



# Altered Interoception and Functional Neurological Disorder

## Mapping Mechanisms to Psychotherapy Targets

COLUMBIA UNIVERSITY  
IN THE CITY OF NEW YORK

COLUMBIA HEALTH

Xin Lyu, Ph.D.<sup>1</sup>, Manali Roy, Ph.D.<sup>2</sup>

<sup>1</sup>Department of Psychiatry and Behavioral Health, George Washington University

<sup>2</sup>Columbia University, New York, NY

## BACKGROUND

**Functional Neurological Disorder (FND)** is among the most common reasons for neurological consultation, and several frameworks have been proposed to explain its multifactorial pathophysiology. Drane et al. (2020) describe FND through five core constructs: attention, interoception, sense of agency, emotion processing (including salience), and predictive processing/active inference. Understanding these mechanisms is critical for targeted intervention, and optimal treatment is consistent, targeted, and multimodal, including psychotherapy.

**Interoception**, the perception and interpretation of internal bodily signals, forms the basis by which individuals make sense of their internal states, and is the focus of this review. Clinically, patients with FND often struggle to relate to and accurately interpret bodily sensations, including challenges with continence, difficulty identifying and labeling internal states, and reduced confidence in interpreting interoceptive signals. This review aims to *synthesize evidence on interoception in FND and link mechanisms to psychotherapeutic implications*.

### Five Core Constructs of FND

| Attention | Interoception | Sense of Agency | Emotion Processing | Predictive Processing |
|-----------|---------------|-----------------|--------------------|-----------------------|
|-----------|---------------|-----------------|--------------------|-----------------------|

Framework adapted from Drane et al. (2020).

## METHODS

Systematic database review of empirical, peer-reviewed studies on interoception in FND.



## REFERENCES

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## RESULTS

**Findings were heterogeneous:** no single domain consistently implicated. Studies assessed three dimensions:

### Representative Studies

| Study                       | FND Subtype | Sample / Method                                                                                                                                                        | Main Finding                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Apazoglou, K. et al. (2017) | mFND        | mFND = 16, Healthy Controls (HC) = 15; Repeated measures pre- and post- stress test (TSST) comparison of saliva collected at 9 timepoints and between group comparison | Aberrations in interoceptive abilities found in patients with (pw) mFND under stress, with significantly higher perceived stress vs. objectively measured stress compared to HC; might indicate that elevated background cortisol may predispose individuals to develop FND                                                                        |
| Elkommos, S. et al. (2023)  | PNES/FS     | PNES/FS = 25, ES = 19; Within and between group comparison using retrospective data-Heartbeat-evoked potential (HEP), preictal and interictal state HEP amplitudes     | Altered interoception occurs prior to FS, HEP amplitude is a potential biomarker for FND indicating dissociation. Re-embodiment through grounding/body centering as a potential treatment intervention, to strengthen bottom-up interoceptive signals and reintegrate top-down and bottom-up signals                                               |
| Stoffel, N. et al. (2025)   | Mixed FND   | FND = 43, HC = 48; between group comparison of respiratory interoception ability using the Respiratory Resistance Sensitivity Task (RRST)                              | In pw FND, reduced interoceptive accuracy, reduced efficiency accumulating sensory evidence prior to interoceptive judgement during RRST, indicating altered predictive processing. Found self-report of lower tendency to focus on interoceptive sensations and lower interoceptive accuracy                                                      |
| Ciacchini, R. et al. (2025) | PNES        | PNES = 12; Pre- and post-intervention comparison to assess effects of group-based mindfulness-based intervention (MBI)                                                 | Limited statistically significant results but trends emerged: MBI complicated the relationship between awareness and verbal expression, changed interoceptive sensibility rather than accuracy                                                                                                                                                     |
| Robinson, S. et al. (2020)  | FMD         | FMD = 18 (children); Pre- and post- intervention comparison to assess effects of CBT approach with novel attention                                                     | Clinical improvement in FMD symptoms reported in all children. Supports hypotheses: atypical motor, emotion, and frontal neural network connectivity, importance of effective psychoeducation, specially about role of attention, reduced attention on internal bodily sensations/FMD symptoms and increased external attentional focus is helpful |

## INTERPRETATION

Altered interoception is a relevant but multidimensional construct in FND, with inconsistent findings across domains. Rather than a global deficit in accuracy, evidence points toward a multifaceted explanation:

- **Reduced confidence** in evaluating bodily sensations
- **Altered subjective ratings** of arousal and symptom severity

## Psychotherapy Targets

Aligned with this mechanistic understanding, psychotherapy approaches with the following targets have demonstrated symptom improvement in many patients (Panchmatia et al., 2025).

Reduce avoidance of feared bodily sensations

Build interoceptive trust in bodily signals

Cultivate tolerance of feared sensations

## LIMITATIONS

- Conclusions remain preliminary due to small sample sizes across included studies.
- Heterogeneous interoception measures across studies.

## FUTURE DIRECTIONS

- Design psychotherapeutic interventions that explicitly target FND mechanisms.
- Evaluate efficacy in larger, more diverse patient populations.

## CONTACT

**Xin Lyu, PhD**  
xinl@gwu.edu  
Department of Psychiatry & Behavioral Health  
The George Washington University