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**Evaluation of LiNES, the Lifespan Negative Experiences Scale: a new measure of trauma, affect and relationship security across the lifespan in individuals with functional neurological disorders**

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**Key words:** Life experiences; Interpersonal trauma; Attachment; Negative affect; Functional neurological symptom disorder

1

**Abstract**

*Aims:* To evaluate potential predisposing vulnerabilities and perpetuating factors in individuals with functional neurological symptom disorder (FND), using the novel Lifespan Negative Experiences Scale (LiNES), designed to assess retrospective self-report of interpersonal trauma, negative affect and relationship security at three developmental stages – childhood, adolescence, and adulthood.

*Methods:* LiNES, CATS (measure of childhood abuse and trauma), RSQ (measure of relationship insecurity) and PANAS (measure of affect) questionnaires were administrated to 71 individuals with FND. Reliability and validity of LiNES were examined by correlation with other measures. FND patients' responses on LiNES were compared with those of 170 healthy controls.

*Results:* LiNES scores in the FND group were internally consistent and correlated highly with CAT, RSQ and PANAS. LiNES trauma scores in FND patients were higher than in controls at each developmental stage. Trauma scores were higher in the FND subgroup with nonepileptic attacks than in other FND patients. Patients also reported greater negative affect and relationship insecurity in adulthood than controls. Lifetime LiNES interpersonal trauma and relationship insecurity predicted FND group membership with over 80% accuracy.

*Conclusions:* This study provides further support for the links between FND trauma, negative affect and insecure attachment. Their recognition is likely to be important for treatment and the stratification of important subpopulations in research. Our findings provide new insights into the association between the timing of negative

experiences and the subsequent effect on an individual, with the LiNES emerging as a potentially useful measure in patients presenting with FND.

**Introduction**

Despite a recent acceleration of research {1}, Functional Neurological Disorder (FND) is still poorly understood by the public and health professionals {2}. The fact that the need for the identification of a precipitating stressor has been dropped from the DSM-5 diagnostic criteria for FND {3}, does not mean that psychosocial factors, including negative life experiences of trauma, negative affect, and relationship insecurity do not play important roles {4-6}. Indeed, evidence for a causal relationship between FND and negative life experiences such as childhood neglect or trauma is not only based on correlational or association studies but also emerges from prospective longitudinal research {6-10}.

In view of this, and the likely relevance of these factors, if present, for therapeutic formulation or patient stratification, a standardised measurement approach could be of great importance clinically and in research studies. Unfortunately, existing measures of trauma tend to be intrusive and time-consuming. For example, the Childhood Trauma Questionnaire (CTQ), a 25-item measure {11} or the Life Events and Difficulties Schedule (LEDS) {12} (a semi-structured interview that can take 2-4 hours), have been used individuals with FND {13,14}. Both are so detailed and intrusive that they may cause distress to patients or research participants. In addition, there are no combined measures of trauma, negative affect, and relationship insecurity in existence which has been validated in this patient group. Moreover, existing measures fail to differentiate between developmental phases during the respondent's lifespan, although the developmental vulnerabilities vary in different life phases {15,16}.

To address this gap, we developed a new, short questionnaire, the Lifespan Negative Experiences Scale (LiNES) {17}. LiNES asks adults retrospectively to rate their experiences of interpersonal trauma, negative affect, and relationship insecurity during three life phases: childhood, adolescence and adulthood {17}. In a non-clinical population LiNES scores at each developmental stage were found reliably to predict both physical symptom reporting and emotional processing difficulties in adulthood {17}. A key strength of LiNES is that it has been designed to be minimally invasive in terms of the number and nature of the questions it asks. For example, the Childhood Abuse and Trauma scale (CATS) {18}, an established trauma measure, consists of 38 items and asks questions about experiences of abuse in more detail than necessary or appropriate for a screening or stratification tool. Moreover, the CATS only focuses on traumatic experiences in childhood, and, like most established questionnaires, measures trauma by focussing on objective events (e.g., number of experiences or perpetrators) rather than their subjective effects, although there is little evidence that this information is relevant to the occurrence of posttraumatic symptoms {19}.

LiNES has been designed for use in clinical settings, but was validated in a non-clinical sample {17}. The present study was intended to examine whether LiNES could be useful for the identification of predisposing, precipitating and perpetuating factors in patient populations. Consequently, we compared data from patients with FND with those from healthy controls. Further, we explored the construct validity of the LINES by studying correlations with previously validated measures of related domains such as childhood abuse and trauma, positive and negative affect, physical symptoms and the quality of interpersonal relationships.

