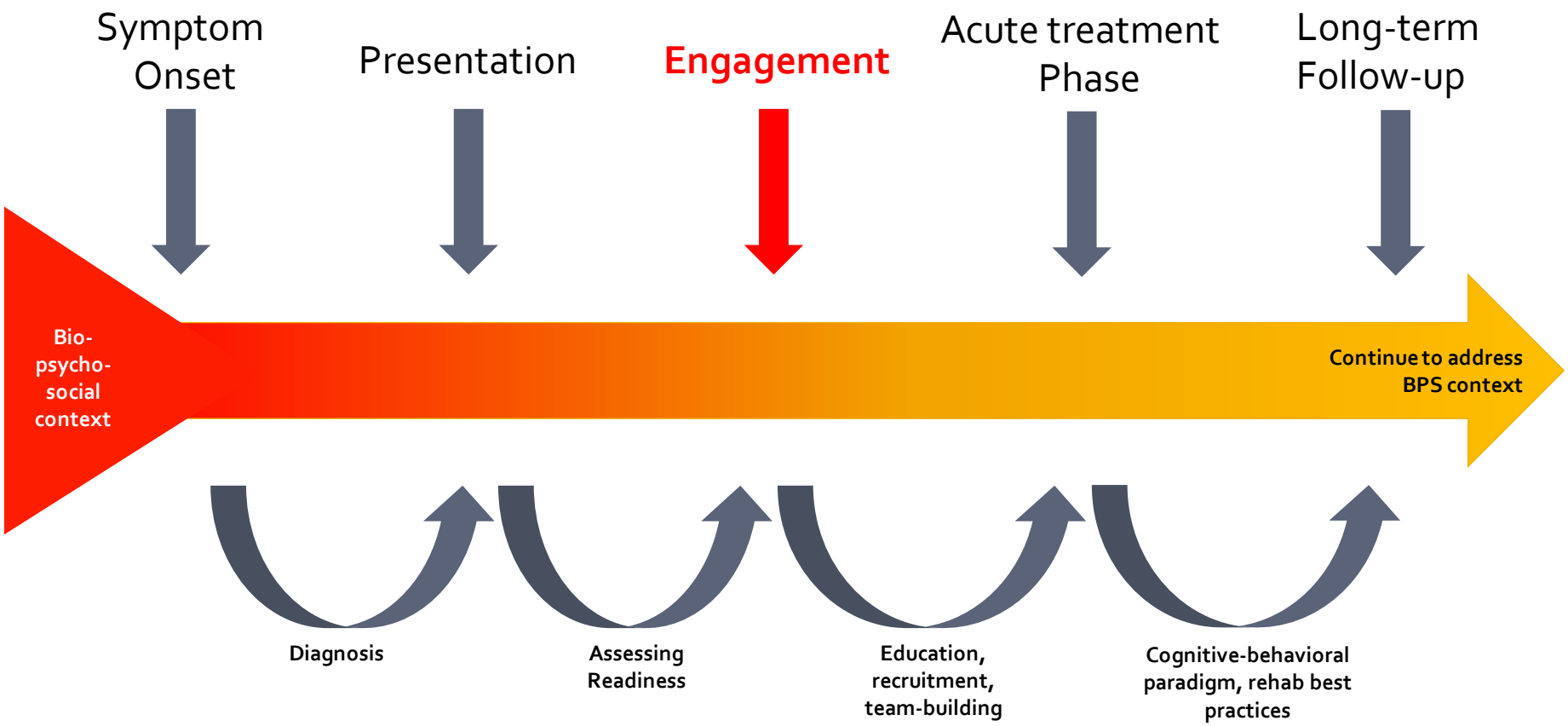
"Do you have any questions or concerns about what I just said?

Use language which incorporates trauma-informed-care principles*

Reuber, 2003; Hall-Patch, et al Epilepsia 2010

**safety, choice, collaboration, trustworthiness, empowerment*

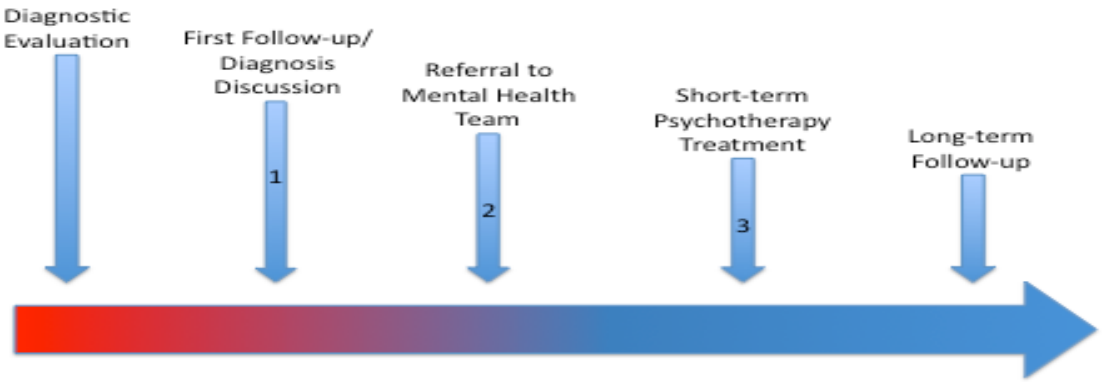
Course of treatment in FND



FN(S)D: Functional Neurological (Symptom) Disorder

Adapted from, Baslet et al, *Clin EEG Neurosci*, 2014

Treatment Engagement: At-risk times



	Time Point	Rate of Adherence
1	Immediate follow-up with neurologic team following PNES diagnosis	71-72%[1,2]
2	Initial referral to behavioral health team	66%[3]
3	Completion of psychotherapy	31-54%[4,5]
1-3	Composite Adherence Rate (time points 1-3 considered in series)	15-26%

Tolchin and Baslet, Treatment Adherence and Obstacles to Treatment, in Dworetzky and Baslet (Eds)"Psychogenic Non-Epileptic Seizures: Towards the Integration of Care", OUP, 2017 -- 1. Duncan et al, Epilepsy & Beh, 2014; 2. McKenzie et al, Neurology, 2010; 3. Kanner et al, Neurology, 1999; 4. LaFrance et al, JAMA Psych, 2014; 5. Baslet et al, JNCN, 2013

Patient Readiness for Treatment is Crucial

Therapy is not done to the patient- pt must "opt in"
Successful outcomes depend on

- Active patient engagement
- Realistic and Specific goals for improvement
- Diagnosis agreement
- Minimizing barriers for Rehab (i.e., pain, fatigue)
- Aligning pt goals with skills of the team

Some Red Flags (patient may not be ready):

- *"I will do anything to get better"* yet multiple failed treatments ("help seek/help reject")
- Chronic but coping fine (no impetus for change)
- Active litigation

