Preliminary fMRI findings investigating a predictive coding model for the implicit psychogenesis of Eating Disorders and Functional Motor Disorders.

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Introduction

In 1893 Freud and Breuer first proposed Conversion Disorder arose from unconscious defences. As a Consultant in the NHS I worked psychoanalytically with trans-diagnostic presentations, Personality Disorder (PD), Eating Disorders (ED) and Functional Motor Disorders (FMD). I developed a Relational Affective Hypothesis linking psychoanalytic defences to disordered body ownership (SoO) in ED and agency (SoA) in FMD (Mizen 2014). In my PhD I investigated an Implicit Psychogenesis Hypothesis: a proposed neural mechanism describing how biological triggers to panic lead to adjustments in precision in the Internal Generative Model of the Minimal Self (Limanowski and Blankenberg 2013). Linking disorders in the sense of self in psychological terms with self representation at a neural level addresses both why and how somatic symptoms arise within a predictive coding framework.

Aim

To test the Implicit Psychogenesis Hypothesis by presenting ED and FMD participants with a stimulus to an unconscious psychological defence in the fMRI scanner and measuring BOLD signal in predicted brain regions implicated in SoO in ED and SoA in FMD. The Hypothesis proposes defences are initiated by biological triggers to panic, suffocation and separation (Busch et al 2010) giving rise to adjustments to the Internal Generative Model of the Minimal Self. Adjustments to precision resolve the conflict by reducing activity in regions linked to SoO in ED (Right Inferior Parietal Lobule (IPL) (Supramarginal Gyrus (SMG) and Angular Gyrus(AG)), Extrastriate Body Area(EBA), Extrastriate Fusiform Area (EFA) and Posterior Insula Cortex (PIC) and SoA in FMD (Right IPL including SMG and AG, Head of Caudate, Supplementary Motor Area (SMA) and primary motor cortex (M1)). The proposed neural mechanism is shown in Figure 1.

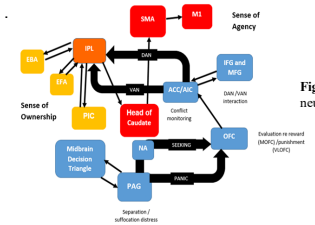


Figure 1 Proposed neural mechanism

Method

Participants: Healthy Controls (41), Eating Disorders ED (28), Functional Motor Disorders FMD (14)

fMRI paradigm: The Interpersonal Relations Picture Set (Fuchs et al 2018) 32 stick man pictures representing patterns of interpersonal relating from Axis 2 of the Operationalised Psychodynamic Diagnosis (OPD-2) and two control pictures. Pictures selected for each participant are a cue to recall specified memories.

3 Conditions: Neutral memories (Control), Conscious relational memories (Explicit) and relational memories related to Unconscious conflict (Implicit)

Identifying Unconscious conflict: a filmed psychoanalytic interview rated on OPD-2 axes II (Interpersonal relating) III (Conflict) and IV (Structure) by CI and 3 independent raters.

Identifying conscious maladaptive relations: The Maladaptive Interpersonal Relations Q Sort (Zimmerman et al 2014), 32 cards with sentences describing maladaptive relationships linked to IRPS picture set (Figure 2).

Figure 2 IRPS pictures and sentences

"I tend to lean heavily on others and be clingy"

"I tend to try to harmonise with others avoiding aggression"

Pre-scanning Narrative recordings of six memories: 2 neutral, 2 Explicit identified from Q sort task, 2 Implicit identified at analytic interview. Emotional Valency and Intensity re recalled memories rated using a Self Assessment Mankin, a 9 item likert scale.

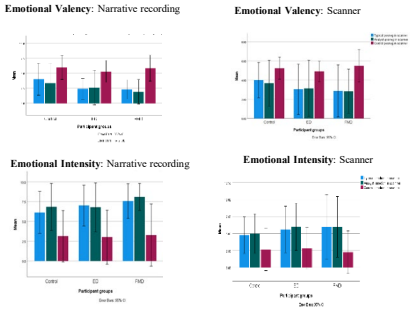
Scanning procedure: 3T scanner, mixed block design, 18 trials (3 x 6 pictures) per run, 3 runs (changed sequence).

Emotional valency and intensity were rated after each trial with the Self Assessment Mankin using a button press.

Results

Did participants recall emotions related to their memories in the scanner?

Figure 3 Emotion ratings following narratives and in the scanner



There was a significant difference in emotional valency and intensity ratings of the two experimental conditions from the control condition following narrative recordings. This significant difference was retained in the scanner although emotions were rated less negatively and less intensely, reflecting the difficulty recalling emotions in the scanning environment.

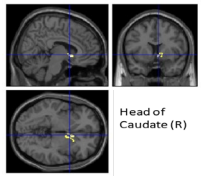
fMRI findings

Data was analysed using SPM12. Key findings from the Region of Interest Analysis are presented here

FMD group findings

Figure 4 FMD group ROI analysis

ROI Analysis: Contrast between FMD group and Control group (p<.005 Threshold 101 voxels)



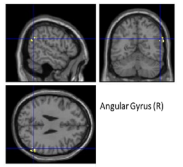
Implicit – Explicit: Control group – FMD group: Right head of Caudate less active in FMD group

The Implicit (Unconscious) stimulus was associated with reduced activity in the head of the right Caudate Nucleus when contrasted with the Explicit (conscious) stimulus in the FMD group compared with the control group. This region is implicated in the initiation of movement as part of the efferent pathway for the SoA in keeping with the prediction of the Implicit Psychogenesis Hypothesis.

ED group findings

Figure 5 ED group ROI analysis

ROI Analysis: Contrast between ED group and Control group (p<.005 Threshold 70 voxels)



Explicit – Control: No above threshold clusters.
Implicit - Control: Control group – ED group: R Angular Gyrus less active in ED group.

The Implicit (Unconscious) stimulus when contrasted with the control stimulus was associated with reduced activity in the right Angular Gyrus, whereas the Explicit (Conscious) stimulus was not, in the ED group compared with the control group. This region is implicated in self-other distinction and the SoO in keeping with the prediction of the Implicit Psychogenesis Hypothesis

Conclusion

- I have presented preliminary evidence for the role of implicit psychological conflict in the genesis of disordered SoO in ED and SoA in FMD.
- These preliminary findings provide support for the Implicit Psychogenesis Hypothesis
- The findings have implications for psychotherapeutic practice.

Limitations:

- Insufficient FMD participants – 5 more have been recruited (n=19).
- Connectivity analysis – yet to be completed (Resting state scans and DTI).

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