5

**Method**

**Participants**

Patient participants were recruited via e-mail through non-epileptic attack disorder (NEAD) and FND online forums. Control participants were recruited via e-mail through a volunteer database (current students at the University of Sheffield and alumni and staff). The control participants data were used previously in the original LiNES validation {17}. Participants were offered the chance to enter a prize draw for a £20 voucher. To increase the number and diversity of controls, participants were was asked to share the survey link with at least one person who was not affiliated with the university. Ethical approval was granted by the University of Sheffield Psychology Department ethics committee.

**Procedure**

This study was conducted using the Qualtrics online survey software (Qualtrics, 2015).

**Measures**

  **Demographics.** Participants provided information on their date of birth, gender, country of birth, and ethnicity. Participants were also prompted to report any relevant diagnoses (mental health conditions, neurodevelopmental differences, seizures, or medically unexplained symptoms) and who their primary childhood caregivers were. Respondents rated their socio-economic status (SES) using the SES Ladder {20} at two life stages, once for the family in which they grew up and

once for their current circumstances.  Respondents in the NEAD/FND group were asked about employment status, diagnosis, symptomology and treatment history.

**The Lifetime Negative Experiences Scale (LiNES)**

LiNES (Supplementary Information 1) consists of 13 items grouped into three subscales, interpersonal trauma (items = 4), negative affect (items = 5) and relationship insecurity (items = 4). Each item was rated on a seven-point scale (0, not at all, to 6, a lot). They had to rate all 13 items three times: thinking about their childhood, adolescence and adulthood. Scores were calculated for each subscale at each developmental stage by calculating an average across the items within that subscale at each stage. Subscale scores were calculated without replacing any missing data as long as no more than one item per subscale was missing. Scores were not calculated if more than one item per subscale was missing.

**Construct validation measures**

Three previously validated measures were chosen to support the convergent validity of each of the three LiNES subscales in the FND sample.

Early life trauma was measured by the 38-item Childhood Abuse and Trauma Scale (CATS) {18}, which has good psychometric properties(overall Cronbach's alpha 0.90) {18,21}. Each item is rated on a 0 (never) to 4 (always) scale. The original paper describes three subscales: 1) sexual abuse; 2) punishment; and 3) neglect/negative home atmosphere. An additional emotional abuse subscale was created and validated using items not included in the original three subscales {21}. A total CATS score was also calculated (mean of the responses of the 38 questions).

Affect during the previous week was measured using the 20-item Positive and Negative Affect Scale (PANAS) {22} which has good psychometric properties (Negative affect and Positive affect subscales Cronbach's alpha, 0.85 and 0.89, respectively).

The 30-item Relationship Scales Questionnaire was used to measure previous attachment/experiences in relationships {23}. Similarly to LiNES, it does not ask about any particular relationship (e.g., with parents or romantic partners). The RSQ yield two attachment dimensions (anxiety and avoidance) with good psychometric properties (Anxiety: Cronbach's alpha=0.83, Avoidance: 0.77) {24}.

**Physical symptom measure**

Current physical symptom reporting was measured using the 20-item Somatoform Dissociation Questionnaire (SDQ) {25}. Higher SDQ scores are associated with a greater likelihood of symptoms not being attributable to pathophysiological or structural abnormalities {26}.

**Data Analysis**

Data were analysed using SPSS (version 25). Alpha level , $p = .05$. Tests used were 2-tailed. The risk of false negative findings was reduced by the Benjamini-Holm procedure. Histogram plots of LiNES, PANAS, CATS, RSQ and SDQ scores indicated that the majority of scores were not normally distributed. Hence, non-parametric analyses were conducted. Internal reliability of LiNES subscales were examined by calculating Cronbach's alpha.

To explore changes in interpersonal trauma, negative affect and relationship insecurity across the three developmental stages in the FND and control groups, each subscale score was compared across all developmental stages. Spearman's correlation coefficient scores between childhood and adolescence, childhood and adulthood, and adolescence and adulthood were highly significant for FND and control participants and each subscale (p<.001, Supplementary Table 5 a & b). However, t-tests (Wilcoxon signed ranks test) and effect sizes suggested that some subscale scores differed significantly at different developmental stages. Where these were significant, effect sizes were calculated.

Whether LiNES subscales could predict the likelihood that participants had FND was tested by stepwise (forward) binomial logistic regression based on average lifetime scores of all three LiNES subscales - interpersonal trauma, negative affect and relationship insecurity scores. Included in the model were age, childhood SES status and gender as independent variables. A Receiver Operating Characteristic (ROC) curve was used to calculate discrimination accuracy of the model.