Case: Formulation

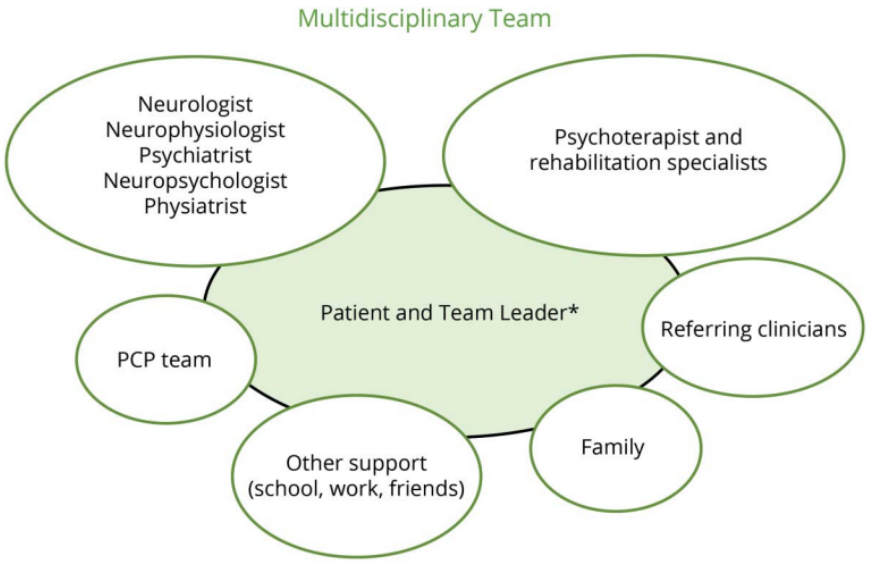
- Multiple experts communicated FND dx at multiple time points
- Barriers to acceptance of diagnosis
  - Comorbid, longstanding epilepsy w/ "same aura"
  - Family disbelief/limited understanding
  - Misattribution with psychiatric illness
  - Active comorbid psychiatric illness prior to and exacerbated by diagnosis: *"It's my fault. I'm doing this."*

Case: Formulation

- Challenging to voice concerns over fear of disappointing providers
- Exacerbating and provoking factors
  - Sensory overload
  - Boom-and-bust activity cycle
  - Dissociated self-experience: “it’s not me”
  - Frustration over uncontrollable tic-like movements

Multidisciplinary team

Figure The Ideal Multidisciplinary Care Team for a Patient With FND



Members of the team interact in a fluid nature as determined by the patient's needs. A neurologist may be the referring clinician or part of the multidisciplinary team.

*The Team Leader is the individual most engaged with the patient. This could be the PCP, neurologist, or one of the mental health providers.

FND = functional neurologic disorder; PCP = primary care provider.

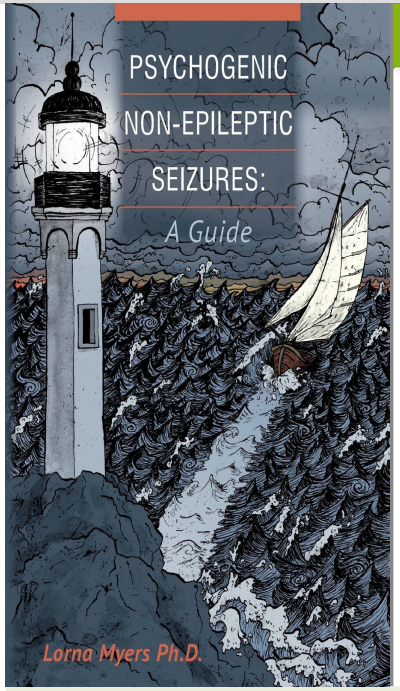
Adapted from O'Neal, Baslet, Polich, Raynor, Dworetzky, Functional Neurological Disorder: The Need for a Model of Care, Neurology Clin Practice, April 2021

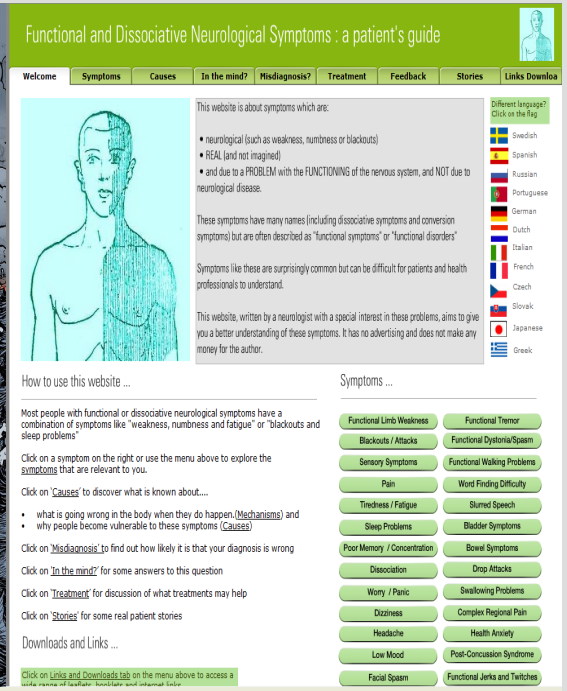
Case: Treatment Plan

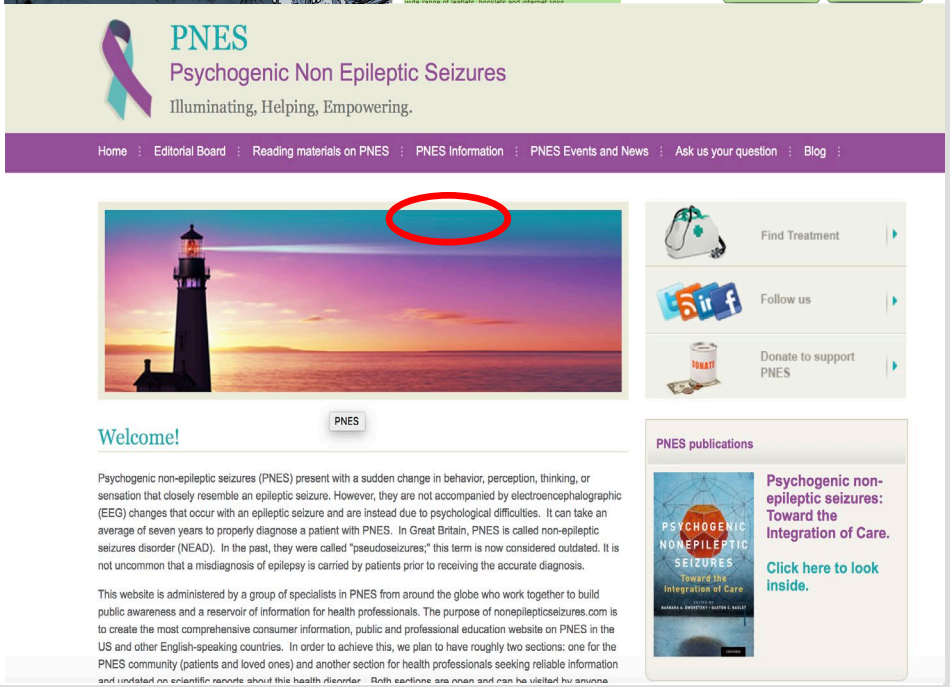
- Biopsychosocial model to address risk factors, triggers, warning signs, in a *multidisciplinary* fashion
  - Neuropsychiatry and regular epilepsy/neuro follow-up
  - Work accommodations
  - CBT for FND
  - SLP for speech symptoms/cognitive symptoms s/p ATL
  - OT for sensory overload triggers, pacing practice
  - PT for episodic weakness, bodily dissociation
- Multidisciplinary team meetings on a weekly basis
- Spousal and parental involvement, FMLA/MLOA

