Momentary Predictors of Dissociation in Functional Neurological Disorder: An Ecological Momentary Assessment-Based Pilot Study

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1. Background:

- Functional neurological disorder (FND) affects approximately 0.05% of the UK population.[1]
- FND encompasses a wide range of potential symptoms including cognitive, motor and sensory dysfunction.[2]
- The International Classification of Diseases 11th Edition (ICD-11)[3] classifies FND as a dissociative condition, whereas the Diagnostic & Statistical Manual of Mental Disorders 5th Edition (DSM-5)[4] classifies FND as a somatoform disorder.
- Research has shown that dissociative symptoms correlate with FND severity.[5;6]
- Better understanding of the impact of dissociative symptoms on the manifestation and maintenance of FND will allow for improved patient outcomes.

2. Hypotheses:

1) Compared to healthy controls, participants with FND will have significantly higher scores across three dissociative symptoms: dissociative amnesia, depersonalisation and derealisation.

2a) Elevated heart-rate will be a significant predictor of all dissociative symptoms: dissociative amnesia, depersonalisation and derealisation in the FND group.

2b) Increased subjective arousal will be a significant predictor of all dissociative symptoms: dissociative amnesia, depersonalisation and derealisation in the FND group.

2c) Greater negative affect will be a predictor of all dissociative symptoms: dissociative amnesia, depersonalisation and derealisation in the FND group.

3. Methods:

- This was a secondary analysis using data from an intensive longitudinal case-control observational study.[7]
- Study approved by King's College London High Risk Research Ethics Committee (HR/DP-21/22–28,714)

Two groups were recruited:

- 17 people with a diagnosis of FND & 17 healthy controls.
- Ecological momentary assessment (EMA) was used to collect data at 8-random time points across the day for a week.
- This was collected via a smart phone app, and heart rate data was obtained using a wearable device (Fitbit Charge 5).
- EMA questions focused on three dissociative symptoms (amnesia, derealisation & depersonalisation) The affect questions were adapted from the Positive and Negative Affect Schedule (PANAS)[8] and the dissociation items from the Clinician-Administered Dissociative States Scale (CADSS).[9]

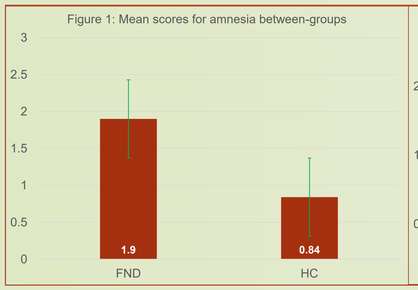
Table 1: Demographic Characteristics

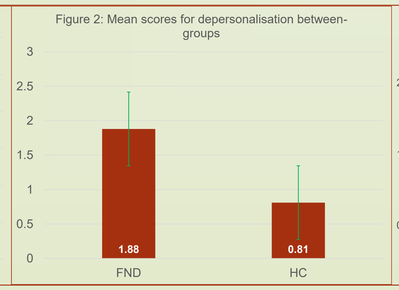
Demographic	FND Group	Healthy Controls	Statistical Values
Age (years)	36.5 (SD = 10.6)	39 (SD = 39)	t(32) = 0.67, p = 0.51
Mental Health Diagnosis (% yes)	10 (59%)	1 (6%)	p = 0.001*
Physical Health Diagnosis (% yes)	12 (71%)	4 (24%)	p = 0.007*
Medication Use (% current use)	16 (94%)	5 (29%)	p < 0.001*

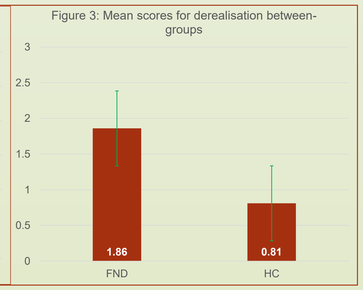
4a. Results: Between-group comparisons

Table 2: Mann-Whitney U comparisons of dissociative symptoms between groups

Dissociative Symptom	U value	Z statistic	*P* value	Benjamini-Hochberg corrected *p* value	Significance withstood correction?	Rank Biserial Effect size (r)
Amnesia	63	-2.872	0.004	0.05	√	0.563
Depersonalisation	63.5	-2.893	0.004	0.0333	√	0.560
Derealisation	84	-2.122	0.034	0.00167	√	0.418