To explore whether different presentations of FND are associated with different predisposing factors {27}, we compared findings among individuals with FND only and those with NEAD or NEAD and FND using t-tests (Mann-Whitney).

## Results

### Participants

Demographic data is shown in Table 1. For the FND sample, of 104 people who opened the survey link 71 (62 females) completed demographic information and all items of the LiNES (completion rate: 68%), suggesting that the majority found the measure acceptable. For the healthy control sample, of 373 people who opened the survey link 271 (194 females) completed demographic information and all items of the LiNES (73% completion rate), 37% of these were excluded , as they reported being diagnosed with at least one disorder (37%). Hence, the healthy control sample included in this study comprised 170 individuals (109 females).

Participants were matched for ethnicity and country of origin. However, the healthy controls had a lower median age than the FND sample, and included more male participants. In addition, FND patients reported a significantly lower SES, both currently and during childhood compared to controls. The majority of FND participants reported their employment status as on leave/out of work due to illness (59%). When asked about educational status, 36% of the patients had obtained vocational qualifications. No employment or educational data was available from the healthy control group.

**Clinical symptomology in the FND group**

The majority of patient participants (n = 71) self-reported a diagnosis of FND only (50.7%), 11.3% one of NEAD, and 38% of both diagnoses. Patients reported high levels of comorbid conditions. The six most commonly self-reported diagnoses were anxiety (57.7%), depression (56.3%), Chronic pain/chronic fatigue/IBS (52.1%), PTSD (15.5%), epilepsy (11.3%), other mental health problems (12.7%). Almost of all the FND group (91.5%) were taking some form of medication (median number: 3

drugs, range 0-18) with 66.2% stating that they had received some form of psychological treatment.  In this sample, seizures were the most commonly reported disabling symptom (33.8%), followed by paralysis (14.1%), tremor (7%) and weakness (4.2%).

**Self-report measures in patients with FND compared to healthy controls**

FND participants reported higher levels of negative affect and lower levels of positive affect compared to controls, and higher levels of trauma and avoidant and anxious realtionship styles compared to controls. Furthermore, indviduals with FND scored signficantly higher on the SDQ compared to controls (Supplementary Table 1).

**LiNES**

**Internal consistency**

Internal consistency was acceptable to very good in the FND group (α ranged from 0.78 to 0.96). In the control group, internal consistency ranged from 0.52 to 0.86. Notably, with the exception of the interpersonal trauma subscale in the control group, internal reliability was acceptable for all three subscales. The internal consistency of the trauma subscale in the control group may have been low because of low or absent levels of trauma in many respondents.  Cronbach's Alpha values are presented in Supplementary Table 2.

**LiNES scores in FND and healthy control participants**

FND participants reported higher levels of interpersonal trauma, negative affect and relationship insecurity at all three stages of development compared to healthy control participants (Figure 1, Supplementary Table 3). Notably, while trauma scores for

FND participants were significantly larger compared to control participants, these were not significantly different between each developmental stage in either the FND or control groups (Friedman test; FND group $\chi 2$= 1.677, p = .431; Control group, $\chi 2$= .0844, p = .656). In contrast, for both negative affect and relationship insecurity there were significant differences in the scores across the three-developmental periods in both the FND and control groups (Friedman Tests: Negative affect - FND group $\chi 2$= 30.372, p < .001, Control group, $\chi 2$= 100.129, p <.001; Relationship insecurity - FND group $\chi 2$= 16.301, p < .001; Control group, $\chi 2$= 35.379, p <.001).

Of the patients in our FND patient cohort 36 reported FND only (male = 4, female, 31, other = 1; Age, M = 44.89, SD = 11.43), 35 had FND including NEAD or only NEAD (male = 4, female, 31; Age, M = 42.6, SD = 12.010). Those with NEAD reported significantly higher levels of inter-personal trauma during childhood and adolescence, and very nearly significantly higher levels in adulthood (p = 0.051), compared to individuals with other FND. Differences in other LiNES sub-scales between these patient subgroups were not significant after correcting for multiple comparisons (Supplementary Table 4).

