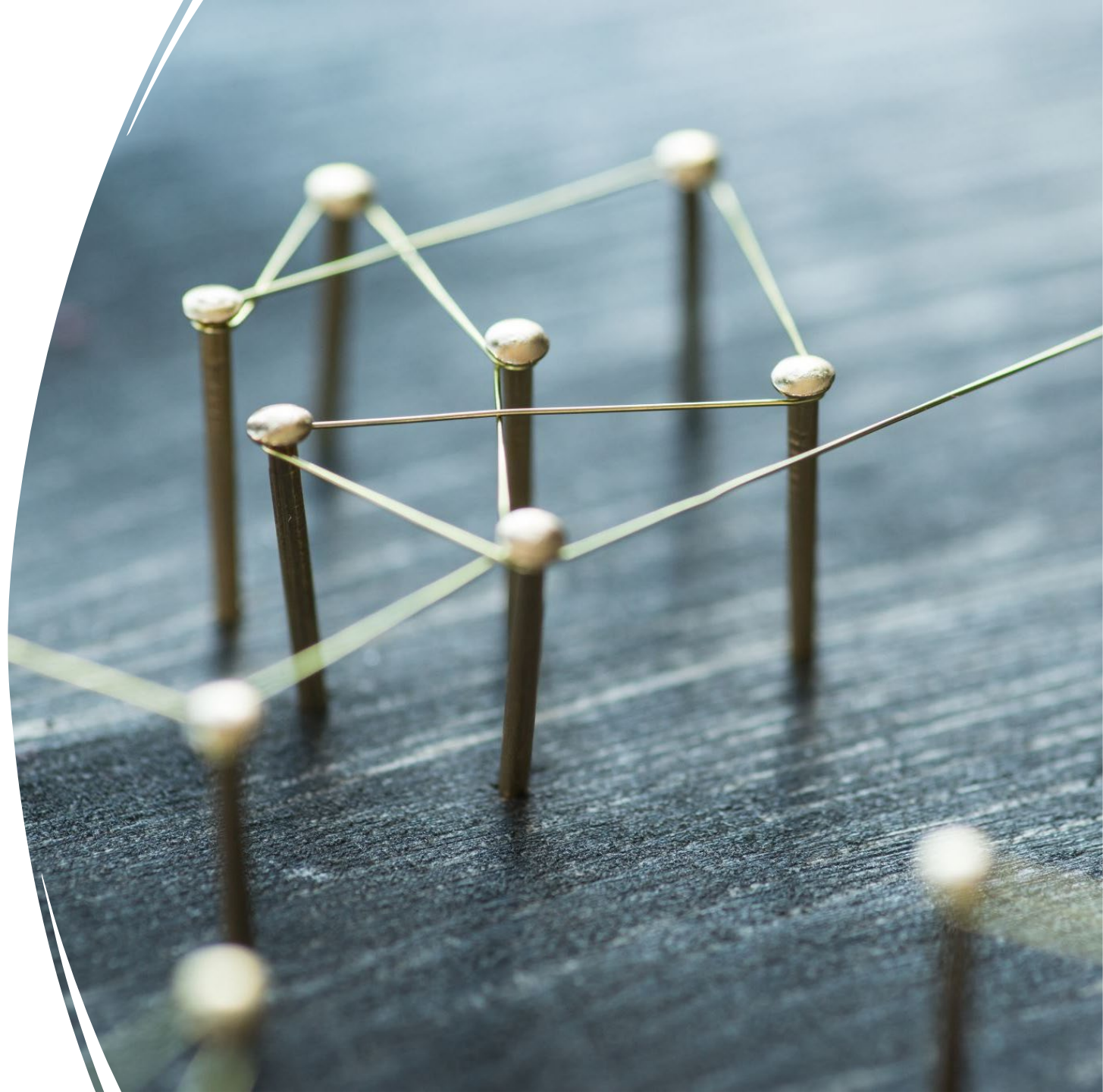


Tangled Wires: Functional Neurological Disorder

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Goals

01

Explain current understanding of: What is FND?