Educate everyone

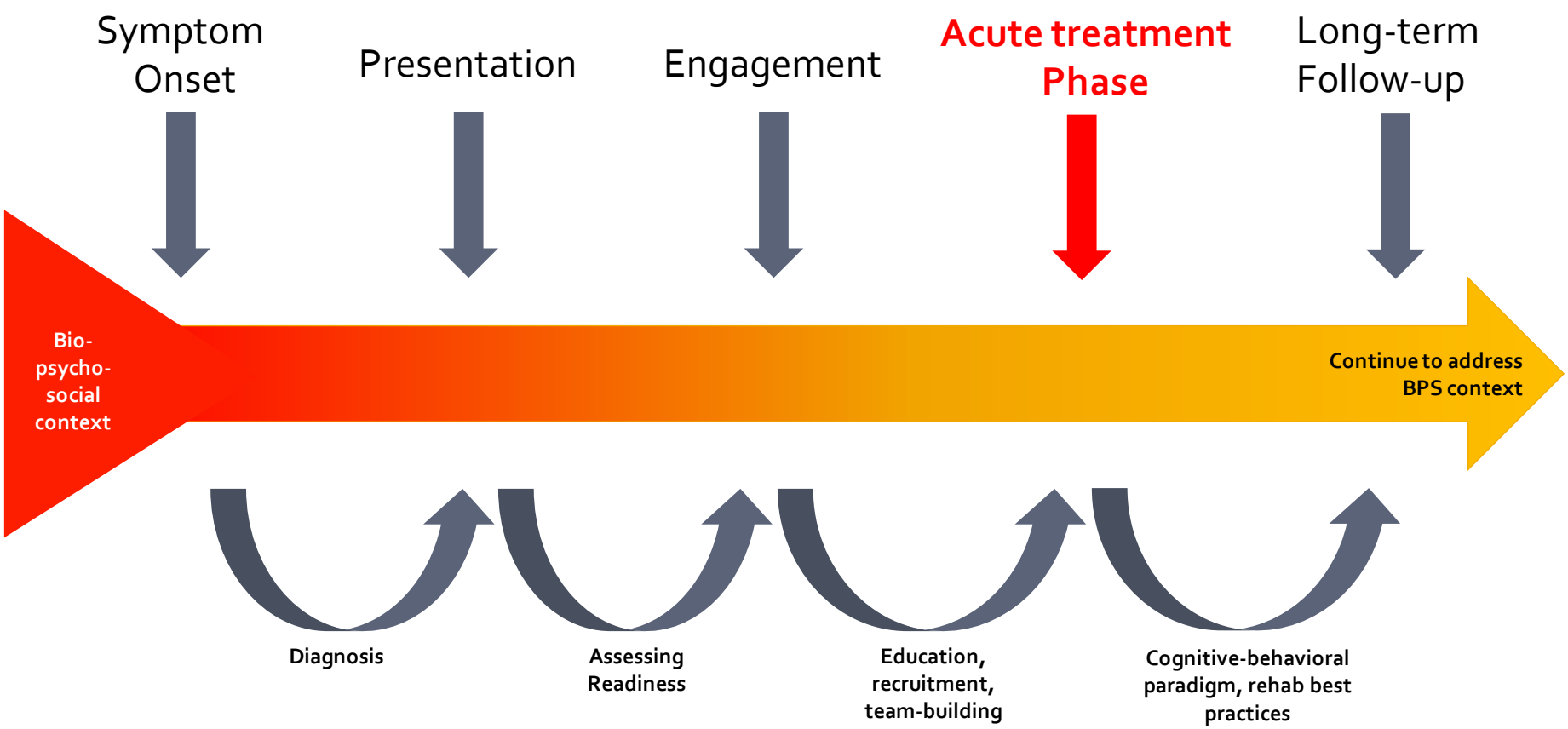
- Safety
  - Warning signs: get to a safe spot
  - ED only for injury
  - Psychological safety: share with close family, employer as needed (including MLOA for treatment)
- Resources
  - www.neurosymptoms.org (UK) (FND)
  - www.fndhope.org (US, UK, Australia)(FND patient support website)
  - www.nonepilepticseizures.com (US – includes info in Spanish)
  - www.nonepilepticattacks.info (UK)
  - **https://www.fndsociety.org/fnd-education**
  - Psychogenic non-epileptic seizures: A guide (Lorna Myers, Ph.D.)
  - Overcoming Functional Neurological Symptoms
  - Documentary: ***dis-sociated*** (first feature documentary on PNES) – available free on YouTube https://youtu.be/MA1EYAg9y5k







Course of treatment in FND



FN(S)D: Functional Neurological (Symptom) Disorder

Adapted from, Baslet et al, *Clin EEG Neurosci*, 2014

Case: Acute Phase

- DD engaged readily throughout treatment, attending all sessions with regularity (good patient!), but misgivings about psychiatric issues
- Often required reassurance and affirmation of correct diagnosis, although ultimately came to a deep understanding and acceptance
- Psychiatric distress remitted as acceptance grew
  - Psychiatric illness is often comorbid but distinct phenomenology and distinct treatment!
  - "Panic without panic" is a common refrain but nonetheless a different illness

Cognitive Behavioral Therapy for Dissociative Seizures

- Multicenter, RCT over 27 UK sites
- 368 adults w/ NES in prior 8 wks, no ES in 12 mos) randomized to CBT + SMC or SMC alone
- Monthly sz freq at 12 mo= primary outcome
- Secondary outcomes →
- 75% adherent to intervention

