Do ACEs, childhood relational trauma and interoception predict emotional regulation, self-stigma and wellbeing in FND and is this moderated by self-compassion?

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THESIS PORTFOLIO: CANDIDATE DECLARATION

Title of degree programme	Professional Doctorate in Clinical Psychology
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Initial date of registration	September 2022

Declaration and signature of candidate
I confirm that the thesis submitted is the outcome of work that I have undertaken during my programme of study, and except where explicitly stated, it is all my own work.
I confirm that the decision to submit this thesis is my own.
I confirm that except where explicitly stated, the work has not been submitted for another academic award.
I confirm that the work has been conducted ethically and that I have maintained the anonymity of research participants at all times within the thesis.
Signed: C Fay   Date: 30.04.2025

Acknowledgements

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Thesis Abstract

Paper one is a literature review of 5 databases, yielding 8 studies looking at the impact of attachment security on psychological symptomology, coping and wellbeing in those with a diagnosis of FND. The CCAT was used to appraise the quality of the studies and findings synthesised using narrative synthesis. Results found higher levels of insecure attachment patterns in FND population, which is positively correlated with depression, anxiety, mental health, PTSD symptomology, personality pathology, alexithymia, pain catastrophizing, somatoform dissociation, dissociative experiences and negatively correlated with resilience. There was no relationship found within the FND population between attachment and quality of life. Limitations of studies include representativeness of sample, multicollinearity, self-report nature of measures and lack of validity in measures used for FND population. It is suggested that further study to clarify causality and distinguish between concepts would be helpful as well as evaluation of psychometric measures for use in the FND population.

Paper two is a cross-sectional, questionnaire study investigating predictive roles of adverse childhood experiences (ACEs), early relational trauma, and interoception on emotional regulation, wellbeing, and self-stigma in individuals with FND. A total of 91 people with a diagnosis of FND completed seven validated measures, as well as demographics. Results indicate that higher early life relational trauma and lower interoceptive ability significantly predicted greater emotional dysregulation and wellbeing; and early life relational trauma significantly predicted higher self-stigma. Average scoring on the self-compassion measure fell between low-moderate levels. Self-compassion did not significantly moderate any of the relationships but was associated with interoception and emotional regulation. Findings suggest that screening prior to intervention planning in FND would help tailor interventions towards what would be most beneficial. Research into interoceptive, compassion-based and relational interventions are supported. Key limitations include high dropout rate due to cognitive demands of questionnaires and self-report nature of measures.

Paper three is an executive summary of paper two aimed at people living with a diagnosis of FND, people who may care for someone with FND and professionals who are caring for those with FND.

Paper One: Literature Review

What is the impact of attachment security on psychological symptomology, coping and wellbeing in those with a diagnosis of Functional Neurological Disorder (FND).

Total Report Word Count: 7988 (Excluding title page, references and appendices)

This article has been written up for potential publication in Attachment and Human Development (Appendix E). Due to this review being initially submitted as part of a dissertation, needing to meet university marking criteria, changes will be made to formatting and word count following university submission.

Abstract

FND has various theories of its aetiology. There may be a link between attachment and various psychological risk factors related to FND's development and perpetuation. This review synthesises initial findings to clarify the relationships between attachment security, psychological symptoms, coping and wellbeing. A systematic search was undertaken across 5 databases yielding 7 studies that met the inclusion criteria. Studies are appraised using the Critical Appraisal Tool v1.4 (CCAT) and findings synthesised using narrative synthesis. Overall, a higher prevalence of insecure attachment patterns was found within the FND populations. Positive correlations were found between insecure attachment styles and depression; anxiety; mental health; PTSD symptomology; personality pathology; alexithymia; pain catastrophizing; somatoform dissociation and dissociative experiences. A negative relationship was found between insecure attachment and resilience. No relationship was found within the FND population between attachment and quality of life. Attachment plays a key role in various aspects of psychological health, coping and wellbeing. Having greater awareness of attachment experiences within FND can ensure therapeutic intervention is personalised. Further research should aim to understand the direction of these relationships, using measures that are validated for use and relevant to the experiences of those with a diagnosis of FND.

Keywords: Functional Neurological Disorder; attachment; coping; wellbeing; depression; anxiety; mental health; PTSD; alexithymia; somatoform dissociation

Introduction

Functional Neurological Disorder (FND) is a condition that affects the functioning of the nervous system and how the brain and body send and receive signals. It is functional in nature, in that symptoms cannot be explained by an underlying organic or structural cause. It can be understood as a dysfunction in the "software" of the brain as opposed to the "hardware" for example, as seen in a stroke or traumatic brain injury. Symptoms typically wax and wane with complete remissions followed by sudden increases in symptoms. FND's core symptoms include motor, cognitive, sensory symptoms and seizures. There are multiple diagnoses accounting for the variance of symptom profiles including Functional Movement Disorders (FMD), Motor Functional Neurological Disorder (mFND) and Functional Seizures (FS)/Psychogenic Non-epileptic Seizures (PNES). Symptoms of FND can be disabling with negative impacts on day-to-day activity which is seen to a greater extent than in other neurological conditions (O'Keeffe et al., 2021).

Historically, FND has been referred to as Conversion Disorder or Hysteria with the aetiological underpinnings formulated to be psychological whereby FND is 'caused' by an event or experience which is understood to be traumatic (Freud, 1997). The pain felt by the sufferer would subsequently be 'converted' into physical symptoms to protect from the distress. This view has been challenged more recently given that it has little empirical support (Stone et al., 2010), not all those diagnosed with FND have experienced trauma (Ludwig et al., 2018) and because psychiatric explanations of physical symptoms can receive a negative response from patients (Stone et al., 2002).

Nevertheless, the FND population has been shown to have a high prevalence of psychiatric comorbidities including depression, anxiety, post-traumatic stress disorder (PTSD), trauma, unhelpful coping strategies and alexithymia (Carle-Toulemonde, 2023; Jalilianhasanpour et al., 2018). However, initial studies assessing the possible role of the factors as both causal and maintenance factors in FND have been inconclusive (Reuber, 2009). Also, despite lack of clarity regarding the role of trauma, it is still documented that it may play a key role in FND (Paredes-Echeverri et al., 2022) as well as impacting quality of life (QOL) (Morsy et al., 2021). Given the complex mix of theories related to the aetiology of FND and other functional

disorders, research around this has shifted focus to psychological processes, including attachment and emotional regulation (Schovsbo et al., 2023). It has been posited that by looking at the mechanisms associating insecure attachment and functional symptomology (across various conditions), we may be able to better understand what links the psychological characteristics and physical symptoms of these diagnoses (Khan et al., 2023).

According to attachment theory, as a child, we rely on relationships and primary caregivers to offer comfort, safety and security. This theory extends into a model of attachment styles (see Appendix A: Glossary of Terms) meaning that our early relationships act as a template by which we assess and develop future relationships. They also form the basis for mental representations of self (Internal working models[1]) as well as playing a role in processing emotional situations and relationships (Bowlby, 1977; Payne & Brooks, 2019). Secure attachment is a consistent predictor of positive mental and physical outcomes whereas insecure attachment has been linked to poorer physical health (Mikulincer & Shaver, 2016), psychopathology (Chambers, 2017; Daga et al., 2018; Shorey & Snydr., 2006), dissociation (Green & Goldwyn, 2002; Liotti, 2006) and impairs the development of systems associated with stress, coping and emotional regulation (Chambers, 2017; Cheche & Jackson, 2021; Shorey & Snydr, 2006). Individuals who are insecurely attached have learnt that to stay safe, or have their attachment needs met, they should adopt either an avoidant or heightened emotional response to others. Those who struggle with emotional regulation difficulties may be more likely to feel and exhibit more pronounced displays of emotions which can negatively affect relationships and overall wellbeing. In addition, mood disorders, PTSD and personality disorders can manifest from emotional dysregulation (Paulus et al., 2021) further evidencing the potential link between attachment related processes and psychopathology.

Within the FND population, there are significantly more insecure attachment representations when compared to epilepsy or healthy control groups (Reuber et al., 2004). Holman et al (2008) identified the most predominant style of attachment to be

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[1] The internal working model is a cognitive framework comprising mental representations for understanding the world, self, and others.

"fearful" within a sample of people with PNES and in FS, higher insecure and anxious attachment styles are documented (Green et al., 2017; Gerhardt et al., 2021; Kramska et al., 2022; Keskin et al., 2023; Villagran et al., 2022). Adverse relational experiences in childhood may make someone more vulnerable to being insecurely attached which in turn may be associated with the development or persistence of FND (Jalilianhasanpour et al., 2019; Williams et al., 2019). More recently, Levita et al (2020) found that higher levels of relational trauma and relationship insecurity in early life was associated with a greater likelihood of having FND. It may be then that in fact, relational trauma and subsequent attachment insecurity may play a role in the development of FND and possible psychiatric comorbidities.

It is clinically important to understand the associations between attachment and psychiatric comorbidities given that attachment styles can impact how a person utilises mental health services (Adams et al., 2018) for example, attachment anxiety if associated with higher engagement in services while attachment avoidance is associated with lesser engagement. Furthermore, within FND patients, comorbid psychiatric conditions are associated with increased odds for healthcare utilization and disease complexity (Macchi et al., 2021). Psychotherapy is advised as a key part of interdisciplinary treatment for FND with proven beneficial effects (Goldstein & Mellers, 2016; Lehn et al., 2016), but attachment security may impact the effectiveness of this treatment (Levy et al., 2011; Shorey & Snydr, 2006). It is therefore important to be aware of an individual attachment style to develop an optimum therapeutic experience.

Given the association between attachment styles, psychiatric functioning, emotional regulation, coping and overall wellbeing, it is therefore important to look at this more in depth within the FND population, given a higher prevalence of insecure attachment styles in this population. Previous research within this area has often focused on specific diagnoses within FND i.e. FS, FMD, (Green et al., 2017; Gerhardt et al., 2021; Holman et al., 2008; Kramska et al., 2022; Keskin et al., 2023; Reuber et al., 2004; Villagran et al., 2022). It would therefore be helpful to collate findings across the spectrum of FND to examine relationships more generally. In addition, attachment style has been found to be crucial to the therapeutic outcome and vital within treatment planning (Levy et al., 2011; Shorey & Snydr, 2006).

Through identifying attachment as a potential prognostic factor of FND and understanding the effect on psychological functioning, this could be used to help tailor intervention and therapeutic input towards relevant and specific areas.

<u>Aims</u>

The aim of the current review is to synthesise the current literature regarding relationships between attachment security and aspects of psychological functioning including psychological symptomology, personality, coping and wellbeing within the FND population.

<u>Materials and Methods</u>

Search Strategy

Scoping searches were initially completed using Google Scholar to identify gaps within the current FND literature as well as searching the Cochrane Database to determine the viability of the review. No systematic reviews were found in the current area. Online searches were conducted on 24th May 2024 using the following databases: Web of Science, PsycINFO, MEDLINE, CINAHL, EMBASE. Limiters were set around peer reviewed papers only to improve the quality and validity of the findings (Higgins & Green, 2011).

Search terms used can be found in Table 1. These were derived from a literature search of terms commonly used to describe both FND and psychological factors in published research. The Boolean operator 'OR' was used to combine search terms across all databases. 'AND' was used to combine levels of search terms. Speech marks were used to ensure phrases were searched as a whole and truncations were adopted to enable multiple spellings or deviations from certain terms, for example: "Attachment*" AND "Functional neurological disord*" OR "Functional seizure*" OR "Non-epilep*" OR "Nonepilep*" OR "conversion disorder" OR "Functional movement dis*" AND "distress*".

Attachment styles or security	AND	Functional Neurological disorder diagnosis	AND	Psychological functioning
Attachment*		Functional Neurological disorder		Distress*
OR Relation*		OR Functional seizure*		OR Psycholog*

OR Intima*		OR Non-epilep*		OR mood
		OR Nonepilep*		OR Quality of life
		OR Conversion disorder		OR Adjust*
		OR Functional movement dis*		OR Cop*

Table 1: Database Keywords

Articles were first screened by title and abstract by the main author. Papers were then sought for retrieval and for those that were accessed, the full text was screened against inclusion criteria. Inclusion and exclusion criteria were developed following guidance of the SPIDER tool (Cooke et al., 2012; Table 2). A citation search of included papers was then conducted via Google Scholar. This yielded an additional two papers for inclusion. The PRISMA diagram (Page et al., 2021; Figure 1) demonstrates the search strategy.

Sample	- People with a diagnosis of an FND. - Over the age of 16.	- Studies of carers of those with FND and child populations.
Phenomenon of Interest	- Assessment of relationship between attachment and psychological variables.	- Studies not including an assessment of attachment style or level of security. - Studies offering individual perspectives of life with FND.
Design	- Quantitative studies (i.e. cross-sectional, case control, cohort studies).	- Qualitative design (i.e. focus groups, interviews, free-form questionnaires or surveys). - Expert opinion papers.
Evaluation	- Evaluation using quantitative methods only (i.e. Correlational or regression analysis). - Use of standardised measures.	- Qualitative studies (i.e. experiences, feelings, views and opinions as unable to assess relationship statistically).

Research Type	- Peer-reviewed journals - Full text available in English	- Systematic reviews, opinion pieces, review articles, theoretical work, protocols, editorials

Table 2: Inclusion and Exclusion Criteria using the SPIDER tool (Cooke et al., 2012)

Identification of studies via databases and registers

Identification

Records identified from database searching:
(total n= 1,116
Web of Science, n=536
PsychINFO, n=196
MEDLINE, n=77
CINHL, n=41
EMBASE, n=266)

Records removed *before screening*:
Duplicate records removed (n = 336)

Screening

Records screened by title and abstract
(n = 780)

Records excluded by title and abstract
(n = 764)

Reports sought for retrieval
(n = 16)

Reports excluded due to non-english language when accessed
(n = 2)

Reports assessed for eligibility
(n = 14)

Reports excluded (n=9):
Reason 1: area not suitable: factors not psychological variables or focuses on family functioning not attachment (n = 4)
Reason 2: review paper (n = 1)
Reason 3: non-standardised assessments used (n = 4)

Reports gathered from citation search
(n = 2)

Included

Studies included in review
(n = 7)

Figure 1: Flow chart demonstrating the screening process in accordance with the PRISMA guidelines (Page et al., 2021)

Publication Bias

Studies are more likely to be published in journals if they show statistically significant findings (Franco et al., 2014) and are in the English language (Montori et al., 2000). This can limit the quality and reliability of literature review and may result in overestimated effects. To manage this, an additional search of ProQuest was completed to identify any grey literature appropriate for the review. There were no additional papers found to meet the inclusion criteria. Furthermore, the current

review included studies from a variety of different countries i.e. Turkey, Norway, Italy, United States, which improves its cultural sensitivity.

Quality Appraisal tool

It is more reliable to use a tool as opposed to informal appraisal as it reduces rater effects and minimises bias (Crowe et al., 2011). Articles were therefore critically appraised using the Crowe Critical Appraisal Tool v1.4 (CCAT; Crowe, 2013; Crowe & Sheppard, 2011). The CCAT was chosen as it has been found to be a valid and reliable tool (Crowe & Sheppard, 2011) and is suitable for use across a mixture of designs. The tool assesses eight areas: preliminaries, introduction, design, sampling, data collection, ethical matters, results and discussion. Each area contains aspects which are assessed to be 'present', 'absent' or 'non-applicable' to help guide the overall scoring of the categories. Each category is scored from 0 to 5 (0 is low quality, 5 is high quality), with a maximum score of 40. This is then converted to a percentage allowing for comparisons across studies. Higher scores and percentages indicate a higher quality article (Appendix B: CCAT Table of results).

Data synthesis

Data was synthesised using a Narrative Synthesis approach (Popay et al., 2006). This was chosen as the most appropriate method to consider the findings across studies with differing designs, aims and contexts. In accordance with the method by Popay et al (2006) the findings were synthesised both within and between studies to develop new understanding on the topic.

Results
Overview and aims of included studies

Seven studies met the inclusion criteria and were included in the review. The studies took place across a range of countries including Turkey (n=1), Norway (n=1), United Kingdom (n=2), United States (n=1), Italy (n=1) and Germany (n=1). Studies were published between 2013-2023. All the studies completed a standardised measurement of either attachment security or style alongside other standardised measures of psychological and wellbeing factors i.e., mood, QOL, coping, resilience, PTSD, personality factor, alexithymia, dissociation (see Appendix C for all measures included as well as psychometric properties). All the studies used self-report measures and mostly questionnaires however, self-report measures are subjective, rely on memory and recall and can be vulnerable to social desirability (Choi & Pak,

2005). Furthermore, concerns were raised around the validity of some of the measures for use within an FND population. Some of the papers looked at the predisposing nature of some experiences i.e. attachment and trauma on FND outcomes (Keskin et al., 2023; Villagran et al., 2022) and others looked for possible relationships between attachment styles and various psychological and wellbeing factors with some adopting a control to compare findings between groups (Cuoco et al., 2021; Gerhardt et al., 2021; Green et al., 2017; Williams et al., 2019). One study sought to assess if there are any meaningful subgroups related to emotional regulation within the PNES diagnosis (Brown et al., 2013). Most studies were cross-sectional in design (n=5) and the remaining adopted a cohort design (n=2). All the studies used participants with a diagnosis of FND (or subtype of FND) with four also using a comparison group (see 'Study Aims', 'Participants' for further detail). A summary of the study characteristics is in Table 3 (more detailed Data Extraction Table in Appendix D).

Authors and Country	Design, Methodology and Data Collection	Participants (diagnosis, gender)	Aims	Findings	CCAT Score (%)
Brown et al (2013) United Kingdom	Cross-sectional case control design Questionnaires Agglomerative hierarchical cluster analysis	Total, n=67 PNES, n=43 (15 M, 28 F) PWE, n=24 (10 M, 14 F)	To determine if there are any meaningful subgroups with PNES characterised by different kinds of emotional dysregulation difficulties.	The PNES group was divided into two clusters by emotional regulation measure scores: Cluster 1 (higher scores) and Cluster 2 (lower scores). No significance within groups (between clusters) or between PNES and epilepsy group in insecure attachment. Non-significant trend for higher anxiety, depression, and attachment insecurity in Cluster 1 compared with Cluster 2 suggesting links with emotional regulation difficulties.	83%

Cuoco et al (2021)	Cross-sectional case control design	Total, n-= 110	Explore attachment styles within FND	Patients with FND had higher depression, alexithymia and an avoidant attachment style and poorest QoL among groups.	73%
Italy	Questionnaires	FND, n=46 (15M, 31F; 14 FS, 32 FMD)	Explore the relationship between attachment styles and	In the FND group, avoidant attachment, somatic-affective component of depression and difficulty identifying feelings (TAS-20) independent predictors of FND.	
	Analysis of covariance and regression analysis	ND, n=34 (16M, 18F)	psychiatric symptoms within FND and control groups	In the whole sample, attachment anxiety independent predictor of depression and alexithymia.	
		HC, n=30 (16M, 14F)	Explore attachment style differences and their relationship with psychiatric symptoms	No significant difference between FMD and FS group in terms of attachment. Significant differences in alexithymia and clinician perceived anxiety symptoms.	

			between FMD and FS	Clinician perceived anxiety symptoms, difficulty identifying feelings (TAS-20) and gender significant predictors of FS.	
Gerhardt et al (2021) Germany	Cross-sectional case control design Questionnaires Correlation and Chi-squared analysis	Total, n=88 PNES, n= 44 (10M, 34F) HC, n= 44 (10M, 34F)	Assess attachment, psychopathology, demographics and childhood trauma in PNES compared to controls.	PNES group significantly less secure with more unresolved/disorganized attachment classifications. Patients with unresolved attachment representation significantly more likely to be screened positive for personality pathology and report more emotional abuse in their childhood. Relationship between attachment style, depression and somatoform dissociation insignificant.	90%
Green et al (2017)	Cross-sectional case control design	Total, n=95 PNES, n= 23 (19F, 4M)	To investigate differences in relationship	Patients with PNES reported lower overall HRQoL, and higher levels of depressive and anxiety symptoms than those with epilepsy. There were no significant differences between the scores of patients with PNES and epilepsy	

United Kingdom

Questionnaires

Correlation and regression analysis

PWE, n=72 (38F, 34M)

quality, attachment style, HRQoL, depression, and anxiety between PNES and epilepsy.

Assessing the extent to which measures of relationship quality, attachment style, and seizure severity are associated with HRQoL, depression, and anxiety in

on the subscales of the QRI measuring relationship quality or attachment style.

In PNES, no significant correlations were found with HRQoL. Depression and anxiety correlated positively with attachment avoidance, attachment anxiety and relationship conflict. Anxiety correlated negatively with relationship depth and support.

Attachment style and relationship quality explained larger amounts of variance in depression and anxiety in PNES than those with epilepsy.

			patients with PNES versus PWE.		
Keskin, et al (2023) Turkey	Cross-sectional case control design Questionnaires Correlation and regression analysis	Total, n = 83 PWE, n= 44 (12 M, 32 F) PWFS, n=14 (3 M, 11 F) HC, n=25 (10 M, 15 F)	Assess depression, childhood trauma, attachment styles and alexithymia in FS and control groups. Investigate risk factors associated with Functional Seizures	The PWFS group had lower prevalence of secure attachment style (35.71%) than PWE (70.45%) and healthy controls (88%) and higher prevalence of avoidant attachment style (57.14%) when compared to epilepsy (18.18%) and healthy (12%) control groups. The PWFS group had significantly higher depression, childhood trauma, and alexithymia scores than the other Groups. Alexithymia and childhood trauma scores both correlated with depression across all groups. Significant difference in depression between attachment styles; anxious attachment having highest levels and	75%

secure attachment the lowest levels (unclear if across all groups or specific groups).

Childhood trauma and alexithymia significant risk factors for PWFS.

Villagran et al (2022)	Prospective, cohort study	Diagnosis of PNES	Investigate clinical outcomes in patients with PNES and associations with parenting and attachment styles, along with demographic, clinical, and neuropsychiatric factors.	Baseline: PNES participants had significantly lower levels of confidence (security) and higher levels of insecurity on attachment styles than a normative sample.	83%
Norway	Questionnaires			Prior history of anxiety or depression in 60% of participants and 85% experienced at least one traumatic life event.	
	Chi-squared and regression analysis	Baseline, n=53 (8 M, 45 F)		Follow-up: 39% free of PNES: predicted by male gender, younger age at PNES onset and less attachment anxiety.	

		Follow up, n=51 (7 M, 44 F)			
Williams et al (2019) United States	Cohort, Prospective design Questionnaire Correlation and regression analysis	Total, n= 56 (41F, 15M) Mixture of FMD, PNES or functional limb weakness	Investigate relationships between attachment styles, demographics, motor subtypes, and other neuropsychiatric factors within mFND.	Secure attachment positively correlated with extraversion, mental health (SF-36), FMD subtype and resilience. Secure attachment negatively correlated with neuroticism, alexithymia, state and trait anxiety and PTSD symptomology. Fearful attachment positively correlated with depression, Somatoform dissociation, dissociation, adverse life events, childhood trauma, alexithymia, somatic symptom severity, pain catastrophizing, state and trait anxiety, PTSD symptomology and neuroticism.	65%

Fearful attachment negatively correlated with being married, extraversion, resilience and mental health (SF-36).

Childhood trauma (abuse), depression, alexithymia and not being married significantly associated with fearful attachment, explaining 60.9% of variance in scores. Childhood trauma (abuse) independently explained 37.0% of variance.

Preoccupied attachment positively correlated with dissociation, neuroticism, pain catastrophizing, state and trait anxiety and impulsivity.

Preoccupied attachment was negatively associated with conscientiousness. No variables independently correlated with preoccupied attachment.

Dismissing attachment was negatively associated with being married and white ethnicity.

M: Male; F: Female; PWE: People with Epilepsy; PWFS: People with Functional seizures; HC: Healthy controls; PNES: Psychogenic non-epileptic seizures; FMD: Functional Movement Disorder; FND: Functional Neurological Disorder; mFND: Motor FND; ND: Neurological Disorders; SF-36: Short Form Health Survey; TAS-20: The Toronto Alexithymia Scale-20; QRI: Quality of Relationships Inventory; PTSD: Post-traumatic stress disorder; HRQoL: Health related quality of life.

Table 3: Study Characteristics

Critical Appraisal

All the papers were assessed to be of good standard according to the CCAT with scores ranging from 26 (65%) (2019; Williams et al., 2019) to 36 (90%) (Gerhardt et al., 2021) (Appendix B). Williams et al (2019) scored low across many areas given lack of detail on data collection processes and absence of an ethical statement. One of the highest rating papers, Gerhardt et al (2021) demonstrated strength in the introduction, sampling, data collection and ethical matters areas.

Overall, the poorest scoring area was "ethical matters" with 5 out of 7 papers scoring 3 or less. In six of the studies, it was not clear if the study had received ethical approval making the ethical integrity of the studies questionable. Only one study (Keskin et al., 2023) reported that informed consent and ethical approval were gained and were transparent regarding funding and conflicts of interest. Data collection was also a poorer performing area with a notable lack of detail. Highest scoring areas included the "Introduction" and "Discussion".

Design and Methodology

There was a range of designs used with most of the studies adopting a cross-sectional and case control design (Brown et al., 2013; Cuoco et al., 2021; Green et al., 2017; Gerhardt et al., 2021; Keskin et al., 2023). In cross-sectional designs however, it is difficult to make casual inferences, and they are susceptible to nonresponse and recall biases (Wang & Cheng, 2020). There were two prospective cohort studies (Villagran et al., 2022; Williams et al., 2019) which offered more longitudinal information where outcomes and risks could be established within the FND population. However, these studies did not include a control comparison and so we are unable to see if these findings are relevant to FND or seen across other populations.

The methods of analysis used in the studies is deemed to be acceptable in terms of the overall aims of each of the studies. In terms of power analyses, the majority of the studies were not transparent in the process. In the study that was (Villagran et al., 2022), it was found to be underpowered.

Participants

Participant numbers ranged from 34-110 across the seven studies. Females made up most of the participants across all studies with 65%-84% of FND participants recruited identifying as female. This matches with the general picture of

FND that women are disproportionately affected with rates of 70% across phenotypes (Lidstone et al., 2022). There are many theories for the disparity in FND between genders such as bias in diagnosis, gender weighted risk factors and historical perspectives (McLoughlin et al., 2023). Given the lower numbers of males within the studies, generalising to males should be cautioned. Nonetheless, samples do seem to be representative of those diagnosed with FND (McLoughlin et al., 2023).

In terms of FND, there were a mix of phenotypes included in the studies. Five studies recruited participants with a diagnosis of PNES (Brown et al., 2013; Gerhardt et al., 2021; Green et al., 2017; Villagran et al., 2022; Williams et al., 2019). Two studies assessed those with a diagnosis of FS (Cuoco et al., 2021; Keskin et al., 2023), two studies assessed mFND (Cuoco et al., 2021; Williams et al., 2019) and one recruited participants with Functional Limb weakness (Williams et al., 2019). Given the skew of results towards those with non-epileptic FND presentations, the findings may be biased towards one diagnostic groups experience, which can present differently in symptoms and outcomes, compared to other diagnoses under the FND umbrella i.e. mFND (Gigliotti et al., 2023). In terms of control groups, three used a healthy control comparison (Cuoco et al., 2021; Gerhardt et al., 2021; Keskin et al., 2023) with Keskin et al (2023) also using an epilepsy comparison sample and Cuoco et al (2021) also recruiting those with neurological difficulties. Two used only an epilepsy control group (Brown et al., 2013; Green et al., 2017) and two studies used no control group (Villagran et al., 2022; Williams et al., 2019). Use of a control group is beneficial to establish if the relationships seen within the FND population are either unique or of greater significance when compared to other similar diagnoses or the general population. For studies without a control sample, conclusions regarding the magnitude of these relationships should be taken with caution and should be assessed against the findings across the other studies.