4b. Results: Predictors of Dissociation

Table 3: Multilevel model results for individual predictors of dissociative symptoms

	Negative affect	Arousal	Heart rate
Amnesia	β=0.094, *p*<.001	β=0.102, *p*<.001	β=0.078, *p*=.010
Depersonalisation	β=0.106, *p*<.001	β=0.114, *p*<.001	β=0.089, *p*=.006
Derealisation	β=0.111, *p*<.001	β=0.124, *p*<.001	β=0.091, *p*=.006

Table 4: Combined multilevel model results for negative affect and subjective arousal

	Amnesia	Depersonalisation	Derealisation
Negative affect:			
F	17.404	13.686	24.375
p-value	<.001	<.001	<.001
β	.230	.190	.235
Arousal:			
F	24.141	9.991	25.259
p-value	<.001	.002	<.001
β	.121	.073	.107

When combined in a final model, negative affect and arousal remained significant and were positively associated with amnesia, depersonalisation and derealisation, including when controlled for depression (PHQ-9) and anxiety (GAD-7) scores. Heart rate did not remain significant in the concurrent model.

5. Implications & Limitations:

The sample was underpowered thus generalisable conclusions are limited, but using EMA, with 56 datapoints per participant increased analytic power. EMA captured moment-to-moment dissociation in FND, revealing real-time symptom dynamics that traditional retrospective measures may miss. High response rates (>80%) show EMA is acceptable for this population, supporting its use in future work to clarify FND pathophysiology.

1. Finkelstein, S.A., Diamond, C., Carson, A. & Stone, J. (2025)'Incidence and prevalence of functional neurological disorder: a systematic review'*Journal of Neurology, Neurosurgery & Psychiatry* 96, pp.383-395 **2.** Bennett, K., Diamond, C., Hoeritzauer, I., Gardiner, P., McWhirter, L., Carson, A., & Stone, J. (2021). A practical review of functional neurological disorder (FND) for the general physician. *Clinical medicine (London, England)*, *21*(1), 28–36. **3.** World Health Organization. (2022). ICD-11: International classification of diseases (11th revision). **4.** American Psychiatric Association (2013) Diagnostic and statistical manual of mental disorders: DSM-5. 5th edn. Washington, D.C.: American Psychiatric Publishing. **5.** Campbell, M. C., Smakowski, A., Rojas-Aguiluz, M., Goldstein, L. H., Cardeña, E., Nicholson, T. R., Reinders, A.A.T.S. & Pick, S. (2023). Dissociation and its biological and clinical associations in functional neurological disorder: systematic review and meta-analysis. *BJPsych Open*, *9*(1) **6.** Brown, R. J. (2016) Dissociation and functional neurologic disorders. *Handbook of clinical neurology*, *139*, 85-94. **7.** Pick, S., Millman, L.S.M., Davies, J., Hodsoll, J., Stanton, B., David, A.S., Edwards, *et al.* (2024a) '*Real-time biopsychosocial antecedents and correlates of functional neurological symptoms in daily life: A pilot remote monitoring technology study*' ***Psychiatry Research,*** 342, p.115424 **8.** Watson, D., Clark, L. A., & Tellegen, A. (1988). 'Development and validation of brief measures of positive and negative affect: The PANAS scales.' *Journal of Personality and Social Psychology*, 54(6), 1063–1070.
9. Bremner, J. D., Krystal, J. H., Putnam, F. W., Southwick, S. M., Marmar, C., Charney, D. S., & Mazure, C. M. (1998). 'Measurement of dissociative states with the Clinician-Administered Dissociative States Scale (CADSS).' *Journal of Traumatic Stress*, 11(1), 125–136.