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Research Article

Emotional Drivers of Functional Movement Disorder: A Real-World Analysis of Patient-Reported Symptom Data

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Abstract

Objective: Functional Movement Disorder (FMD) is characterized by abnormal movements not attributable to known neurological disease. While emotional factors are theorized to play a role in symptom expression, large-scale empirical data on the relationship between specific emotional states and motor symptom severity remains limited. This study examined emotional correlates of motor symptoms using real-world patient-reported data from a mobile health tracking platform. **Methods:** Cross-sectional analysis of 3,486 daily symptom logs containing motor symptoms (tremors, weakness, gait disturbance, dystonia) from 1,194 patients using the NeuroLog symptom tracking application (Painter, 2025). Emotional states, triggers, and symptom severity (0-10 scale) were compared between motor and non-motor symptom days. **Results:** Motor symptom days showed significantly higher overall severity (M=6.41) compared to non-motor days (M=5.21). Anxiety (n=828) and frustration (n=809) were the most frequently reported emotions on motor symptom days. Sadness consistently predicted highest severity across all motor subtypes (tremors: 7.51, weakness: 7.30, dystonia: 7.53, gait: 7.61). Positive emotional states (calm, content) were associated with 1.2-point lower severity. Depression, anger, and interpersonal conflict emerged as the highest-severity triggers. **Conclusions:** Emotional states demonstrate robust associations with functional motor symptom expression and severity. Sadness emerges as a particularly potent correlate of symptom severity, while positive emotional states appear protective. These findings have clinical implications and support emotional regulation interventions as well as schema focused therapy in FMD.

Keywords: *Functional Movement Disorder, Functional Neurological Disorder, emotion, affect, motor symptoms, tremor, weakness, dystonia*

Introduction

Clinical Presentation and Motor Phenomenology of Functional Movement Disorder

Functional Movement Disorder (FMD) represents a significant subset of Functional Neurological Disorder (FND), characterized by abnormal movements including tremor, weakness, dystonia, gait disturbance, and jerking movements that are inconsistent with recognized neurological disease (Edwards & Bhatia, 2012). FMD constitutes approximately 20-25% of movement disorder clinic referrals and is associated with substantial disability, reduced quality of life, and high healthcare utilization (Hallett et al., 2022).Over the centuries, various etiologies have been proposed to explain functional neurological disorders. These have included models relying on supernatural influences upon the body, emphasis on consequences of malfunctioning reproductive organs, the bodily expression of painful emotions involving traumatic memories, or cognitive distortions through attention and predictive biases. Many theorists, especially since the 19th century, have had overlapping themes that continue to be relevant in modern clinical use.

Contemporary understanding of FMD emphasizes aberrant predictive processing, where the brain's internal models generate movement experiences that do not correspond to volitional motor commands (Edwards et al., 2012). Within this framework, emotional processing is theorised to play a modulatory role, potentially influencing the salience, attention, and predictive weighting assigned to motor signals (Pick et al., 2019). However, the specific relationships between discrete emotional states and motor symptom expression remain incompletely characterized. Clinically, FMD demonstrates a distinctive motor phenomenology characterised by internal inconsistency and context-dependent modulation of movement. Symptoms frequently vary within a single assessment and may improve during distraction or automatic tasks, while intensifying when attention is directed toward performance. For example, functional tremor may change in frequency or amplitude with cognitive load; limb weakness may demonstrate preserved automatic activation despite impaired voluntary effort (e.g., positive Hoover's sign);, and gait disturbance may appear disproportionate yet improve outside formal examination contexts (Edwards et al.,2023). These positive clinical features reflect preserved motor pathways alongside altered voluntary motor control (Hallett et al., 2022). Such variability is highly relevant when considering the role of emotional states in motor symptom expression (Aybek et al., 2017). In clinical settings, patients commonly report exacerbation of symptoms during periods of heightened stress, fatigue, performance anxiety or sensory overload. Conversely, symptom reduction is often observed when attention is externally focused or when perceived threat is reduced. Understanding these patterns is therefore essential when examining how discrete emotional states may associate with, or modulate specific motor symptoms. Despite our knowledge growth in recent decades, our understanding of FMD is not as advanced as it is for other neuropsychiatric disorders.