Participants were mainly recruited via convenience sampling from hospital settings, which may bias findings towards those who are experiencing more severe symptomology, therefore seeking medical or professional support, and possibly feeling greater distress.

All studies stated the locations participants were recruited from, all defined the exclusion criteria and all, except two (Keskin et al., 2023; Williams et al., 2019), defined inclusion criteria. However, they did not define why the participants who were selected, were selected, and so it is difficult to assess potential selection bias of the participants.

Synthesis of Findings

Attachment and FND

The relationship between attachment security and FND was initially studied in six of the studies (Brown et al., 2013; Cuoco et al., 2021; Green et al., 2017; Gerhardt et al., 2021; Keskin et al., 2023; Villagran et al., 2022). Higher levels of insecure (avoidant, disorganised) attachment styles were found within FND populations when compared to either healthy, epilepsy or a neurological difficulty comparison sample (Cuoco et al., 2021; Gerhardt et al., 2021; Keskin et al., 2023). Gerhardt et al's (2021) found a significant difference in both classifications of secure attachment (control = 30%, PNES sample = 7%; p = .006) and disorganised attachment (control = 23%, PNES sample = 43%; p = .041). Keskin et al (2023) also found a higher prevalence avoidant attachment in participant's with FND (57.14%) when compared to epilepsy (18.18%) and healthy (12%) control groups. Cuoco et al (2021) found that there were significantly higher levels of avoidant attachment patterns in participants with FND than control groups (group medians: FND = 3; healthy control = 2; neurological disorder control = 2; p = .004). Villagran et al (2022) found that the FND group had statistically significant lower levels of attachment confidence (*M*: 32.30; *SD* 7.30; $p < .001$) than a normative sample. Two studies found no significant difference between attachment between a FND group and an epilepsy control group (Brown et al., 2013; Green et al., 2017). However, Green et al's study (2017) was underpowered which may have affected the overall findings.

Studies used different assessments of attachment security which are considered within the findings. The focus of assessment was different across measures with the ECR-R, used in Cuoco et al's (2021) study, focusing on current intimate relationships; it has been found that variance in scores is more relevant to the romantic domain even though it is used as a general attachment measure (Fraley et al., 2011). Furthermore, the assessment used in Green et al (2017) only included two dimensions of attachment and no inclusion of a "secure" attachment

representation, meaning there can be no conclusion made regarding secure attachment styles, as has been the case in other studies. In addition, only one of the studies finding a relationship between attachment and FND included an epilepsy control group (Keskin et al., 2023). This is important to note given that epilepsy would be the most comparable control group for an FND sample. Further, studies finding no significance in the relationship between attachment and FND both had an epilepsy control group (Brown et al., 2013; Green et al., 2017). This may have improved the strength of the relationships given the greater disparity between groups.

Psychological or Mental Health Related Factors
Depression

A total of five studies examined the relationship between depression and attachment security measures in FND (Cuoco et al., 2021; Gerhardt et al., 2021; Green et al., 2017; Keskin et al., 2023; Williams et al., 2019) with all but one (Gerhardt et al., 2021) finding a significant positive relationship between insecure attachment and depression. Keskin et al (2023) found secure attachment styles to be negatively correlated with depression. Williams et al (2019) finding a strong correlation ($r = .61$, $p < .001$), adopted a prospective design, indicating reliability of the findings however, recruited no control group, and scored very low in data collection aspects raising questions around the overall reliability of the results. Furthermore, they used the Relationship Scales Questionnaire (RSQ; Griffin & Bartholomew, 1994) to assess attachment security which has been criticised for adopting a categorical view of attachment, performing poorly in confirmatory factor analysis, with a two-dimensional model (anxiety and avoidance) felt to be more optimal (Zortea et al., 2019).

However, it is noted that both Cuoco et al (2021) and Green et al (2017) found comparable relationships between attachment related anxiety and avoidance across both FND and control samples (epilepsy, neurological disorders and healthy controls) suggesting that FND may have not played a role within this relationship. Green et al (2017) however, found a stronger relationship within the FND sample (FND group: attachment avoidance ($r = .58$, $p < .01$) and attachment anxiety ($r = .77$, $p < .001$. Epilepsy control: attachment avoidance ($r = .47$, $p < .001$) and attachment anxiety ($r = .42$, $p < .001$) indicating that the impact of attachment-related difficulties

may be larger within the FND group than the epilepsy group. Cuoco et al (2021) used both self-and clinician-report measures of depression within their study, which is advised in clinical trials (Cuijpers et al., 2010), supporting the robustness of their findings. Contrastingly, Keskin et al (2023) did not report any statistical data to support their findings, weakening the reliability of them.

Anxiety

Two studies found significance in the relationships between anxiety and attachment security in FND (Green et al., 2017; Williams et al., 2019). Green et al (2017) found anxiety correlated positively with attachment avoidance (r = .62, p < .01) and attachment anxiety (r = .60, p < .01) however, similar was found within the epilepsy control group (attachment anxiety (r = .25, p < .01; attachment avoidance (r = .36, p < .001)). Williams et al (2019) found secure attachment negatively correlated with anxiety (r = -.42, p = .001) and insecure attachment styles positively correlated (fearful attachment: r = .56, p < .001; Preoccupied attachment: r = .28, p = .04). An issue highlighted within this study, however, is that the measure of anxiety used was found to be collinear with several psychometric variables, which are undisclosed as part of the study, and so significance levels should be treated with caution.

General Mental Health measures

Williams et al (2019) assessed mental health more generally, drawing upon the mental health subscale of the SF-36 (Ware & Sherbourne, 1992). Findings demonstrated that secure attachment positively correlated with the mental health subscale (r = .30, p = .03) and negatively with fearful attachment (r = -.48, p < .001), further supporting the findings from more focused measures of anxiety and depression mentioned prior (Cuoco et al., 2021; Gerhardt et al., 2021; Green et al., 2017; Keskin et al., 2023; Williams et al., 2019).

One study assessed the prevalence of both insecure attachment, depression and anxiety finding that the PNES participants had significantly higher levels of insecurity on attachment styles than a normative sample with 60% of participants reporting prior history of anxiety or depression (Villagran et al., 2022). There was no statistical analysis regarding a relationship between these variables completed meaning that we cannot comment on whether this was evidenced or not.

PTSD symptomology

One study investigated PTSD symptomology and attachment. Williams et al (2019) assessed PTSD symptomology, adopting the posttraumatic stress disorder (PTSD) Checklist-5 (PTSD-CL5; Blevins et al., 2015). PTSD symptom severity negatively correlated with secure attachment ($r = .30$, $p = .03$) and positively correlated with fearful attachment ($r = .49$, $p = .001$). This measure has not been validated for use in either FND or epilepsy populations, despite being used in recent studies (Capitaine et al., 2024; Ertan et al., 2024; Gearhart et al., 2023; Mariotti et al., 2021; Paredes-Echeverri et al., 2022). Furthermore, some items may be indirectly influenced by the physical and cognitive difficulties associated with FND i.e. "Having difficulty concentrating?" or "Trouble falling or staying asleep?", affecting the overall validity of results within this population.

Other PTSD-related measures in the Williams et al (2019) study focused on PTSD life events as opposed to PTSD symptomology. This was found also in Gerhardt et al (2021) with no reflection on the psychological impact of this with reference to attachment or FND. These measures, and findings, were not included as part of this study.

Personality Factors

The relationship between attachment and personality factors within FND was assessed by two studies (Gerhardt et al., 2021; Williams et al., 2019). In Gerhardt et al's (2021) study, it was found that those who have unresolved/disorganised attachments were more likely to screen positively for personality pathology when compared to those with secure attachment (disorganised: n = 17; organised n = 15; $p = .03$).

Williams et al (2019) looked at a more dimensional view of personality and attachment and found fearful attachments to be positively correlated with NEO-neuroticism ($r = .48$, $p < .001$) and negatively correlated with NEO-extraversion ($r = -.40$, $p = .003$) and the opposite for those identifying with secure attachment profiles. This finding is interesting given that neuroticism shows positive correlations with disorders characterised by emotional distress (i.e. Paranoid, Schizotypal, Borderline, Avoidant, and Dependent) and extraversion associated with gregarious disorders (e.g., Histrionic and Narcissistic) (Saulsman & Page, 2004). This further indicates a relationship between insecure attachment and difficulties with emotional regulation.

Preoccupied attachment was found to be negatively associated with NEO-conscientiousness (Williams et al., 2019).

Coping mechanisms and wellbeing
Alexithymia
Two studies assessed relationships between alexithymia and attachment (Cuoco et al., 2021; Williams et al., 2019). Cuoco et al (2021) found that attachment avoidance is an independent predictor of alexithymia within the FND sample (β = 4.67, p = .009, r^2 =0.15) and Williams et al (2019) found fearful attachment positively correlated with alexithymia (r = .38, p = .004) and secure attachment negatively correlated (r = -.47, p < .001).

Cuoco et al. (2021) found attachment avoidance predicted alexithymia across all groups, while attachment anxiety predicted alexithymia only in neurological and healthy controls, not FND. However, the neurological control group's heterogeneity weakens comparisons. Williams et al. (2019) lacked a control group, limiting interpretation. Overall, these findings do not demonstrate that FND significantly influences the relationship between attachment and alexithymia.

Quality of Life
In terms of QOL, no significant correlation was found between attachment and health related QOL within an FND sample, as measured by the Quality of Life in Epilepsy questionnaire (QOLIE-10; Cramer et al., 1996). However, QOL was found to be negatively correlated with attachment avoidance (r = -.29, p < .05) and attachment anxiety within an epilepsy control group (r = -.30, p < .05) (Green et al., 2017). It is important to state that this measure has not been validated to use within an FND population (Pick et al., 2020) and so may not identify factors relevant to this population in comparison to an epilepsy population.

Pain Catastrophizing and Resilience
Williams et al (2019) found that both insecure attachment classifications (preoccupied, fearful) significantly positively correlated with pain catastrophizing (preoccupied: r = .32, p =.02; fearful: r = .51 p < .001). They also found secure attachment to be positively correlated with resilience and fearful attachment negatively correlated. However, as noted previously, a major limitation to this study is that there was no control or comparison group to assess the findings against.

Dissociation and Somatoform dissociation

Assessment of dissociation in the FND sample was again variable dependant on the focus of the measure used. Gerhardt et al (2021), using the Somatoform Dissociation Questionnaire-20 (SDQ-20; Nijenhuis et al., 1996), found no relationship between attachment security and somatoform dissociation within the FND population (M(±SD) disorganised: 35.56 (± 7.55); organised 35.54 (± 8.05); p = .993). This was contrasted against Williams et al (2019), adopting the Dissociative experiences scale (DES; Bernstein & Putnam,1986), who found a significant positive relationship between fearful attachment and somatoform dissociation (r = .43, p = .001) and insecure attachment styles and dissociative experiences (fearful: r = .57, p < .001; preoccupied: r = .38, p = .004).

Discussion
Overall key findings

The current review sought to investigate, within the current literature, any relationships between attachment and psychological functioning within the FND population. It highlights that few studies have examined this area and in the studies that have, there is variability in consensus of findings. Some studies suggest that the relationship is not impacted by the presence or diagnosis of FND, and the presence of some psychopathological factors is because of a culmination of various interactions between psychological variables. There are several limitations of the studies included which will be discussed.

Firstly, some studies aimed to establish a relationship between attachment and FND. It was found in most studies that there is higher attachment insecurity seen within the FND population (Cuoco et al., 2021; Gerhardt et al., 2021; Keskin et al., 2023; Villagran et al., 2022). Furthermore, the findings across most papers are supported by the wider research around FND and attachment with higher rates of insecure attachment representations as well as fearful attachments (Holman et al., 2008; Kramska et al., 2022; Reuber et al., 2004).

The majority of studies included found a relationship between mood-related factors such as depression and anxiety, and attachment (Cuoco et al., 2021; Green et al., 2017; Keskin et al., 2023; Williams et al., 2019) which concurs with previous literature in the area (Bifulco et al., 2006; Jalilianhasanpour et al., 2018; Paulus & Stein, 2010; Pollatos et al., 2009). A meta-analysis found consistent evidence for

increased levels of depression within PNES when compared to epilepsy samples (Walsh et al., 2018). However, two studies found the relationship within control groups (Cuoco et al., 2021; Green et al., 2017). It could be that this relationship may not be distinctly related to the development of FND. Within non-FND populations, anxious attachment orientations have also been associated with depression (Cole-Detke & Kobak, 1996; Dagan et al., 2018; Fonagy et al., 1996; Zheng et al., 2020). Bowlby (1980) initially hypothesised that depression is more likely when an individual, with an insecure attachment, experiences stressful events, because their attachment representations may influence the way in which they interpret and react to the stressor (Collins, 1996; Collins & Read, 1990). This offers further explanation around the high prevalence of depression within the FND population, given the possibly higher representation of attachment insecurity. It has been found meta-analytically that emotional regulation may mediate the relationship between attachment and depression (Malik et al., 2014). One of the studies (Brown et al., 2013) assessed emotional regulation but did not find any relationships between attachment and/or depression. Future studies should include measures of emotional regulation to develop understanding around its role as a mediator within the FND population.

The studies included also assessed both traumatic early life events as well as PTSD symptomology resulting from these experiences (Gerhardt et al; 2021; Williams et al; 2019). It was found that increased PTSD symptom severity is related to fearful attachment. Other literature has found that PTSD symptomology may be elevated in those with a diagnosis of FND and may be associated with QOL, depression and anxiety (Gray et al., 2020). Although prevalence of traumatic life events were not discussed, as they were not relevant to the aims of this literature review, it was found that there was a higher reported prevalence of traumatic early life events within the FND population (Gerhardt et al; 2021; Williams et al; 2019) with links between childhood trauma and fearful attachment (Williams et al; 2019). This has been further evidenced within the literature with childhood abuse and neglect associated with insecurity in adult relationships (Holman et al., 2008). In addition, in a systematic review by Greenman et al (2024), it was found that insecure and disorganised attachment patterns were related to FND as well as somatisation in those exposed to trauma in childhood. It has been hypothesised that attachment

may act as a moderator between childhood trauma and somatisation (Waldinger et al., 2006) whereby dysfunctional attachments may strengthen the relationship between childhood maltreatment and somatic symptomology.

Insecure attachment styles are associated with increased personality disorder traits (Gerhardt et al., 2021), higher neuroticism, and lower extraversion (Williams et al., 2019). Attachment plays a crucial role in both the development and treatment of personality disorders (Fonagy & Luyten, 2016; Levy et al., 2015). In borderline personality disorder, attachment mediates the relationship between childhood trauma and personality dysfunction (Erkoreka et al., 2021), highlighting its developmental significance. It is hypothesised that trauma or abuse in childhood may contribute to personality disorders in FND. Elevated neuroticism in FND (Ekanayake et al., 2017) has been linked to psychopathology (Ormel et al., 2013) and reduced QOL (Liu et al., 2021). Clinically this is important, as individuals with personality disorders frequently use psychiatric services (Comtos et al., 2016; Tomko et al., 2014; Zimmerman et al., 2008), and avoidant personality disorder is linked to poorer therapy outcomes (Joyce et al., 2007). Understanding personality traits is essential for predicting treatment effectiveness and interpersonal difficulties, further exacerbating attachment difficulties.

Assessments of relationships between attachment security, dissociation and somatoform dissociation within the studies reviewed were inconclusive. This is surprising given the historical aetiological understanding of FND and the wider literature reporting elevated dissociation levels within the FND population (Brown et al., 2007; Goldstein & Mellers, 2006; Pick et al., 2017). An explanation for lack of significance in Gerhardt et al's (2021) study may lie within the measure that was selected to assess dissociation. PNES is associated more strongly with psychoform dissociative symptoms as opposed to somatoform dissociative symptoms (Campbell et al., 2023) however, the SDQ-20 was used, which contains only one item regarding attacks resembling seizures. It may be that the measure selected was not appropriate for the population being assessed which impacted the overall findings. In addition, research has found that dissociation in adulthood is associated with childhood abuse and neglect (Vonderlin et al., 2018). Further, duration of abuse and parental abuse predicts higher levels of dissociation (Ruf et al., 2010) which may have a direct impact on adult attachment styles. FND is often comorbid with other

dissociative disorders (Brown et al., 2007) suggesting shared risk factors related to its development across conditions. Dissociation can negatively impact treatment outcomes, particularly treatment of trauma (i.e. EMDR) (Suhalitka, 2022) and so it is important to further assess for clarity around the prevalence and impact of dissociation given its relationship with psychopathology (Černis et al., 2021) and PTSD (Armour et al., 2014).

The review found some evidence that insecure attachment can predict higher rates of alexithymia (Cuoco et al., 2021; William et al., 2019). This is supported by a recent meta-analysis finding that, overall, insecure attachment is significantly and positively correlated with alexithymia (Zhang et al., 2024). It hypothesised that alexithymia is closely related to the early experiences in childhood, childhood trauma (Feyzioglu et a, 2022) and low-quality parenting (Thorberg et al., 2011). As we cannot conclude causation, it is again unclear to what extent FND plays a role within this and if these findings are specific to FND. In patients with PNES, alexithymia has also been found to correlate with trauma symptoms, emotion-oriented coping strategies, demoralisation, low positive emotion and cynicism (Myers et al., 2012). In those with FMD, elevated alexithymia is associated with obsessive compulsive disorder (Demartini et al., 2014). These findings highlight a possible relationship between deficiencies in expressing emotional distress and reduced adaptive coping abilities. Difficulties in identifying emotions and implementing adaptive coping strategies because of these emotions has been found within a PNES population (Williams, 2018). This difficulty may be captured within alexithymia measures meaning that it would be helpful for future research to assess emotional regulation, as well as other coping strategies, alongside alexithymia and attachment to help understand the mechanisms of this relationship more thoroughly.

Several factors were only explored in one study, limiting conclusions about consensus. These included QOL, resilience, and pain catastrophising. Resilience was negatively, and pain catastrophising positively, associated with insecure attachment. Literature suggests higher resilience may reduce catastrophising due to increased positive emotions (Ong et al., 2010), potentially linked to attachment security. QOL and attachment were unrelated in FND but significant in epilepsy, despite broader findings showing poorer QOL in PNES compared to epilepsy and general populations. In FND, QOL also overlaps with depression, anxiety,

dissociation, family influence, alexithymia, abuse, and trauma (Avalos et al., 2020; Jones et al., 2016a; Rawlings et al., 2017; Wolf et al., 2015).

Limitations of the included studies

The findings indicate that overall, there is an association between attachment and various psychological variables within the FND population however, there are some key limitations that should be considered in respect of these findings.

There are potential issues with singularity and multicollinearity among psychological variables, making it difficult to determine if they are conceptually distinct or overlapping. Another limitation is that most of the studies adopted convenience sampling. This is a widely and easily used method of sampling, however it may reduce the representativeness of the population. Given recruitment was from clinical settings, the sample my skew towards more severe presentations. A final limitation is most the measures were self-report. Although helpful in gaining information directly from the participants perspective, they are subject to retrospective bias and social desirability in the responses given (Pervin, 1999).

From this review, it is evident that few studies use measures that have been shown to be reliable and valid within an FND population. Furthermore, there is limited reporting of the properties of this within the study information meaning it is hard for the appraiser to assess the suitability of the measure used. A recent systematic review by Pick et al (2020) concluded that there are very few FND specific outcome measures and outside of that, very few outcome measures that have been validated for use within an FND population. This may have impacted the validity of the measures and therefore the findings of the studies.

Limitations of this review

A key limitation of this review is that it was conducted and synthesised by a single rater, preventing assessment of inter-rater reliability and potentially affecting objectivity. While the CCAT ensured appraisal consistency, it lacks a defined cut-off score, making it difficult to place studies within broader quality thresholds.

In addition, although participants are representative of those diagnosed with FND, the gender bias in the studies means that there should be caution around transferring the overall findings of this review to male FND populations given

differences in presentations and experiences of services that exists between the genders (McLoughlin et al., 2023).

Also, most of the studies analytical approach means we cannot establish causality and the direction of the relationships. The current review was seeking to understand if a relationship exists and not in what direction, so this is acceptable. However, given that another aim is to support appropriate clinical intervention, future research should explore directionality to better inform clinical interventions.

Future directions
There is considerable overlap among psychological variables linked to FND aetiology and epidemiology. Further research, particularly longitudinal, is needed to clarify causality and distinguish between these concepts.

In addition, both this and a prior systematic review (Pick et al., 2020) identified a lack of validated measures for FND populations. It was noted in the current study that the PTSD measures and QOL measures are not suitable for assessment of FND symptomatology due to FND's unique symptom profile and varied aetiology, future research should evaluate the validity and relevance of existing measures and consider developing FND-specific tools for more accurate assessment.

Conclusion
In conclusion, the review overall offers an initial synthesis of quantitative studies assessing relationships that exist between attachment security and various psychological variables. From this, it has been found that across different diagnoses within FND there is a consensus around a relationship between insecure attachment, poorer psychological wellbeing, mental health and systems that help support emotional understanding and regulation. Further research is needed within this area to further evidence or challenge these findings with measures validated for use in an FND population.

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Appendices

Appendix A: Glossary of terms

Glossary	
Attachment Security	Attachment security involves mental schemas about whether one is worthy of love and care and whether others will be responsive to one's needs.
Secure attachment	Securely attached individuals are comfortable with intimacy and can balance dependence and independence in relationships. Someone who has positive representations of themselves and others meaning they will seek out and receive emotional support from others (Mikuliner and Shaver, 2016)
Preoccupied (anxious) attachment style	Individuals with this attachment style crave intimacy and can be overly dependent and demanding in relationships. This typically involves negative representations of the self and positive views of others (Bartholmew and Horowitz et al., 1991; Bartholomew, 1994).
Dismissing (avoidant) attachment style	This style is characterized by a strong sense of self-sufficiency, often to the point of appearing detached. Individuals with dismissive attachment value their independence highly and may seem uninterested in close relationships. They have positive perceptions of the self and negative of others (Bartholmew and Horowitz et al., 1991; Bartholomew, 1994).
Fearful Attachment (Disorganised)	Individuals with a fearful attachment style desire close relationships and fear vulnerability. They may behave unpredictably in relationships due to their internal conflict between a desire for intimacy and fear of it. They have both negative views of self and others (Bartholmew and Horowitz et al., 1991; Bartholomew, 1994).

Appendix B: CCAT Table of results

Author & Year	Preliminaries	Introduction	Design	Sampling	Data Collection	Ethical Matters	Results	Discussion	Total (/40)	%
Gerhardt et al (2021)	4	5	4	5	5	5	4	4	36	90
Cuoco et al (2021)	4	5	3	3	2	3	4	5	29	73
Villagran et al (2022)	5	5	4	4	5	3	4	3	33	83
Green and Norman (2017)	5	5	4	3	4	2	4	5	32	80
Brown et al (2013)	4	4	4	4	5	3	4	5	33	83
Keskin et al (2023)	5	4	4	2	2	4	4	5	30	75
Williams et al (2019)	3	3	4	4	2	2	4	4	26	65

Appendix C: Outcome Measures Table

Psychological Variable assessed	Measure	Study measure used in	Psychometric Properties
Attachment	Relationship Scales Questionnaire (RSQ; Griffin and Bartholomew, 1994)	Brown et al (2013); Williams et al (2019); Lally et al (2010)	The scale demonstrates good internal consistency (α =0.83) (Griffin and Bartholomew, 1994). Confirmatory factor analyses demonstrate that a two-dimensional approach to the RSQ is psychometrically optimal (Zortea et al., 2019), yielding good discriminant validity and reliability. Also found to have satisfactory validity as measured with concurrent self- and friend-reports of interpersonal functioning (Bartholomew and Horowitz, 1991)
	Attachment style Questionnaire (ASQ; Feeney et al., 1994)	Villagran et al., (2022)	Demonstrates good internal consistency (security:.83; avoidance:.83, anxiety: .85). test-retest reliability was acceptable at ;74 (security), .75 (avoidance) and .80 (anxiety) over a period of 10 weeks (Feeney et al., 1994).
	Attachment style Questionnaire – short form (ASQ; Feeney et al., 1994)	Green et al (2017)	The questionnaire's two factor structure has been investigated in relation to other attachment questionnaires and successfully validated. Reported internal reliability and retest reliability both amount to α > 0.86. Internal consistency for attachment anxiety subscale was 0.87, and the one for the attachment avoidance subscale was 0.78 (Alexander et al., 2001).

	Adult Attachment Scale (AAS; Collins & Read, 1990).	Keskin et al (2023)	Internal consistency: close (α =.69), depend (α =.75) and Anxiety (α = .72). Test-retest correlations for a 2-month period were (α = .68) for Close, (α =.71) for Depend, and (α =.52) for Anxiety (Collins & Read, 1990).
	Experiences in Close Relationships-Revised questionnaire (ECR-R; Fraley et al., 2000)	Cuoco et al (2021)	ECR-anxiety correlated .66 with RS-romantic anxiety; ECR-R avoidance correlated .56 with RS-romantic avoidance (Fraley et al., 2011). Test-retest coefficients were low.90s for both ECR and ECR-R (Sibley and Liu (2004).
	Adult attachment projective picture system (AAP; George and West, 2012)	Gerhardt et al (2021)	Was developed in constant validation with the Adult Attachment Interview (AAI; George et al., 1996) (considered to be the "gold standard" of attachment measurement (George and West, 2001)). Concordant validity: strong with the AAI (kappa = 0.84, P = 0.001) (George and West, 2011; George and West, 2001). Inter-rater reliability (kappa = 0.85, P=0.001) (George and West, 2011; George and West, 2001).

			Test-retest reliability (kappa = 0.78, P =0.001) (George and West, 2011; George and West, 2001).
Depression	Beck Depression Inventory (BDI-II; Beck et al.,1996)	Keskin et al (2023); Williams et al (2019); Cuoco et al (2021)	Construct validity: high at α = 0.92 for psychiatric outpatients and α = 0.93 for college students. (Beck and Steer, 1987) Concurrent validity between BDI-II and Minnesota Multiphasic Personality Inventory-D, high at r = .77. (Beck et al., 1988) Content validity: Mean correlation coefficients of 0.72 and 0.60 have been found between clinical ratings of depression and the BDI for psychiatric and non-psychiatric populations. (Beck et al., 1988) Criterion positively correlated with the Hamilton Depression Rating Scale (r = .71) with a high 1-week test-retest reliability r = .93 and an internal consistency of α = 91 (Beck et al., 1996)
	Patient Health Questionnaire	Brown et al (2013); Green et al (2017);	Good internal Reliability (α= .89) and test–retest reliability (r= .84).