**LiNES: Consistency of experiences across the lifespan**

Changes in experiences of trauma, negative affect and relationship insecurity across the three developmental stages in the FND and control groups are presented in Supplementary Tables 5 a & b. For interpersonal trauma, the Wilcoxon signed ranks tests did not identify any significant differences between the scores for three developmental stages, this was the case both for FND and control participants. Interestingly, in both the FND and healthy control participants we found an increase

in negative affect and relationship insecurity during the adolescent period. Notably, negative affect only continued to rise into adulthood in FND participants. For relationship insecurity, after showing an increase from childhood to adolescence in both FND and control participants, a significant reduction in this domain at the transition into adulthood was only observed in the control participants (Figure 1).

## *Construct validity*

The LiNES subscale scores in the FND sample were expected to correlate with existing, validated measures of interpersonal trauma (CATS), negative affect (PANAS), and relationship insecurity (RSQ). Significant Spearman's correlation coefficients were identified for each of the LiNES subscales, CATS total and suscales, PANAS and the RSQ anxious style, but not the RSQ avoidance style score (Supplementary Table 6).

## Prediction of FND diagnosis based on life time LiNES interpersonal trauma

The assumption of linearity of the continuous variables in our model (age, SES, LiNES subscale scores) with respect to the logit of the dependent variable as assessed via the Box-Tidwell procedure was met. A Bonferroni correction was applied using all 12 terms in the model resulting in statistical significance being accepted at $p <$ .004. Based on this assessment, all continuous independent variables were found to be linearly related to the logit of the dependent variable. In addition, five standardized residuals with values of -2.69, 2.79, 3.20, 3.08, 3.82 were found, which were kept in the analysis

Explanatory variables that were retained in the final model were LiNES interpersonal trauma, LiNES relationship insecurity, age and gender ($\chi^2(4) =$

129.63, $p < .0001$, Table 2). Thus, higher levels of trauma and relationship insecurity were associated with a greater likelihood of having FND. Females had 0.23 times higher odds to exhibit FND than males and greater age was associated with an increased likelihood of exhibiting FND. SES and LiNES negative affect did not contribute to the model. This final model explained 59.5% (Nagelkerke $R^2$) of the variance in FND and correctly classified 82.9% of cases. Sensitivity was 60.0%, specificity was 92.4%, positive predictive value was 73.4% and negative predictive value was 84.9%. The area under the ROC curve was .912 (95% CI, .876 to .948), an outstanding level of discrimination {28}.

**Discussion**

Using the new Lifespan Negative Experiences Scale (LiNES), we assessed self-reported experiences of interpersonal trauma, affect and relationship security at three developmental stages – childhood, adolescence, and adulthood – in patients with FND. We found that the LiNES is an internally consistent and reliable questionnaire with good construct validity. The interpersonal trauma, negative affect and relationship insecurity LiNES subscales correlated highly with more detailed older measures of trauma, attachment, and affect. The LiNES lifetime interpersonal trauma and relationship insecurity, but not negative affect, reliably predicted FND status.

Using LiNES, we found that individuals with FND had higher levels of interpersonal trauma, negative affect and relationship security at all three developmental stages than healthy controls. Cronbach's alpha exhibited good internal consistency of the LiNES among patients with FND. Moreover, the LiNES correlated highly with

14

previously validated measures of the three constructs, although it is much shorter and likely to be more acceptable than these more established measures, with just 13 items, completed once for each developmental stage. Our findings of higher levels of interpersonal trauma are consistent with those of other studies which have revealed high levels of trauma in the early life and adulthood of FND patients {6,29}.

The strength of LiNES is its ability to measure negative experiences longitudinally. This revealed important differences in changes in such experiences in individuals with FND compared to controls. We found that negative affect and relationship insecurity increased significantly during adolescence. Indeed, the life changes that occur during adolescence are often associated with an increase in the experience of emotional and interpersonal turmoil {30}. However, only in FND individuals' does negative affect increase further during adulthood.

The high levels of negative affect reported by FND individuals in this study are consistent with the idea that functional symptoms are physical manifestations resulting from emotional distress {29,31}. Negative affect is thought to be risk factor and is associated with functional symptoms {32}. Likewise, an insecure attachment style, which was also high in the FND group, has been associated with functional symptoms {33,34}, and could influence peoples' help-seeking behaviours. E.g., having an insecure, anxious attachment style could make people more likely to experience distress and to report common physical symptoms {35}. In support of this, we found a positive association between the SDQ-20 and LiNES relationship insecurity in FND individuals.