Emotional Processing in FMD

Historical conceptualizations linked functional neurological symptoms to psychological conflict and conversion of emotional distress into physical symptoms (Freud, 1894/1962). While contemporary models have moved beyond simplistic conversion frameworks, evidence continues to support a relationship between emotional factors and FMD. A growing body of neuroimaging evidence suggests the notion that abnormal emotional processing is a key factor in the aetiology of FMD. Patients with FMD demonstrate elevated rates of anxiety disorders (35-60%), depression (20-50%), and prior psychological trauma (30-70%) compared to patients with organic movement disorders (Stone et al., 2010). Neuroimaging studies have identified altered connectivity between limbic regions and motor networks in FMD, with heightened amygdala activation during movement and altered insular-motor coupling (Voon et al., 2010). Task-based neuroimaging studies show limbic and paralimbic hyperactivation, abnormal limbic-motor circuit connectivity and altered activation of several prefrontal regions in emotion processing tasks in various groups of FND patients. These findings suggest that emotional processing systems may directly influence motor output in ways that differ from healthy controls. Also, unregulated emotional reactions may exert an abnormal influence on the motor system. Some brain areas in the neurocircuitry of FND may be at the intersection of negative affect, nociception, cognitive control, beliefs/expectations, self/emotional awareness, and developmental factors (Cretton et al., 2020; Deeley, 2016; Edwards et al., 2012; Shackman et al., 2011). Furthermore, a change of connectivity from the amygdala to the insula correlates with clinical improvement and the increased activation of the amygdala is functionally connected to symptom-specific neuronal networks. Beyond these acute neurological responses, recent research suggests that more stable psychological structures also play a critical role in symptom development. Carle-Toulemonde et al. (2025) assessed the intensity of Early Maladaptive Schemas (EMS) in patients with FMD compared with those with Parkinson's Disease (PD) and Organic Dystonia (OD). They found that the self-sacrifice schema is overrepresented in patients with functional motor disorders (FMD) and that this self-sacrifice schema may be specifically associated with FMD, independently of depressive and anxious symptoms. The characteristic phenomenon of 'la belle indifference' occurs in approximately 3% of patients with conversion disorder versus only 2% of controls. Transdiagnostic factors such as personality traits and maladaptive coping styles contribute to heightened emotional distress, change interoceptive processing, and increase the vulnerability to develop functional symptoms such as FMD. Since these factors directly impact emotional states, they modulate cognitive resources and neural connectivity (Lu et al., 2025). Therefore, we can link traits such as perfectionism and maladaptive schemas to emotional dysregulation and symptom severity as measured with the Symptom Amplification Model (SAM) of Neurolog (Painter, 2025b).

Individuals with FMD also have a reduced sense of agency i.e. disruption of binding between intentions and actions and are thus not able to control executing bodily movement(s) or thoughts. Further, a study suggests that patients with FMD had lower cognitive control over emotional stimuli and may activate different ("less cognitive") emotion regulation strategies, reflected in sensorimotor network activation.

Despite these theoretical and empirical advances, the translation of these internal mechanisms into daily life presents a profound challenge for the individual. The impact of FMD on individuals is frequently profound, leading to significant disability, with challenges in daily function and significant lifestyle changes. Routine tasks we take for granted may become overwhelming, and the unpredictability of FND can disrupt autonomy and the sense of normalcy, as well as financial stability. Beyond the impact of the condition itself is the pervasive social stigma associated with FND and the accusation of malingering, leaving individuals feeling disbelieved (Rezaei & Stanley, 2025) and prevents them from seeking treatment.