	(PHQ-9; Kroenke et al., 2001)	Gerhardt et al (2021)	Construct validity found correlation between PHQ-9 and SF-20 (Mental health scale; 20-item Short Form Survey) to be 0.73 (Kroenke et al., 2001). Internal consistency of the PHQ-9 has been shown to be high. A study involving two different patient populations produced Cronbach alphas of .86 and .89.
	Hamilton Depression Rating Scale (HAM-D; Hamilton, 1960)	Cuoco et al (2021)	Interrater reliability found low levels of reliability for individual items with 14 out of 22 demonstrating intraclass correlation coefficient of less than .40 (Chicchetti and Prusoff, 1983)
Mental Health	Short-Form 36 (SF-36) – Mental health Subscale (Ware and Sherbourne, 1992)		For the whole measure: Item correlations with their specified dimensions were good (above 0.50 for 33 of 36 items). Cronbach's alpha was good: 0.85; reliability estimates for each of the 8 dimensions were above 0.50 for all dimensions except for social functioning, which had only 2 items in the scale. Test-re-test reliability estimates (obtained two weeks after the first survey) were in the low to moderate range (0.60 - 0.81).

			The SF-36 has been shown to be valid for people with stroke (the physical and mental health domains, the social functioning less so) - Anderson et al (1996)
Anxiety	General anxiety disorder measure (GAD-7; Spitzer et al., 2006)	Williams et al (2019)	Shown to have excellent internal (α = .92) and test–retest reliability (r= .83) in a clinical sample (Spitzer et al., 2006)
	State-trait anxiety inventory (STAI-T; Spielberger et al., 1970).	Green et al (2017)	Internal consistency coefficients for the scale have ranged from .86 to .95; test-retest reliability coefficients have ranged from .65 to .75 over a 2-month interval (Spielberger et al., 1983). Test-retest coefficients for this measure in the present study ranged from .69 to .89. Considerable evidence attests to the construct and concurrent validity of the scale (Spielberger, 1989).
Alexithymia	Toronto Alexithymia Scale (Bagby et al., 1994)	Cuoco et al (2021); Williams et al (2019).	In a global psychometric review including data from 22 countries, observed alpha values above .70 for all countries except Poland (Taylor et al., 2003). Appropriate patterns of convergent and discriminant validity have been observed, and a large majority are consistent on a three-factor solution (Bagby et al., 2020).

Pain Catastrophizing	Pain catastrophizing (PCS; Sullivan et al., 1995)	Williams et al (2019)	Within a mixed population: Excellent test-retest reliability and internal consistency for PCS total score (Wheeler et al., 2019)
Quality of Life	Quality of Life in Epilepsy questionnaire (QOLIE-10; Cramer et al., 1996)	(Green et al., 2017)	QOLIE-10 components correlated adequately with QOLIE-31 subscales in the validation study and shows good concurrent validity with the Nottingham Health Profile. (Cramer et al., 1996).
Dissociative experiences	Somatoform Dissociation Questionnaire-20 (SDQ-20; Nijenhuis et al., 1996)	Williams et al (2019); Gerhardt et al (2021)	Reliability of the scale was high. Construct validity was supported by high intercorrelations with the Dissociation Questionnaire (DIS-Q; Vanderlinden et al., 1993) (Nijenhuis et al., 1996)
	Dissociative experiences scale (DES; Bernstein and Putnam,1986).	Williams et al (2019)	Test-retest coefficient: 0.84 (p < .0001, N = 26) (Bernstein and Putnam,1986) Criterion and concurrent validity: x^2 of 93.57 (N =192, df 7, p < .0001) (Bernstein and Putnam,1986)

| Resilience | Connor-Davidson Resilience Scale (CDRISC; Connor and Davidson, 2003) | Williams et al (2019) | Internal consistency: Cronbach's alpha for the full Scale was 0.89 and item-total correlations ranged from 0.30 to 0.70. (Connor and Davidson, 2003)

Test–retest reliability: correlation coefficient of .87 (Connor and Davidson, 2003)

Convergent Validity: CD-RISC scores were positively correlated with the Kobasa hardiness measure in psychiatric outpatients (.83, P=.001). Compared to the Perceived Stress Scale (PSS-10), the CD-RISC showed a significant negative correlation (.76, p=.001), indicating that higher levels of resilience corresponded with less perceived stress. The Sheehan Stress Vulnerability Scale (SVS)was similarly negatively correlated with the CD-RISC (.32, P=.001) in 591 subjects from the combined sample. (Connor and Davidson, 2003)

Discriminant validity: The CD-RISC was not significantly correlated with the at baseline (n=23; r= 0.34, P=.11) or at end point (n=19; r=0.30, P=.21) (Connor and Davidson, 2003) |

Personality	NEO Five-Factor Inventory-3 (NEO; Costa and McCrae, 1992)	Williams et al (2019)	Internal consistency: good with a mean of .81 across different scales (John et al., 2008) Discriminant validity was low at (.20 (John et al., 2008)).
	Structured Clinical Interview for DSM-IV axis II disorders, Patient Questionnaire (SCID-II-PQ; First et al., 1997)	Gerhardt et al (2021)	Moderate to excellent inter-rater agreement of the Axis I disorders, while most categorically and dimensionally measured personality disorders showed excellent inter-rater agreement (Lobbestael et al., 2011) The SCID's severity scales demonstrated substantial internal consistency (all Cronbach's αs >.80), test–retest reliability, and concurrent and predictive validity (Shankman et al., 2017).
	Childhood Trauma Questionnaire (CTQ; Bernstein et al., 1994)	Williams et al (2019); Gerhardt et al (2021)	CTQ showed excellent test-retest reliability over a 2- to 6 month interval as well as convergent and discriminant validity with a structured trauma interview (Bernstein et al., 1994; Fink et al., 1995)

PTSD experience and symptomology	Life Events Checklist-5 (LEC; Weathers et al., 2013)	Williams et al (2019)	With respect to its reliability as a measure of direct trauma exposure, only one item failed to achieve a kappa of.40, and all other item kappa's were above .50 (p <.001 for all kappa coefficients). Kappa coefficients for seven of the LEC items were above .60. The mean kappa for all items was .61, and the retest correlation was r = .82, p < .001. Also, good convergence with an established measure of trauma history-the Traumatic Life Events Questionnaire (TLEQ). (Gray et al., 2004)
	Posttraumatic Stress Disorder (PTSD) Checklist-5 (PTSD-CL5; Blevins et al., 2015).	Williams et al (2019)	PCL-5 scores exhibited strong internal consistency (α = .94), test-retest reliability (r = .82), and convergent (rs = .74 to .85) and discriminant (rs = .31 to .60) validity. In addition, confirmatory factor analyses indicated adequate fit with the DSM-5 4-factor model (χ2(164) = 455.83, p < .001) (Blevins et al., 2015).

Not validated for use in epilepsy or similar group but been used in many studies with this population (Ertan et al., 2024; Gearhart et al., 2023; Mariotti et al., 2021; Capitaine et al., 2024; Paredes-Echeverri et al., 2022) |

Appendix D: Data Extraction Table

Authors and Country	Design, Data Collection	Participants (gender)	Measures	Aims	Analysis	Findings	Limitations
Keskin et al., (2023) Turkey	Cross-sectional case control design Questionnaires	Total, n = 83 PWE, n= 44 (12 M, 32 F) PWFS, n=14 (3 M, 11 F) Healthy controls, n=25 (10 M, 15 F)	BDI, CTQ, AAS, TAS-20	Assess depression, childhood trauma, attachment styles and alexithymia in FS and control groups. Investigate risk factors associated with Functional Seizures	Mann-Whitney U, Kruskal–Wallis, Dunn–Bonferroni post hoc test, Chi-square Test, Fisher–Freeman–Halton Exact Test, spearman correlation, multivariate logistic regression.	The FS had lower prevalence of secure attachment style (35.71%) than PWE (70.45%) and healthy controls (88%) and higher prevalence of avoidant attachment style (57.14%) when compared to epilepsy (18.18%) and healthy (12%) control groups. They found a significant difference in depression level based on adult attachment style and that those with anxious attachment had the highest depression and secure had the lowest. The FS group had significantly higher depression, childhood trauma, and alexithymia scores than the other Groups.	Measures chosen do not account for disorganised attachment style which is associated with dissociative disorders Samples low- low statistical power Questionnaires may be less reliable than interview i.e. AAI Not all NEAD participants had diagnoses confirmed by video- EEG telemetry, which is the gold-standard.

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						Alexithymia and childhood trauma scores were both correlated with depression across all groups.	Retrospective cross-sectional in design – relying on memory
						Significant difference in depression levels between attachment styles (p < 0.001) with anxious attachment having the highest levels and secure attachment the lowest levels (unclear if across all groups or specific groups).	Measures not validated in this population
						Childhood trauma and alexithymia significant risk factors for FS.	
Villagran et al., (2022) Norway	Prospective, cohort study Question naires	Diagnosis of PNES Baseline, n=53 (8 M, 45 F) Follow up, n=51	ASQ, PBI, TEC, DES, SDQ-20, EQ-VAS	Investigate clinical outcomes in patients with PNES and possible associations with parenting and attachment styles, along with	T-test, Mann-Whitney U, chi-squared, Fisher exact tests, multivariate logistic regression.	Baseline: PNES participants had significantly lower levels of confidence (security) (p < 0.0001) and higher levels of insecurity on attachment styles than a normative sample. Prior history of anxiety or depression in 60% of participants	Cross-sectional- Recruitment only from one site Small sample size Self-report relies on retrospective recall of events from childhood

| | | (7 M, 44 F) | | demographic, clinical, and neuropsychiatric factors. | | and 85% experienced at least one traumatic life event.

Follow-up: 39% were free of

PNES. This was predicted by male gender, younger age at PNES onset and less attachment anxiety. | Unclear on the mechanisms behind relationship and lacking in statistical analysis to demonstrate this

No Control group

Measures not validated in this population |
| Brown et al., (2013)

United Kingdom | Cross-sectional case control design

Question naires | Total, n=67

PNES, n=43 (15 M, 28 F)

PWE, n=24 (10 M, 14 F) | DERS, TAS-20, RSQ, GAD-7, PHQ-9, SDQ-20 | To determine if there are any meaningful subgroups with PNES characterised by different kinds of emotional dysregulation difficulties | Agglomerati ve hierarchical cluster analysis. | PNES group separated into two clusters for analysis based on their scoring on an emotional regulation scale. Cluster 1 scoring higher on emotional regulation measure and Cluster 2 scoring lower on emotional regulation measure

No significance within groups (between clusters) or between | Limited the number of predictors inputted into regression due to small sample size.

Under powered

Cohort recruited from one service |

						PNES and epilepsy group in insecure attachment. Non-significant trend for higher anxiety, depression, and attachment insecurity in Cluster 1 compared with Cluster 2 meaning possible link between these variables and emotional regulation difficulties.	Cannot control for confounds between baseline and follow up Measures not validated in this population
Williams et al (2019) United States	Cohort, Prospective design Questionnaire	Total, n= 56 (41F, 15M) Mixture of FMD, PNES or functional limb weakness	RSQ, PHQ-9, SOMDS:CD, DES, SDQ-20, SF-36, BDI, STAI-T, NEO-3, TAS, BIS, CD-RISC, CTQ, LEC,	To investigate relationships between attachment styles, demographics, motor subtypes, and other neuropsychiatric factors within mFND.	Univariate tests, Pearson, independent sample two-tailed t tests followed by multivariate linear regressions, automated stepwise linear regression.	Secure attachment positively correlated with NEO-extraversion (r=0.47, p<0.001), SF-36 mental health (r=0.30, p=0.03), FMD subtype (t=2.27, p=0.03) and CD-RISC scores (r=0.47, p<0.001). Secure attachment negatively correlated with NEO-neuroticism (r=20.44, p=0.001), TAS (r=20.47, p<0.001), STAI-T (r=20.42, p=0.001), and PTSD-CL5 (r=20.30, p=0.03) Fearful attachment positively correlated with PHQ-15 (r=0.35,	Cannot control for confounds between baseline and follow up Small sample size 26% participant loss to follow-up Intervention lacked control: across variety of institutions

			PTSD-CL5			p=0.009), SDQ-20 (r=0.43, p=0.001), DES (r=0.57, p<0.001), LEC 'happened to me' (r=0.37, p=0.005), CTQ-abuse (r=0.55, p<0.001), CTQ-neglect (r=0.34, p=0.01), TAS (r=0.38, p=0.004), BDI (r=0.61, p<0.001), STAI-T (r=0.56, p<0.001), PTSD-CL5 (r=0.49, p<0.001), PCS (r=0.51 p<0.001), and NEO-neuroticism (r=0.48, p<0.001) scores.

Additionally, fearful attachment negatively correlated with being married (t=22.09, p=0.04), NEO-extraversion (r=20.40, p=0.003), CD-RISC (r=20.30, p=0.03), and SF-36 mental health (r=20.48, p<0.001) scores.

Automated step wise linear regression of the statistically significant variables: CTQ-abuse (standardized beta=0.39, p<0.001), BDI (standardized beta=0.39, p<0.001), TAS (standardized beta=0.22, p=0.03), and not being married (standardized beta=20.25, | No Control group

Measures not validated in this population |

						p=0.009) to be significantly associated with fearful attachment. Model explained 60.9% of variance in fearful attachment style scores. Strength of CTQ-abuse meant did a post-hoc analysis between fearful attachment and CTQ-Abuse: sexual abuse (standardized beta=0.29, p=0.03) and emotional abuse (standardized beta=0.49, p=0.002) independently correlated with fearful attachment. This model explained 37.0% of the variance in fearful attachment style scores. Preoccupied attachment positively correlated with DES (r=0.38, p=0.004), NEO-neuroticism (r=0.34, p=0.01), STAI-T (r=0.28, p=0.04), BIS (r=0.28, p=0.04), and PCS (r=0.32, p=0.02) scores; preoccupied attachment was negatively associated with NEO-conscientiousness (r=20.32, p=0.02). In a multivariate linear regression analysis, no variables	

						independently correlated with preoccupied attachment. Dismissing attachment was negatively associated with being married (t=22.41, p=0.02) and white ethnicity (t=22.13, p=0.04) in univariate analyses. Neither variable remained statistically significant in a multivariate linear regression analysis.	
Cuoco et al (2021) Italy	Cross-sectional case control design Question naires	Total, n-= 110 FND, n=46 (15M, 31F; 14 FS, 32 FMD)	ECR-R, EQ-5D, QOL-VAS	Explore the role of attachment styles within FND Explore the relationship between attachment styles and psychiatric symptoms	MANOVA with bootstrap Univariate linear regressions Multiple logistic regression analysis with	Patients with FND had higher depression (p=0.001) and alexithymia (p=0.001) as well as an avoidant pattern on the ECR-R (p=0.004) than patients with ND and FND group reporting the poorest QoL among groups (EQ-5D p=<0.001; QoL-VAS p=<0.001).	Rely on self-report included 11 FND patients with major neurological comorbidities to ensure that the study sample was representative of the overall FND

		ND, n=34 (16M, 18F)		within FND and control groups	stepwise approach	In the FND group, ECR-R avoidance was an independent predictor of psychiatric symptoms (BDI-II (β = 6.95, p <.001, R2 = 0.40; TAS-20: (β = 4.67, p = .009, R2 =0.15)), and, altogether, ECR-R avoidance (β = 0.88, p = .008), the somatic-affective component of depression (BDI-SA (β = ☐ 0.28, p < .001)) and difficulty identifying feelings (β = ☐ 0.14, p = .008) were independent predictors of FND, together explaining about 50% of the variance (R2 = 0.51) .	population. (Patients with major neurologic
				Explore possible attachment style differences and their relationship with psychiatric symptoms between FMD and FS	MANCOVA.		Comorbidities (N=7) or comorbid epileptic seizures (N=4) were also included.)
		Healthy controls, n=30 (16M, 14F)				There was no significant difference between FMD and FS group in terms of ECR-R scores	Measures not validated in this population
						In the whole sample, ECR-anxiety was an independent predictor of BDI -II total (β = 4.51, p < .001, R2 = 0.19), BDI-SA (β = 2.05, p < .001, R2 = 0.17), BDI-C (β = 2.49, p < .001, R2 = 0.17), TAS-20 total (β = 3.40, p = .003, R2 = 0.08) and TAS-20 Difficulty Identifying	

						Feelings (β = 2.32, p < .001, R2 = 0.18). A multivariate logistic regression analysis showed that ECR-R avoidance (β = 0.88, p = .008), BDI-SA (β = □ 0.28, p < .001) and TAS-20 Difficulty Identifying Feelings (β = □ 0.14, p = .008) were significant predictors of FND.	
Green et al (2017) United Kingdom	Cross-sectional case control design Question naires	Total, n=95 PNES, n= 23 (19F, 4M) PWE, n=72 (38F, 34M)	LSSS-3, QRI, ASQ, PHQ-9, GAD-7, QOLIE-10-P,	To investigate differences in relationship quality, attachment style, HRQoL, depression, and anxiety between PNES and epilepsy. Assessing the extent to which measures of relationship quality,	Pearsons, t-tests, hierarchical regression analyses.	Patients with PNES reported lower overall HRQoL, and higher levels of depressive and anxiety symptoms than those with epilepsy. There were no significant differences between the scores of patients with PNES and epilepsy on the subscales of the QRI measuring relationship quality or attachment style. In PNES, no significant correlations were found with HRQoL. Depression correlated positively with attachment	Heterogeneity of the ND group No recording of history of trauma No collection of symptom severity Measures not validated in this population

| | | | | | attachment style, and seizure severity are associated with HRQoL, depression, and anxiety in patients with PNES versus PWE. | | avoidance (r= 0.58, p < .01) and attachment anxiety (r=0.77, p < .001). Anxiety correlated positively with attachment avoidance (p < .01), attachment anxiety (p < .01), and relationship conflict (p < .001), Attachment style and relationship quality explained 45% of variance in depression and anxiety in PNES ($\Delta R2 = .45$, F(3,14) = 7.48, p = .003) and 16% in those with epilepsy ($\Delta R2 = .16$, F(1,66) = 15.34, p < .001).. In Epilepsy, HRQoL correlated negatively with attachment avoidance (r=-0.29, p < 0.05) and attachment anxiety (r=-0.30, p < 0.05). Depression correlated positively with attachment avoidance (r= 0.47, p < .001) and attachment anxiety (r=0.42, p < .001). Anxiety correlated positively with attachment avoidance (r= 0.36, p < .001), and attachment anxiety (r= | |

						0.25, p < .01). Correlations between measures of relationship quality and anxiety were stronger in PNES versus epilepsy patients (zs > 2.66 to 2.97, ps < 0.004). Attachment style and relationship quality explained 60% of variance in anxiety in the patients with PNES (60%; $\Delta R2 = .60$, F (5,12) = 5.08, p = .01.)) and 13% than of those with epilepsy (13%: $\Delta R2 = .13$, F(4,67) = 2.58, p = .045).	
Gerhardt et al (2021) Germany	Cross-sectional case control design Question naires	Total, n=88 PNES, n= 44 (10M, 34F) Healthy Controls, n= 44 (10M, 34F)	AAP, CTQ, PHQ-9, SDQ-20, SCID-II-PQ	To assess attachment, psychopathology, demographics and childhood trauma in PNES compared to controls.	Pearson chi-square test. Independent t-test.	The PNES group, was significantly less secure ($\chi 2 = 7,639$, df = 1, P = 0.006) and had more unresolved/disorganized ($\chi 2 = 4,166$, df = 1, P = 0.041) attachment classifications than healthy controls. Among patients with PNES, 7% were classified secure and 43% were classified unresolved/disorganized. Patients with an unresolved attachment representation were	Not all participants diagnosed with FND using video-EEG Direction of relationships between variables cannot be inferred measures not always using same assessment strategy which may attenuate to the strength of correlations (attachment: trait;

						significantly more likely to be screened positive for personality pathology in the Structured Clinical Interview for DSM-IV axis II disorders, Patient Questionnaire (P = 0.03) and to report more emotional abuse in the Childhood Trauma Questionnaire- emotional abuse (P = 0.007) than patients with other attachment classifications. The relationship between attachment style and PHQ-9 depression score(p=0.639) and somatoform dissociation (SDQ-20) (p=0.993) was insignificant.	depression and anxiety: last two weeks) questions around the validity of administering the QOLIE to PNES populations Underpowered. Validity of FND diagnosis unclear

M: Male; F: Female; PWE: People with Epilepsy; PWFS: People with Functional seizures; HC: Healthy controls; PNES: Psychogenic non-epileptic seizures; FMD: Functional Movement Disorder; FND: Functional Neurological Disorder; mFND: Motor FND; ND: Neurological Disorders; SF-36: Short Form Health Survey; TAS-20: The Toronto Alexithymia Scale-20; BDI-II: Beck Depression Inventory; CTQ: Childhood Trauma Questionnaire; AAS: The Adult Attachment Scale; ASQ: Attachment style Questionnaire; PBI: Parental bonding instrument; TEC: Traumatic experience checklist; DES: Dissociative experience scale; SDQ-20: Somatoform Dissociation Questionnaire-20; EQ-VAS: EuroQol Visual analog health thermometer; DERS: Difficulties in Emotion Regulation Scale; RSQ: The Relationship Scales Questionnaire; GAD-7: Generalized Anxiety Disorder-7 ; PHQ-9: Patient Health Questionnaire 9; SOMS:CD: Screening for Somatoform Symptoms Conversion Disorder subscale; PHQ-15: Patient Health Questionnaire 15; STAI-T: Spielberger State-Trait Anxiety Inventory; PTSD Checklist-5: PTSD Checklist for DSM-5; CD-RISC: Connor Davidson Resilience Scale; NEO-5: The NEO Five-Factor Inventory-3; PCS: Pain Catastrophizing Scale; BSI: Brief Symptom Inventory; BIS: Barrett Impulsivity Scale; LEC: Life Events Checklist ; ECR-R: Experiences in Close Relationships-Revised; EQ-5D: EuroQol; QOL-VAS: Visual Analogue Scale – Quality of Life; LSSS-3: Liverpool Seizure Severity Scale – Version

3; QRI: Quality of Relationships Inventory; QOLIE-10-P: Quality of Life in Epilepsy; AAP: Adult attachment projective picture system; SCID-II-PQ: Screening for Personality Disorders; PTSD: Post-traumatic stress disorder; HRQoL: Health related quality of life; MANOVA: Multivariate Analysis of Variance; MANCOVA: Multivariate Analysis of Covariance.

Appendix E: Formatting guidelines for Attachment & Human Development journal

Attachment & Human Development

Narrative Review

- Should be written with the following elements in the following order: title page; abstract; keywords; main text introduction, materials and methods, results, discussion; acknowledgments; declaration of interest statement; references; appendices (as appropriate); table(s) with caption(s) (on individual pages); figures; figure captions (as a list)

- Should be between 6000 and 7500 words, inclusive of:

    o Abstract

- Should contain any number of **keywords**. Read making your article more discoverable, including information on choosing a title and search engine optimization.

Style Guidelines

Please refer to these quick style guidelines when preparing your paper, rather than any published articles or a sample copy.

Any spelling style is acceptable so long as it is consistent within the manuscript.

Please use double quotation marks, except where "a quotation is 'within' a quotation".

Please note that long quotations should be indented without quotation marks.

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   For single agency grants
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4. **Disclosure statement.** This is to acknowledge any financial or non-financial interest that has arisen from the direct applications of your research. If there are no relevant competing interests to declare please state this within the article, for example: *The authors report there are no competing interests to declare*. [Further guidance on what is a conflict of interest and how to disclose it]().

5. **Data availability statement.** Authors are required to provide a data availability statement, detailing where data associated with a paper can be found and how it can be accessed. If data cannot be made open, authors should state why in the data availability statement. The DAS should include the hyperlink, DOI or other persistent identifier associated with the data set(s), or information on how the data can be requested from the authors. [Templates]() are also available to support authors.

6. **Data deposition.** If you choose to share or make the data underlying the study open, please deposit your data in a [recognized data repository]() prior to or at the time of submission. You will be asked to provide the DOI, pre-reserved DOI, or other persistent identifier for the data set.

7. **Supplemental online material.** Supplemental material can be a video, dataset, fileset, sound file or anything which supports (and is pertinent to) your paper. Articles with extenders, such as infographics or video summaries, are up to 108% more likely to be downloaded (based on data in May 2024 from Plain Language Summary of Publication and Clinical Trial Protocol articles published in Future Oncology in 2023). We publish supplemental material online via Figshare. Find out more about [supplemental material and how to submit it with your article](). Taylor & Francis Editing Services can help you create research promotion materials, including

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8. **Figures.** Figures should be high quality (1200 dpi for line art, 600 dpi for grayscale and 300 dpi for colour, at the correct size). Figures should be supplied in one of our preferred file formats: PS, JPEG, TIFF, or Microsoft Word (DOC or DOCX) files are acceptable for figures that have been drawn in Word. For information relating to other file types, please consult our [Submission of electronic artwork](#) document.

9. **Tables.** Tables should present new information rather than duplicating what is in the text. Readers should be able to interpret the table without reference to the text. Please supply editable files.

10. **Equations.** If you are submitting your manuscript as a Word document, please ensure that equations are editable. More information about [mathematical symbols and equations](#).

11. **Units.** Please use [SI units](#) (non-italicized).

Paper Two: Empirical Paper

Do ACEs, childhood relational trauma and interoception predict emotional regulation, self-stigma and wellbeing in FND and is this moderated by self-compassion?

Ciara Fay

Total word count: 7800 (Excluding title page, references and appendices)

This paper has been written with the intention of submitting to CNS Spectrums. Author guidelines can be found in Appendix A. This paper will initially be submitted to University of Staffordshire as part of a doctoral thesis. Word count and formatting have been changed to meet university requirements and will later be adjusted for journal submission.

Abstract

Objective

Functional Neurological Disorder (FND) is associated with trauma, emotional processing deficits, and poor psychological outcomes, yet these factors are rarely assessed together. This study explores the predictive roles of adverse childhood experiences (ACEs), early relational trauma, and interoception on emotional regulation, wellbeing, and self-stigma in individuals with FND. It further investigates whether self-compassion moderates these relationships. Findings aim to clarify how early trauma and interoceptive abilities contribute to FND outcomes and whether enhancing self-compassion may offer a viable therapeutic target. This research provides a foundation for developing tailored interventions within FND treatment pathways focused on trauma-informed and self-compassion-based care.

Methods

This cross-sectional within subject's study analysed scores of 91 participants, with a diagnosis of FND, across seven validated questionnaire measures. Demographic data was also collected. Correlations, regressions and moderation analyses were used to analyse the data.

Results

Key significant findings included higher early life relational trauma and lower interoceptive ability significantly predicted greater emotional dysregulation and lower wellbeing. None of the predictor variables significantly predicted self-stigma levels. Participants showed overall low-moderate self-compassion levels. Self-compassion did not significantly moderate any of the relationships but was associated with interoception and emotional regulation scores.

Conclusion

This novel study found relationships in line with theory and previous research of FND. While relational trauma and interoception predicted outcomes significantly, self-compassion did not moderate these or any effects. Findings support trauma-informed, interoception and relational-focused interventions and highlight the need for tailored care in FND treatment. Strengths and limitations of design are discussed.

Introduction

Whilst Functional Neurological Disorder (FND) is a common and disabling disorder, understanding of its aetiology and maintenance factors lack consensus. Trauma has been strongly indicated as a predisposing factor [1-5], with biopsychosocial models seeking to integrate the neurobiological and psychosocial risk factors [6], including deficits in emotional processing, and the impact of trauma [7], as well understanding the relationship with comorbid psychological conditions [8-9]. Self-compassion may therefore provide a useful avenue for therapeutic interventions given its success with long-term conditions [10-14]. Recent reviews of FND treatments called for expansion of the evidence base for psychological interventions [15-17]. The current study aims to assess a variety of predictors and outcomes of FND together, alongside self-compassion, an area which is being relatively under researched within FND. Findings will provide a foundation for future studies to assess the novel and tailored interventions within FND treatment pathways.