02

Identifying varied symptoms of FND

03

The role of neurology in FND

04

The role of life context and stressors

05

Treatment and prognosis of FND



What is FND?

- FND = Functional Neurological Disorder
 - Historically was: Hysteria and Conversion Disorder
- Significant disruption to neurological functioning
 - Typically impacts motor functions or sensory functions
 - Can affect cognition though less common
- Not attributable to any known structural neurology
 - FND is “a software problem rather than hardware”
 - Some findings of possible differences in grey matter, but limited studies thus far

What causes FND?

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- First conceptualize it as “neurological vulnerability to FND”
 - Some people’s brains are more likely to develop FND than others
 - Proceed through analysis by:
 - Predisposing Factors – what happened before symptoms
 - Triggering Factors – what happened at moment symptoms began
 - Perpetuating Factors – what has been the effect/impact and continues to be present now
 - Examine Physiological, Psychological, Social, and Emotional Factors
 - Family history may provide clues about neurological vulnerability
 - Beliefs, fears, and expectations (the psychological response) to FND symptoms can contribute to maintenance of symptoms
 - What has been the social impact of FND: School, Work, Friends, Family...
 - What has been the emotional response to FND: Anxiety, Depression, Panic...

Predisposing Factors

- Adverse Childhood Experiences greatly increases likelihood
 - Physical or sexual abuse
 - Acute trauma – events, medical, etc.
 - Increases sensitivity and response of “fight or flight” response (nervous system activation threshold)
 - Dissociative experience activation
- Presence of other Functional Disorders
- Migraine
- Hypermobility/Ehlers Danlos Type 3
- Obsessive tendency (as in OCD but also without compulsive response, such as ruminative disorders)
- Excessive activity or chronic stress (“wearing oneself down”)