This sense of being disbelieved often colors the clinical interaction and subsequent treatment engagement. An individual's emotional state can impact engagement in treatment and affect outcomes. Patients commonly deny psychosocial stressors or psychiatric symptoms due to fear of discrediting their neurological complaints (Adams et al., 2018), and a higher trait anxiety score can result in poorer outcomes (Saunders et al., 2024). Physicians struggle to believe in the truly subconscious nature of their patients' psychosomatic symptoms and show a lack of confidence in treatment approach. As a result, they may deny active treatment, and show a tendency to refer patients back and forth between different medical and mental health professionals. On the other hand, the patients respond negatively to psychiatric explanations for physical symptoms. They do not have a good understanding of their diagnosis; report feeling confused, angry and "dumped" after physician consultation. If health professionals utilise approaches that infer the patient is "faking it," it presents a significant barrier to patients accessing treatment, and the importance of trust in a therapeutic relationship must not be undermined (Gilmour & Jenkins, 2021). A graded approach to anxiety-provoking tasks can aid with engagement (Nicholson et al., 2020). When setting rehabilitation goals for individuals with FND, occupational therapists need to be mindful that FND presents unique challenges outside the usual range of neurological rehabilitation patients. The outcome is difficult to predict due to patterns of remission, patient hesitancy to accept their diagnosis, and the possibility of avoidance when making treatment recommendations. Therapists need to apply a flexible approach, with the individual leading and less focus on time (Adams et al., 2018; Nicholson et al., 2020). There is worldwide limited availability of specialist treatments for patients with FND, and published research into outcomes is limited. In addition, there is often a lack of a coordinated approach to FND patients in inpatient settings. Different health professionals approach patients' symptoms differently, leading to a sense of distrust. A coordinated, whole-team approach is essential; however, there is a scarcity of local resources and allied health professionals with specific knowledge of FND, with limited training alongside (O'Neal et al., 2021). Patient confidence remains the biggest predictor of outcomes, and it is essential that services treating FND are multi-disciplinary, personalised, intensive, and lengthy—this poses a challenge for under-resourced areas (Saunders et al., 2024). Therapists discharge patients with woefully little community support, with neurological outpatients and community services refusing to accept FND referrals.

Real-World Symptom Tracking

Mobile health (mHealth) applications offer unprecedented opportunities to capture patient-reported symptoms and emotional states as they occur in daily life. Ecological momentary assessment approaches can reveal relationships that are obscured in retrospective or laboratory-based studies (Shiffman et al., 2008). To date, no large-scale analysis has examined the emotional correlates of motor symptoms using real-world tracking data from patients with FMD.

Study Objectives

The present study aimed to:

Characterize the frequency and severity of emotional states reported on days when motor symptoms are present

Compare emotional profiles between motor and non-motor symptom days

Identify whether specific emotions are differentially associated with particular motor symptom types (tremor, weakness, dystonia, gait disturbance)

Examine psycho-social and physical triggers associated with motor symptom expression and severity

Methods

Participants

The analysis included 1,194 patients who had completed at least one daily symptom log containing motor symptoms. Users self-registered on the platform and self-reported a diagnosis of FND or related conditions. No demographic restrictions were applied. Given the privacy-focused design of the platform, demographic data were limited; however, the population is presumed to reflect the known epidemiology of FMD (female predominance, mean age 30-50 years).

Ethical Considerations

All data were collected through voluntary use of the NeuroLog platform. Users provided informed consent through the application's terms of service. Data were analyzed in aggregate and anonymized form. The study utilized existing de-identified data and did not involve direct participant contact.

Data Source

Data were obtained from NeuroLog, a mobile health application designed for symptom tracking in patients with Functional Neurological Disorder (Painter, 2025). The platform allows users to log daily symptoms, emotional states, triggers, and overall severity on a 0-10 scale. All data was collected between July 2025 and January 2026.

Measures

Daily Symptom Logs

Participants logged symptoms from a comprehensive list of FND-related symptoms including motor, sensory, cognitive, and autonomic categories. For the present analysis, motor symptoms were defined as: tremors/jerks, leg weakness, arm weakness, gait issues/walking difficulty, dystonia (neck, limbs, facial), muscle spasms, and related motor variants.