FND describes a range of physical and psychological symptomology [18] (Figure 1). Prevalence rates are estimated to be 50/100,000 per year [19] with women shown to be disproportionately affected at 70% [20-21]. Historically, FND was known as "Conversion Disorder" and associated with trauma [22], with symptoms understood as the physical expression of psychological distress [23]. Given the lack of clarity around its prevalence, experience of trauma is now no longer a requirement for
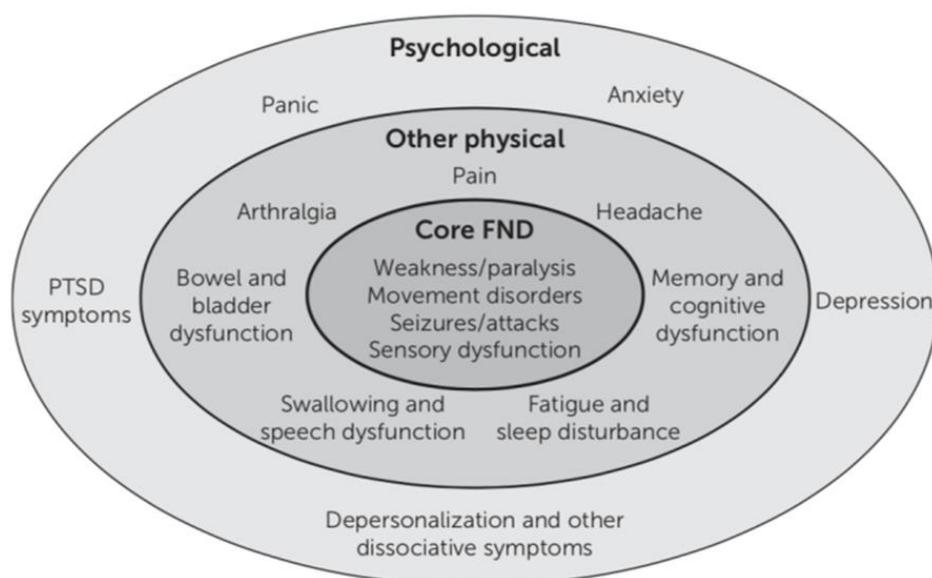
Figure 1

diagnosis of FND (5th ed.; DSM-5;24) but still is documented as playing a role in the severity and onset of FND [25-26].

ACEs, Early life relational trauma and Interoception in FND

A large amount of literature evidences trauma as a predisposing factor in developing FND [1,2-5] with a meta-analysis finding frequency of childhood and adulthood stressors to be increased in FND, when compared to controls [2]. Amongst adverse childhood experiences (ACES), emotional neglect has been found to have the strongest association with the development of FND [19], with other ACES such as the magnitude of early-life physical and sexual abuse also being linked to FND symptom severity [28-29]. When considering childhood attachment and relationships in FND aetiology, relational trauma and relationship insecurity in childhood has been associated with a greater likelihood of having FND [2,30]. These findings suggest that further research should focus on early childhood relationships and attachments to understand FND aetiology.

Interoception is defined as the perception and representation of the physiological state of the body [31]. Consistent exposure to affectionate touch by the caregiver, as an infant, can inform interoceptive perceptions and sense of (physical) self [32]. Impairments in interoceptive accuracy have been found within FND [33-36]. Models of FND postulate that interoception deficits follow top-down and bottom-up discrepancies resulting in altered interoceptive abilities [37]. Interoceptive differences may be linked to a range of clinical characteristics including trauma, emotional processing difficulties, dissociation, depression and anxiety [38] suggesting interoception may play an aetiological and perpetuating role in FND [39].

Self-stigma, Well-being and emotional regulation in FND

More recently, stigma has been studied within FND given its link to poorer quality of life [40] and outcomes [41-42]. Stigma is a social process that can be characterised by exclusion, rejection, blame or devaluation that results from an adverse social judgement about a person or a group [43]. Within a 2020 survey of people with FND, 85% reported feeling dismissed and disrespected due to their FND diagnosis and 81% reported being treated poorly due to stigma related to their diagnosis (FNDHope, [44]). Narrative and qualitative studies have highlighted key themes related to delegitimisation, social exclusion, identity and experiences with

healthcare professionals [45-46]. Research assessing trauma, interoception and stigma in FND is sparse. But deficits in interoception, related to trauma [7], may increase vulnerability to stigma, due to difficulties in articulating symptoms and emotions which may impact recovery [7]. This study will quantitatively assess self-stigma within FND and understand its relationship with trauma and interoception.

Within FND, there is a high rate of co-morbid psychological difficulties [8-9] with prevalence reported as 49% for anxiety, 22% comorbid post-traumatic stress disorder (PTSD) and 42% of depression [9]. In terms of quality of life, those with Functional seizures consistently show lower rates when compared to epilepsy controls [47-48], even when controlled for seizure frequency [49]. Increased ACEs within FND is also negatively associated with quality of life [2]. Research has suggested insecure attachment [50-51] and maladaptive coping strategies [29,51] may act as mediators between the negative effect of ACEs on wellbeing. Given the hypothesised links between emotional abilities and psychological comorbidities [38], it would be helpful to investigate impact of ACEs and relational traumas as well as interoception.

Evidence exists for reduced or impaired emotional processing in FND [52-54]. Emotion regulation is an individual's process of assessing, managing, and acting on their emotional state in relation to oneself and others [55]. This process is aided by interoceptive abilities. Effective emotional regulation has been found to be correlated with higher life satisfaction and positive affect [56]. A model proposed by Pick et al [7] suggests that those with FND have a heightened preconscious, 'bottom-up', processing of emotionally significant stimuli, with evidence of limbic and motor system hyperactivation, as well as disrupted 'top-down' regulation. This may arise from a range of biological and psychosocial risk factors including disruptions to brain circuitry associated with early adversity. The current research hopes to clarify relationships between comorbid symptoms and psychosocial risk factors of FND [7] by quantitively studying trauma, interoception and emotional regulation deficits within this group.

The Current Study

Despite research assessing each of the factors individually within FND, no research has assessed these factors together and sought to understand their possible relationships within and across variables. Research is inconclusive

regarding the impact and prevalence of trauma on outcomes in FND [2] and suggests relational trauma be more closely related to FND [2,30]. Models have proposed links between emotional processing and impaired interoception with outcomes and social contexts [7;54] however, there is little empirical evidence to clarify these relationships. Empirical evidence could offer direction of therapeutic interventions, tailored to the experiences of people with FND, and important clinical considerations for management of the diagnosis around stigma, wellbeing and emotional abilities.

Self-compassion and FND

Self-compassion has been found to be an effective target for the treatment of chronic physical health conditions [57-60] and long-term neurological conditions [61]. Self-compassion is defined as being touched by and open to one's own suffering, not avoiding or disconnecting from it, generating the desire to alleviate one's suffering and to heal oneself with kindness [62]. It comprises three elements: self-kindness, common humanity and mindfulness [63]. Theoretically, an individual who has experienced high criticism or threat from parents during childhood may have a heightened sensitivity to threat protection. The threat system is associated with high shame, self-criticism and psychopathology [64] and high activation prevents access to the inner compassionate voice to self-soothe [65-66]. Conversely, the soothe system, relying on self-compassion, is associated with positive feelings of wellbeing and a sense of 'social safeness' [64]. All three systems are important in effective emotional regulation. Thus, the current study is working on the theoretical hypothesis that childhood trauma, impacting emotional understanding and processing [7], may in turn impact development of self-compassion, influencing emotional regulation, wellbeing and self-critical/stigmatising beliefs.

Empirically, higher levels of childhood trauma predict poorer self-compassion, higher self-stigma [69] and poorer quality of life [70] with self-compassion found to partially mediate the link between childhood trauma and mental health symptomology [71]. People who struggle to access self-compassion, following childhood trauma, often experience greater self-criticism, shame, and guilt, which can significantly hinder their recovery [72]. Further research has documented a relationship between lower levels of self-compassion and difficulties in emotional regulation [73] suggesting emotional regulation abilities mediate the relationship between childhood trauma and self-kindness [74]. Emotional processing mechanisms

i.e. interoception, may also be associated with self-compassion with one session of mindfulness self-compassion improving interoceptive accuracy in fibromyalgia [68].

Compassion focused therapy (CFT) [64] addresses feelings of shame and self-criticism by increasing self-compassion, both of which arise from abuse, neglect [64-65] and interactions with early caregivers [66-67]. There has been little research into self-compassion in FND [69, 118] bar one case study of CFT with an adult with Motor FND [75]. Self-compassion interventions in clinical and non-clinical samples have however been associated with reduction in shame, self-criticism and depression [14]. With this in mind, and given the high levels of trauma [1-2,4-5], stigma (FNDHope, [44-46]) and reported difficulties in emotional regulation [52-53] within FND, it is important to assess if, and to what degree, compassion may moderate relationships as assessed in the study to provide evidence for self-compassion as a target for intervention.

Aims and Hypotheses

The study aimed to investigate whether relationships exist between the predictive variables—ACEs, interoception, and early life relational trauma—and the outcome variables of self-stigma, positive affect and wellbeing, and emotional regulation. It was hypothesised that self-compassion would significantly moderate the direction and strength of these relationships (see Figure 2 for proposed model). The following hypotheses were tested:

1. Higher scores on measures of ACEs, early life relational trauma and lower scores on a measure of interoception will predict higher scores on a measure of emotional regulation meaning poorer emotional regulation abilities.

2. Higher scores on measures of ACEs, early life relational trauma and lower scores on a measure of interoception will predict lower scores on a measure of positive affect and wellbeing.

3. Higher scores on measures of ACEs, early life relational trauma and lower scores on a measure of interoception will predict higher scores on a measure of self-stigma.

4. Self-compassion will significantly moderate the relationships between the predictive variables of ACEs, early life relational trauma, interoception and the outcome variables of self-stigma, wellbeing, and emotional regulation in

individuals with FND. Specifically, higher levels of self-compassion will buffer the relationship between predictors and outcomes.

PREDICTORS	MODERATOR	OUTCOMES
	Self-compassion	
Adverse childhood experiences		Self-stigma
Interoception		Positive affect and Wellbeing
Early life relational trauma		Emotional Regulation
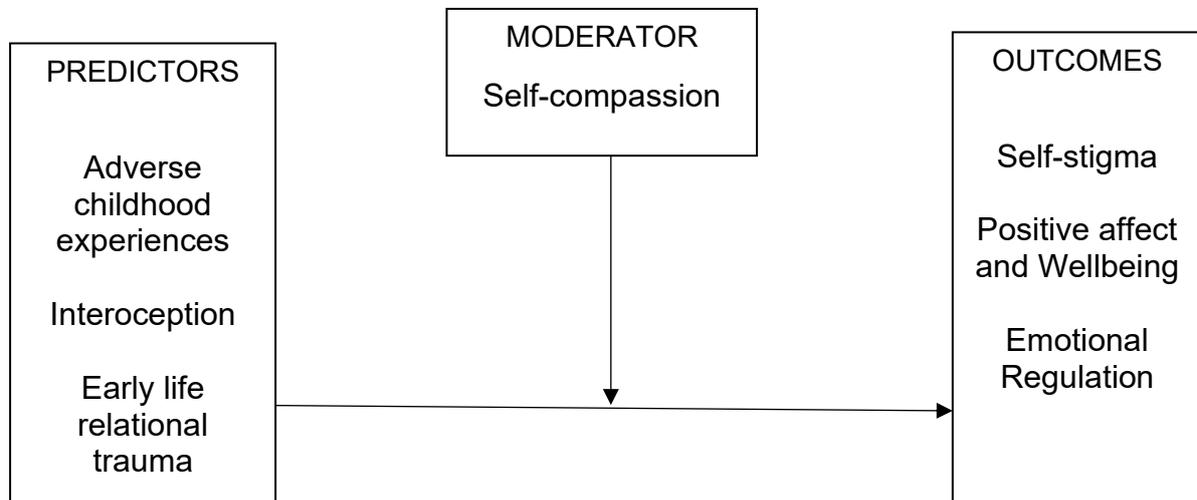
Figure 2

Model of predictors, outcomes and proposed moderator assessed in study

Method
Ethics

This study was reviewed and approved by the University of Staffordshire Ethics Committee (Appendix B). All participants provided informed consent before participating.

It was acknowledged that the study may cause distress for some participants in the information sheet provided to participants, prior to consent being sought. Participants were also encouraged to cease participation should they feel distressed. Participants were signposted to relevant support services i.e. FND information and support groups (https://www.fndaction.org.uk/#) and listening service, Samaritans (https://www.samaritans.org/) should they require further support. Furthermore, participants were provided contact details of the lead researcher, academic supervisor and ethics committee should they wish to contact them and/or raise a concern.

To maintain participant anonymity whilst upholding the right to withdrawal, participants were required to create a participant ID code, which meant their data could be removed up to two weeks post completion, should they wish.

Design

The study is a cross-sectional within-subject's survey design exploring whether ACEs, childhood relational trauma and interoception predict emotional regulation, self-stigma, positive affect and wellbeing scores and the moderating effect of self-compassion.

The questionnaires were presented to participants in a random order to reduce the implications of order effects. Forced entry was employed for all responses to limit missing data.

Recruitment

The study recruited participants via convenience and purposive sampling. To be eligible for the study, participants had to be 18 years of age or over, have a diagnosis of FND by a medical professional (neurologist, psychiatrist) and read and understand the English Language.

Recruitment took place between November 2024 and March 2025. A poster advertising the study (Appendix C) was posted to Facebook FND support and community groups (listed in Appendix M) to recruit those with a diagnosis of FND.

Procedure

Participants accessed the study via QR code or URL link. The study was hosted by Qualtrics (www.qualtrics.com). Potential participants were asked to read an information sheet (Appendix D) and complete a consent form (Appendix E), before they were able to progress to the main survey. After consenting, participants were required to create a participant ID code made up of a mixture of letters and numbers but not containing any identifiable information i.e. date of birth, name. Those consenting, then completed the demographic questions (Appendix F) as well as seven standardised questionnaires (Appendix G) before being directed to a debrief sheet (Appendix H) and thanked for their participation.

Measures
Demographic Information

Demographic information was collected including participant gender, age range and FND diagnosis (Appendix F).

Interoception

Interoception was measured using the <u>Multidimensional Assessment of Interoceptive Awareness Version 2 (MAIA-2; [76])</u>. The MAIA-2 is a 37-item scale of subjective interoceptive attention. It is split into 8 subscales. Responders assess how often each statement applies to their experience in daily life on a scale ranging from 0 (never) to 5 (always). Example items include "I notice that my breathing becomes free and easy when I feel comfortable" and "I ignore physical tension or discomfort until they become more severe". Scores for each subscale are derived by computing the mean of the items comprising the specific subscale. A total index of interoceptive awareness is derived by summing the individual scores for each of the 8 subscales [77]. The study used a total scale score with scores ranging between 0-40. There are no universal clinical cut-off scores and/or norms for data. Higher scores equate to more awareness of bodily sensation.

The MAIA-2 is found to have variable internal consistency across the subscales ranging from poor to acceptable (α=0.64-0.83) [76]. In the current study, reliability ranged from acceptable to good (α=0.75-0.88). The MAIA-2 has been used within the FND population [78, 79]. This measure is free to use as stipulated on the published assessment form.

Table 1

MAIA-2 subscales and descriptors

Subscale	Description
Noticing	awareness of body sensations
Not-Distracting	a tendency not to ignore or distract oneself from sensations of pain or discomfort
Not-Worrying	a tendency not to worry about sensations of discomfort
Attention Regulation	an ability to sustain and control attention to body sensations
Emotional Awareness	awareness of the connection between body sensations and emotional states
Self-Regulation	an ability to regulate distress by paying attention to body sensations
Body Listening	listening to the body for insight
Trusting	trusting one's body sensations

Relational Trauma

Relational Trauma was measured using <u>The Early Life Events Scale (ELES;</u> <u>80).</u> The ELES is a 15-item scale developed to measure emotional memories in one's family, linked to recall of feeling devalued, frightened and having to behave in a subordinate way. Many questionnaires of early life ask about recalling specific experiences however, this scale asks about memories of personal feelings. Example items include "I often had to give in to others at home" and "I felt an equal member of my family". Participants are asked to rate statements on a five-point scale ranging from 1 (Completely untrue) to 5 (Very true). The scale can be used as a single construct or as three separate subscales. The total scale score, ranging between 15-75, was used in the current study. Higher scores indicate more emotional memories linked to feeling devalued, frightened and having to behave in a subordinate way.

The ELES has high internal consistency both in the total score and across all subscales [80] and adequate convergent validity [81]. In the current study, reliability was excellent (α=0.93). Permission was provided to use this scale for research purposes (see Appendix I).

ACEs

ACEs were measured using the <u>Adverse Childhood Experience Questionnaire</u> <u>(ACE-Q; 82).</u> The ACE-Q is a 10-item self-report scale assessing the presence of abuse (physical, emotional, sexual), neglect, and family dysfunction during childhood. Participants respond either "yes" or "no" to 10 statements. Statements include "Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?" and "Did a household member go to prison?". Due to an error in administration, only 9 items from the measure were included in the study, question 5 was omitted from the Qualtrics questionnaire: "Did you often or very often feel that …You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you? or Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?".

The ACE-Q is usually scored 0-10 with higher scores indicating a greater accumulation of adversities in the participants childhood. Due to error in administration, the current studies ACE-Q scores were between 0-9. Scores of 4 or more are considered clinically significant. A minority (5%–10%) of the general population score 4 or more, where the general long-term health consequences

become most pronounced [83]. Cronbach's alpha reliability shows high internal consistency (α = 0.88) [82] and good to excellent test-retest reliability (Cohens kappa: 0.46-0.86) [84]. In the current study, reliability for the shorter measure was good (α=0.73).

Self-Compassion

Self-compassion was measured using The Self-compassion Scale -Short Form (SCS-SF; [85]). The SCS-SF comprises 12-items measuring the following six components of the three dimensions of self-compassion: self-kindness vs self-judgment: being warm and understanding to ourselves when we feel inadequate rather than critical; common humanity vs isolation; recognising suffering or inadequacy is part of the human experience, not happening to "me" alone and mindfulness vs overidentification: taking a balanced approach to our negative emotions so neither supressed or exaggerated. Example items include "When something upsets me, I try to keep my emotions in balance" and "I'm disapproving and judgmental about my own flaws and inadequacies". Participants are asked to rate statements on a five-point scale ranging from 1 (Almost never) to 5 (Almost always). Subscales are computed by calculating the mean of subscale item responses. Total scores are then computed by a grand mean of all six subscale means. Total scores range between 1-5.

There are no clinical norms for the SCS-SF however, it is advised that you can consider scores 1.0-2.49 to be low, between 2.5-3.5 to be moderate, and 3.51-5.0 to be high [85].

Internal consistency was found to be high for total scale scores for both clinical and nonclinical samples (≥ 0.86) and a near perfect correlation with the long form SCS (r ≥ 0.97 all samples; [85]). In the current study, reliability for total scale was good (α=0.82). The SCS-SF is approved for use for research purposes by the author.

Emotional Regulation

Emotional Regulation was measured using The Difficulties in Emotion Regulation Scale (DERS-16;[86]). The DERS-16 is a 16-item version of the more comprehensive DERS [87]. It encompasses five subscales: Nonacceptance of Emotional Responses; Difficulties Engaging in Goal-Directed Behaviour; Impulse Control; Limited Access to Emotional Regulation Strategies and Lack of Emotional

Clarity. Example items include "When I am upset, I feel out of control" and "I am confused about how I feel". The sixth subscale of Awareness, as in the original DERS, was removed in the DERS-16 given limited reliability or validity for this factor within the model [88]. The DERS-16 items are scored on a 5-point likert scale ranging from 1 (almost never) to 5 (almost always). It is scored as a total scale with scores ranging between 16–80. There are no cut-offs recommended for the use of DERS-16, however Burton et al [89] found a clinically significant cut-off of 34 or more to distinguish between depressed and non-depressed participants. Higher scores reflect greater difficulty with emotion regulation.

The DERS-16 was originally validated in three samples demonstrating good construct validity (i.e., both convergent and discriminant), excellent internal consistency and test-retest reliability [86,89]. In the current study, reliability was excellent ($\alpha=0.95$). The scale is approved by its author for clinical and research use.

Positive affect and wellbeing and Self-stigma

Positive affect and wellbeing and Self-stigma were both measured using The Quality of Life in Neurological Disorders – Short Form versions: Stigma and positive affect and wellbeing scales (Neuro QoL- SF;[90]). Neuro-QoL- SF assesses health-related quality of life in patients with neurological disorders regarding several different aspects of life related to neurological disorders. Participants respond to statements in a Likert scale format from 1 (Never) to 5 (Always). Neuro-QoL scores are calculated by adding up the scores for all items then converting them into T scores (50 is the mean and 10 is the standard deviation). Both scales have good internal consistency, good test-retest reliability (ICC values around <.8), good convergent and discriminant validity [90]. The measures are permitted for use for research purposes.

- The stigma section of this questionnaire consists of 8 items relating to self/internalised stigma. It is a shortened version of the original 24-item version in the Neuro-QoL. The stigma short form has been found to have good internal consistency ($\alpha=.91$) [91]. Raw scores range between 8-40. Scores are normed in comparison to a clinical population sample. Higher scores indicate a higher intensity of stigmatisation. In the current study, reliability was excellent ($\alpha=0.90$).

- The positive affect and wellbeing scale consists of 9 items related to psychological wellbeing in chronic conditions. It is a shortened version of the original 23-item version in the original Neuro QoL. Raw scores range between 9-45. Scores are normed in comparison to a general population sample. Lower scores indicate lower positive affect and wellbeing. In the current study, reliability was excellent (α=0.95).

Power Analysis

A priori power analysis was conducted to determine the sample size needed for a multiple regression with moderator analysis. For a multiple regression, predicting the outcome variables (self-stigma, positive affect and wellbeing and difficulties in emotional regulation) with four predictor variables (self-compassion, ACEs, early life relational trauma and interoception) a medium effect size (0.15) was chosen due to its ability to reasonably detect an effect in real world scenarios [92] and is based upon similar studies [2; 34-35;93], with power set at 0.8 and alpha at 0.05, 84 participants are required [94].

Data Screening

Data was transferred from Qualtrics to Microsoft Excel for data screening. Data was assessed for indication of study completion by spam bots, duplicate records and missing data. Data was removed accordingly resulting in 91 participants data being used in final analysis (see 'Results'- 'Data Screening and Participants' for further information).

Data Analysis and Statistical Assumptions

The online responses were exported from Qualtrics to SPSS Statistics (Version 28).

Prior to analyses, all variables were checked to ensure they met parametric and regression assumptions including absence of outliers, normality, linearity, homoscedasticity and absence of multicollinearity, and independence of residuals [95]. All standardized residual statistics were less than ±3 indicating no concerns regarding outliers (Appendix K). A Kolmogorov-Smirnov test and histogram inspection showed ACEs to be non-normally distributed (D(91) = 0.94, p = <.001). All other measures were found to have normal distribution (Appendix J). Early life relational experiences highly correlated with ACEs however, Variance Inflation

Factor (VIF) results were under 10 and tolerance statistics were greater than 0.1 and therefore did not indicate problematic multi-collinearity [96] (Appendix K). All other variables met the assumption of multi-collinearity necessary for regression analyses. From examining scatterplot and residual information, the data is seen to meet the assumptions of linearity. Homoscedasticity, the uniform variance of residuals across the range of predicted values, was confirmed via the Breusch-Pagan test (Appendix K). Furthermore, the Durbin-Watson statistics stood close to 2, ruling out autocorrelation among residuals and attesting to the independence of errors (Appendix K).

Correlations between the variables were assessed as part of the regression and moderation analysis. Correlational analyses were conducted on the seven variables of the study using non-parametric Spearman's Rho, due to non-normality of the ACE variable. All within groups tests were two-tailed.

A series of multiple regressions were run to explore the relationship between the predictor variables (self-compassion, ACEs, early life relational trauma and interoception) and the outcome variables (self-stigma, positive affect and wellbeing and difficulties in emotional regulation). To control the increased risk of Type I errors due to multiple comparisons, the Benjamini-Hochberg procedure was applied. This method controls the false discovery rate (FDR), which is more appropriate than familywise error rate corrections (e.g., Bonferroni) when conducting multiple hypothesis tests. An FDR threshold of $q = 0.05$ was used to determine statistical significance.

PROCESS version 5.0 for SPSS [97] was used to conduct a moderation analysis to investigate the influence of self-compassion on the relationships between the independent and dependant variables.

Results
Data Screening and Participants

145 participants consented to take part in the study with 91 completing it in its entirety. Out of those removed for missing data/incompletion of the questionnaires, 46 participants had more than 20% of missing data. The remaining 8 participants had more than 10% missing data. Given sufficient numbers for regression analysis, without inclusion of participants with missing data, 91 participants were included in

final analysis. Participant demographic data is presented in Table 2 (demographic for participants not included in analysis are in Appendix N).

Table 2

Participant Demographics

Demographic Characteristic	N (%)
Gender	
Female	80 (87.9%)
Male	11 (12.1%)
Participant numbers by age range (years)	
18-30	18 (19.8%)
31-45	36 (39.6%)
46-60	28 (30.8)
61-75	9 (9.9%)
FND diagnosis	
Functional Neurological Disorder (FND)	65 (71.4%)
Functional Movement Disorders (FMD)	4 (4.4%)
Motor Functional Neurological Disorder (mFND)	1(1.1%)
Functional Seizures (FS)/Psychogenic Non-epileptic Seizures (PNES)	
Something else (free text)	20 (22%)
FND w Central Sensitization Syndrome	1 (1.1%)

Within-Group Differences

The means, standard deviations and ranges for ACEs, early life relational experiences, interoception, self-compassion, positive affect and wellbeing, self-stigma and emotional regulation are provided in Table 3.

We can assess the mean score in relation to recommended cut-offs or clinical significance. There are no clinical cut-offs documented for either ELES or MAIA-2 measures. However, a study using the MAIA-2 with an FND sample (M=19.6) found comparable scoring [38] and ELES scores are elevated in comparison to general population sample (M= 32.53, SD= 12.02) [80]. We can see across the FND sample,

ACEs scores are slightly below the clinical significance of 4 or more (M=3.43; SD=2.34). Regarding SCS-SF, mean scores across the sample fall slightly within the 'moderate' range, as classified by Raes et al [85] (M=2.57; SD=.72).   Mean scores for the FND sample on Positive Affect and Wellbeing fall slightly below the mean for the general population sample (m= 25.98; SD=8.49; t=44.4-45.3). For self-stigma, mean scores are 1 SD above the clinical reference population (m=25.31; SD=8.02; t=61.6-62.4) indicating higher levels of self-stigma in an FND population compared to a clinical population. Difficulties in emotional regulation mean score was found to be higher than the cut-off recommended by Burton et al [89] to indicate clinically significant depression (M=49.86; SD=17.13).