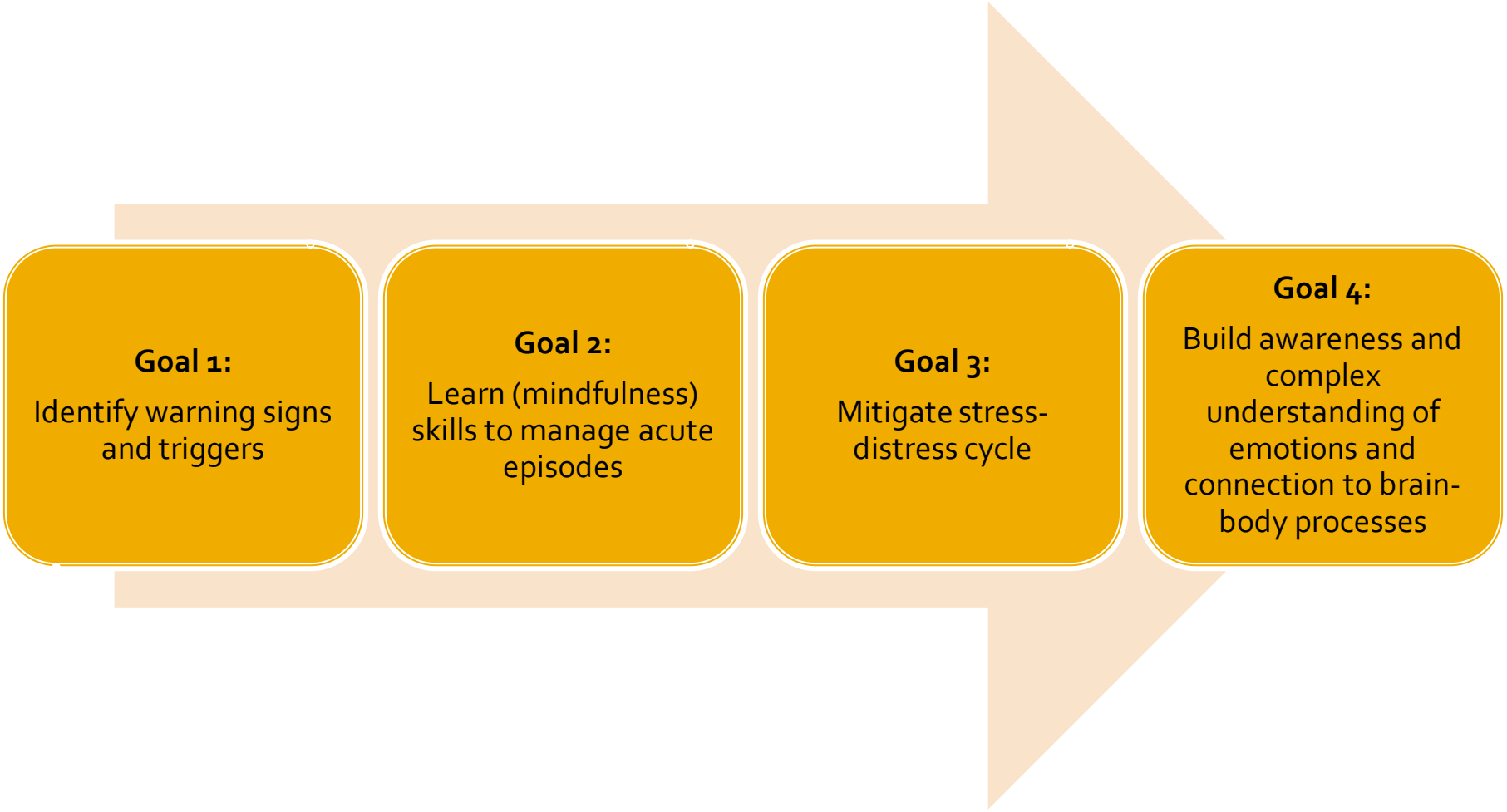
	Estimated mean difference* (95% CI)	Standardised group difference (95% CI)	p value
Primary outcome			
Monthly seizure frequency in last 4 weeks	NA	0·78 (0·56 to 1·09)†	0·144
Secondary outcomes			
Seizure severity score	−0·11 (−0·50 to 0·29)	−0·07 (−0·31 to 0·18)	0·593
Seizure bothersomeness severity score	−0·53 (−0·97 to −0·08)	−0·30 (−0·56 to −0·05)	0·020‡
Longest period of seizure freedom in past 6 months (days)	NA	1·64 (1·22 to 2·20)†	0·001†
Seizure freedom in last 3 months of trial	NA	1·77 (0·93 to 3·37)§	0·083
>50% reduction in monthly seizure frequency relative to baseline	NA	1·27 (0·80 to 2·02)§	0·313
Physical Component Summary score (SF-12v2)	1·78 (−0·37 to 3·92)	0·15 (−0·03 to 0·32)	0·105
Mental Component Summary score (SF-12v2)	2·22 (−0·30 to 4·75)	0·15 (−0·03 to 0·33)	0·084
EQ-5D-5L visual analogue scale	6·16 (1·48 to 10·84)	0·27 (0·06 to 0·47)	0·010†
Impact on functioning (WSAS)	−4·12 (−6·35 to −1·89)	−0·39 (−0·61 to −0·18)	<0·001†
Anxiety (GAD-7)	−1·09 (−2·27 to 0·09)	−0·18 (−0·37 to 0·01)	0·069
Depression (PHQ-9)	−1·10 (−2·41 to 0·21)	−0·17 (−0·37 to 0·03)	0·099
Distress (CORE-10)	−1·65 (−2·96 to −0·35)	−0·25 (−0·45 to −0·05)	0·013‡
Other somatic symptoms (modified PHQ-15)	−1·67 (−2·90 to −0·44)	−0·26 (−0·45 to −0·07)	0·008‡
Self-reported change (CGI score)	0·66 (0·26 to 1·04)	0·39 (0·16 to 0·62)	0·001‡
Clinician-rated change (CGI score)	0·47 (0·21 to 0·73)	0·37 (0·17 to 0·57)	<0·001‡
Patient-reported satisfaction with treatment	0·90 (0·48 to 1·31)	0·50 (0·27 to 0·73)	<0·001‡

p values not adjusted for multiple testing. Standardised group differences between 0·35 and 0·65 were considered moderate. NA=not applicable. SF-12v2=12-item Short Form survey–version 2. EQ-5D-5L=EuroQoL-5 Dimensions-5 Level scale. WSAS=Work and Social Adjustment Scale. GAD-7=Generalised Anxiety Disorder seven-item. PHQ-9=Patient Health Questionnaire nine-item. CORE-10=Clinical Outcomes in Routine Evaluation-10. PHQ-15=Patient Health Questionnaire fifteen-item. CGI=Clinical Global Impression. *Using original scales.†Treatment effects for count outcomes are presented as incidence rate ratios. ‡Statistically significant at 5% level (not accounting for multiple testing). §Treatment effects for binary outcomes are presented as odds ratios.

Table 3: **Comparison of outcome measures between the CBT plus standardised medical care and standardised medical care alone groups at 12 months derived by multiple imputation (100 imputations)**

Goldstein et al, *Lancet Psychiatry*, 2020

Manualized mindfulness-based psychotherapy for FS



Baslet et al, *Clin EEG Neurosci*, 2014

Manualized mindfulness-based psychotherapy for FS

MODULE I: UNDERSTANDING YOUR DISEASE AND YOUR TREATMENT
- Session 1: Understanding Your Illness
- Session 2: Identifying the function of the symptom
- Session 3: Identifying values

MODULE II: STRESS MANAGEMENT STRATEGIES
- Session 4: Understanding the stress cycle
- Session 5: Mastering a stress management skill

MODULE III: MINDFULNESS
- Session 6: Introduction to mindfulness
- Session 7: Incorporating mindfulness into everyday life

MODULE IV: EMOTION MANAGEMENT
- Session 8: Emotion Recognition
- Session 9: Emotion Acceptance
- Session 10: Regulation of emotion-driven behavior

MODULE V: REWORKING COGNITIONS & RELAPSE PREVENTION
- Session 11: Reworking cognitions
- Session 12: Relapse Prevention