The temporal changes across the life span in negative affect and relationship insecurity in our FND and healthy control participants contrasted with steadily elevated levels of interpersonal trauma across the lifespan. Likewise, we found little lifetime variation of the low levels of trauma among healthy controls. There is much work on the association between trauma history and FND {6}. Consistent with a recent review{6}, our study found FND patients to have higher levels of trauma than controls during childhood, adolescence and adulthood. Moreover, our analyses demonstrate that LiNES lifetime interpersonal trauma and relationship insecurity score could be used to reliability predict FND status, providing an initial indication of the LiNES's potential clinical validity and further evidence of an aetiological link, at group level, between trauma and FND. Consistent with the idea that differences in traumatic experiences may shape functional symptoms {27}, our subgroup analysis comparing findings in individuals reporting FND only and those with NEAD and FND revealed that the participants in the NEAD subgroup reported higher levels of inter-personal trauma during childhood and adolescence – and almost significantly higher trauma in adulthood - compared to individuals with FND only.

Notably, our findings need to be viewed in light of this study's limitations. First, patients in the FND group were recruited through internet forums for patients with this diagnostic label or one of NEAD. They were asked to self-certify that they were diagnosed with one of these disorders, which were not medically confirmed. Therefore, we cannot be certain that all would have met the DSM-5 criteria for FND. It is possible that some patients may have received FND/ NEAD diagnosis by non-specialists without appropriate assessment. However, it is unlikely that a substantial number of participants wrongly self-declared that they had FND/NEAD. We note that

the demographic and psychopathological profile revealed by patients' responses to previously validated self-report measure matches that described in previous studies of FND. Further, the diagnostic uncertainty related to our recruitment procedure has to be weighed against the fact that we may have captured data from a group of patients that is less acutely unwell than those we might have recruited from a specialist clinic. On the other hand, it is possible that patients frequenting FND internet forums and willing to take part in research studies represent a particular subset of FND patients with higher rates of psychopathology or trauma history than other FND patients.

Next, the participant groups were not matched with regards to gender, age, and SES status. This is an issue as there are gender differences in the type of trauma men and women are exposed to and/or are likely to report {36}, and trauma is more prevalent among deprived populations {37}. However, we tried to address this by taking into account age, SES and gender in our logistic regression analysis. Further, LiNES is based on retrospective recall. The additional validated measures used in this study provide some reassurance about the reliability of retrospective reports, however, it is possible that perception of childhood trauma was related to recall bias related to adulthood trauma (rather than childhood trauma setting individuals up to experience trauma in adolescence and adulthood as well). Lastly, we acknowledge that our results are correlational, and more work is needed to examine the causal relationships between trauma, affect and relationship insecurity and FND.

In conclusion, although psychological factors may not be necessary to develop FND, they are likely to play an important pathophysiological role in a large proportion of

patients and their recognition is important for treatment. Our findings suggest that

LiNES could be helpful in clinical settings where functional symptoms are common.

Although this tool is not designed as a diagnostic test for FND, it could be useful for

screening for potentially relevant predisposing, precipitating, or perpetuating factors

and thereby inform treatment formulations. LiNES could also be used in research, for

instance for stratification based on different developmental backgrounds.

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## Supplementary Information 1: LiNES with scoring grid

**Instructions: In each of the following sections, you will be asked to rate how often you had some particular experiences and had certain feelings. You will be asked to rate the same items several times, in order to find out about your experiences during three different stages of your life (childhood, adolescence, and adulthood).** Please complete by placing a cross in the appropriate box

**Part A: In your * to what degree did you experience…?**

| | Not at all | | | Some | | | A lot | |
|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | **Scoring** |
| Physical neglect | | | | | | | | |
| Physical abuse | | | | | | | | |
| Emotional abuse | | | | | | | | |
| Sexual abuse | | | | | | | | |
| Average (if at least 3 items completed) | | | | | | | | **A** |

**Part B: In your * to what extent did you feel…?**

| | Not at all | | | Some | | | A lot | |
|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | **Scoring** |
| Angry | | | | | | | | |
| Afraid | | | | | | | | |
| Stressed | | | | | | | | |
| Worried | | | | | | | | |
| Anxious | | | | | | | | |
| Average (if at least 3 items completed) | | | | | | | | **B** |

**Part C: In your * to what extent did you feel…?**

| | Not at all | | | Some | | | A lot | |
|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | **Reverse Scoring** |
| Secure | | | | | | | | |
| Loved | | | | | | | | |
| Confident | | | | | | | | |
| Supported | | | | | | | | |
| Average (if at least 3 items completed) | | | | | | | | **C** |