Table 3

Combined outcomes for analysis measures showing means, standard deviations, and ranges (n = 91)

Measure	M	T	SD	Range	T score range
Adverse Childhood Experiences (ACE-Q)	3.43	-	2.34	0-8	-
Early Life Relational Experiences (ELES)	47.13	-	15.48	17-75	-
Interoception (MAIA-2)	17.89	-	5.51	7-35	-
Self- Compassion (SCS-SF)	2.57	-	.72	1-5	-
Positive Affect and Wellbeing (Neuro QoL- SF)	25.98	44.4-45.3	8.49	9-45	26.3-68
Self-Stigma (Neuro QoL- SF)	25.31	61.6-62.4	8.02	8-40	39.2-81.5
Difficulties in Emotional Regulation (DERS-16)	49.86		17.13	18-80	

Correlational Analysis

The relationships between all seven of the variables were assessed via Spearman's Rho correlational analyses and interpreted in accordance with Dancey and Reidy's classifications [98]. Correlations were completed prior to regression analyses to understand the strength and direction of relationships, to check multicollinearity as well as to gather a general sense of the data.

Most of the correlations were weakly or moderately correlated to one another (Table 4; Appendix K). Self-compassion and difficulties in emotional regulation were

found to have a significant strong negative relationship (p = -.77, *p* <.01). There were non-significant relationships found between interoception when correlated with ACEs, early life relational experiences and self-stigma individually. In addition, ACEs were not found to significantly correlate with any variables apart from early life relational experiences (p = .63, *p* <.01) where it was found to have a significant and strong positive correlation.

Table 4

Spearman's Rank-Order correlation matrix of the seven variables measured in the study

Measure	1	2	3	4	5	6	7
1. Adverse Childhood Experiences (ACE-Q)	-						
2. Early Life Relational Experiences (ELES)	.63**	-					
3. Interoception (MAIA-2)	.03	-.04	-				
4. Self- Compassion (SCS-SF)	-.10	-.40**	.40**	-			
5. Positive Affect and Wellbeing (Neuro QoL- SF)	-.11	-.32**	.32**	.34**	-		
6. Self-Stigma (Neuro QoL- SF)	.16	.29**	-.10	-.31**	-.23*	-	
7. Difficulties in Emotional Regulation (DERS-16)	.12	.44**	-.38**	-.77**	-.34**	.41**	-

Abbreviations: ACE-Q= Adverse Childhood Experience Questionnaire; ELES= Early Life Events Scale; MAIA-2= Multidimensional Assessment of Interoceptive Awareness Version 2; SCS-SF= Self-compassion Scale -Short Form; Neuro QoL-SF= Quality of Life in Neurological Disorders – Short Form; DERS-16= Difficulties in Emotion Regulation Scale.

*Indicates correlation is significant at .05, **indicates correlation is significant at .01

Multiple Regressions

For all regression analyses, predictor variables were entered into the model at the same time using the enter method.

Emotional Regulation

A multiple regression was conducted with early life relational experiences (ELES), ACEs (ACE-Q) and interoception (MAIA-2) entered as predictors and emotional regulation scores (DERS-16) as the outcome variable. The results show that the overall regression model was significant, $F (3, 87) = 15.86$, $p < .001$ (Table 5; Appendix K). accounting for 35.4% of the total variance in emotional regulation scores ($R^2 = .354$), 33.1% adjusted (Adjusted $R^2 = .331$). Higher levels of early life relational trauma significantly predicted higher difficulties in emotional regulation (ELES; $\beta = .532$, $p < .001$). Lower Interoceptive ability was found to significantly predict higher difficulties in emotional regulation (MAIA; $\beta = -.350$, $p < .001$). ACEs were not a significant predictor of difficulties in emotional regulation (ACE; $\beta = -.203$, $p=.069$). After adjusting for multiple comparisons using the Benjamini-Hochberg procedure, and FDR set at < 0.05, both early life relational trauma (adjusted $p= 0.006$) and interoception (adjusted $p= 0.011$) remained statistically significant.

The analysis was re-run with ACEs scores removed to improve precision. The model remained significant, $F (2, 88) = 21.52$, $p < .001$, and explained 32.8% of the variance in emotional regulation scores ($R^2 = .328$), and 31.3% when adjusted (adjusted $R^2 = .313$) (Table 6).

Table 5

Multiple regression analysis – Emotional Regulation (DERS-16)

Variable	B	SE B	β	sig
(Constant)	46.627	7.209		< .001
Early life Relational Trauma (ELES)	.589	.123	.532	< .001
ACEs (ACE-Q)	-1.489	.809	-.203	.069
Interoception (MAIA-2)	-1.087	.271	-.350	< .001

Note. $R^2 = .354$, adjusted $R^2 = .331$, F (3, 87) = 15.86, p < .001

Abbreviations: B - unstandardised beta co-efficient; SE - standard error; β - standardised beta coefficient; sig - significance level.

Table 6

Multiple regression analysis – Emotional Regulation (DERS-16) without non-significant predictor (ACE-Q)

Variable	B	SE B	β	sig

(Constant)	40.164	7.172		< .001
Early life Relational Trauma (ELES)	.448	.097	.405	< .001
Interoception (MAIA-2)	-1.142	.273	-.367	< .001

Note. R^2 = .328, adjusted R^2 = .313, F (2, 88) = 21.52, p < .001

Abbreviations: B - unstandardised beta co-efficient; SE - standard error; β - standardised beta coefficient; sig - significance level.

Positive Affect and Wellbeing

A multiple regression was conducted with early life relational experiences (ELES), ACEs (ACE-Q) and interoception (MAIA-2) entered as predictors and positive affect and wellbeing scores (Neuro-Qol-PAW) as the outcome variable. The results show that the overall regression model was significant, F (3, 87) = 9.09, p < .001 (Table 7; Appendix K) accounting for 23.9% of the total variance in positive affect and wellbeing scores (R_2 = .239), 21.3% adjusted (Adjusted R_2 = .213). In order of relative contribution, higher interoceptive ability (MAIA; β = -.362, p < .001) and lower levels of early life relational trauma significantly predicted higher positive affect and wellbeing (ELES; β = -.345, p=.005). ACEs were not a significant predictor of positive affect and wellbeing (ACE; β = .126, p=.295). After adjusting for multiple comparisons using the Benjamini-Hochberg procedure, and FDR set at < 0.05, both early life relational trauma (adjusted p= 0.022) and interoception (adjusted p= 0.017) remained statistically significant.

The analysis was re-run with ACEs scores removed to improve precision. The model remained significant, F (2, 88) = 13.08, p < .001, and explained 22.9% of the variance in positive affect and wellbeing scores (R_2 = .229), and 21.2% when adjusted (adjusted R_2 = .212) (Table 8).

Table 7

Multiple regression analysis – Positive affect and wellbeing (Neuro-Qol-PAW)

Variable	B	SE B	β	Sig
(Constant)	23.357	3.876		< .001
Early life Relational Trauma (ELES)	-.189	.066	-.345	.005
ACEs (ACE-Q)	.458	.435	.126	.295
Interoception (MAIA-2)	.557	.146	.362	< .001

Note. R^2 = .239, adjusted R^2 = .213, , F (3, 87) = 9.09, p < .001

Abbreviations: B - unstandardised beta co-efficient; SE - standard error; β - standardised beta coefficient; sig - significance level.

Table 8

Multiple regression analysis – Positive affect and wellbeing (Neuro-Qol-PAW) without non-significant predictor (ACE-Q)

Variable	B	SE B	β	Sig
(Constant)	22.577	3.807		< .001
Early life Relational Trauma (ELES)	-.146	.052	-.266	.006
Interoception (MAIA-2)	.574	.145	.373	< .001

Note. R^2 = .229, adjusted R^2 = .212, F (2, 88) = 13.08, p < .001

Abbreviations: B - unstandardised beta co-efficient; SE - standard error; β - standardised beta coefficient; sig - significance level.

Stigma

       A multiple regression was conducted with early life relational experiences (ELES), ACEs (ACE-Q) and interoception (MAIA-2) entered as predictors and stigma scores (Neuro-Qol-STIG) as the outcome variable. The results show that the overall regression model was significant, F (3, 87) = 2.82, p < .005 (Table 9; Appendix K), accounting for 8.9% of the total variance in stigma scores (R_2 = .089), 5.7% adjusted (Adjusted R_2 = .057). Only high early life relational trauma was found to significantly predict higher stigma (ELES; β = .279, p=<.05). Both interoception (MAIA; β = -.083, p = .426) and ACEs (ACE; β = -.002, p=.990) were not significant predictors of stigma. After adjusting for multiple comparisons using the Benjamini-Hochberg procedure, early life relational trauma no longer remained statistically significant at FDR < 0.05 (adjusted p= 0.028), meaning the overall regression model was no longer significant.

Table 9

Multiple regression analysis – Stigma (Neuro-Qol-STIG)

Variable	B	SE B	β	sig

	B	SE	β	sig
(Constant)	20.670	4.005		< .001
Early life Relational Trauma (ELES)	.144	.068	.279	.037
ACEs (ACE-Q)	-.120	.151	-.083	.426
Interoception (MAIA-2)	-.005	.449	-.002	.990

Note. R^2 = .089, adjusted R^2 = .057, F (3, 87) = 2.82, p < .005

Abbreviations: B - unstandardised beta co-efficient; SE - standard error; β - standardised beta coefficient; sig - significance level.

Moderation Analysis

The SPSS PROCESS Macro model 5.0 by Hayes [97] was applied to analyse the moderation effects of self-compassion on relationships between all significant predictor and outcome variables according to the regression analysis. The analyses were uncentred as high multicollinearity was not indicated [95]. All moderation analyses were non-significant. A multivariate moderation analysis was conducted with interoception and early life relational trauma as independent variables, self-compassion as the moderator, and difficulties in emotional regulation and positive affect and wellbeing as dependent variables.

For the moderation of self-compassion on difficulties in emotional regulation, the overall models were significant for early life relational trauma F(3, 87) = 43.224, p = <.001 adj R^2 = .585² and interoception F(3, 87) = 39.7, p = <.001 adj R^2 = .563² However, the interaction of interoception and self-compassion was not significant (p = .519). Neither was the interaction of early life relational trauma and self-compassion (p = .547). This suggests that relationships between early life relational trauma, interoception and difficulties in emotional regulation is not significantly moderated by self-compassion.

For the moderation of self-compassion on positive affect and wellbeing, the overall models were significant for early life relational trauma F(3, 87) = 5.724, p = .001 adj R^2 = .136² and interoception F(3, 87) = 6.662, p = <.001 adj R^2 = .159² However, the interaction of interoception and self-compassion was not significant (p = .770). Neither was the interaction of early life relational trauma and self-compassion (p = .183). This suggests that relationships between early life relational

trauma, interoception and positive affect and wellbeing is not significantly moderated by self-compassion.

The results of the analyses are seen in tables 10-11 and Appendix L.

Table 10

Analyses of moderation of Self-Compassion (SCS) on the relationships between Interoception (MAIA-2); Early life relational Trauma (ELES) and Difficulties in Emotional Regulation (DERS-16)

Variable	B	SE B	t	p	R²
(Constant)	105.418	12.976	8.124	<.001	.578
MAIA	-.591	.722	-.819	.415	
SCS	-20.475	4.903	-4.176	<.001	
Interaction	.158	.245	.647	.519	
(Constant)	91.568	14.785	6.194	<.001	.598
ELES	.018	.285	.062	.951	
SCS	-19.529	5.241	-3.727	<.001	
Interaction	.065	.108	.604	.547	

Abbreviations: B - unstandardised beta co-efficient; SE - standard error; p - significance level.

Table 11

Analyses of moderation of Self-Compassion (SCS) on the relationships between Interoception (MAIA-2); Early life relational Trauma (ELES) and Positive Affect and Wellbeing (Neuro-Qol-PAW)

Variable	B	SE B	t	p	R²
(Constant)	9.379	8.923	1.051	.296	.187
MAIA	.610	.496	1.229	.222	
SCS	3.135	3.372	.930	.355	
Interaction	-.049	.168	-.293	.770	
(Constant)	10.855	10.563	1.028	.307	.165
ELES	.152	.203	.749	.456	
SCS	7.792	3.744	2.081	.040	
Interaction	-.103	.077	-1.344	.183	

Abbreviations: B - unstandardised beta co-efficient; SE - standard error; sig - significance level.

Discussion

The study aimed to investigate the following within an FND population: 1) the predictive relationship between various psychological factors associated with the predisposition to FND (ACEs, early life relational trauma and interoception) and outcome factors including positive affect and wellbeing, emotional regulation, self-stigma and 2) the extent to which self-compassion moderates these relationships. The first two hypotheses are partially accepted and latter two rejected. Higher levels of early life relational trauma and lower interoceptive abilities significantly predicted greater difficulties in emotional regulation, meaning hypothesis one has been partially met. Lower early life relational trauma and higher interoceptive ability significantly predicted higher positive affect and wellbeing, meaning hypothesis two is also partially met. While relational trauma initially predicted higher self-stigma, this effect did not hold after correction for multiple comparisons. Finally, self-compassion did not moderate any of the predictor–outcome relationships tested. The findings highlight the unique predictive value of interoception and relational trauma over ACEs within the FND population and indicate towards further research and intervention.

The findings for emotional regulation provide strong support for the predictive role of early life relational trauma and interoception in individuals with FND, together accounting for 35% of the variance, indicating both factors play a meaningful role in emotional regulation for this population. This suggests that within the FND population, the quality of early attachment may play a more prominent role in emotional functioning than general exposure to adversity. The non-significance of ACEs supports this interpretation, as the ACE-Q may not capture the interpersonal and relational nuances that are more relevant to FND development. This is consistent with theory [99-101] with the relationship thought to develop as trauma may hinder development of emotional regulation abilities, meaning emotional sensitivity and dysregulation [102–104]. One explanation proposed is that caregivers who are inconsistent in care and affection towards children, may be experiencing difficulties regulating their own emotions [105]. In addition, neurobiological models suggest FND symptomology as a result of mismanagement of energy and sensory processing difficulties, exacerbated by psychosocial experiences such as, trauma[106]. Another suggests limbic (amygdala) hyperactivation, impaired interoception, suboptimal

emotional regulation, and disorder in interpretation of affective stimuli are impairments potentially due to biological and psychosocial factors such as exposure to early trauma [7]. These findings indicate a shift to further understanding FND symptoms from a physiological perspective with impairment in emotional processing versus repression of emotions, described historically.

The results for positive affect and wellbeing also supported the predictive role of early life relational trauma and interoception, though more modest. The model accounted for a significant but less pronounced relationship when compared to emotional regulation and reinforced the findings that relational trauma may have a more direct impact on wellbeing than ACEs within FND. Findings align with research indicating that higher interoceptive ability can predict use of positive emotional regulation strategies which in turn, leads to better management of psychological difficulties [107]. Also, early childhood trauma can have profound and cumulative impact on mental health and wellbeing [108], increasing susceptibility to mood disorders such as post-traumatic stress disorder (PTSD), depression and anxiety [109]. Importantly, the findings support clinical approaches such as mindfulness-based psychotherapies, aimed at enhancing interoceptive awareness, which have been shown to have a positive effect on mental health symptomology [110]. This raises the possibility that enhancing interoception may not improve only emotional regulation but broader quality of life outcomes in FND and indicates areas for further research and/or intervention pathways.

Although initial regression analysis showed early life relational trauma predicted higher stigma scores, this effect was no longer significant after correction for multiple comparisons. Therefore, hypothesis three was not supported. The findings suggest that while there may be an association between relational trauma and stigma in FND, the strength of this relationship is relatively small and potentially sensitive to sample size or measures used. This aligns with previous research of a relationship between adversity in early life and stigma in FND [69-70], however the predictive power may have not been robust enough in this sample. Looking at the wider literature, individuals with FND often face negative and stigmatising attitudes from others [46] which may further exacerbate exclusion and social withdrawal [111]. Additionally, historical misunderstanding feeds into a stigma associated with a FND

diagnosis in trying to distinguish it from feigning or malingering [112-114]. People with FND have reported to seek to distance themselves from a label they feel to be unacceptable, finding psychiatric explanations of physical symptoms insufficient [115]. Self-stigma can negatively impact interventions, influencing an individual's ability to seek help and inhibiting accessing support that may be available through healthcare professionals [66]. While stigma has been identified as a key barrier to help-seeking, it is important to recognise that experiences of stigma are likely to differ depending on the subtype of FND. For instance, those with PNES/FS may face delegitimization of this from clinicians [116] whereas motor symptoms may be seen through the lens of physical disability, potentially eliciting different responses from healthcare workers. Future research should aim to tailor approaches according to symptom type and the social contexts in which they are experienced. Further, relevant to the current findings, research should explore the potential predictors of stigma in FND, based on previous research which may account for the variance in the findings.

It was found that self-compassion did not significantly moderate any of the relationships found in the regression. This is unexpected given theoretical underpinnings of compassion relate it to early adversity and trauma, leading to high levels of shame and self-criticism and associated with heightened sensitivity to threat [65-66;117]. However, overall self-compassion was between low-moderate for majority of the sample, indicating deficits within self-compassion within the sample population. This concurs with previous findings that self-compassion is lower in FND compared to a healthy control [118]. Additionally, self-compassion significantly correlated with all measures, except ACES. It is therefore suggested that although self-compassion may not moderate relationships to a significant degree, a possible relationship exists which is worth investigating more deeply. One study has sought to investigate the potential for compassion focused interventions with an FND population [75]. The intervention did not produce reliable change regarding a measure of self-compassion however, it did improve overall psychological impact of FND (i.e. anxiety, depression) to below clinical levels. Additionally, compassion focused interventions have been found to be beneficial in the context of trauma which could be helpful if identified during assessment [119]. It is therefore indicated that further assessment of the presence and function of self-compassion is needed within an FND population.

The overall predictive value of the regression models ranged from moderate to small. This suggests that while early life relational trauma and interoception are meaningful predictors within this FND sample, a large proportion of variance remains unaccounted for, indicating the involvement of additional psychological, physiological, or social variables not captured in this study. Unexpectedly, ACEs were not significant in any model despite prior literature suggesting a strong link [2;7; 120]. The lack of relationship was, however, supported by a recent study that found no relationship between difficulties with emotion regulation and childhood trauma, also measured by the ACE and DERS [121]. One potential explanation is that the ACE-Q captures broad categories of adversity, meaning it may be less sensitive to the subtle relational dynamics captured by the ELES. This is supported by the high correlation between the two measures indicting conceptual overlap. It is also possible that the overall low average ACE-Q score, below the clinical threshold of 4, reduced the likelihood of a significant effect (M=3.43; SD=2.34). Interestingly, two ACE-Q questions had a higher frequency of 'yes' replies (Q1: 59.3%; Q4: 58.2%). These queried feelings of fear, humiliation, subordination, and lack of love/care from family, tapping into relational experiences, reinforcing the idea that relationship-based trauma may be more relevant to FND outcomes [30] than broader categories of adversity. Additionally, the potential of a type-II error must be acknowledged due to error in ACEs measure administration (see 'Limitations'). The ACE measure did, however, correlate highly with the early life relational trauma measure, as expected, suggesting that administration error may not fully explain the lack of significance.

Clinical relevance

Self-compassion was not found to mediate the relationships found within the study and therefore we cannot make conclusions regarding its utility as a therapeutic intervention. It is then worth considering other possible psychological interventions that are supported by the findings of the study. Early relational trauma and interoception are possibly predictive of emotional regulation difficulties and wellbeing. It may be then worth considering trauma-informed approaches to FND treatment, with a focus on emotional regulation skills such as Dialectical Behaviour Therapy (DBT) [122]. DBT offers a structured and evidenced-based approach effective in targeting both emotional dysregulation and interpersonal difficulties, both

which may arise from trauma. Clinicians should aim to robustly assess early life trauma, not just in relation to ACEs, to appropriately target attachment and emotional development deficits within therapeutic work.

Further, better interoceptive ability may improve wellbeing. Therapies to enhance bodily awareness i.e. mindfulness-based interventions, Body Signal Integration Training (BSI) may be effective in improving interoceptive abilities [123-124]. Another therapeutic intervention worth consideration is Psychodynamic Interpersonal Therapy (PIT) which targets early dysfunctional relationship patterns and includes somatic trauma therapy to build mind-body awareness. A pilot study, on an FND sample, showed improved wellbeing, quality of life, mental and general health symptomology sustained at 6 months [125], though not consistently replicated [126]. Routine screening for trauma in FND services is recommended to tailor interventions to individual needs and relevant areas.

Strengths and Limitations

The study is the first of its kind to not only look at the relationship between all the variables assessed, but also the first to assess the moderating role of self-compassion on relationships within an FND population. Although self-compassion findings were non-significant, further research is supported as well as into possible interventions. Furthermore, research supports that early relational trauma may be more associated with FND than ACES[2,30], indicating additional appropriate treatment pathways

A key limitation was the large amount of incomplete data, resulting in the exclusion of many participants. Qualitative feedback indicated that the study's attentional demands were too high, leading to dropouts. Given that individuals with FND often report cognitive symptoms, including reduced visual and auditory attention [127-130], it may have been beneficial to pilot the study with an FND sample to ensure suitability and reduce attrition. Despite this, the study did recruit a high sample size to obtain appropriate power.

Design issues include the cross-sectional nature preventing any conclusions about causality. Also, an error in administration the ACEs questionnaire deviated it

from the standard 10-item format [82]. This may have influenced scores and interpretation, particularly as the population mean fell just below clinical thresholds. It is hoped that exposure to caregiver substance misuse, was captured in question 8 of the ACE-Q (see Appendix G). Further, the MAIA scores of internal consistency were found to be low in the original study [82] raising questions on its strength as a measure. However, it is the only self-report interoceptive measure used in FND [81] and internal consistency ranged from acceptable to good in the current study.

Participants were recruited worldwide through convenience and purposive sampling. However, demographic information regarding ethnicity and geographic location was not collected, limiting assessment of sample representativeness. Given known disparities in access to care and diagnosis based on race and cultural background [131-132] and variance in ethnographic conceptualisations of FND [46] this is a notable omission.

Diagnosis was self-reported and could not be verified and measures were self-report, making them subject to recall bias and social desirability. However, no incentives were offered, and participants accessed the study via private social media groups for those with FND.

Finally, the sample was predominantly female, reflecting typical FND demographics [21, 39-40,118], but limiting generalisability to males.

Future Research
Future research should continue to investigate the mechanisms of FND. Given the relationship found between interoception, emotional regulation and wellbeing, it would be important to focus more in depth on how interoceptive deficits may develop in FND and whether these mediate outcomes of FND. This could be done through longitudinal research or incorporation of neural imaging. Interoceptive ability has been linked to better emotional regulation [109] and management of PTSD symptomology [110] and so would be worth further investigation.

Further, ACEs did not significantly predict outcomes, but early life relational trauma did. This indicates that there should be a broader conceptualisation of trauma

aside from the commonly used ACEs categories. Measures developed to assess developmental and attachment-based trauma in FND populations (i.e. LiNES [30]) should be used within research examining trauma experiences to understand their potential clinical utility.

Given the correlational relationship found, future research could explore whether self-compassion mediates, as opposed to moderates, the effects of trauma on psychological outcomes in FND. This may provide information on whether, instead, self-compassion forms part of the pathway between trauma and outcomes as opposed to buffering this relationship, as initially hypothesised.

Our study did not find the predictive variables to be significantly associated with stigma. Qualitative research in this area may provide a clearer and richer understanding around the experiences of stigma for those with FND and how this may be internalised, alongside other life experiences.

Another key consideration regards variation in outcome measures employed in FND research, which may lead to overestimation of symptom severity due to reliance on subjective reports, fluctuating presentations and heterogeneity in assessed domains with little consensus regarding a standardised approach [133-135]. Interpretation of measures, both clinically and in research, should be taken with caution and consensus around a core outcome set, that is well-validated with a mixed patient, and clinician-rated instruments should be prioritised.

Conclusion

The study is novel, adding to the growing body of research seeking to understand the psychological and physiological aspects of FND diagnosis and symptomology. Relationships found suggest future research into understanding more in depth the impact of relational trauma and interoception in FND could be useful in understanding outcomes as well as focus for intervention.

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<u>Appendices</u>

Appendix A

Author Guidelines for Submission

Article type	Length	Abstract	Figures/ Tables	Purpose/ features
Original research	6,000 words Up to 100 references	Structured ≤ 250 words No citations	Minimum 2 tables and/or figures	Original Research: Reports the results of a formal study based on original research.

Preparing your article for submission

Original Research: Articles should be separated into the following sections:

- Title page (including Author List)
- Structured Abstract (Objective, Methods, Results, Conclusion; no more than 250 words)
- Keywords
- Introduction
- Methods
- Results
- Discussion
- Conclusion
- Acknowledgements
- Funding
- Competing interests
- References
- Tables and/or Figures (minimum of two)
- Preferred formats: mpg/mpeg, mp4 or mov

Author list: Please list names as they should appear in the published version. One author must be identified as the 'corresponding author.'

<="" b="" style="box-sizing: border-box;">

On the title page of the uploaded manuscript file, please list the designated corresponding author's contact information, in the way that person would want it to appear publicly (please note that we don't publish phone numbers). In this section only, please also include the corresponding author's main academic degree (for example, MD, PhD, MBBS, etc.).

Footnotes and endnotes are not permitted. If you decide to include any text at the bottom of your table(s) and/or figure(s), please exclude any dividing lines preceding that text.

Clinical Implications

Where appropriate, authors of Reviews, Perspectives, and Meta-Guidelines may elect to also include a number of Clinical Implication points to be presented in addition to the Abstract and Conclusion. These will be most appropriate for articles that discuss material from preclinical studies and will be used to explain the findings and comment on their possible clinical applications. Authors may include 3 to 5 points that are constructed as full sentences. They should be clear, unambiguous, and aid the comprehension of the material being discussed. Clinical Implications will be assessed as part of the peer review process and authors may be asked to alter and update the points, or to remove them if they are not felt to add to the article.

Neuroscience-based Nomenclature (NbN-2) Terminology

CNS Spectrums encourages the use of Neuroscience-based Nomenclature (NbN-2) terminology for psychotropic medications, as it reflects contemporary pharmacological knowledge, rather than arbitrary descriptors based on indications or chemical structure. Please download the free app for NbN-2 (http://nbnomenclature.org/) and the NbN-2 Instructions for Authors (http://nbnomenclature.org/authors).

While you are welcome to use NbN-2 throughout the manuscript, as a minimum requirement we ask that on first mention in the paper, substances are referred to by their NbN-2 classification. In addition, we ask that all substances studied in the paper receive NbN-2 compliant keywords (e.g. eleven pharmacological domains and nine mode of action).

Reference style

Please use American Medical Association (AMA) style. References should be superscripted in text, then numbered, and comprehensive in list. Please number these references in the order that they appear in the text. These superscript numbers in the text should match the numbers and order of the references in the reference list (you should not list the references in alphabetical order). List all authors when there are six or fewer; for seven or more authors, list only the first three and add "et al." (please note that this excludes authors of citations listed in tables and figures). Abbreviations of journals' names should conform to the style used in Index Medicus; journals that are not indexed there should not be abbreviated. When following this format, please do not list any reference in your reference list more than once.

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Authors, particularly those whose first language is not English, may wish to have their English-language manuscripts checked by a native speaker before submission. This step is optional, but may help to ensure that the academic content of the paper is fully understood by the Editor and any reviewers.

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Artwork, Figures, and Other Graphics

Tables, figures, and images must be cited in the text, for example (see Table 1). They should be numbered consecutively in Arabic numerals and captioned appropriately. Tables should appear **in an editable format** at the end of the article (figures should be submitted as separate figure files). Neither should not be interspersed in the text. For detailed information on figure preparation, please see the [Cambridge Journals Artwork Guide](#).