ASSESS COMMITMENT TO CHANGE

LOWER BASELINE HYPERAROUSAL

TRAIN THE 'PRESENT MOMENT AWARENESS' MUSCLE

USE AWARENESS TO RELATE MORE EFFECTIVELY TO THOUGHTS AND FEELINGS

Baslet et al, *Clin EEG Neurosci*, 2014

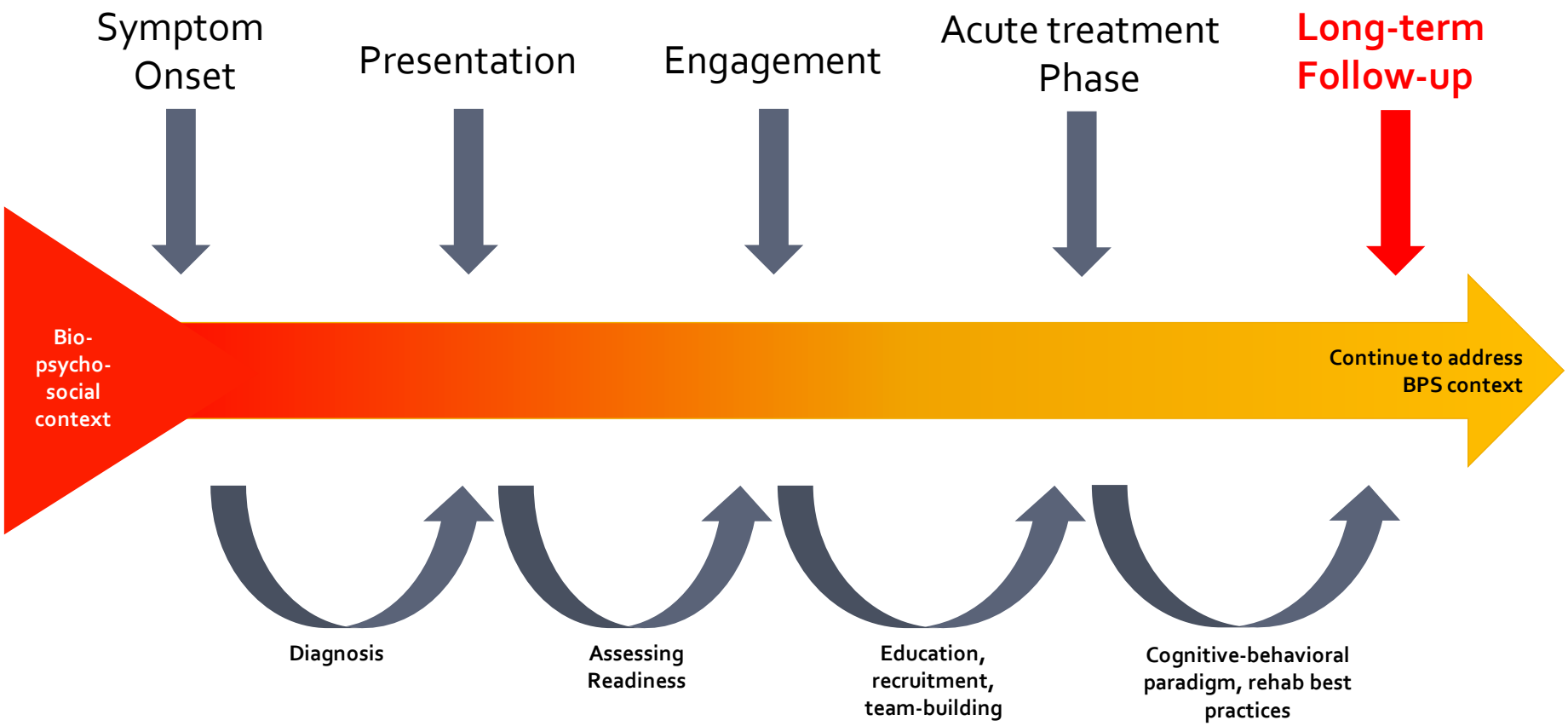
Physiotherapy in motor FND: Principles

- Limited 'hands-on' treatment. When handling the patient, facilitate rather than support.
- Encourage early weight bearing. 'On the bed strength' will not usually correlate with ability to stand in functional weakness.
- Foster independence and self-management.
- Goal directed rehabilitation focusing on function and automatic movement (eg, walking) rather than the impairment (eg, weakness) and controlled ('attention-full') movement (eg, strengthening exercises).
- Avoid use of adaptive equipment and mobility aids (though these are not always contra-indicated).
- Avoid use of splints and devices that immobilize joints.
- Recognize and challenge unhelpful thoughts and behaviors.

FNSD: Functional Neurological Symptom Disorder

Nielsen et al, JNNP, 2014

Course of treatment in FND



FN(S)D: Functional Neurological (Symptom) Disorder

Adapted from, Baslet et al, *Clin EEG Neurosci*, 2014

Case: Chronic Phase

Doctors don't know what to do once you have done everything you are supposed to do, and still have seixzures.

Kate Berger, "View from the floor"

- Our patient ultimately engaged in multiple courses of CBT for FND, SLP, OT, and PT
- Continued follow-up with epileptologist and neuropsychiatrist, including active pharmacotherapeutic management of psychiatric distress
- Despite consistent engagement, she remained symptomatic
  - Improvements in drop attacks
  - Persistent functional seizures
  - Near daily tic-like movements of face, arms/hands, and utterances

Case: Chronic Phase

- Nonresponse factors
  - Fear of losing providers/attachment figures
  - Ongoing psychiatric symptoms
  - Persistent boom-bust cycle of activity
  - Avoidant coping and recursive guilt over ongoing symptoms
- Chronic treatment plan
  - Address trMDD (aggressive pharmacotherapy, including ketamine)
  - Shift to DBT and trauma-focused therapy, away from FND care *per se*

Long-term outcomes: FS

Study	n	Method	Follow up period	Cont events in last year*	On ASM	Unemployed/ disabled	Psych morbid	Other functional sx's
Meierkord et al., 1991	110	Face to face	Mean 5 years	**60%**	n/a	20%	n/a	n/a
Selwa et al., 2000	57	Phone	19 months – 4 years	**59.6%**	32%, PNES only	n/a	39%	n/a
Lancman et al., 1993	63	Face to face	Mean 5 years	**74.6%**	n/a	n/a	n/a	n/a
Reuber et al., 2003	148	Postal	1-10 years	**71.2%**	40.7%, PNES only (79% cont events)	53.8%	n/a	n/a
Jones et al., 2010	61	Postal	<10 years	**83%***	39%, all patients (8% with epilepsy)	n/a	52.6%	72.9%
Duncan et al., 2014	75	Postal	5-10 years	**61%***	n/a	29.3% in paid employment	26.5%	n/a
Walther et al, 2019	52	Face to face	1-16 years	**63%***	n/a	n/a	n/a	n/a
Asadi Pooya et al, 2018	86	Phone	4-9 years	**45%***	n/a	n/a	n/a	n/a

FS: Functional Seizures
ED: Emergency Department
ASM: Anti-seizure medication

Long-term effects of psychotherapy at 24 months - Denmark

	Inclusion	End of treatment	Follow-up	
			12 months	24 months
Number of participants	42	42	42	32
Number of seizures/month	4 (1.25–11.5)	0.75 (0–2.75)*	0 (0–1)*	0.04 (0–2.75*
Number of patients without seizures	0	19	22	16
>50% reduction in number of seizures	–	15	13	10
<50% reduction in number of seizures or unchanged	–	5	4	4
Number of patients with increased number of seizures	–	3	3	2

Data (seizure frequency) are expressed as median with interquartile range.
* Indicates levels of significance compared with number of seizures at inclusion ($p < 0.0001$).

Table 4
HCU before and after treatment.

	Before 24–13	Before 12–0	After 0–12	After 13–24
All visits	3.9	7.9	6.26	2.97
Median (IQR)	2 (1–6)	5 (4–9)	2 (1–8)	1 (0–3)
ED All causes	0.41 ± 0.79	01.51 ± 1.8	0.44 ± 0.64	0.36 ± 0.67
ED Seizures	0.15 ± 0.49	1.1 ± 1.64	0.05 ± 0.22	0.05 ± 0.32
ED Pain	0.18 ± 0.51	0.26 ± 0.55	0.28 ± 0.51	0.28 ± 0.56
ED Other	0.08 ± 0.35	0.15 ± 0.49	0.1 ± 0.31	0.08 ± 0.35
Department of Neurology	1.85 ± 2.77	3.9 ± 4.24	1.05 ± 1.73	0.54 ± 1.12
Department of Psychiatry	0.05 ± 0.22	1.18 ± 6.08	2.77 ± 10.4	0.79 ± 3.78
Other departments	1.67 ± 2.85	1.51 ± 2.27	2.54 ± 4.65	1.26 ± 2.07
Total hospital admission days (range)	60 (0–24)	119 (0–36)	97 (0–88)	28 (0–14)

Number of healthcare contacts expressed as mean ± SD, in parentheses, before and after psychotherapeutic intervention. All visits shown with mean and median IQR = interquartile range, 25th and 75th percentile. Healthcare utilization of all patients was acquired from the regional medical record system.
ED = Emergency Department