* This will be filled in for three different developmental categories – childhood, adolescence, and adulthood. *Scoring*: Part C. Reverse scoring: All four items in Part C, are reverse scored. Therefore, the score for each item is calculated by subtracting the score from 6; Missing data: If more than one item per subscale is missing, average scores should not be calculated.
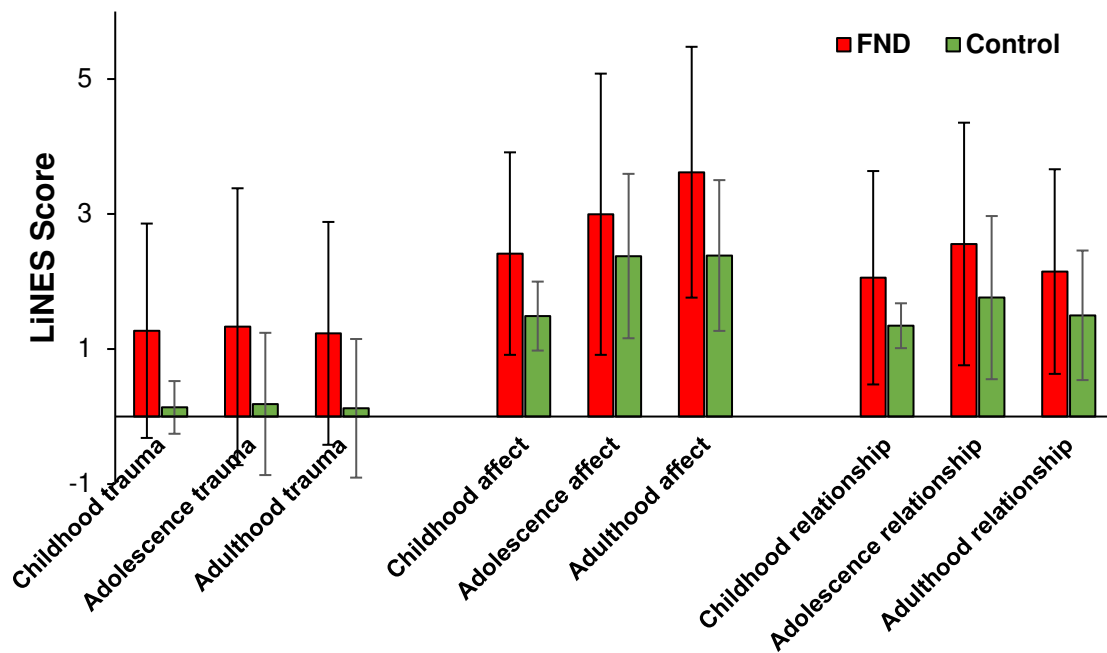
**Figure 1:** LiNES subscales scores which retrospectively assess experiences of interpersonal trauma, negative affect and relationship security at three developmental stages – childhood, adolescence, and adulthood, in FND (n = 71) and healthy control participants (n = 170). Higher scores indicate greater trauma, negative affect and relationship insecurity. Trauma, LiNES Interpersonal trauma subscale; Affect, LiNES Negative affect subscale; Relationship, LiNES Relationship insecurity subscale; Error bars are standard deviations of the mean

**Table 1.** Participant demographics[a]

| Characteristic | FND (n = 71) | Controls (n = 170) | *p* |
|---|---|---|---|
| **Median Age (range)** | 45 (18-73) | 23.45 (18-67) | **<.001[a]** |
| **Gender (%)** | | | |
| Female / Male | 87.3 /11.3 | 64.1/35.9 | **<.001[b]** |
| Other | 1.4 | | |
| **Ethnicity (%)** | | | |
| White | 98.6 | 88.2 | |
| Mixed/Multiple | 1.4 | 4.1 | |
| Asian/Asian British | | 4.7 | |
| Black/African Caribbean | | 1.8 | |
| Other | | 1.2 | |
| **Country of birth (%)** | | | |
| UK | 94.4 | 86.5 | |
| USA | 4.2 | 2.9 | |
| Other | 1.4 | 10.6 | |
| **Median SES (range)** | | | |
| Childhood | 5 (1-10) | 6 (2-10) | **=.008[a]** |
| Current | 5 (1-10) | 6 (2-10) | **<.001[a]** |

[a] FND=Functional Neurological Symptom Disorder; SES=Socioeconomic Status;UK=United Kingdom; USA= United States of America. [a] = between-groups t test, [b] = Chi squared test of association.