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Authors must include a Competing interests declaration (formerly titled 'Disclosures' or 'Conflicts of interest declaration') in their manuscript when they submit, which should be published in their article. These include any situation that could be perceived to exert an undue influence on an author's presentation of their work. They may include, but are not limited to, financial, professional, contractual or personal relationships or situations.

If the manuscript has multiple authors, the Competing interest declarations should list all contributing authors, e.g., "**Competing interests.** Author A is employed at company B. Author C owns shares in company D, is on the Board of company E and is a member of organisation F. Author G has received grants from company H in the past."

If one or more coauthors do not have anything to disclose, please include that information in this section.

Ethical considerations

Where research involves human and/or animal experimentation, the following statements should be included (as applicable) in the Methods section: "The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008." and "The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional guides on the care and use of laboratory animals." Articles reporting randomised trials must conform to the standards set by the Consolidated

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Authors should also review our standard ethics policies prior to submission.

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All authors listed on any papers submitted to this journal must be in agreement that the authors listed would all be considered authors according to disciplinary norms, and that no authors who would reasonably be considered an author have been excluded. For further details on this journal's authorship policy, please see this journal's publishing ethics policies.

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Clinical Trials

As a condition of consideration for publication, registration of clinical trials in a public trials registry is required. A clinical trial is defined by the International Committee of Medical Journal Editors (in accordance with the definition of the World Health Organisation) as any research project that prospectively assigns human participants or groups of humans to one or more health- related interventions to evaluate the effects on health outcomes. Trials must be registered before the start of patient enrollment. The registry must be accessible to the public at no charge. It must be open to all prospective registrants and managed by a not-for-profit organization. There must be a mechanism

to ensure the validity of the registration data, and the registry should be electronically searchable. An acceptable registry must include at minimum a unique trial number, trial registration date, secondary identification information if assigned by sponsors or others, funding source(s), primary and secondary sponsor(s), responsible contact person, research contact person, official scientific title of the study, research ethics review, the medical condition being studied, intervention(s), key inclusion and exclusion criteria, study type, anticipated trial start date, target sample size, recruitment status, primary outcome, and key secondary outcomes. Registration information must be provided at the time of submission. Trial registry name, registration identification number, and the URL for the registry should be included at the end of the abstract.

Manuscripts reporting the results of randomized controlled trials should include a "CONSORT" flow diagram as a figure in the manuscript to illustrate the progress of all patients in the study (See: Schulz KF, Altman D, for the CONSORT Group. The CON- SORT statement: revised recommendations for improving the quality of reports of parallel-group randomized trials. JAMA. 2001;285(15):1987–1991.)

Acknowledgements

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We are aware that authors sometimes receive assistance from technical writers, language editors and/or writing agencies in preparing manuscripts for publication. Such assistance must be noted in the cover letter and in the Acknowledgements section along with a declaration that the author(s) are entirely responsible for the scientific content of the paper. Failure to acknowledge assistance from technical writers, language editors and/or writing agencies in preparing manuscripts for publication in the cover letter and in the Acknowledgements section may lead to disqualification of the paper. Authors may use the format "The author(s) thank [name and qualifications] of [company, city, country] for providing [medical/technical/language] writing support/editorial support [specify and/or expand as appropriate], which was funded by [sponsor, city, country]."

Funding

Within this section please provide details of the sources of financial support for all authors, including grant numbers, for example: "This work was supported by the Medical Research Council (grant number XXXXXXX)".

Multiple grant numbers should be separated by a comma and space, and where research was funded by more than one agency the different agencies should be separated by a semi-colon, with "and" before the final funder. Grants held by different authors should be identified as belonging to individual authors by the authors' initials, for example: "This work was supported by the Wellcome Trust (AB, grant numbers XXXX, YYYY), (CD, grant number ZZZZ); the Natural Environment Research Council (EF,

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Supplementary materials will be published with the same metadata as your parent article, and are considered a formal part of the academic record, so cannot be retracted or modified other than via our article correction processes. Supplementary materials will not be typeset or copyedited, so should be supplied exactly as they are to appear online. Please make sure you are familiar with our detailed guidance on supplementary materials prior to submission.

Where relevant we encourage authors to publish additional qualitative or quantitative research outputs in an appropriate repository, and cite these in manuscripts.

Appendix B
Staffordshire University Ethical Approval

University of Staffordshire

School of Health, Education, Policing and Sciences

ETHICAL APPROVAL FEEDBACK

Researcher name:	Ciara Fay
Title of Study:	Self-compassion and FND: does adverse childhood experiences, childhood relational trauma and interoceptive abilities predict emotional regulation, self-stigma, positive affect and wellbeing within the FND population and to what extent is this relationship moderated by
Status of approval:	Approved

Thank you for addressing the committee's comments.

To be actioned:

- **Details of the chair of ethics need to be updated to Sarahjane Jones, ethics@staffs.ac.uk**
- **Supervisors contact details need to be on the information sheet and debrief form.**

Your research proposal has now been approved by the Ethics Panel pending receipt of the above amendments. Once we receive the above amendments you may commence the implementation phase of your study. You should note that any divergence from the approved procedures and research method will invalidate any insurance and liability cover from the University. You should, therefore, notify the Panel of any significant divergence from this approved proposal. This approval is only valid for as long as you are registered as a student at the University.

You should arrange to meet with your supervisor for support during the process of completing your study and writing your dissertation.

When your study is complete, please send the ethics committee an end of study report. A template can be found on the ethics BlackBoard site.

Signed: **Date: 06.11.2024**

Sarah Rose

Dr. Sarah Rose

Ethics Co-ordinator - HEPS

Version Number: 3 23/10/2024

INFORMATION SHEET FOR PARTICIPANTS

Project Reference Number:

Study Title: Self-compassion and FND: does adverse childhood experiences, childhood relational trauma and interoceptive abilities predict emotional regulation, self-stigma, positive affect and wellbeing within the FND population and to what extent is this relationship moderated by self-compassion?

Researcher: Ciara Fay

I would like to invite you to participate in this research project which forms part of my Doctorate in Clinical Psychology. Before you decide whether you want to take part, it is important for you to understand why the research is being done and what your participation will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask me if there is anything that is not clear or if you would like more information.

What is the purpose of the study?

The study is being completed as part of my doctoral qualification thesis.

The studies' aim is to understand factors which influence self-compassion within the population of those diagnosed with a Functional Neurological Disorder (FND). We are looking to establish a link, if any, between various psychological concepts and self-compassion levels and also, how self-compassion may influence experiences in the present.

Why have I been invited to take part?

You have been invited to take part as you have a diagnosis of FND and/or a subtype of FND, are over the age of 18 and able to read and understand English.

What will happen if I take part?

You will be required to complete a number of questionnaires. The questionnaires will be accessed and completed online via Qualtrics. You will be provided with a link to access the questionnaires or use the QR code. The questionnaires should take you around 15-18 minutes to complete.

Before completing the online questionnaires, you must consent to taking part in the study by signing a consent form. Firstly, you will be asked to provide some demographic information including your age, gender and diagnosis. This is so we can get a better understanding of the population completing the study.

There will then be seven questionnaires for you to complete, each designed to assess a different psychological construct. The psychological constructs we will be assessing include childhood trauma, bodily awareness, early life memories of your parent/caregiver, levels of self-compassion, emotional regulation and quality of life factors of wellbeing and stigma. Instructions of how to complete each questionnaire will be provided prior to completing the questionnaire. You will be required to answer **all** the questions and will not be able to skip any questions/questionnaires.

You will be provided a debrief information sheet once you have completed the online questionnaire which will include the researcher's contact details and signposting to relevant support services, should you require any further support.

Do I have to take part?

Participation is completely voluntary. You should only take part if you want to and choosing not to take part will not disadvantage you in anyway. Once you have read the information sheet, please contact us if you have any questions that will help you make a decision about taking part. If you decide to take part, we will ask you to sign a consent form.

What are the possible risks of taking part?

The study is not designed to cause you any harm, however, it may bring up some uncomfortable feelings and possible distress to think about the topic discussed. Furthermore, the questionnaires of the study will ask you about potentially distressing memories requiring you to think about childhood trauma, distressing events and emotions. This may cause you distress. You are advised to take breaks if you need to and to withdraw from the study at any time should you be feeling unable to continue.

You will also be provided access to a debrief and contact information for relevant support services both at the start and end of the study.

What are the possible benefits of taking part?

There are no direct benefits to taking part in this research however, it is hoped that the outcome from the project will be used to add to a base of literature to further understand factors influencing the development of FND and treatments which may lead to better psychological wellbeing and quality of life.

Data handling and confidentiality

Your data will be processed in accordance with the data protection law and will comply with the General Data Protection Regulation 2016 (GDPR). Data collected will be stored on a secure laptop. If information is to be transferred at any point, it will be encrypted and/or stored within a password protected folder.

In accordance with Staffordshire University regulations, data is to be stored for 10 years post end of the project after which it will be destroyed. This data will only be accessed by the lead researcher and university supervisor. It is possible for the university to request access to the data as they reserve the right to audit any research completed following their approval.

Before completing the study, you will be asked to create a unique identifier code. This will mean that if you want to withdraw your data in the future, we will be able to do so without requiring any personal information. We ask that you create a code that is made up of numbers or letters but does not contain any personally identifiable information i.e. dates of birth. It may be helpful to store a copy of this in a safe place where you can access it should you wish to withdraw the data you have provided within two weeks of completing the study.

Data Protection Statement

The data controller for this project will be Staffordshire University. The University will process your personal data for the purpose of the research outlined above. The legal basis for processing your personal data for research purposes under the data protection law is a 'task in the public interest' You can provide your consent for the use of your personal data in this study by completing the consent form that has been provided to you.

What if I change my mind about taking part?

You are free withdraw at any point of the study, without having to give a reason. Withdrawing from the study will not affect you in any way. You are able to withdraw your data from the study for up to 2 weeks after you completed the questionnaire. After this date, withdrawal of your data will no longer be possible as it would have been processed and already committed to the final thesis.
If you choose to withdraw from the study, we will not retain any information that you have provided us as a part of this study.

How is the project being funded?

This project is self-funded.

Who has approved the project?

The project has been approved by the Staffordshire University Ethics panel.

What will happen to the results of the study?

The results of the study will be submitted to the university as part of a Doctorate in Clinical Psychology dissertation. It is also intended that the results will be submitted to a peer-reviewed journal for publishing.

Who should I contact for further information?

If you have any questions or require more information about this study, please contact me or my academic supervisor, using the following contact details:

Lead researcher: Ciara Fay

Email contact: f042168m@student.staffs.ac.uk

Academic Supervisor: Dr Yvonne Melia

Email contact: Yvonne.Melia@staffs.ac.uk

What if I have further questions, or if something goes wrong?

If this study has harmed you in any way or if you wish to make a complaint about the conduct of the study you can contact the study supervisor or the Chair of the Staffordshire University Ethics Committee for further advice and information:

Chair: Sarah Jane Jones

Email contact: ethics@staffs.ac.uk

Thank you for reading this information sheet and for considering taking part in this research.

CONSENT FORM

Self-compassion and FND: does adverse childhood experiences, childhood relational trauma and interoceptive abilities predict emotional regulation, self-stigma, positive affect and wellbeing within the FND population and to what extent is this relationship moderated by self-compassion?

Name of Researcher: Miss Ciara Fay

Please initial box

1. I confirm that I have read the information sheet dated 10/05/2024 (version 2) for the above study. I have had the opportunity to consider the information, ask questions and have answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected.

3. I understand that the information collected about me will be used to support other research in the future and may be shared anonymously with other researchers.

4. I understand that the study will take around 15-18 minutes of my time.

5. I understand my data will be processed in accordance with the data protection law and will comply with the General Data Protection Regulation 2016 (GDPR). Data collected will be stored on a secure laptop.

6. I understand that I will not be identifiable from the results of the research and that the results will be written up as part of a Professional Doctorate in Clinical Psychology.

☐

7. I understand that I may withdraw my data up to two weeks after I have completed the

   questionnaires

☐

8. I agree that in accordance with Staffordshire University regulations, data is to be stored for 10 years post end of the project after which it will be destroyed. This data will only be accessed by the lead researcher and university supervisor. It is possible for the university to request access to the data as they reserve the right to audit any research completed following their approval.

☐

9. I agree to take part in the above study.

☐

_____   _____   _____

Name of Participant   Date   Signature

_____   _____   _____

Name of Person   Date   Signature
seeking consent

Gender: how do you identify?	
	Male
	Female
	Non-binary
	Prefer not to say
	Prefer to self-describe, below:

Age: what age range do you sit within?	
	18-30
	31-45
	46-60
	61-75
	76-90
	90+

What diagnosis do you feel you identify with most?	
	Functional Neurological Disorder (FND)
	Functional Movement Disorders (FMD)
	Motor Functional Neurological Disorder (mFND)
	Functional Seizures (FS)/Psychogenic Non-epileptic Seizures (PNES)
	Something else, fill below

Ace-q

Instructions:

While you were growing up, during your first 18 years of life:

		No	Yes
1	Did a parent or other adult in the household often… Swear at you, insult you, put you down, or humiliate you? or Act in a way that made you afraid that you might be physically hurt?	0	1
2	Did a parent or other adult in the household often… Push, grab, slap, or throw something at you? or Ever hit you so hard that you had marks or were injured?	0	1
3	Did an adult or person at least 5 years older than you ever… Touch or fondle you or have you touch their body in a sexual way? or Try to or actually have oral, anal, or vaginal sex with you?	0	1
4	Did you often feel that… No one in your family loved you or thought you were important or special? or Your family didn't look out for each other, feel close to each other, or support each other?	0	1
5	Did you often feel that… You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you? or Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?	0	1
6	Were your parents ever separated or divorced?	0	1
7	Was your mother or stepmother: Often pushed, grabbed, slapped, or had something thrown at her? or Sometimes or often kicked, bitten, hit with a fist, or hit with something hard? or Ever repeatedly hit over at least a few minutes or threatened with a gun or knife?	0	1
8	Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?	0	1
9	Was a household member depressed or mentally ill or did a household member attempt suicide?	0	1
10	Did a household member go to prison?	0	1

ELES

This scale is designed to explore your memories of your childhood. Research suggests that early experiences play a role in later psychological difficulties. Below are a set of questions that tap various aspects of early life. Read each question carefully and rate how true each statement is for you. To do this, circle a number under each statement.

Completely untrue	Very occasionally true	Sometimes true	Fairly true	Very true
1	2	3	4	5

1. I often had to give in to others at home

    1   2   3   4   5

2 I felt on edge because I was unsure if my parents might get angry with me

    1   2   3   4   5

3 I rarely felt my opinions mattered much

    1   2   3   4   5

4 There was little I could do to control my parents' anger once they became angry

    1   2   3   4   5

5 If I didn't do what others wanted I felt I would be rejected

    1   2   3   4   5

6 I felt able to assert myself in my family

    1   2   3   4   5

7 I felt very comfortable and relaxed around my parents

    1   2   3   4   5

8 My parents could hurt me if I did not behave in the way they wanted

    1 2   3   4   5

9 I felt an equal member of my family

    1   2   3   4   5

10 I often felt subordinate in my family

    1   2   3   4   5

11 My parents exerted control by threats and punishments

    1   2   3   4   5

12 I often had to go along with others even when I did not want to

    1   2   3   4   5.

13 In order to avoid getting hurt I used to try to avoid my parents

    1   2   3   4   5

14 The atmosphere at home could suddenly become threatening for no obvious reason

    1   2   3   4   5

15 I experienced my parents as powerful and overwhelming

    1   2   3   4   5

MAIA-2

Below you will find a list of statements. Please indicate how often each statement applies to you generally in daily life.

	Circle one number on each line					
	Never					Always
1. When I am tense I notice where the tension is located in my body.	0	1	2	3	4	5
2. I notice when I am uncomfortable in my body.	0	1	2	3	4	5
3. I notice where in my body I am comfortable.	0	1	2	3	4	5
4. I notice changes in my breathing, such as whether it slows down or speeds up.	0	1	2	3	4	5
5. I ignore physical tension or discomfort until they become more severe.	0	1	2	3	4	5
6. I distract myself from sensations of discomfort.	0	1	2	3	4	5
7. When I feel pain or discomfort, I try to power through it.	0	1	2	3	4	5
8. I try to ignore pain	0	1	2	3	4	5
9. I push feelings of discomfort away by focusing on something	0	1	2	3	4	5
10. When I feel unpleasant body sensations, I occupy myself with something else so I don't have to feel them.	0	1	2	3	4	5
11. When I feel physical pain, I become upset.	0	1	2	3	4	5
12. I start to worry that something is wrong if I feel any discomfort.	0	1	2	3	4	5
13. I can notice an unpleasant body sensation without worrying about it.	0	1	2	3	4	5
14. I can stay calm and not worry when I have feelings of discomfort or pain.	0	1	2	3	4	5
15. When I am in discomfort or pain I can't get it out of my mind	0	1	2	3	4	5
16. I can pay attention to my breath without being distracted by things happening around me.	0	1	2	3	4	5
17. I can maintain awareness of my inner bodily sensations even when there is a lot going on around me.	0	1	2	3	4	5
18. When I am in conversation with someone, I can pay attention to my posture.	0	1	2	3	4	5

How often does each statement apply to you generally in daily life? Circle one number on each line

	Never					Always
19. I can return awareness to my body if I am distracted.	0	1	2	3	4	5
20. I can refocus my attention from thinking to sensing my body.	0	1	2	3	4	5
21. I can maintain awareness of my whole body even when a part of me is in pain or discomfort.	0	1	2	3	4	5
22. I am able to consciously focus on my body as a whole.	0	1	2	3	4	5
23. I notice how my body changes when I am angry.	0	1	2	3	4	5
24. When something is wrong in my life I can feel it in my body.	0	1	2	3	4	5
25. I notice that my body feels different after a peaceful experience.	0	1	2	3	4	5
26. I notice that my breathing becomes free and easy when I feel comfortable.	0	1	2	3	4	5
27. I notice how my body changes when I feel happy / joyful.	0	1	2	3	4	5
28. When I feel overwhelmed I can find a calm place inside.	0	1	2	3	4	5
29. When I bring awareness to my body I feel a sense of calm.	0	1	2	3	4	5
30. I can use my breath to reduce tension.	0	1	2	3	4	5
31. When I am caught up in thoughts, I can calm my mind by focusing on my body/breathing.	0	1	2	3	4	5
32. I listen for information from my body about my emotional state.	0	1	2	3	4	5
33. When I am upset, I take time to explore how my body feels.	0	1	2	3	4	5
34. I listen to my body to inform me about what to do.	0	1	2	3	4	5
35. I am at home in my body.	0	1	2	3	4	5
36. I feel my body is a safe place.	0	1	2	3	4	5
37. I trust my body sensations.	0	1	2	3	4	5

Positive affect and wellbeing

Positive Affect and Well-Being - Short Form

Please respond to each question or statement by marking one box per row.

	Lately…	Never	Rarely	Sometimes	Often	Always
NQPPF14	I had a sense of well-being………………	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
NQPPF12	I felt hopeful………………………………..	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
NQPPF15	My life was satisfying……………………	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
NQPPF20	My life had purpose………………………	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
NQPPF17	My life had meaning………………………	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
NQPPF22	I felt cheerful……………………………..	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
NQPPF19	My life was worth living…………………	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
NQPPF16	I had a sense of balance in my life……….	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
NQPPF07	Many areas of my life were interesting to me………………………………………....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Self-stigma

Stigma-Short Form

Please respond to each question or statement by marking one box per row.

	Lately…	Never	Rarely	Sometimes	Often	Always
NQSTG02	Because of my illness, some people avoided me………………………………….	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
NQSTG04	Because of my illness, I felt left out of things…………………………………….	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
NQSTG 08	Because of my illness, people avoided looking at me………………………………	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
NQSTG 16	I felt embarrassed about my illness………	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
NQSTG 01	Because of my illness, some people seemed uncomfortable with me…………	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
NQSTG 17	I felt embarrassed because of my physical limitations………………………………..	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
NQSTG05	Because of my illness, people were unkind to me ……………………………..	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
NQSTG21	Some people acted as though it was my fault I have this illness……………………	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

SCS-SF

Please read each statement carefully before answering. To the left of each item, indicate how often you behave in the stated manner, using the following scale:

Almost never				Almost always
1	2	3	4	5

_____ 1. I'm disapproving and judgmental about my own flaws and inadequacies.

_____ 2. When I'm feeling down I tend to obsess and fixate on everything that's wrong.

_____ 3. When things are going badly for me, I see the difficulties as part of life that everyone goes through.

_____ 4. When I think about my inadequacies, it tends to make me feel more separate and cut off from the rest of the world.

_____ 5. I try to be loving towards myself when I'm feeling emotional pain.

_____ 6. When I fail at something important to me I become consumed by feelings of inadequacy.

_____ 7. When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am.

_____ 8. When times are really difficult, I tend to be tough on myself.

_____ 9. When something upsets me I try to keep my emotions in balance.

_____ 10. When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.

_____ 11. I'm intolerant and impatient towards those aspects of my personality I don't like.

_____ 12. When I'm going through a very hard time, I give myself the caring and tenderness I need.

_____ 13. When I'm feeling down, I tend to feel like most other people are probably happier than I am.

_____ 14. When something painful happens I try to take a balanced view of the situation.

_____ 15. I try to see my failings as part of the human condition.

_____ 16. When I see aspects of myself that I don't like, I get down on myself.

_____ 17. When I fail at something important to me I try to keep things in perspective.

_____ 18. When I'm really struggling, I tend to feel like other people must be having an easier time of it.

_____ 19. I'm kind to myself when I'm experiencing suffering.

_____ 20. When something upsets me I get carried away with my feelings.

_____ 21. I can be a bit cold-hearted towards myself when I'm experiencing suffering.

_____ 22. When I'm feeling down I try to approach my feelings with curiosity and openness.

_____ 23. I'm tolerant of my own flaws and inadequacies.

_____ 24. When something painful happens I tend to blow the incident out of proportion.

_____ 25. When I fail at something that's important to me, I tend to feel alone in my failure.

_____ 26. I try to be understanding and patient towards those aspects of my personality I don't like.

DERS-16

Instructions:

Please indicate how often the following statements apply to you by selecting the appropriate option for each item.

		Almost Never	Sometimes	About half the time	Most of the time	Almost always
1	I have difficulty making sense out of my feelings	1	2	3	4	5
2	I am confused about how I feel	1	2	3	4	5
3	When I am upset, I have difficulty getting work done	1	2	3	4	5
4	When I am upset, I become out of control	1	2	3	4	5
5	When I am upset, I believe that I will remain that way for a long time	1	2	3	4	5
6	When I am upset, I believe that I'll end up feeling very depressed	1	2	3	4	5
7	When I am upset, I have difficulty focusing on other things	1	2	3	4	5
8	When I am upset, I feel out of control	1	2	3	4	5
9	When I am upset, I feel ashamed with myself for feeling that way	1	2	3	4	5
10	When I am upset, I feel like I am weak	1	2	3	4	5
11	When I am upset, I have difficulty controlling my behaviours	1	2	3	4	5
12	When I am upset, I believe that there is nothing I can do to make myself feel better	1	2	3	4	5
13	When I am upset, I become irritated with myself for feeling that way	1	2	3	4	5
14	When I am upset, I start to feel very bad about myself	1	2	3	4	5
15	When I am upset, I have difficulty thinking about anything else	1	2	3	4	5
16	When I am upset, my emotions feel overwhelming	1	2	3	4	5

Version Number: 2 23/10/24

DEBRIEF SHEET

Thank you for participating in this study.

The aim of the research is to assess to what degree, self-compassion moderates the effect of adverse childhood experiences, early life perceived relational trauma and interoceptive abilities on self-stigma, wellbeing and emotional regulation in people diagnosed with Functional Neurological disorder (FND).

The study aims to assess levels of self-compassion within those with a diagnosis of FND, assess of various factors which may lead to low self-compassion and develop understanding around how self-compassion may influence the here and now experiences.

It is hoped that the findings may support in establishing a direction towards an alternate treatment pathway as well as indicating possible causal factors in this diagnosis.

It is possible to withdraw your data up until 2 weeks after you complete the questionnaire. After which, data would have entered the analysis process and can no longer be redacted. If you wish to withdraw your data prior to this date, please contact the researcher on the below email address, quoting the participant identifier code you created prior to completing the study.

Should you wish for further information, help or support with any of the issues raised in the study, you can contact the support organisations below:

- **FND information and support groups:** for information regarding the FND diagnosis and support which may be available https://www.fndaction.org.uk/#
- **Samaritans:** if you have been affected by any of the issues raised and want some support you can go to https://www.samaritans.org/

Thank you again for your participation.

Lead researcher: Ciara Fay

Email contact: f042168m@student.staffs.ac.uk

Academic Supervisor: Dr Yvonne Melia

Email contact: Yvonne.Melia@staffs.ac.uk

Appendix I
Approval to use ELES measure

Hi Ciara,

Thank you for your email and I am so sorry for the delay in getting back to you.

You would be most welcome to use our scales. They are all free to use and available on our website https://www.compassionatemind.co.uk/resource/scales

Scales - Paul Gilbert
Listed below are scales developed by Prof Paul Gilbert and colleagues which are free to use with permission. They are available for research use and other purposes. www.compassionatemind.co.uk
. Please reference all scales appropriately.

If you wish to translate or adapt the scales, we ask that you kindly detail what adaption or translation you would like to make as we may have access to this already. If it's not available and we give permission to adapt or translate it, we ask that you send the adaptation or back-to-back English translation for us to have a look at before its usage, so we can check it corresponds with the original scale and you make the translated version available to us to put on our website.

Furthermore, we are also gathering information about different studies to start to coordinate all the research linked to compassionate focused therapy projects around the world. This is so we can register people who can then be mutually aware of and in contact with each other. Therefore, I have attached a document containing different forms for treatment outcome studies, process research and studies of translation. Please could you use this document to provide details of your study/studies in the appropriate sections.

I hope this is helpful, but if you require any further assistance, please do not hesitate to ask.