The 24-month pretreatment costs compared with the 24-month posttreatment costs directly associated with seizures dropped by 95.8%, and total healthcare costs were reduced by 63%.
Deleuran et al, *Epilepsy Beh*, 2019

Long-term outcomes: motor FND

24 studies (n=2069 patients)

Mean follow-up duration: 7.4 years

Overall – **40% of patients with same or worse outcome at follow-up**

20% of patients with complete remission

Gelauff and Stone, *Hand Clin Neurol: Funct Neurol Dis*, 2016

FND-focused rehab treatment works! 13–month (median) outcome; 50% inpt - Brazil

	n (%)
No improvement	83 (44.9%)
Improvement	101 (55.1%) [Complete recovery of all symptoms n=39 (21.2%)]
Rehabilitation	
No	56 (30.3%)
Yes	129 (69.7%)

Improvement	Rehabilitation No	Rehabilitation Yes	95%CI	chi-square p-value
No	46	38		
Yes	10	91	11.01(4.9–23.5)	<0.0001
	56	129		

Improvement	Age under 18 years	Age 18+	95%CI	chi-square p-value
No	7	77		
Yes	40	61	7.2 (3.0–17.7)	<0.0001

95%CI: 95% confidence interval.

Theuer et al, *Arq Neuropsiqiatr*, 2020

Take-home messages

- FND is common, distressing, and debilitating.
- Our understanding of FND has expanded in recent years with increasing identification of neurobiological and cognitive processing mechanisms with ongoing research.
- Evidence-based treatment for FND is growing and should be tailored to the patient in front of you (expect chronic sx).
- Ongoing communication between patient, clinicians, family, other supports is an essential part of the treatment.

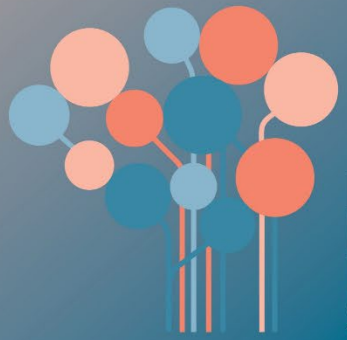
FUNCTIONAL SEIZURES AND EPILEPSY:

CUTTING EDGE DIAGNOSTICS, BIOLOGY AND MANAGEMENT

JUNE 13-14, 2025

The Inn at Longwood Medical, Boston, Massachusetts

In Person, Virtual, & On-Demand



FUNCTIONAL NEUROLOGICAL DISORDER SOCIETY

ILAE BRITISH BRANCH

This course is endorsed by the ILAE British Branch.

Trainees can have free membership in FNDS for 1 year. To become a member: https://www.fndsociety.org/membership

Treatment in FND is multidisciplinary

Neuropsychiatry

VIEWPOINT

Physiotherapy for functional motor disorders: a consensus recommendation

Glenn Nielsen,[1,2] Jon Stone,[3] Audrey Matthews,[4] Melanie Brown,[4] Chris Sparkes,[5] Ross Farmer,[6] Lindsay Masterton,[7] Linsey Duncan,[7] Alisa Winters,[3] Laura Daniell,[3] Carrie Lumsden,[7] Alan Carson,[8] Anthony S David,[9,10] Mark Edwards[1]

Occasional essay

Occupational therapy consensus recommendations for functional neurological disorder

Clare Nicholson ,[1] Mark J Edwards,[2] Alan J Carson,[3] Paula Gardiner,[4] Dawn Golder,[5] Kate Hayward,[1] Susan Humblestone,[6] Helen Jinadu,[7] Carrie Lumsden,[8] Julie MacLean,[9] Lynne Main,[10] Lindsey Macgregor,[11] Glenn Nielsen,[2] Louise Oakley,[12] Jason Price,[13] Jessica Ranford,[9] Jasbir Ranu,[1] Ed Sum,[14] Jon Stone [3]

General neurology

Review

Management of functional communication, swallowing, cough and related disorders: consensus recommendations for speech and language therapy

Janet Baker,[1,2] Caroline Barnett,[3] Lesley Cavalli,[4,5] Maria Dietrich,[6] Lorna Dixon,[7] Joseph R Duffy,[8] Annie Elias,[9] Diane E Fraser,[10] Jennifer L Freeburn,[11] Catherine Gregory,[2] Kirsty McKenzie,[12] Nick Miller,[13] Jo Patterson,[14] Carole Roth,[15] Nelson Roy,[16,17] Jennifer Short,[18] Rene Utianski ,[19,20] Miriam van Mersbergen,[21] Anne Vertigan,[22,23] Alan Carson,[24] Jon Stone ,[24] Laura McWhirter [24]

Review

Systematic review of psychotherapy for adults with functional neurological disorder

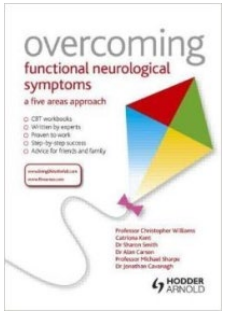
Myles Gutkin [1,2] Loyola McLean [3,4] Richard Brown [5,6] Richard A Kanaan [1]

19 studies were included

- 12 skills-based, CBT-like approaches vs 7 psychodynamic approaches
- 11 pre-post studies vs. 8 RCTs
- Most studies (except 4) included only one FND phenotype
- Effect sizes showed medium-sized benefits for physical (FND) symptoms, mental health, well-being, function and resource use for both kinds of therapies.
- Outcomes comparable across both types of therapy.
- Lack of controlled trials for psychodynamic psychotherapy.
- Lack of follow-up data in majority of CBT trials

JNNP, 2020

Cognitive Behavioral Model in FND



Situation, relationship, resources and practical problems
Good marriage; husband, mother and father supportive; income currently reduced

Symptoms
Tremor,
pain in arms and legs,
tired all the time

Positive feedback loop

Feelings
Down, confidence knocked.
Annoyed.

Behavior
Stopped working, driving and socializing.
Searching the Internet to find out what's wrong.

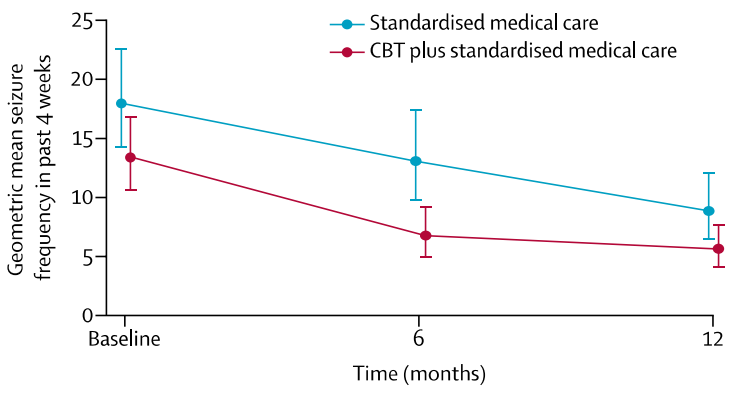
Thinking
'People think I'm making this up', 'There's something seriously wrong with me'

Williams et al, "Overcoming Functional Neurological Symptoms", Hodder Arnold 2011; Kent and McMillan, Advances in Psych Treatment, 2009