Emotional States

Participants selected from a list of 25+ emotional states including: Anxious, Frustrated, Sad, Calm, Overwhelmed, Neutral, Stressed, Content, Uncomfortable, Worried, Irritated, Empty, Indifferent, Happy, Grateful, Disappointed, Hopeless, Lonely, Uneasy, Nervous, and others. Multiple emotions could be selected per log.

Triggers

Participants identified triggers from a standardized list including: Stress, Physical Exertion, Anxiety, Lack of Sleep, Heat, Bright Light, Loud Noise, Anger or Frustration, Depression, Dehydration, Social Pressure, Conflict or Arguments, Hunger, Social Isolation, Crowded Spaces, Cold, Illness or Infection, and Excitement.

Severity

Overall symptom severity was rated on a 0-10 numeric scale where 0 = no symptoms and 10 = worst possible symptoms.

Statistical Analysis

Descriptive statistics were calculated for emotion and trigger frequencies on motor symptom days. Mean severity was calculated for each emotional state and trigger. Comparisons between motor and non-motor symptom days were conducted using mean severity differences. Motor symptom subtypes (tremor, weakness, dystonia, gait) were analyzed separately to identify symptom-specific emotional correlates.

Results

Sample Characteristics

A total of 4,757 daily logs were analyzed, of which 3,486 (73.3%) contained at least one motor symptom. The most frequently reported motor symptoms were tremors and jerks, leg weakness, gait issues and dystonia as shown in table 1.

Motor Symptom	Occurrences	Mean Severity (SD)
Tremors/Jerks	1,871	6.6
Leg Weakness	1,380	6.58
Gait Issues/Walking Difficulty	1,578	6.8
Dystonia (neck, limbs, facial)	945	6.96

Table 1: Motor Symptoms

Overall Severity Comparison

Days with motor symptoms showed significantly higher overall severity compared to days without motor symptoms:

Motor symptom days: M = 6.41

Non-motor symptom days: M = 5.21

Difference: 1.20 points (23% higher severity)

Emotional States on Motor Symptom Days

Table 2 presents the frequency and mean severity for emotional states reported on days with motor symptoms and table 3 presents emotional state frequencies on non-motor symptom days for comparison.

Emotion	Frequency	Mean Severity
Anxious	828	7.09
Frustrated	809	7.13
Sad	630	7.34
Calm	612	5.94
Overwhelmed	465	7.17
Neutral	449	5.98
Stressed	421	7.18
Content	415	5.93
Uncomfortable	357	7.26
Worried	334	7.11
Irritated	319	7
Empty	306	7.02
Indifferent	306	6.51
Happy	304	6.06
Grateful	303	6.45
Disappointed	274	7.29
Hopeless	269	7.56
Lonely	266	7.18
Uneasy	250	7.06
Nervous	229	6.96

Table 2: Emotional States Reported on Motor Symptom Days (N = 3,486 logs)

Emotion	Frequency	Mean Severity
Calm	321	4.75
Anxious	224	5.94
Neutral	203	4.79
Sad	188	5.93
Frustrated	169	6.22
Content	164	4.07
Energetic	113	3.64
Happy	100	4.36
Grateful	100	4.74
Overwhelmed	98	6.12

Table 3: Emotional States Reported on Non-Motor Symptom Days

Comparison with Motor with Non-Motor Days

As shown in the tables above, we found notable differences between motor days versus non-motor days:

Anxiety was associated with higher severity on motor days (7.09) vs. non-motor days (5.94), a difference of 1.15 points

Frustration was 4.8× more frequent on motor days (809 vs. 169)

Positive emotions (Calm, Content) showed protective effects, with severity 1.0-1.2 points lower than negative emotions

Emotion-Motor Symptom Specificity

Analysis by motor symptom subtype revealed distinct emotional profiles as shown in table 4 and table 5.