Kind regards,

Tommy (Ptarmigan) Plowright (she/her)

Researcher

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Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
ACE_FS	.125	91	.001	.944	91	<.001
MAIA_FS	.050	91	.200[*]	.984	91	.333
SCS total score	.071	91	.200[*]	.983	91	.281
STIG_FS	.062	91	.200[*]	.978	91	.117
DERS_FS	.087	91	.083	.961	91	.008
ELES_FS	.090	91	.066	.961	91	.008
PAW_FS	.065	91	.200[*]	.985	91	.397

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Histogram

Mean = 17.89
Std. Dev. = 5.512
N = 91

MAIA_FS

Histogram

Mean = 2.57
Std. Dev. = .716
N = 91

SCS total score

Histogram

Mean = 25.31
Std. Dev. = 8.016
N = 91

STIG_FS

Histogram

Mean = 49.86
Std. Dev. = 17.133
N = 91

DERS_FS

Histogram

Mean = 47.13
Std. Dev. = 15.482
N = 91

ELES_FS

Histogram

Mean = 25.98
Std. Dev. = 8.488
N = 91
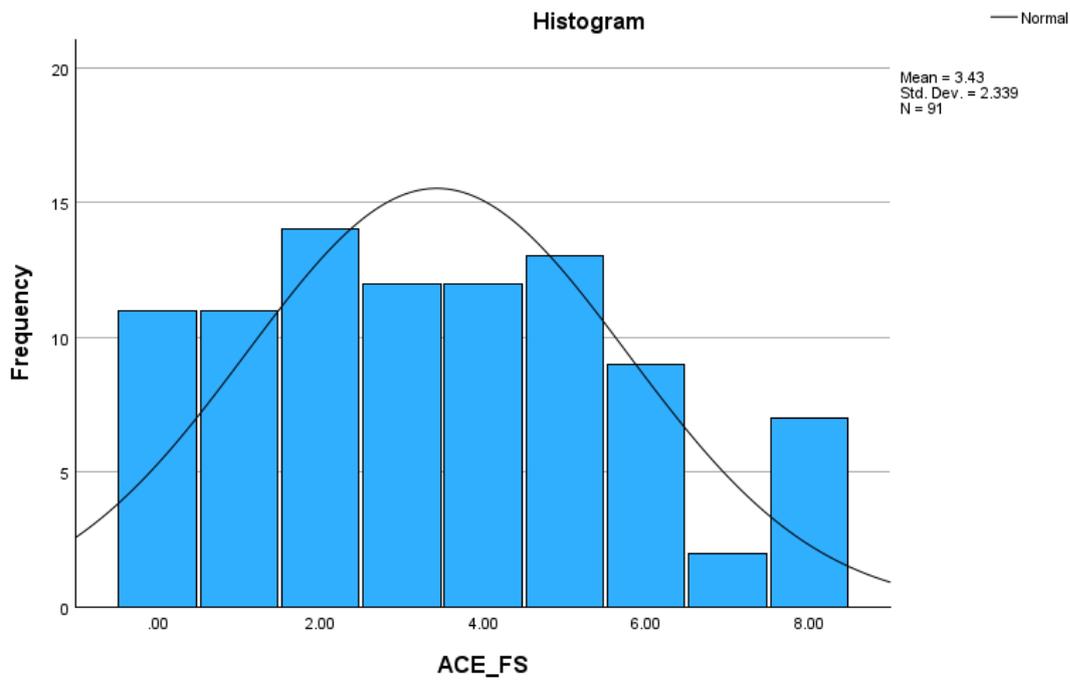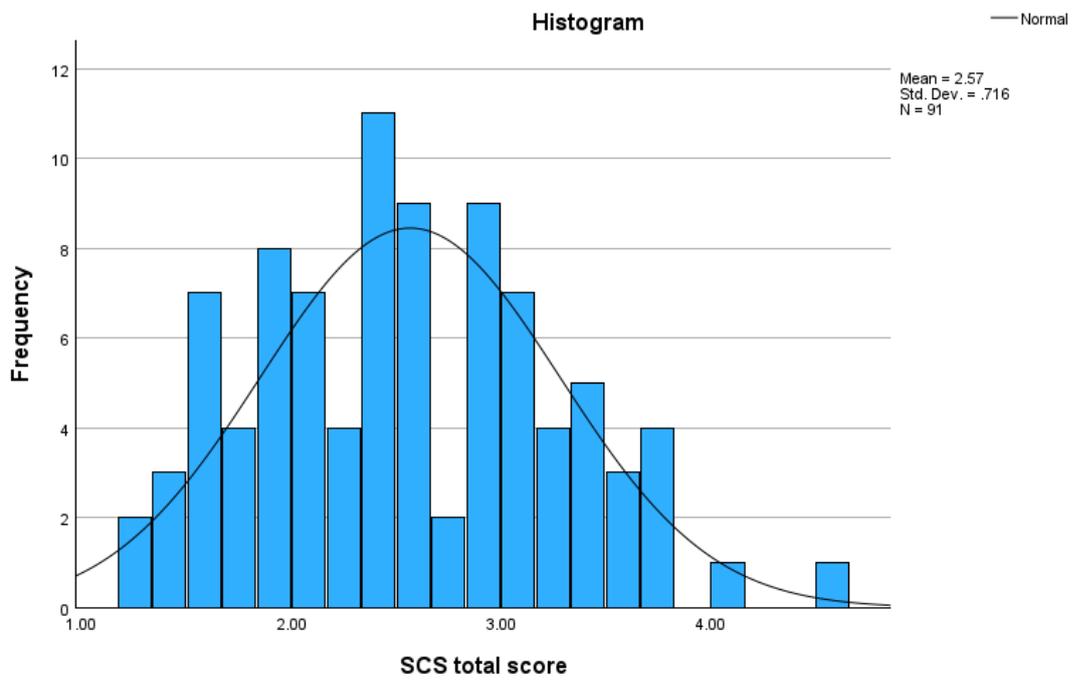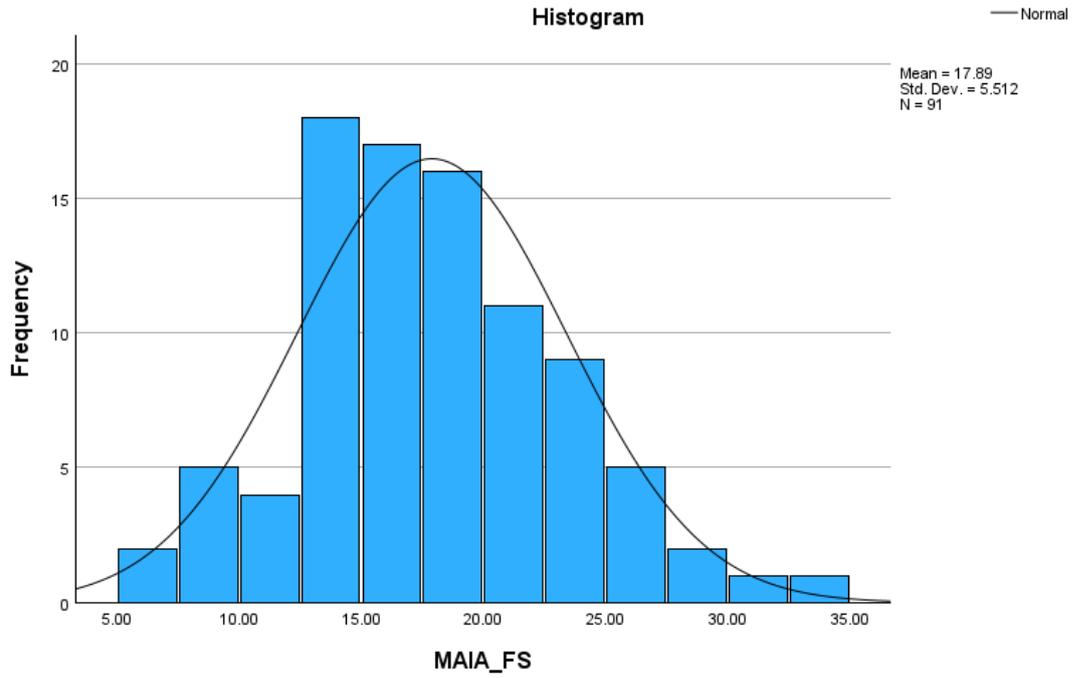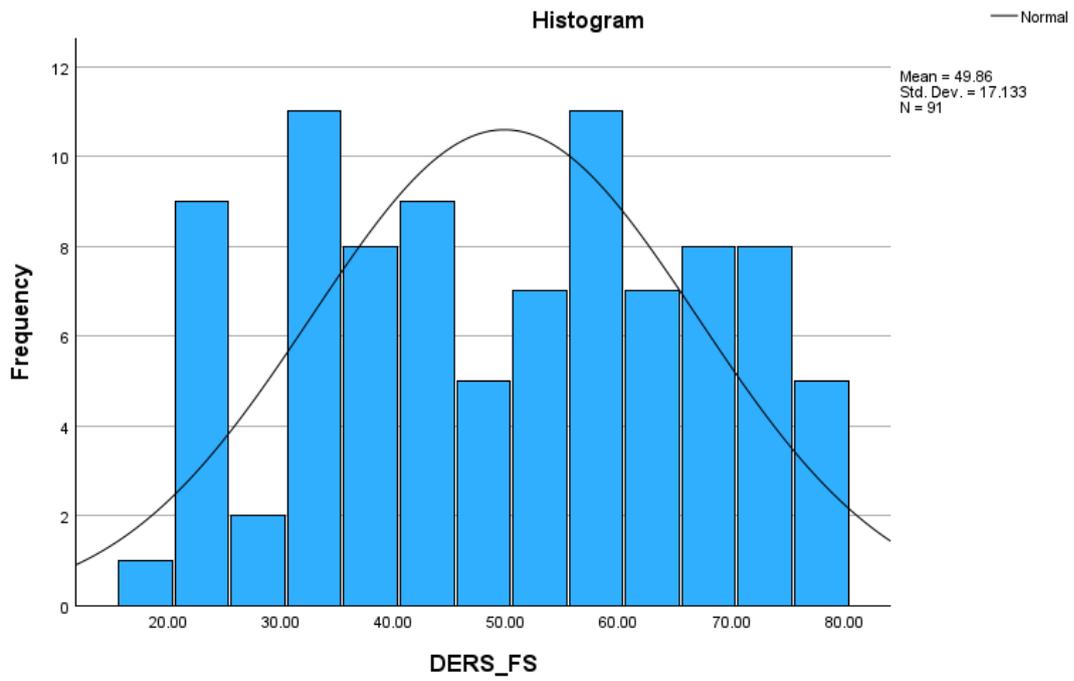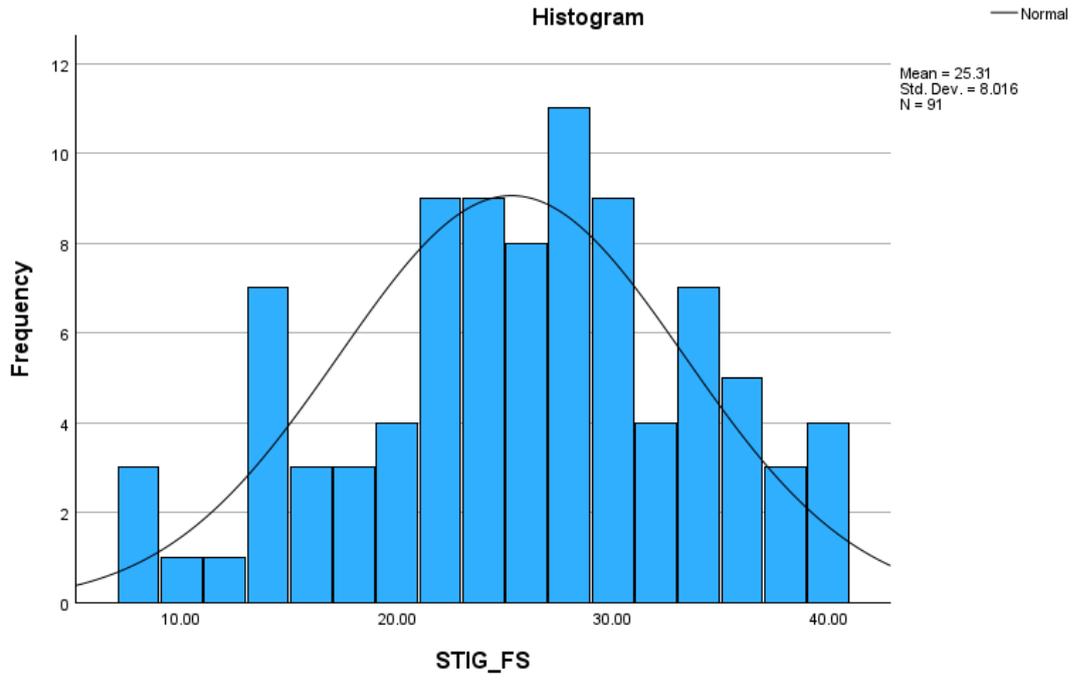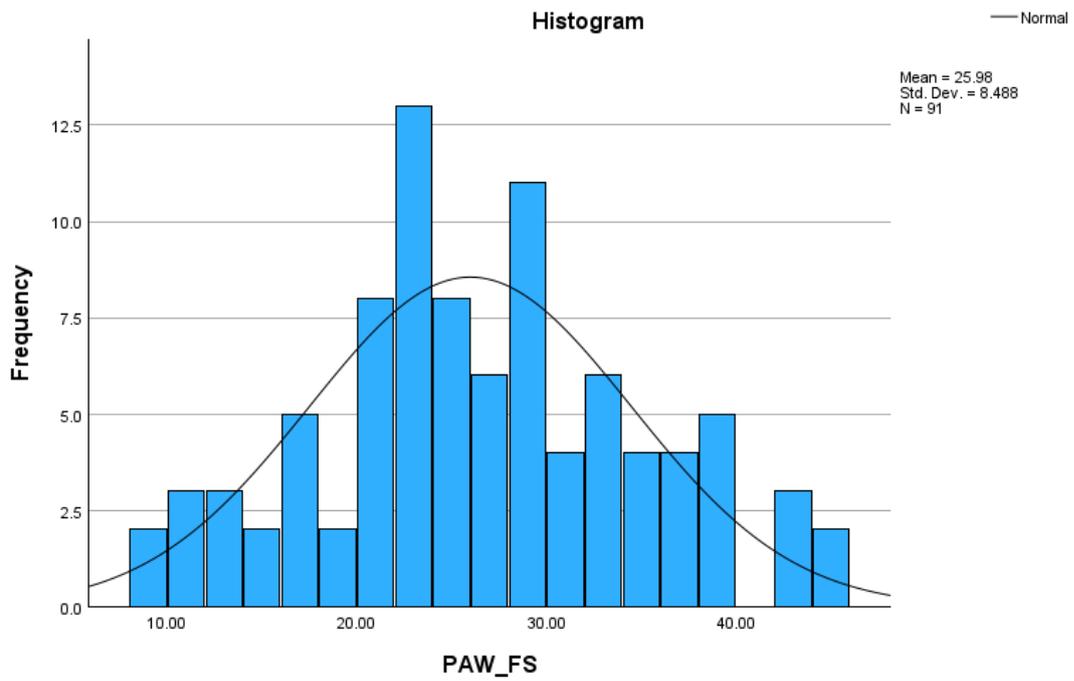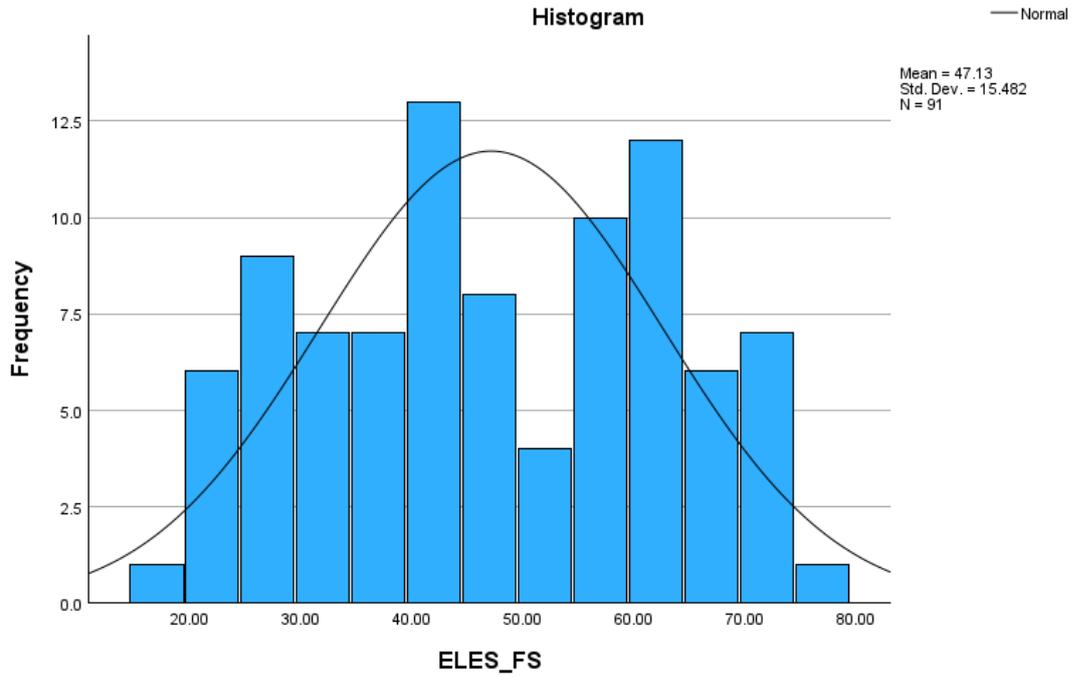
PAW_FS

Appendix K
Statistical Analyses Outputs

Correlational Analysis

Correlations

			DERS_FS	ELES_FS	PAW_FS	STIG_FS	SCS total score	MAIA_FS	ACE_FS
Spearman's rho	DERS_FS	Correlation Coefficient	1.000	.436**	-.340**	.410**	-.769**	-.377**	.116
		Sig. (2-tailed)	.	<.001	<.001	<.001	<.001	<.001	.274
		N	91	91	91	91	91	91	91
	ELES_FS	Correlation Coefficient	.436**	1.000	-.316**	.287**	-.397**	-.041	.630**
		Sig. (2-tailed)	<.001	.	.002	.006	<.001	.698	<.001
		N	91	91	91	91	91	91	91
	PAW_FS	Correlation Coefficient	-.340**	-.316**	1.000	-.230*	.336**	.317**	-.111
		Sig. (2-tailed)	<.001	.002	.	.028	.001	.002	.294
		N	91	91	91	91	91	91	91
	STIG_FS	Correlation Coefficient	.410**	.287**	-.230*	1.000	-.308**	-.097	.158
		Sig. (2-tailed)	<.001	.006	.028	.	.003	.359	.135
		N	91	91	91	91	91	91	91
	SCS total score	Correlation Coefficient	-.769**	-.397**	.336**	-.308**	1.000	.406**	-.097
		Sig. (2-tailed)	<.001	<.001	.001	.003	.	<.001	.360
		N	91	91	91	91	91	91	91
	MAIA_FS	Correlation Coefficient	-.377**	-.041	.317**	-.097	.406**	1.000	.028
		Sig. (2-tailed)	<.001	.698	.002	.359	<.001	.	.794
		N	91	91	91	91	91	91	91
	ACE_FS	Correlation Coefficient	.116	.630**	-.111	.158	-.097	.028	1.000
		Sig. (2-tailed)	.274	<.001	.294	.135	.360	.794	.
		N	91	91	91	91	91	91	91

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Multiple regression: Emotional regulation

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
					Change Statistics					
1	.595[a]	.354	.331	14.00969	.354	15.868	3	87	<.001	2.090

a. Predictors: (Constant), MAIA_FS, ACE_FS, ELES_FS
b. Dependent Variable: DERS_FS

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9343.536	3	3114.512	15.868	<.001[b]
	Residual	17075.607	87	196.271		
	Total	26419.143	90			

a. Dependent Variable: DERS_FS

b. Predictors: (Constant), MAIA_FS, ACE_FS, ELES_FS

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Correlations Zero-order	Correlations Partial	Correlations Part	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	46.627	7.209		6.468	<.001					
	ELES_FS	.589	.123	.532	4.802	<.001	.441	.458	.414	.604	1.655
	ACE_FS	-1.489	.809	-.203	-1.841	.069	.117	-.194	-.159	.610	1.640
	MAIA_FS	-1.087	.271	-.350	-4.011	<.001	-.408	-.395	-.346	.978	1.023

a. Dependent Variable: DERS_FS

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	Variance Proportions ELES_FS	Variance Proportions ACE_FS	Variance Proportions MAIA_FS
1	1	3.664	1.000	.00	.00	.01	.01
	2	.238	3.920	.02	.00	.51	.09
	3	.072	7.123	.03	.38	.32	.42
	4	.025	12.116	.95	.62	.16	.49

a. Dependent Variable: DERS_FS

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	17.1679	79.1357	49.8571	10.18907	91
Std. Predicted Value	-3.208	2.874	.000	1.000	91
Standard Error of Predicted Value	1.576	6.388	2.824	.811	91
Adjusted Predicted Value	14.0617	81.9745	49.8813	10.35542	91
Residual	-26.37354	28.74005	.00000	13.77421	91
Std. Residual	-1.883	2.051	.000	.983	91
Stud. Residual	-1.936	2.095	-.001	1.007	91
Deleted Residual	-27.90214	29.98234	-.02420	14.44877	91
Stud. Deleted Residual	-1.968	2.138	-.002	1.014	91
Mahal. Distance	.149	17.725	2.967	2.531	91
Cook's Distance	.000	.094	.012	.017	91
Centered Leverage Value	.002	.197	.033	.028	91

a. Dependent Variable: DERS_FS

Multiple regression: Emotional regulation

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.489[a]	.239	.213	7.53196	.239	9.098	3	87	<.001	2.214

Change Statistics columns: R Square Change, F Change, df1, df2, Sig. F Change

a. Predictors: (Constant), MAIA_FS, ACE_FS, ELES_FS
b. Dependent Variable: PAW_FS

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1548.408	3	516.136	9.098	<.001[b]
	Residual	4935.548	87	56.730		
	Total	6483.956	90			

a. Dependent Variable: PAW_FS
b. Predictors: (Constant), MAIA_FS, ACE_FS, ELES_FS

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Correlations Zero-order	Partial	Part	Collinearity Statistics Tolerance	VIF
1	(Constant)	23.357	3.876		6.026	<.001					
	ELES_FS	-.189	.066	-.345	-2.865	.005	-.303	-.294	-.268	.604	1.655
	ACE_FS	.458	.435	.126	1.053	.295	-.078	.112	.098	.610	1.640
	MAIA_FS	.557	.146	.362	3.823	<.001	.399	.379	.358	.978	1.023

a. Dependent Variable: PAW_FS

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	ELES_FS	ACE_FS	MAIA_FS
1	1	3.664	1.000	.00	.00	.01	.01
	2	.238	3.920	.02	.00	.51	.09
	3	.072	7.123	.03	.38	.32	.42
	4	.025	12.116	.95	.62	.16	.49

a. Dependent Variable: PAW_FS

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	14.2518	38.8356	25.9780	4.14784	91
Std. Predicted Value	-2.827	3.100	.000	1.000	91
Standard Error of Predicted Value	.847	3.435	1.518	.436	91
Adjusted Predicted Value	14.7735	38.0048	25.9960	4.11697	91
Residual	-18.06627	20.69325	.00000	7.40536	91
Std. Residual	-2.399	2.747	.000	.983	91
Stud. Residual	-2.442	2.775	-.001	1.003	91
Deleted Residual	-18.72108	21.10664	-.01793	7.71475	91
Stud. Deleted Residual	-2.515	2.890	-.001	1.016	91
Mahal. Distance	.149	17.725	2.967	2.531	91
Cook's Distance	.000	.082	.010	.015	91
Centered Leverage Value	.002	.197	.033	.028	91

a. Dependent Variable: PAW_FS

Multiple Regression: Stigma

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.298[a]	.089	.057	7.78308	.089	2.824	3	87	.043	2.131

a. Predictors: (Constant), ACE_FS, MAIA_FS, ELES_FS
b. Dependent Variable: STIG_FS

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	513.243	3	171.081	2.824	.043[b]
	Residual	5270.142	87	60.576		
	Total	5783.385	90			

a. Dependent Variable: STIG_FS
b. Predictors: (Constant), ACE_FS, MAIA_FS, ELES_FS

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Correlations Zero-order	Partial	Part	Collinearity Statistics Tolerance	VIF
1	(Constant)	20.670	4.005		5.161	<.001					
	ELES_FS	.144	.068	.279	2.119	.037	.286	.222	.217	.604	1.655
	MAIA_FS	-.120	.151	-.083	-.800	.426	-.110	-.085	-.082	.978	1.023
	ACE_FS	-.005	.449	-.002	-.012	.990	.169	-.001	-.001	.610	1.640

a. Dependent Variable: STIG_FS

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	(Constant)	ELES_FS	MAIA_FS	ACE_FS
1	1	3.664	1.000	.00	.00	.01	.01
	2	.238	3.920	.02	.00	.09	.51
	3	.072	7.123	.03	.38	.42	.32
	4	.025	12.116	.95	.62	.49	.16

a. Dependent Variable: STIG_FS

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	20.6632	30.6896	25.3077	2.38803	91
Std. Predicted Value	-1.945	2.254	.000	1.000	91
Standard Error of Predicted Value	.875	3.549	1.569	.451	91
Adjusted Predicted Value	20.1153	31.5104	25.2838	2.41669	91
Residual	-19.35096	17.40720	.00000	7.65226	91
Std. Residual	-2.486	2.237	.000	.983	91
Stud. Residual	-2.557	2.303	.002	1.006	91
Deleted Residual	-20.47253	18.46043	.02392	8.01923	91
Stud. Deleted Residual	-2.644	2.363	.000	1.016	91
Mahal. Distance	.149	17.725	2.967	2.531	91
Cook's Distance	.000	.095	.012	.019	91
Centered Leverage Value	.002	.197	.033	.028	91

a. Dependent Variable: STIG_FS

Breusch Pagan tests outputs

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ELES_FS, MAIA_FS, ACE_FS [b]	.	Enter

a. Dependent Variable: sq_resid_reg1
b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.184[a]	.034	.001	206.87284

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	131148.931	3	43716.310	1.021	.387[b]
	Residual	3723284.353	87	42796.372		
	Total	3854433.284	90			

a. Dependent Variable: sq_resid_reg1

b. Predictors: (Constant), ELES_FS, MAIA_FS, ACE_FS

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ELES_FS, MAIA_FS, ACE_FS[b]	.	Enter

a. Dependent Variable: sq_resid_reg2

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.296[a]	.088	.056	76.58519

a. Predictors: (Constant), ELES_FS, MAIA_FS, ACE_FS

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48971.375	3	16323.792	2.783	.046[b]
	Residual	510280.382	87	5865.292		
	Total	559251.757	90			

a. Dependent Variable: sq_resid_reg2

b. Predictors: (Constant), ELES_FS, MAIA_FS, ACE_FS

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ELES_FS, MAIA_FS, ACE_FS[b]	.	Enter

a. Dependent Variable: sq_resid_reg3

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.184[a]	.034	.001	73.95086

a. Predictors: (Constant), ELES_FS, MAIA_FS, ACE_FS

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16689.851	3	5563.284	1.017	.389[b]
	Residual	475779.454	87	5468.729		
	Total	492469.306	90			

a. Dependent Variable: sq_resid_reg3

b. Predictors: (Constant), ELES_FS, MAIA_FS, ACE_FS

Multiple Regressions: non-significant variables removed

Multiple regression: Emotional regulation

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	MAIA_FS, ELES_FS[b]	.	Enter

a. Dependent Variable: DERS_FS

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.573[a]	.328	.313	14.19859	.328	21.524	2	88	<.001

a. Predictors: (Constant), MAIA_FS, ELES_FS

b. Dependent Variable: DERS_FS

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8678.348	2	4339.174	21.524	<.001[b]
	Residual	17740.795	88	201.600		
	Total	26419.143	90			

a. Dependent Variable: DERS_FS

b. Predictors: (Constant), MAIA_FS, ELES_FS

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Correlations Zero-order	Partial	Part	Collinearity Stat Tolerance	
1	(Constant)	49.164	7.172		6.855	<.001					
	ELES_FS	.448	.097	.405	4.613	<.001	.441	.441	.403	.990	
	MAIA_FS	-1.142	.273	-.367	-4.186	<.001	-.408	-.407	-.366	.990	

a. Dependent Variable: DERS_FS

Multiple regression: Positive Affect and Wellbeing

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	MAIA_FS, ELES_FS[b]	.	Enter

a. Dependent Variable: PAW_FS

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	F Change	df1	df2	Sig. F Change
1	.479[a]	.229	.212	7.53660	.229	13.077	2	88	<.001

a. Predictors: (Constant), MAIA_FS, ELES_FS

b. Dependent Variable: PAW_FS

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1485.528	2	742.764	13.077	<.001[b]
	Residual	4998.428	88	56.800		
	Total	6483.956	90			

a. Dependent Variable: PAW_FS

b. Predictors: (Constant), MAIA_FS, ELES_FS

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Correlations Zero-order	Partial	Part	Collinearity Statistics Tolerance	VIF
1	(Constant)	22.577	3.807		5.931	<.001					
	ELES_FS	-.146	.052	-.266	-2.825	.006	-.303	-.288	-.264	.990	1.010
	MAIA_FS	.574	.145	.373	3.962	<.001	.399	.389	.371	.990	1.010

a. Dependent Variable: PAW_FS

Multiple regression: Stigma

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	ELES_FS[b]	.	Enter

a. Dependent Variable: STIG_FS

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
					Change Statistics				
1	.286[a]	.082	.072	7.72382	.082	7.943	1	89	.006

a. Predictors: (Constant), ELES_FS

b. Dependent Variable: STIG_FS

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	473.882	1	473.882	7.943	.006[b]
	Residual	5309.503	89	59.657		
	Total	5783.385	90			

a. Dependent Variable: STIG_FS

b. Predictors: (Constant), ELES_FS

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Correlations Zero-order	Partial	Part	Collinearity Statistics Tolerance	VIF
1	(Constant)	18.322	2.607		7.027	<.001					
	ELES_FS	.148	.053	.286	2.818	.006	.286	.286	.286	1.000	1.000

a. Dependent Variable: STIG_FS

Appendix L
Moderation Interaction Outputs

Interoception*Self compassion (emotional regulation DV)

Run MATRIX procedure:

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This version of PROCESS requires SPSS version 26 or later
Workshop schedule available at haskayne.ucalgary.ca/CCRAM
In SPSS 29 and later, change default output font to Courier New for tidier
output. More information about PROCESS at processmacro.org/faq.html.