**Table 2.** Stepwise (forward) logistic regression predicting the likelihood of FND[a]

| Model | Variable | β | SE | Wald | *df* | *p* | Odds ratio | 95% CI for Odds Ratio | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| 1 | LiNES interpersonal trauma | 1.93 | 0.32 | 36.66 | 1 | <0.001 | 6.90 | 3.69 | 12.89 |
| 2 | Age | 0.07 | 0.01 | 30.21 | 1 | <0.001 | 1.07 | 1.04 | 1.10 |
| | LiNES interpersonal trauma | 1.85 | -.34 | 29.23 | 1 | <0.001 | 6.37 | 3.255 | 12.46 |
| 3 | Age | 0.08 | 0.01 | 30.71 | 1 | <0.001 | 1.08 | 1.05 | 1.11 |
| | Gender | -1.56 | 0.53 | 8.70 | 1 | 0.003 | 0.21 | 0.07 | 0.59 |
| | LiNES interpersonal trauma | 1.84 | 0.36 | 25.98 | 1 | <0.001 | 6.32 | 3.11 | 12.86 |
| 4 | Age | 0.08 | 0.01 | 29.51 | 1 | 0.007 | 1.08 | 0.08 | 0.68 |
| | Gender | -1.45 | 0.54 | 7.21 | 1 | 0.007 | 0.23 | 0.08 | 0.68 |
| | LiNES interpersonal trauma | 2.61 | .55 | 22.29 | 1 | <0.001 | 13.59 | 4.60 | 40.18 |
| | LiNES relationship insecurity | -0.57 | -.27 | 4.42 | 1 | 0.036 | 0.57 | 0.33 | 0.96 |

[a]β=probability of FND occurring; SE, standard error; Wald, Wald test used to determine statistical significance for each independent variable; CI, confidence interval; LiNES, Lifetime of Negative Experiences Scale; Gender is for females compared to males.

**Supplementary Table 3. LiNES scores[a]**

| LiNES subscales | FND n = 71 | | Control n = 170 | | Mann-Whitney (Z) | p |
|---|---|---|---|---|---|---|
| | **Median** | **range** | **Median** | **range** | | |
| **Childhood** | | | | | | |
| Trauma | 0.50 | 0-4.75 | 0.00 | 0-2.75 | 6.79 | **<0.001** |
| Affect | 2.00 | 0-6 | 1.40 | 0-5.6 | 2.41 | **0.016** |
| Relationship | 5.25 | 0-6 | 1.25 | 0-5.25 | 2.69 | 0.07 |
| **Adolescence** | | | | | | |
| Trauma | 0.75 | 0-4.5 | 0.00 | 0-3.5 | 7.48 | **<0.001** |
| Affect | 3.00 | 0-6 | 2.40 | 0-6 | 1.82 | 0.067 |
| Relationship | 2.50 | 0-6 | 1.50 | 0-5.5 | 2.84 | **0.004** |
| **Adulthood** | | | | | | |
| Trauma | 0.75 | 0-6 | 0.00 | 0-2 | 7.34 | **<0.001** |
| Affect | 4.20 | 0-6 | 2.40 | 0-5.4 | 5.07 | **<0.001** |
| Relationship | 2.00 | 0-5.25 | 1.50 | 0-4.5 | 2.89 | **0.004** |

[a] Trauma, LiNES Interpersonal trauma subscale; Affect, LiNES Negative affect subscale; Relationship, LiNES Relationship insecurity subscale; p in bold, signficant after Bonferroni-Holm correction.

**Supplementary Table 4** LiNES scores in FND and NEAD&FND individuals[a]

| LiNES subscales | FND n = 36 | | NEAD&FND n = 35 | | Mann-Whitney (Z) | p |
|---|---|---|---|---|---|---|
| | **Median** | **range** | **Median** | **range** | | |
| **Childhood** | | | | | | |
| Trauma | 0.00 | 0-4.5 | 1.5 | 0-4.75 | 2.91 | **0.004** |
| Affect | 1.50 | 0-5.6 | 3 | 0-6 | 1.58 | 0.114 |
| Relationship | 1.25 | 0-5.6 | 3 | 0-6 | 1.62 | 0.104 |
| **Adolescence** | | | | | | |
| Trauma | 0.25 | 0-4.5 | 1.5 | 0-4.5 | 2.81 | **0.005** |
| Affect | 2.1 | 0-6 | 3.4 | 0-6 | 2.30 | 0.021 |
| Relationship | 1.75 | 0-6 | 3 | 0-6 | 1.92 | 0.054 |
| **Adulthood** | | | | | | |
| Trauma | 0.12 | 0-5.25 | 1.25 | 0-6 | 1.95 | 0.051 |
| Affect | 2.8 | 0-6 | 4.6 | 0-6 | 2.61 | 0.009 |
| Relationship | 1.5 | 0-5.25 | 2.25 | 0-5 | 2.28 | 0.022 |

[a] Trauma, LiNES Interpersonal trauma subscale; Affect, LiNES Negative affect subscale; Relationship, LiNES Relationship insecurity subscale; p in bold, signficant after Bonferroni-Holm correction.