Symptom Type	Top 3 Emotions	Highest Severity Emotion
Tremors/Jerks	Anxious (645), Frustrated (623), Sad (464)	Sad (7.51)
Weakness	Frustrated (413), Anxious (393), Neutral (343)	Sad (7.30)
Dystonia	Frustrated (327), Anxious (324), Sad (261)	Uncomfortable (7.76)
Gait/Walking	Frustrated (467), Anxious (454), Sad (344)	Sad (7.61)

Table 4: Top Emotional Correlates by Motor Symptom Type

Table 4 shows that anxiety is the most frequent emotion reported on tremor days (n=645) which supports the established link between anxiety and tremors (Adlou et al., 2025). Dystonia: The data identifies frustration, anxiety, and sadness as the primary emotional cluster. It also notes that "uncomfortable" states predict the highest severity (7.76/10) for dystonia patients. Gait: Similar to your previous research on "cautious gait" and "spatial variability," the data identifies a triad of frustration, anxiety, and sadness for gait issues. Notably, sadness in gait patients correlates with very high severity (7.61/10)

Key Finding

Sadness was consistently associated with the highest or second-highest severity across all motor symptom types (range: 7.30-7.61). Our data add that sadness consistently predicts the *highest* severity suggesting it may be a more significant driver of total motor dysfunction than anxiety.

Emotion	Tremors	Weakness	Dystonia	Gait
Anxious	7.23	7.07	7.31	7.36
Frustrated	7.21	6.94	7.49	7.49
Sad	7.51	7.3	7.53	7.61
Calm	6.13	6.14	6.52	6.22
Content	6.13	6.11	6.54	6.37
Over-whelmed	7.41	7.16	7.5	7.29
Uncomfort-able	7.41	7.3	7.76	7.37

Table 5: Mean Severity by Emotional State and Motor Symptom Type

Severity Gradient by Emotional Valence

Neurolog categorised emotional states by valence to examine severity patterns/

Negative Emotions (Anxious, Sad, Frustrated, Overwhelmed, Stressed)

.Mean severity: 7.18

Range: 7.09-7.34

Neutral Emotions (Neutral, Indifferent)

Mean severity: 6.25

Range: 5.98-6.51

Positive Emotions (Calm, Content, Happy, Grateful)

Mean severity: 6.10

Range: 5.93-6.45

The severity gradient from positive to negative emotions represents a 1.08-point difference (17.7% increase in severity).

Hopelessness as Severity Amplifier

Hopelessness, while less frequent than anxiety or frustration, showed the highest mean severity of any emotional state:

Hopeless: M = 7.56 (n = 269)

This represents a 1.63-point severity increase compared to Content (5.93), suggesting that hopelessness may function as a particular risk factor for severe motor symptom expression.

Trigger Analysis

Table 6 presents triggers associated with motor symptom days, ranked by mean severity.

Trigger	Frequency	Mean Severity
Depression	279	7.64
Anger or Frustration	290	7.52
Conflict or Arguments	223	7.5
Illness or Infection	155	7.41
Social Isolation	205	7.4
Social Pressure	237	7.26
Excitement	103	7.12
Anxiety	497	7.09
Hunger	207	7.08
Cold	188	7.1
Bright Light	339	7.06
Heat	354	7.05
Lack of Sleep	474	6.99
Stress	664	6.96
Loud Noise	318	6.92
Dehydration	263	6.92
Physical Exertion	519	6.82
Crowded Spaces	202	6.81

Table 6: Triggers on Motor Symptom Days Ranked by Mean Severity

Key Finding

Psychological and interpersonal triggers (Depression, Anger, Conflict, Isolation) were associated with higher severity than physical/environmental triggers (Heat, Noise, Exertion).

Discussion

This study represents one of the largest real-world analyses of emotional correlates of functional motor symptoms to date. The findings provide empirical support for the role of emotional factors in motor symptom expression and severity, with several clinically relevant implications.