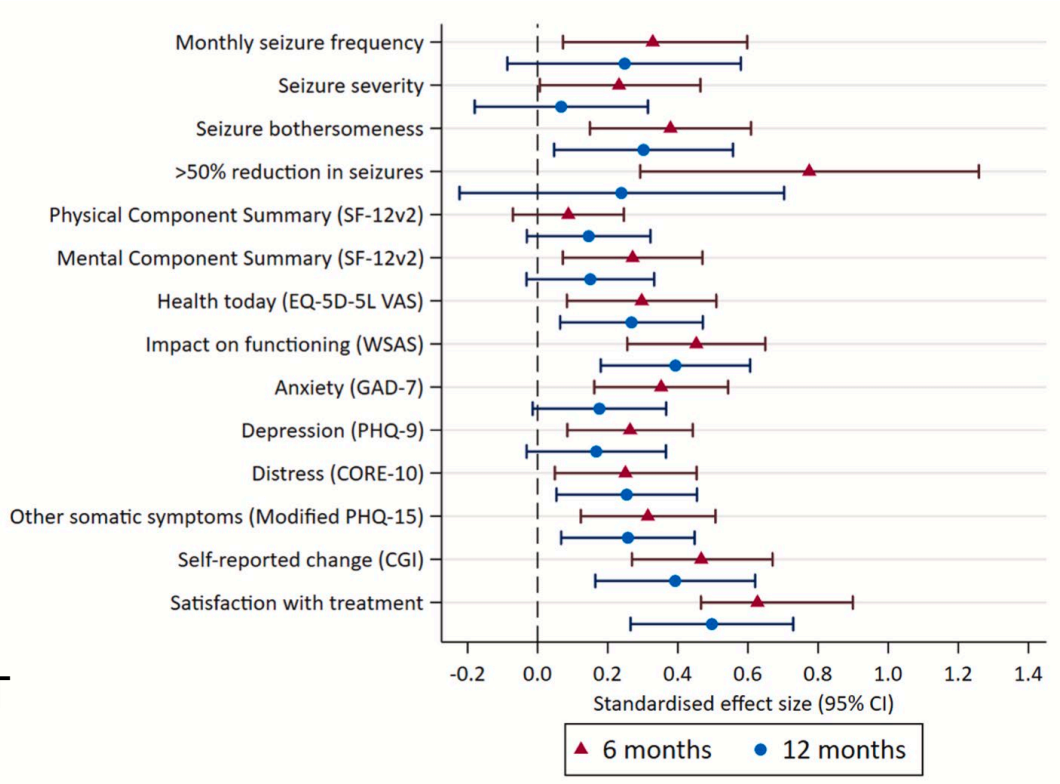
Cognitive Behavioral Therapy for Functional Seizures

- Multicenter, randomized controlled trial across the UK (27 sites).
- 368 adults with FS randomized to receive CBT + standardized medical care or SMC alone (2 neuro + 4 psych appts)

Changes in mean sz frequency over time



Standardized effects sizes at 6 and 12 months (between arm differences)



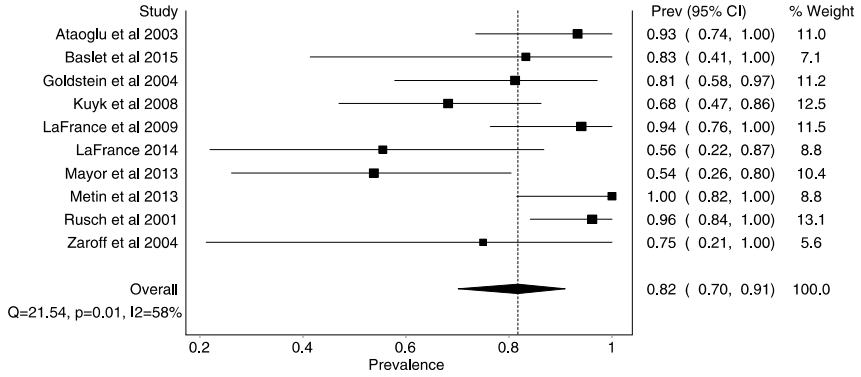
-20% in CBT vs 12% in SMC in remission
-68% reduction in sz freq at 12 mo in CBT vs 63% reduction in SMC

Goldstein et al, *Lancet Psychiatry*, 2020

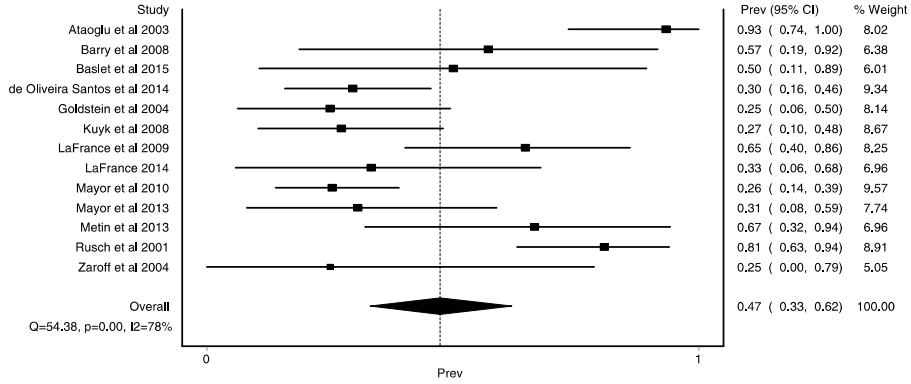
Goldstein et al, *Seizure*, 2022

Cognitive-Behavioral Therapy for FND

- Primary evidence-based treatment of FND (particularly paroxysmal)
- 2017 MA found moderate-to-large effects benefits over treatment-as-usual; 2020 MA found similar
- What type?
  - More evidence for CBT over psychodynamic
  - Time limitations and translation to group favors CBT over psychodynamic
- Medication is not effective