**Supplementary Table 5a. FND participants -** Relationships between childhood, adolescence, and adulthood LiNES scores[a]

| LiNES subscales | Developmental stage | | |
|---|---|---|---|
| | Child x Adol (r) | Child x Adult | Adol x adult |
| *Interpersonal Trauma* | | | |
| $r_s$ | **0.884** | **0.571** | **.649** |
| Z | .672 | .308 | .768 |
| Cohen's d | - | - | - |
| | | | |
| *Negative affect* | | | |
| $r_s$ | **.833** | **.565** | **.651** |
| Z | 4.112* | 5.125* | 2.989* |
| Cohen's d | 0.3* | 0.43* | 0.24* |
| | | | |
| *Relationship insecurity* | | | |
| $r_s$ | **.925** | **.524** | **.634** |
| Z | 5.124* | 0.534 | 2.176 |
| Cohen's d | 0.42* | - | - |

[a] Correlations are shown in bold; all correlations were significant at p < .001 and remained significant after Bonferroni-Holm corrections for multiple comparisons; $r_s$=Spearman's correlation coefficient; Z = Wilcoxon signed ranks test. * indicates t-test significance < .01 (corrected, Bonferroni-Holm) or effect size > 0.2 (small); - indicates where no effect size calculation was carried out due to non-significant t-test.


**Supplementary 5b. *Control participants* -** Relationships between childhood, adolescence, and adulthood LiNES scores (n = 170)[a]

| Description | Developmental stage | | |
|---|---|---|---|
| | Child x Adol (r) | Child x Adult | Adol x adult |
| *Interpersonal Trauma* | | | |
| $r_s$ | **.551** | **.390** | **.435** |
| Z | .502 | .751 | -1.399 |
| Cohen's d | - | - | - |
| | | | |
| *Negative affect* | | | |
| $r_s$ | **.561** | **.413** | **.694** |
| Z | 8.512** | 7.953** | .737 |
| Cohen's d | 0.46* | 0.43* | - |
| | | | |
| *Relationship insecurity* | | | |
| r | **.745** | **.570** | **.632** |
| Z | 7.133* | 2.578* | 3.398* |
| Cohen's d | 0.39* | 0.13 | 0.18 |

[a] Correlations are shown in bold; all correlations were significant at p < .001 and remained significant after Bonferroni-Holm corrections for multiple comparisons; $r_s$=Spearman's correlation coefficient; Z = Wilcoxon signed ranks test. * indicates t-test significance < .01 (corrected, Bonferroni-Holm) or effect size > 0.2 (small), ** indicates t-test significance < .001 (that remained significant after Bonferroni-Holm correction) or effect size > 0.5 (medium); - indicates where no effect size calculation was carried out due to non-significant t-test.

**Supplementary Table 6.** Concurrent validity[a]

| LiNES Subscale | Validated measure | Correlations ($r_s$) | | |
|---|---|---|---|---|
| | | Child | Adoles | Adult |
| Interpersonal Trauma | **CATS** (n = 70) | | | |
| | Negative Environment | .746** | .790** | .533** |
| | Punishment | .615** | .633** | .516** |
| | Sexual Abuse | .642** | .569** | .385** |
| | Emotional Abuse | .636** | .681** | .452** |
| | Total Score | .769** | .774** | .534** |
| Negative Affect | **PANAS** (n = 70) | | | |
| | Negative | .544** | .569** | .575** |
| | Positive | -.242* | .257* | -.292* |
| Relationship Insecurity | **RSQ** (n= 70) | | | |
| | Anxious | .486** | .548** | .620** |
| | Avoidant | .063 | .081 | .019 |

[a] CATS = Childhood Abuse and Trauma Scale; PANAS = Positive and Negative Affect Scale; RSQ = Relationship Scales Questionnaire; Adoles = Adolescence. $r_s$ = Spearman's rho value. ** p< .001, *p<0.05 (2-tailed) and remained significant following Bonferroni-Holm correction for multiple comparisons