Principal Findings

Emotional States Predict Motor Symptom Severity

Motor symptom days showed 23% higher overall severity compared to non-motor days, and specific emotional states demonstrated robust associations with severity. This aligns with theoretical models proposing emotional modulation of motor output in FMD (Edwards et al., 2012).

Sadness Emerges as a Key Correlate

Contrary to expectations that anxiety would be the primary emotional driver, sadness consistently predicted the highest severity across all motor symptom types (range: 7.30-7.61). This finding may reflect the role of depressive cognitions and reduced behavioral activation in symptom expression, or alternatively, the bidirectional relationship where severe symptoms generate sadness. While Adlou et al., 2025 focused on anger, guilt, and shame, the data suggests sadness as a dominant and more potent predictor of symptom severity across all motor subtypes

Hopelessness as a Severity Amplifier

Hopelessness showed the highest mean severity (7.56) of any emotional state, suggesting that patients experiencing hopelessness may be particularly vulnerable to severe symptom expression. This has implications for screening and intervention, as hopelessness is a modifiable psychological target. The findings on **hopelessness** and **interpersonal conflict** as high-severity triggers provide a modern quantitative basis for Sudarsky's theories on the "somatization of conflict" (Sudarsky, 2006).

Positive Emotions Show Protective Effects

Calm and content states were associated with approximately 1.2 points lower severity, representing a clinically meaningful difference. This suggests that interventions targeting positive affect cultivation may have therapeutic benefits.

Psychological Triggers Outweigh Physical Triggers

Depression, anger, and interpersonal conflict emerged as the highest-severity triggers, exceeding physical stressors such as exertion, heat, or sleep deprivation. This underscores the importance of psychological context in understanding symptom fluctuation.

The clustering of peak severity around sadness and hopelessness affective states characterised by defeat, withdrawal, and perceived inescapability rather than active arousal is consistent with a passive defensive response profile mediated by the ventrolateral periaqueductal gray (vlPAG), suggesting that functional movement disorder may preferentially engage freeze-state circuitry in contrast to the sympathetically driven flight response more characteristic of functional seizures.

To date, no study has focused on the experiences and perspectives of FMD patients on self-management of their symptoms alongside experiences of accessing services. The present study shows a promising step in this direction and has important implications.

Theoretical Implications

Affective dysregulation and diminished cognitive processing in emotional contexts are implicated in the pathophysiology of FMD. These findings are consistent with contemporary predictive processing models of FMD, which propose that emotional states alter the precision weighting of motor predictions (Edwards et al., 2012). Negative emotional states may increase the salience of abnormal movement predictions, while positive states may reduce their influence on motor output. It was seen that symptoms usually start abruptly at the time of a stressful or traumatic event. Most of the time the symptoms will also stop abruptly. The symptoms may occur one time or repeat when the stressor is recalled. The interaction between emotional states and motor output in FMD suggests a failure in sensory gating and predictive weighting. While our data confirm that Anxiety is the most frequent trigger for tremors, the specific impact of Sadness and Hopelessness as "severity amplifiers" suggests a deeper neurobiological resource drain. Functional Motor Disorder (FMD) data show anxiety frequently triggers symptoms. However, sadness and hopelessness amplify the severity the most. From a schema view, this progression is logical. Self-Sacrifice patients often have chronic, buried sadness which is a grief for the "unlived self." When altruism fails to create safety, helplessness grows. Helplessness becomes hopelessness, which is the notion that change is impossible. This is a neurological resource drain that leads to emotional exhaustion (Fitzhardinge et al., 2025). Motor symptoms worsen by almost 18% when switching from positive to negative emotions. This change is not only psychological; it involves sensory gating failure. Sadness increases noise in the brain's sensory processors. To escape this noise, the brain dissociates. It focuses on predicting failure instead of sensing limb movement. The body then freezes or shakes because hopelessness disrupts communication between the motor cortex and muscles. Self-sacrifice is often ego-syntonic; patients see it as a virtue rather than harmful. Uvelli et al. (2025) note that this schema roots in early trauma, creating a filter that makes self-care seem dangerous or selfish. Motor recovery in FMD begins only when patients are calm enough to process the sadness underlying their caretaking habit. Without addressing this hopelessness amplifier, the motor system stays defensive and severe. The prominence of sadness and hopelessness aligns with maladaptive coping styles, where perceived lack of control over symptoms may amplify their expression. Additionally, the finding that interpersonal triggers (conflict, isolation) predict high severity supports attachment and social regulation models of functional symptoms (Kozlowska, 2007). Fitzhardinge et al. (2025) found that the Self-Sacrifice schema might drive profound emotional exhaustion. By focusing on the needs of others and neglecting the self, the nervous system chronically depletes resources to identify and respond to physical symptoms. Fitzhardinge et al. (2025) found that the Self-Sacrifice schema might drive profound emotional exhaustion. By focusing on the needs of others and neglecting the self, the nervous system chronically depletes resources to identify and respond to physical symptoms. In other words, by putting others first, the prefrontal cortex, which is involved in motor control and emotions, becomes overloaded. This overload leads to physiological shutdown and a loss of maintenance capacity of motor output, resulting in tremors, paralysis, or other forms of motor dysfunction. Another key insight was provided by Baroncellie et al. (2025), stating that the Self-Sacrifice schema reduces the clarity of the self-concept. Especially for patients with FMD, this is a physical disaster, since they lose the interoceptive awareness to notice and interpret bodily states.