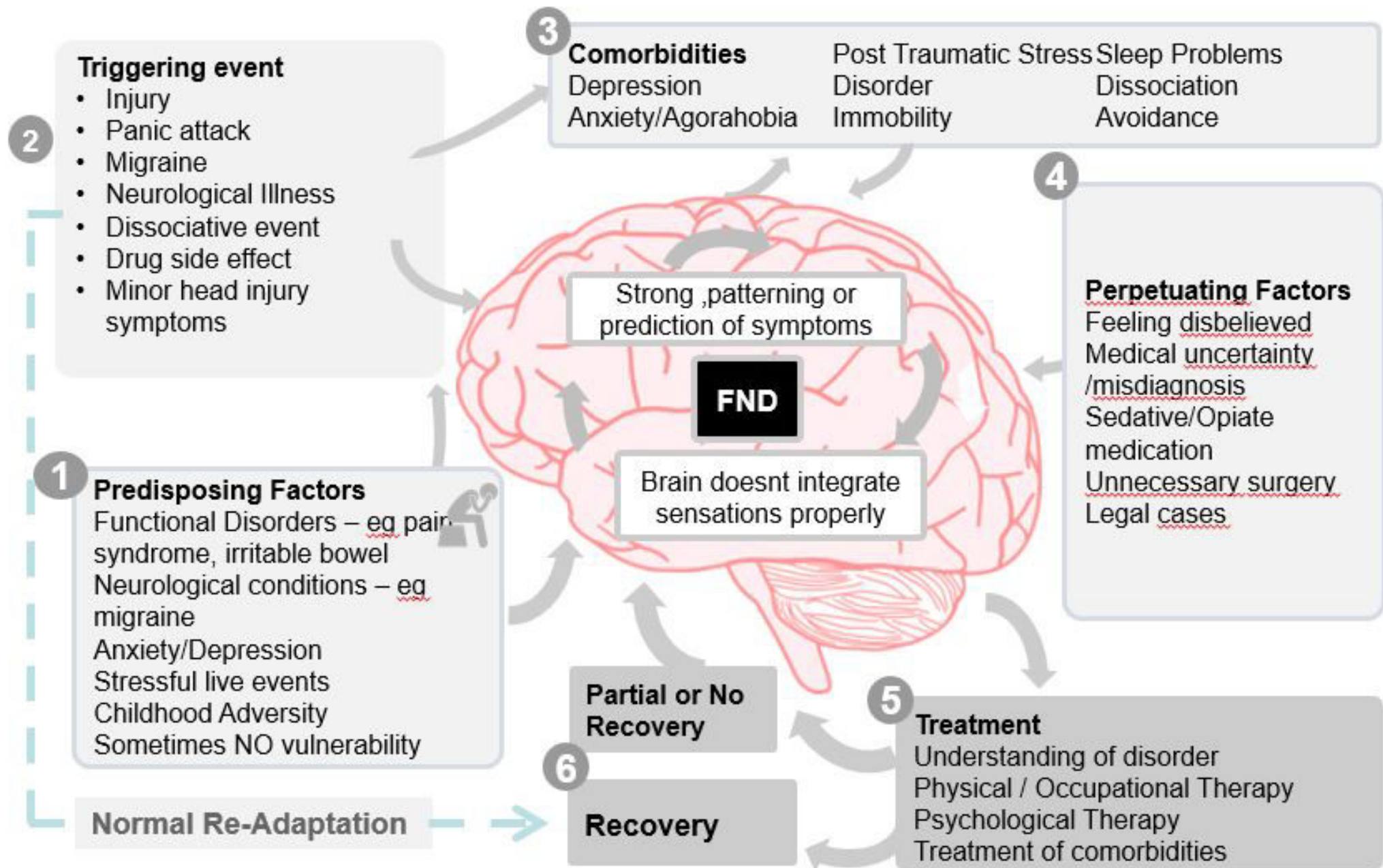
Triggering Factors*

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- Acute injury
 - Fainting or Panic Attack
 - Migraine Headache
 - Illness
 - Acute Stress Response
 - Drug Side-Effects

* Note: Though these things may activate/trigger FND, this does not mean they *cause* FND

Perpetuating Factors

- Not receiving a diagnosis
- Insistence by medical professionals, family members, or others one trusts that it is “all in their head” (Invalidation)
- Disproportionate treatment – strong medications, extensive medical examinations and testing
- Loss of engagement in personal life activities
 - Many will self-isolate in the home
 - May withdraw from school
 - May stop going out with friends
- Increased Anxiety and Depression from functional impacts of FND





How does FND occur?

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- Assess fundamental nature of dysfunction:
 - Motor symptoms – problem with efferent signals from brain to muscles
 - Sensory symptoms – problem with afferent signals from sense organs to brain, or problem with brain’s integration and filtering of stimuli
 - Seizures or dissociation – brain is in a “trance-like” state
 - Observable differences in brain imaging during symptoms
 - Requires functional imaging, not just structural
 - Changes resolve when symptoms remit (even if temporarily)
 - In a manner of speaking, it is a problem of brain’s predictive function with overcommitment to prediction

How common is FND?

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- Historically considered a rare disorder, but unprecedented spike in prevalence during COVID pandemic
 - Actual occurrence of FND may have been much higher than previously assumed but symptoms were masked
 - May actually be one of the most common neurological concerns
 - Often reported to be second most common reason for presentation in neurology clinics
 - Common causes for clinic presentation include persistent headache and functional seizures
 - More recently functional movement disorders (tics, paralysis, dystonia) have been more common
 - Can present like a stroke due to sudden onset and presentation
 - Estimated prevalence rates range from 250,000 to 500,000 in USA

Risk and Probability of Misdiagnosis

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- Requires evaluation of alternative causes and presentation of positive symptoms (functional weakness, sensory disturbance, or seizures all evaluated)
 - It should NOT be strictly a diagnosis of exclusion though
 - Due to the relationship between other neurological conditions and onset of FND, a thorough evaluation is warranted even after FND diagnosis
 - Encouragingly rates of misdiagnosis of functional symptoms has been steadily low (<5%) for nearly 50 years
 - No physiological diagnostic test available at present
 - Feigning of symptoms in FND is extremely rare even if symptoms appear unusual