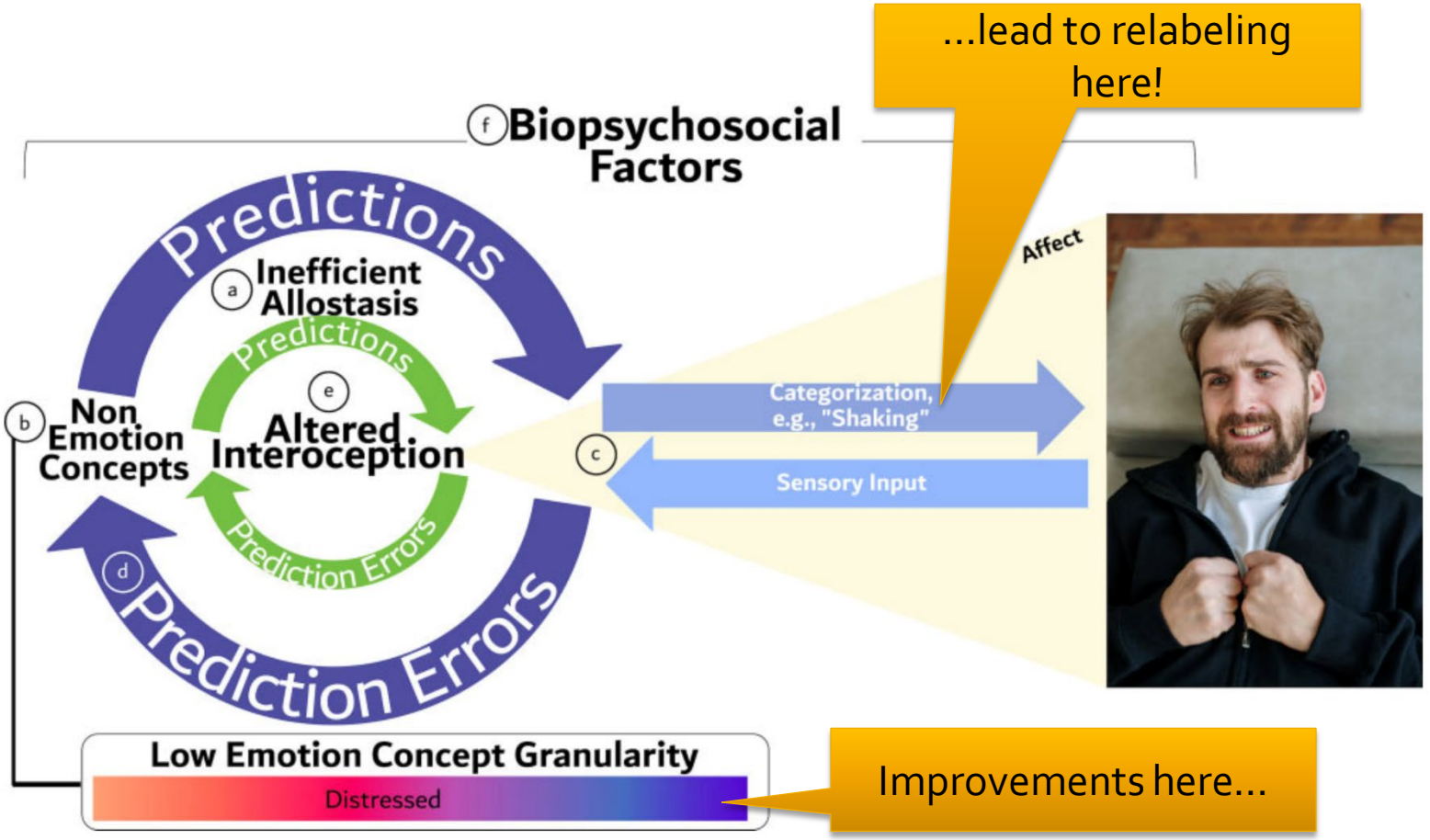
>50% event frequency reduction at treatment end



Event freedom at treatment end

Carlson and Nicholson Perry, *Seizure*, 2017

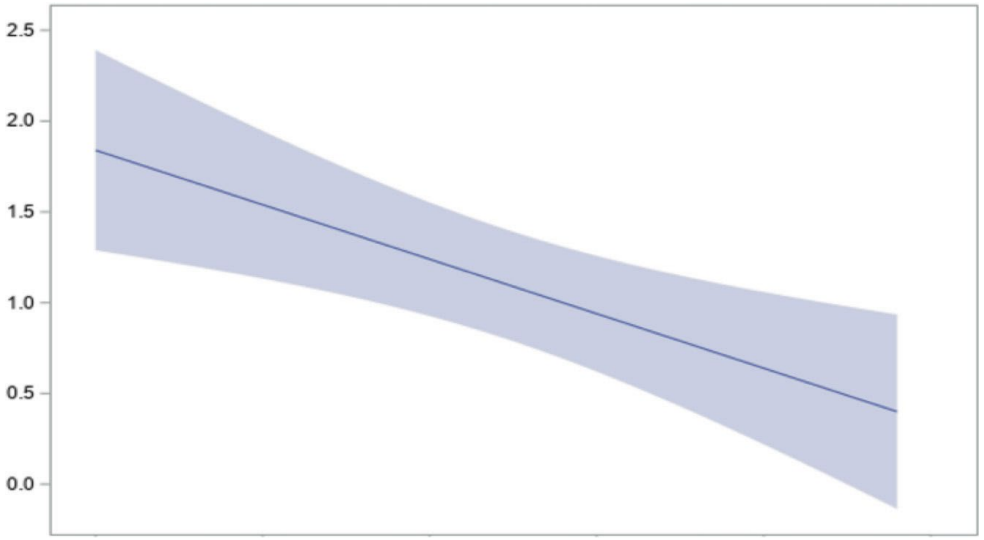
Affective-Inferential Model in FND



Jungilligens et al. A new science of emotion: implications for functional neurological disorder. Brain. 2022

Mindfulness-based psychotherapy for FS

- N= 26
- 70% with 50% reduction in frequency at treatment end
- 50% with no events in last session at treatment end
- At 3- to 6-month post-tx follow-up (n=14), 93% still had lower frequency than at baseline (and 50% further improved from end of treatment).



Changes in PNES intensity and duration and in quality of life (end of treatment compared to baseline measures).

	T1 mean (SD)	T2 mean (SD)	T3 mean (SD)
PNES intensity	5.56 (2.14)	3.92 (2.69)*	3.74 (2.65)#
QOLIE-10	2.59 (0.73)	2.40 (0.76)	2.14 (0.77)*

Statistical significant reductions from baseline scores are indicated with * for $p < 0.01$ and # for $p < 0.05$. QOLIE-10: Quality of Life in Epilepsy-10.

Baslet et al, *Epilepsy and Behavior*, 2020

	T1 median (min-max)	T3 median (min-max)	T3 vs. T1 diff (min-max)	T4 median (min-max)	T4 vs. T1 diff (min-max)
Weekly frequency	1.75 (0-66.5)	0.16 (0-57.6)	**-1.02 (-24.5, 10.7)***	0.29 (0-56.0)	**-1.25 (-17.5, 0.5)***

T0	T1 mean (sd)	T3 mean (sd)	T3 vs. T0 diff (95%CI)	T3 vs. T1 diff (95%CI)	T4 mean (sd)	T4 vs. T0 diff (95%CI)	T4 vs. T1 diff (95%CI)
Number of days per week[a]	1.38 (0.85)	1.01 (0.84)		**-0.37 (-0.69, -0.05)+**	0.70 (0.68)		**0.75 (-1.15, -0.35)***
PNES intensity	5.96 (1.99)	3.74 (2.65)		**-2.21 (-3.44, -0.99)***	2.92 (2.81)		**-2.94 (-4.42, -1.46)***

Baslet et al, *Epilepsy and Behavior*, 2021

Other Treatments for FND

RCT=Randomized Controlled Trials PC=Placebo Controlled (in red, controlled interventions)

OTHER PSYCHOLOGICAL THERAPIES (besides CBT-like and psychodynamic psychotherapy)

- Hypnosis for mixed FND (RCT)
- Brief group psychoeducation for PNES (RCT) (negative trial)[1]
- Group cognitive-behavioral therapy for FS (with comorbid epilepsy)[2]
- Prolonged exposure for FS + PTSD[3]

NONINVASIVE STIMULATION-BASED THERAPIES

- rTMS over motor cortex for functional paralysis, FMD[4-7]
- rTMS over right temporo-parietal junction in FS[8]

PSYCHOPHARMACOLOGICAL THERAPIES

- SSRI's (RCT for PNES, PC) (negative trial)/ SNRI's for FS and FMD

FND: Functional Neurological Disorder; FS: Functional Seizures; FMD: Functional Movement Disorders; rTMS: RepetitiveTranscranial Magnetic Stimulation.

Baslet, *Neuropsychiaric Disease and Treatment*, 2013 except 1. Chen et al, *Epilepsia*, 2014; 2. DeBarros et al, Seizure, 2018; 3. Myers et al, Epilepsy and Behavior, 2016; 4. Pick et al, 2020; 5. Taib et al, 2019; 6. Garcin et al, 2017; 7. Broersma et al, 2015; 8. Peterson et al, *Psychosomatics*, 2018;