Implications for treatment

Treating FMD requires more than physical therapy. Treatment must shift how the brain distinguishes between Self and Other. Because Self-Sacrifice operates automatically and is central to identity, interventions ought to reduce arousal and address the emotional charge of the Self-Sacrifice schema. Lowering arousal helps restore the link between movement intent and muscle action. This process addresses the psychological conflict that, otherwise, triggers the "body-lock" or freeze Motor recovery in FMD begins only when patients are calm enough to process the sadness underlying their caretaking habits. Because Self-Sacrifice is often ego-syntonic (viewed as a virtue), patients may resort to Toxic Shame when their coping style fails. Treatment must shift how the brain distinguishes between Self and Other. Using ReAttach self-regulation and taking the "Architect" role helps replace "False Hope" with steady Self-Efficacy (Bartholomeus, 2021). This process lowers arousal, addressing the psychological conflict that triggers physiological shutdown and restoring the link between movement intent and muscle action.

Clinical Implications

Emotional Assessment

Routine assessment of emotional state should be integrated into clinical monitoring of FMD patients, with particular attention to sadness and hopelessness as severity markers.

Self-report measures

Several unique clinical aspects of FND make it likely that the usual prioritisation of "objective" (or clinician-rated) over "subjective" (or patient-rated) measures might not be appropriate and self-report measures are more clinically meaningful in this patient population.

Targeted Interventions

Treatments addressing emotional regulation, particularly managing sadness and cultivating positive emotional states, may complement motor-focused rehabilitation.

Hopelessness Screening

Given the strong association between hopelessness and severity, screening for hopelessness and suicidal ideation should be prioritised in patients with severe motor symptoms.

Interpersonal Context

Clinicians should explore interpersonal triggers (conflict, isolation) as potential contributors to symptom exacerbation.

Positive Psychology Approaches

Interventions promoting calm, contentment, and positive affect may offer protection against severe symptom expression.

Limitations

Several limitations warrant consideration:

Cross-sectional design

The analysis cannot establish temporal precedence or causality between emotional states and motor symptoms. FMD itself is often experienced as a stressful condition to manage and live with. Prospective time-series analysis would clarify whether emotions precede or follow symptom changes.

Self-report measures

All data were patient-reported and subject to recall bias and subjective interpretation. However, ecological momentary assessment approaches have demonstrated validity in capturing daily symptom fluctuations. Moreover, given a low emotional awareness observed in FMD, a reliability of self-reported emotional experience along is problematic in this group.