- Lidstone et al., 2020

Common Symptoms

Typically present with more than one symptom

- Functional Tics (FTLBs)
 - Functional Seizures (PNES)
 - Drop Attacks
 - Dystonia
 - Tremor
 - Limb Weakness
 - Gait Disorder
 - Pseudoparalysis
 - Bladder Symptoms
-
- Sensory Symptoms
 - Dizziness (PPPD)
 - Jerks and Twitches
 - Cognitive (Thinking, Memory, Concentration)
 - Speech and Swallowing Difficulties
 - Facial Spasms
 - Visual Disturbance

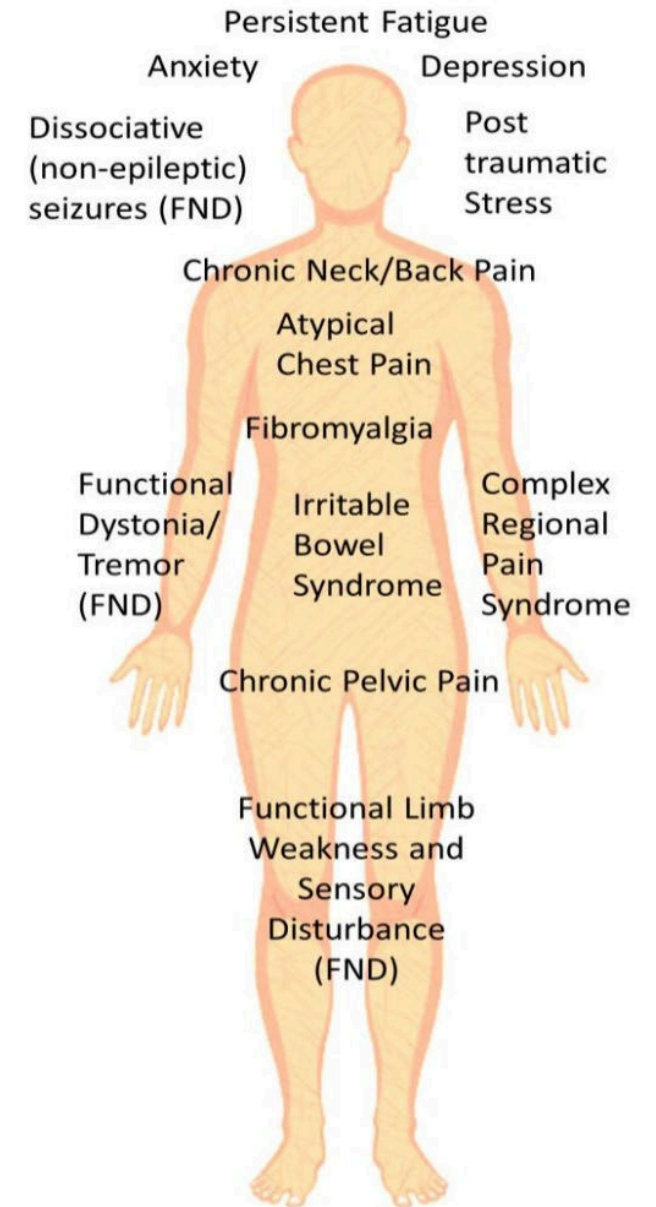
Common Co- Occurring Symptoms

- Dissociation
- Fatigue
- Anxiety and Panic
- Health Anxiety
- Low/Depressed Mood

- Headache
- GI Distress (IBS)
- Chronic Pain
- Sleep Problems

What about multiple Functional Disorders?