*********** PROCESS Procedure for SPSS Version 5.0 beta 2.1 ************

          Written by Andrew F. Hayes, Ph.D.   www.afhayes.com
    Documentation available in Hayes (2022).
www.guilford.com/p/hayes3

****
******
  Model: 1
      Y: DERS_FS
      X: MAIA_FS
      W: SCSSF_TS

Sample
Size: 91

****
******

OUTCOME VARIABLE:
 DERS_FS

Model Summary
          R   R-sq   Adj R-sq   F   p   SEest
       .760   .578   .563   39.700   .000   11.322

               SS   df   MS
Regress   15266.992   3.000   5088.997
Residual 11152.151   87.000   128.186
Total   26419.143   90.000   293.546

Model
            coeff   se   t   p   LLCI   ULCI
constant   105.418   12.976   8.124   .000   79.626   131.210
MAIA_FS   -.591   .722   -.819   .415   -2.026   .844
SCSSF_TS   -20.475   4.903   -4.176   .000   -30.221   -10.729

```
Int_1            .158       .245       .647       .519      -.328
.644

Product terms key:
 Int_1     :        MAIA_FS  x        SCSSF_TS

Covariance matrix of regression parameter estimates:
           constant   MAIA_FS   SCSSF_TS      Int_1
constant   168.387    -8.654    -59.508      2.939
MAIA_FS     -8.654      .521      2.829      -.166
SCSSF_TS   -59.508     2.829     24.042     -1.104
Int_1        2.939     -.166     -1.104       .060

Test(s) of highest order unconditional interaction(s):
      R2-chng        F        df1        df2         p
X*W       .002      .419     1.000     87.000       .519
----------
```



```
Int_1            .158       .245       .647       .519      -.328
.644

Product terms key:
 Int_1     :        MAIA_FS  x        SCSSF_TS

Covariance matrix of regression parameter estimates:
           constant   MAIA_FS   SCSSF_TS      Int_1
constant   168.387    -8.654    -59.508      2.939
MAIA_FS     -8.654      .521      2.829      -.166
SCSSF_TS   -59.508     2.829     24.042     -1.104
Int_1        2.939     -.166     -1.104       .060

Test(s) of highest order unconditional interaction(s):
      R2-chng        F        df1        df2         p
X*W       .002      .419     1.000     87.000       .519
----------
```

Early Life relational trauma*self-compassion (emotional regulation DV)

Run MATRIX procedure:

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This version of PROCESS requires SPSS version 26 or later
Workshop schedule available at haskayne.ucalgary.ca/CCRAM
In SPSS 29 and later, change default output font to Courier
New for tidier
output. More information about PROCESS at
processmacro.org/faq.html.

************ PROCESS Procedure for SPSS Version 5.0 beta 2.1
****

          Written by Andrew F. Hayes, Ph.D.
www.afhayes.com
    Documentation available in Hayes (2022).
www.guilford.com/p/hayes3

****
****
  Model: 1
      Y: DERS_FS
      X: ELES_FS
      W: SCSSF_TS

Sample
Size: 91

****
****

OUTCOME VARIABLE:
 DERS_FS

Model Summary
         R   R-sq   Adj R-sq   F   p
SEest
      .774   .598   .585   43.224   .000
11.042

                SS   df   MS
Regress   15811.094   3.000   5270.365
Residual 10608.049   87.000   121.932
Total   26419.143   90.000   293.546

Model
              coeff   se   t   p
LLCI   ULCI
constant   91.568   14.785   6.194   .000
62.182   120.954

Interoception*Self compassion (Positive affect and wellbeing DV)

```
Run MATRIX procedure:

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In SPSS 29 and later, change default output font to Courier
New for tidier
output. More information about PROCESS at
processmacro.org/faq.html.

************ PROCESS Procedure for SPSS Version 5.0 beta 2.1
*************


          Written by Andrew F. Hayes, Ph.D.
www.afhayes.com
    Documentation available in Hayes (2022).
www.guilford.com/p/hayes3


**************************************************************
************
  Model: 1
      Y: PAW_FS
      X: MAIA_FS
      W: SCSSF_TS

Sample
Size:  91


**************************************************************
************

OUTCOME VARIABLE:
 PAW_FS

Model Summary
          R        R-sq    Adj R-sq          F          p
SEest
      .432        .187        .159       6.662       .000
7.785

               SS        df        MS
Regress   1211.309     3.000    403.770
Residual  5272.647    87.000     60.605
Total     6483.956    90.000     72.044

Model
            coeff        se         t          p
LLCI        ULCI
constant    9.379      8.923     1.051       .296        -
8.356      27.113
```

Early Life relational trauma*Self compassion (Positive affect and wellbeing DV)

```
Run MATRIX procedure:

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Workshop schedule available at haskayne.ucalgary.ca/CCRAM
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New for tidier
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*************


          Written by Andrew F. Hayes, Ph.D.
www.afhayes.com
    Documentation available in Hayes (2022).
www.guilford.com/p/hayes3


*************************************************************
************
  Model: 1
      Y: PAW_FS
      X: ELES_FS
      W: SCSSF_TS

Sample
Size:  91


*************************************************************
************

OUTCOME VARIABLE:
 PAW_FS

Model Summary
          R        R-sq   Adj R-sq          F          p
SEest
      .406        .165       .136      5.724       .001
7.889


               SS         df         MS
Regress    1068.757      3.000    356.252
Residual   5415.199     87.000     62.244
Total      6483.956     90.000     72.044

Model
            coeff        se          t          p
LLCI        ULCI
constant    10.855     10.563      1.028       .307     -
10.140      31.851
```

Interoception*Self compassion (self-stigma DV)

```
Run MATRIX procedure:


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Workshop schedule available at haskayne.ucalgary.ca/CCRAM
In SPSS 29 and later, change default output font to Courier
New for tidier
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************


          Written by Andrew F. Hayes, Ph.D.
www.afhayes.com
    Documentation available in Hayes (2022).
www.guilford.com/p/hayes3

****************************************************************
************
  Model: 1
      Y: STIG_FS
      X: MAIA_FS
      W: SCSSF_TS

Sample
Size:  91

****************************************************************
************


OUTCOME VARIABLE:
 STIG_FS

Model Summary
          R       R-sq  Adj R-sq           F           p
SEest
      .307       .094       .063       3.020        .034
7.759


               SS         df         MS
Regress    545.527      3.000    181.842
Residual  5237.858     87.000     60.205
Total     5783.385     90.000     64.260

Model
            coeff         se          t           p
LLCI       ULCI
constant   35.510      8.893      3.993        .000
17.834     53.186
```

Early Life relational trauma*Self compassion (self-stigma DV)
```
Run MATRIX procedure:

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This version of PROCESS requires SPSS version 26 or later
Workshop schedule available at haskayne.ucalgary.ca/CCRAM
In SPSS 29 and later, change default output font to Courier
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*************


          Written by Andrew F. Hayes, Ph.D.
www.afhayes.com
    Documentation available in Hayes (2022).
www.guilford.com/p/hayes3


****************************************************************
************
  Model: 1
      Y: STIG_FS
      X: ELES_FS
      W: SCSSF_TS

Sample
Size:  91


****************************************************************
************

OUTCOME VARIABLE:
 STIG_FS

Model Summary
          R       R-sq   Adj R-sq           F          p
SEest
      .353        .124        .094       4.116       .009
7.630

                 SS         df         MS
Regress      718.849      3.000    239.616
Residual    5064.536     87.000     58.213
Total       5783.385     90.000     64.260

Model
            coeff         se          t          p
LLCI        ULCI
constant     27.675     10.216      2.709       .008
7.371      47.980
```

Appendix M
Facebook groups where study was advertised

- FND awareness (UK)

- Fighting FND functional neurological disorder

- Functional neurological disorder (FND) warriors

- Non-epileptic seizure awareness

- PNES/NEAD – seizure awareness

- Functional neurological disorder (FND) warriors awareness

Appendix N

Demographic data of participants excluded from analysis

Demographic Characteristic (N= 54)	N (%)
Gender	
Female	32 (59.3%)
Male	3 (5.6%)
Non-binary	1 (1.9%)
Did not complete	18 (33.3%)
Participant numbers by age range (years)	
18-30	8 (14.8%)
31-45	10 (18.5%)
46-60	16 (29.6%)
Did not complete	20 (37%)
FND diagnosis	
Functional Neurological Disorder (FND)	26 (48.1%)
Functional Seizures (FS)/Psychogenic Non-epileptic Seizures (PNES)	7 (13%)
Something else (free text)	1 (1.9%)
Did not complete	20 (37%)

Appendix O: Benjamini-Hochberg corrections

Variables	Unadjusted p	Adjusted p (BH q-value)	Sig after BH?
ELES*DERS-16	< .001	0.006	Yes
MAIA-2*DERS-16	< .001	0.011	yes
ACEs* DERS-16	0.069	0.033	no
ELES*Neuro-Qol-PAW	.005	0.022	yes
MAIA-2*Neuro-Qol-PAW	< .001	0.017	yes
ACEs *Neuro-Qol-PAW	.295	0.039	no
ELES *Neuro-Qol-STIG	.037	0.028	no
MAIA-2*Neuro-Qol-STIG	.990	0.05	no
ACEs *Neuro-Qol-STIG	.426	0.044	no

Paper Three: Executive Summary

Do ACEs, childhood relational trauma and interoception predict emotional regulation, self-stigma and wellbeing in FND and is this moderated by self-compassion?

Ciara Fay

Total word count: 2216 (Excluding title page and references)

Executive Summary of Research

> **Do ACEs, childhood relational trauma and interoception predict emotional regulation, self-stigma and wellbeing in FND and is this moderated by self-compassion?**

> This report is an executive summary of a research project that is written for people living with a diagnosis of FND, people who may care for someone with FND and professionals who are caring for those with FND. It will be disseminated to the support groups where recruitment took place where members include those with a diagnosis of FND and those who care personally or professionally for someone with a diagnosis of FND.
>
> The summary was created in collaboration with a participant of the study who generously provided feedback regarding wording, structure and layout.

What is FND?

Functional Neurological Disorder (FND) is a common and disabling condition with a range of physical and psychological symptoms (1; Figure 1). It is estimated that 50 people per 100,000 are diagnosed annually (2), and with women more likely to be diagnosed (3-4). In the past, FND was called "Conversion Disorder" and was because of trauma (5-6). Nowadays, it is recognised that not all those with a diagnosis have experienced trauma meaning it is no longer needed for a diagnosis of FND (7). Despite this, research has found it to be associated with FND symptom onset and severity (8-12). Newer models to help understand what causes FND include a range of factors both physical and social risk factors including trauma, emotional processing difficulties and psychological difficulties (13-15).
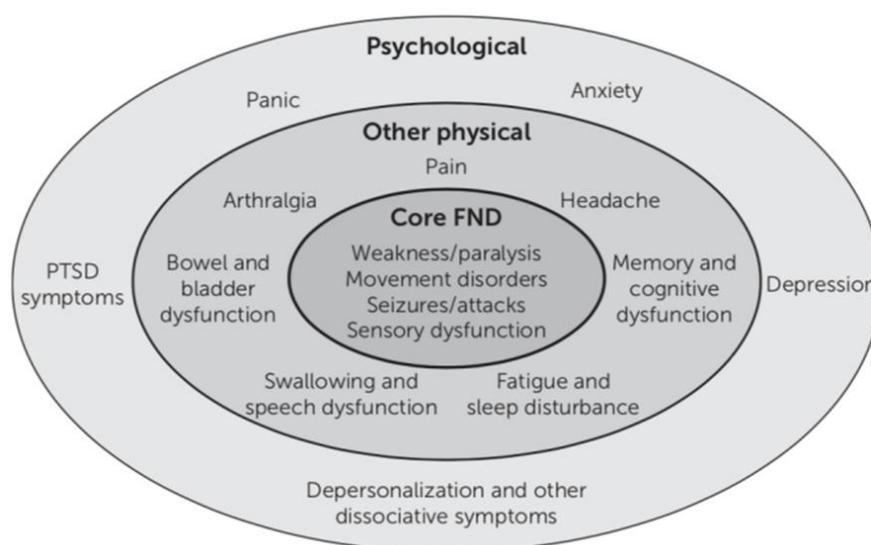

Figure 1

Diagram of symptom and symptom domains in FND (16)

Why is this research important?

Trauma has been shown to be related to both the development and severity of FND symptoms (9-12; 17-19). Relational trauma and disrupted attachment in childhood are also linked with development of FND (2,19). In turn, attachment either supports or hinders the development of a skill called interoception, which has shown to be impaired within FND (20-26). This skill is important in both understanding, naming and acting upon physical sensations which may signal different emotions. This will then also affect how well we can cope and seek support with difficult or distressing emotions. If someone finds it hard to manage their emotions, they are at an increased risk of developing mental health difficulties including anxiety and depression. Within the FND population, there are higher rates of anxiety, PTSD, and depression (15,27), along with reduced quality of life (28-30) which may be related to both past experiences i.e. trauma, alongside difficulties managing distressing emotions. Another factor which is important to consider within FND is stigma as well as self-stigma (31) which is related to poorer outcomes (32-33). Interoceptive difficulties may also make someone more vulnerable to stigma, due to difficulties in communicating symptoms and emotions which may affect recovery (14).

Despite earlier research looking at all these factors individually within FND, no research has assessed these factors together and looked to understand their relationships with one another. Evidence showing a relationship between then could offer a direction for different therapeutic interventions, personalised to the experiences of people with FND. I could also shed light on important clinical issues for supporting people with a diagnosis of FND with stigma, wellbeing and emotional abilities.

Self-compassion has been found to be an effective target for the treatment of chronic physical health conditions (58-61) and long-term neurological conditions (62). Compassion focused therapy (CFT; 63) addresses feelings of shame and self-criticism through increasing self-compassion. There has only been one study of a self-compassion intervention in FND (48), and it would be helpful to understand if it moderates any of the relationships assessed in the study.

See below for relevant key terms for the study:

Adverse Childhood Experiences	Traumatic events that happen during childhood such as abuse, neglect or growing up in a household where there was domestic violence, substance misuse or mental illness.
Childhood Relational Trauma	The emotional distress that arises from early childhood relationships particularly between the child and the caregiver. Relationships are characterised by betrayal, neglect, or inconsistent support. This type of trauma can significantly affect one's mental health and overall well-being.

Interoception	The internal sensory system to which physical and emotional states are recognised and responded to. For example, recognising a rumbling and discomfort in stomach is a sign of hunger and responding by eating.
Emotional Regulation	The ability to exert control over one's emotional state by employing strategies such as reappraisal or mindfulness. Can be conscious or unconscious.
Self-stigma	Personal acceptance and agreement with socially created prejudicial beliefs that are held against oneself (34).
Positive affect and wellbeing	Aspects of a person's life that relate to a sense of well-being, life satisfaction or an overall sense of purpose and meaning (35).
Self-compassion	Practice of recognising when one is suffering or feeling inadequate and being kind to the self at these times, as opposed to critical, which reduces anxiety and depression.

Why was the research done?

The aim of the study was to explore possible relationships between factors that may be related to both the development and maintenance of FND. This study is the first to explore all these variables quantitatively to better understand FND's psychological mechanisms and inform more targeted interventions (14). Then, by exploring the role of self-compassion within relationships, it may inform development of novel, tailored, and trauma-informed interventions.

The aims of the study were to investigate:

1) Whether a relationship exists between ACEs, interoception, early life relational trauma and emotional regulation
2) Whether a relationship exists between ACEs, interoception, early life relational trauma and positive affect and wellbeing
3) Whether a relationship exists between ACEs, interoception, early life relational trauma and self-stigma
4) To see if self-compassion influenced the relationships between these factors. We predicted that self-compassion may buffer between the relationship between the predictors (ACEs, interoception, early life relational trauma) and outcomes (emotional regulation, positive affect and wellbeing and self-stigma).

Based on previous research, we suggest that people with FND who experienced more trauma, more relational trauma and find it more difficult to recognise and act on physical signals of

needs and/or emotions will also find it harder to manage distressing emotions, will have a lower sense of lower sense of wellbeing and be more stigmatising of the self and abilities.

Additionally, we suggested that self-compassion would influence these relationships.
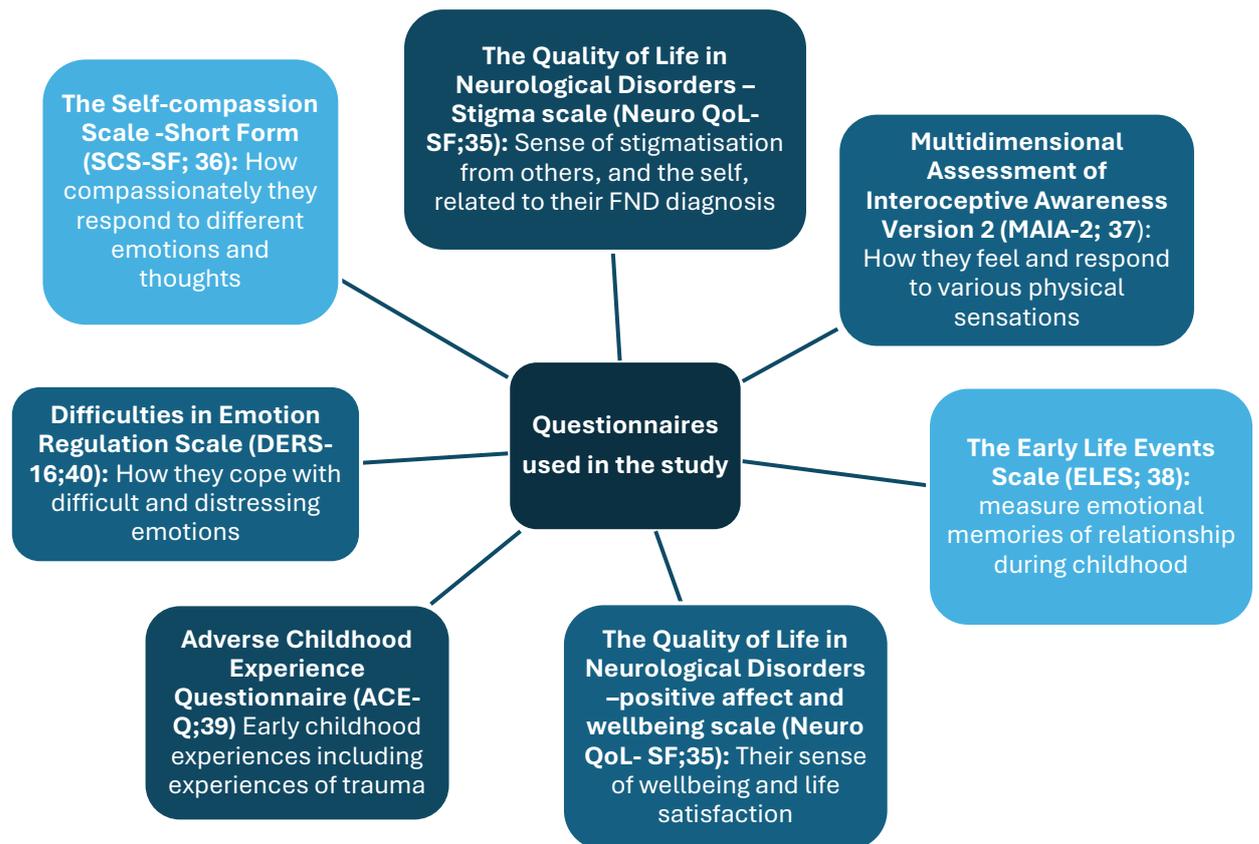
What we did

Procedure

An advert for the study was posted onto FND support groups on Facebook. We advertised for people with a diagnosis of FND, who were above the age of 18 and could read English language, to complete an online study accessible by link or QR code. Those who were interested in taking part were transferred to www.qualtrics.com to read more about the purpose of the study and what taking part would involve for them. After reading the information about the study, those who wanted to take part provided consent and those who did not were directed to a debrief sheet and thanked for their time.

Those who consented to take part then provided some personal information such as gender, age range, diagnosis and completed seven questionnaires. The study was estimated to take between 15-18 minutes to complete.

Questionnaires

Each of the seven questionnaires were created by other researchers and were chosen to be used as they have been deemed reliable measures of the factors being assessed in the study

hypotheses.

The Self-compassion Scale -Short Form (SCS-SF; 36): How compassionately they respond to different emotions and thoughts

The Quality of Life in Neurological Disorders – Stigma scale (Neuro QoL-SF;35): Sense of stigmatisation from others, and the self, related to their FND diagnosis

Multidimensional Assessment of Interoceptive Awareness Version 2 (MAIA-2; 37): How they feel and respond to various physical sensations

Difficulties in Emotion Regulation Scale (DERS-16;40): How they cope with difficult and distressing emotions

Questionnaires used in the study

The Early Life Events Scale (ELES; 38): measure emotional memories of relationship during childhood

Adverse Childhood Experience Questionnaire (ACE-Q;39) Early childhood experiences including experiences of trauma

The Quality of Life in Neurological Disorders –positive affect and wellbeing scale (Neuro QoL- SF;35): Their sense of wellbeing and life satisfaction

Participants

A total of 145 people consented to complete the study with 91 completing it in its entirety. We therefore included only the data from the 91 participants who completed the whole study.

Most of the participants were female (87.9%) aged between 18-75 with majority within the 31-45 age bracket (39.6%). 71.4% identified themselves as having a diagnosis of FND, 22% as having functional seizures/psychogenic nonepileptic seizures and the remaining 6.6% identified with either Functional Movement Disorder, motor FND or FND with Central Sensitization Syndrome diagnoses.

How we analysed the data

The responses from all the questionnaires resulted in large amounts of data to analyse. This data was analysed by two methods: firstly, multiple regression analysis and secondly, a moderation analysis.

Regressions can tell us if there is a relationship between two or more factors. This means that if one variable (i.e. interoception) has an impact on another variable (i.e. emotional regulation), we can see if this impact is statistically significant, that means it is caused by something other than chance.

A moderation analysis is a way of seeing if and how a relationship between two things changes (i.e. between interoception and emotional regulation) dependant on a third thing (i.e. self-compassion).

What we found

Overall, we looked at the average scores of each of the seven questionnaires. We found that:

- Relational trauma scores were higher on average compared to a general population sample.
- ACEs scores for different trauma domains were the same as would be expected in general population.
- Interoception scores match that of other studies assessing an FND population meaning they are reliable (41).
- Scores showing difficulties in managing emotions were higher than general population and comparable to a depression sample (42).
- There were higher levels of self-stigma in the sample FND population compared to an alternate clinical population.
- Positive Affect and Wellbeing scores were slightly below what would be expected within the general population.
- Self-compassion scores showed low-moderate levels on average (36).

Key findings

1) Emotional Regulation	2) Positive Affect and Wellbeing
People who experienced more **relational trauma** in early life and have a **harder time sensing** what's happening in their own bodies tend to **struggle more with managing their emotions**. This suggests that relational trauma affects emotional regulation abilities within FND which means it harder to understand and therefore, cope with and manage emotions. This means that understanding and managing emotions could be a useful target for therapy.	People who are **better at noticing their internal bodily signals** and who experienced **less early life relational trauma** tend to **feel happier** and have better overall wellbeing. This supports prior research that trauma, especially in childhood, negatively affects mental health (43-46) which means it is important to think about trauma when offering treatment for FND.
3) Self-Stigma	4) Role of Self-Compassion

Neither childhood trauma, Interoception or **relational trauma** in early life predicted levels of self-stigma to a significant degree. FND patients often experience stigma from society and healthcare professionals (33). This can contribute to self-criticism, social withdrawal, and avoidance of care.	Being kind to oneself **didn't directly change** how trauma or body awareness affected emotions or wellbeing, but it was independently linked to emotion regulation and body awareness Overall, the group showed low-moderate levels of self-kindness, suggesting that therapy aimed at boosting self-compassion (like Compassion-Focused Therapy) might help.

What does this mean clinically?

- It is important for those working with people with FND to conduct holistic and personalised assessments to understand the best interventions suited to their needs.

- It would also be helpful to screen for presence of past trauma which would indicate if a more trauma informed approach should be taken. The below interventions could also be considered within this:

- Interventions focused on developing mind-body awareness can improve PTSD symptoms and may be worth considering as a therapy option to improve recognition and management of difficult emotions or pain.
- Interventions focused on increasing self-compassion could be helpful given the low-moderate levels of self-compassion found both within the FND population and those with long-term conditions. Also, in those that are self-critical typical interventions such as CBT tend to be less effective (47). Initial studies have shown a reduction in anxiety and depression levels (48).

Strengths of the study

This is the **first study** to look at all these variables in this way.

While self-compassion was not a significant moderator, **further research into compassion therapies is supported**

Findings suggest c**hildhood relational trauma** may be **more closely linked** to FND than other types of traumas, highlighting the need for personalised trauma-informed treatment approaches.

Limitations of the study

High dropout rates possibly due to difficulties with concentration and fatigue which is common in FND (49-52).

Diagnosis was self-reported, and all data were subjective **(self-report measures).**

No data on ethnicity/location were collected so **cultural representation is unclear** (53-54).

Sample was predominantly female, in line with FND demographics but limiting generalisability (4,55).

Future Research

- Future research should focus on understanding the mechanisms behind interoceptive deficits, particularly their role in emotional regulation and wellbeing, using methods like longitudinal studies and neuroimaging.
- A broader approach to trauma beyond traditional ACEs is needed, emphasizing early relational trauma impact
- Exploring self-compassion as a potential mediator rather than a moderator in the trauma-outcome link could offer new insights.
- There is a need for standardized, validated outcome measures in FND research to reduce inconsistencies and improve clinical utility.

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