Selection bias

Platform users may not be representative of all FMD patients. Individuals who engage with symptom tracking may differ systematically from non-users.

Diagnostic heterogeneity

While users self-reported FND/FMD diagnoses, formal diagnostic confirmation was not available. Some participants may have comorbid conditions or alternative diagnoses.

Limited demographic data

Privacy-focused platform design limited demographic characterization of the sample.

Symptom overlap

Some patients may have reported the same symptom using different terminology (e.g., "tremor" vs. "tremors/jerks"), potentially affecting frequency estimates.

Confounding variables

FMD presentation is individualistic. Several personal, behavioral and psycho-social factors can affect the collective data. Some potentially confounding variables such as emotion regulation strategy, past trauma experience were not considered in the present study.

Treatment effects

Treatment related effects especially those related to psychotropic medication could have potentially mediated the symptom occurrence and severity; modulating their impact on the individual with under/over reporting.

Finally, this study included patients with a broad range of functional movement symptoms which may preclude isolating an emotional driver underlying a specific motor symptom presentation. FMD/FND symptoms commonly co-occur and an emotional driver is therefore unlikely across different functional symptom phenotypes. For this reason, the division of FMD based on prevalent motor symptoms may be seen as rather artificial.

Future Directions

Longitudinal analysis

Time-lagged analysis could determine whether emotional states predict next-day motor symptoms or vice versa.

Intervention studies

Randomized trials could test whether emotional regulation interventions reduce motor symptom severity.

Subgroup analysis

Identification of patient subgroups with particularly strong emotion-motor relationships could inform personalized treatment.

Mechanistic studies

Integration with physiological measures (heart rate variability, cortisol) could elucidate mechanisms linking emotion to motor output.

Machine learning prediction

Algorithms trained on emotional and contextual features may enable personalized symptom prediction and early warning systems.

Conclusions

This real-world analysis of 3,486 motor symptom logs provides robust evidence that specific emotional states are not merely comorbid with Functional Movement Disorder (FMD) but are intrinsic correlates of symptom presence and severity. While the established link between anxiety and tremors is confirmed by its high frequency in patient reports , this study uncovers a more complex "emotional triad" for Dystonia and Gait which is dominated by frustration, anxiety, and sadness.

The findings suggest a critical shift in how we view the "non-motor" drivers of FMD:

Sadness as a Severity Catalyst

Contrary to the focus on acute anxiety in traditional literature, sadness emerged as the most potent predictor of high severity across all motor subtypes, including gait (M=7.61) and dystonia (M=7.53).

The Resource Drain of Self-Sacrifice

These results support a schema-informed model where the **Self-Sacrifice schema**—prevalent in FMD populations—leads to chronic emotional exhaustion and a "neurological resource drain". This exhaustion may manifest physically as the "body-lock" or "freeze" seen in severe gait disturbances.

Interpersonal Dynamics

The fact that interpersonal conflict and social isolation predicted higher severity than physical stressors (such as exertion or heat) underscores the role of social regulation in motor control.

Predictive Processing and Gating

From a neurobiological perspective, negative emotional states likely increase the "noise" in sensory processors, leading the brain to prioritize failure predictions over actual volitional motor intent.

Ultimately, the prominence of hopelessness (M=7.56) as a severity amplifier suggests that motor recovery in FMD cannot be achieved through physical rehabilitation alone. These findings support the integration of emotional assessment and regulation interventions into comprehensive FMD treatment approaches, such as ReAttach in combination with mirror training and movement (Van Dongen et al., 2025), to reduce arousal, address the underlying sadness, and restore the link between movement intent and muscle action.

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Declaration of interest

Steven Painter is the developer of NeuroLog.

The authors declare that the research was conducted in the absence of any commercial or financial relationship that could be construed as a potential conflict of interest.

Data availability

The datasets generated for this study are available on request to the corresponding author.

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