- There are quite a few functional disorders
- Presentation of one greatly increases likelihood of others manifesting
- Receiving multiple functional diagnoses can be highly discouraging
 - Recommended instead to frame it as one condition with multiple different aspects and presentations



Walking through an example

- A common recent presentation of FND has been FTLBs (Functional Tic-Like Behaviors)
- Individuals with FTLB's often present with other concerns as well, including Drop Attacks, PNES, pseudoparalysis...
- Differentiating between FTLB's and structural (conventional) tics can be difficult



FTLBs vs Conventional Tics

- European guidelines help differentiate (Pringsheim et al, 2023; Trau et al, 2022)
 - Acknowledging present limitations of knowledge
 - Lack of “positive signs” incongruent with physiological knowledge
- Age at symptom onset: >10 years old
- Rapid evolution of symptoms
 - Onset over hours to days
 - Peak severity after a few weeks
 - Can usually pinpoint moment of onset
 - May have specific events associated with onset



Brief Note on Age and Sex

- Females less likely to be identified with tics in the typical age range described in DSM-5
 - Later age of identification may incorrectly lead to non-diagnosis of TS/CTD
 - What is it then? “*FND?*”
- Complicates diagnostic criteria for FND
- Overrepresentation of females by default?
 - Circular reasoning in sample selection (Andersen et al., 2024)
- Also consider role of trauma in FND manifestation
 - Sex-specific probability of trauma
 - However, only about 1/3 have documented traumatic histories



FTLB Discriminant Phenomenology

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- Many tic-like movements (rather than few)
 - Larger number of complex tics vs simple tics
 - Tic-like behavior variable rather than stereotypic
 - Variably reproduced and inconsistent manifestation
 - Tic-like behaviors may be more harm-oriented (toward self or others)
 - Complex arm and hand movements such as banging self/others, throwing objects, gestures, drop attacks, freezing, or pseudoparalysis
 - May be context dependent
 - More “ballistic” nature – increases risk of harm to self, others, objects



More Phenomenology

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- Vocal tic-like behaviors tend to be complex (words, phrases), context dependent/responsive, and may be socially offensive
 - Tic-like behaviors may be similar to or influenced by popular cultural influences
 - Symptom free periods for several hours and significant increase in symptom frequency in presence of other people or specific contexts – significant increase in symptoms during neurological examination
 - Not typical rostrocaudal progression
 - Tic-like behaviors can change rapidly with new tics occurring daily or every few days



Minor criteria

- Comorbidity profile
 - Significant for preceding anxiety and depression
 - Untreated psychiatric symptoms with significant impact
 - History of self-harm and suicidal ideation
 - Antecedent trauma and acute stressors
 - Family difficulties and social difficulties
- Other FND symptoms or somatic disorders
 - Functional seizures and paralysis
 - Somatoform disorders (e.g., abdominal pain)

Non-Exclusivity

- Tourette's/Chronic Tic Disorders can co-occur with FND/FTLBs
 - Sizable portions of TS population meet preceding criteria
- FTLBs possibly more prevalent in those with TS/CTD
- Important information for patients and families
 - Knowing that FND/FTLB Dx does not rule out TS



Hypothesized Etiological Models

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- Poor interoceptive discrimination
 - Heightened interoceptive responsivity and amplification
 - Prior direct or observed experience of medical trauma
 - Deficiency of coping skills
 - Fewer social supports/external coping systems

Prognostic Factors

Detrimental Factors

- Time to diagnosis
- Non-cohesive medical/treatment response
 - Unnecessary/inappropriate medications
 - Perceived dismissal or invalidation

Positive Factors

- Professional knowledge
- Empirically-validated Psychoeducation – Psychoanalytic explanations may be counterproductive, functional explanations may be more beneficial



Validation and Interaction Patterns

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- Interactions with environment, including people, impact FTLBs
 - Reinforcement effects (negative and positive)
 - Associated stimuli may influence tic presentation
 - Social responsiveness via antecedents and anticipation
 - As part of psychoeducation to reduce associated covert stress responses
 - As part of psychoeducation for self-management and improving prognosis
 - As part of treatment planning and environmental modification
 - Educating relevant others (Parents, Teachers, Employer, Social Relations...)

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