Neural reward circuitry in individuals with anorexia nervosa (AN) vs. healthy controls

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Introduction

Background:
• Individuals with AN have shown atypical patterns of reward processing, which may interfere significantly with the formation and maintenance of healthy interpersonal relationships¹.
• Differences in the neural circuitry of reward processing may be responsible for these problems².

We are using functional magnetic resonance imaging (fMRI) to compare reward-related brain activation in healthy and AN subjects when looking at face, body, and control images.

Hypotheses:
• AN subjects will show increased activation in reward processing regions of the brain when looking at underweight bodies.
• Healthy subjects will show increased brain activation in reward regions when looking at attractive faces.
• AN subjects will show increased activation in the amygdala when looking at faces compared to healthy controls.

Methods

Participants
• 9 healthy, female participants (mean age: 23.46 yrs, range: 19-28 yrs)

Trial Types
• Participants presented with face (varying attractiveness), body (varying attractiveness/weight), and control images

fMRI Task
• 6 runs of functional data
• 72 trials per run
• 144 pictures of each type per subject, distributed through runs

Decision trial:

Non-decision trial:

Results

Decision trial:

Non-decision trial:

Data Analysis

Preprocessing/ Prestats: skull stripping, reorientation/registration, motion correction

Motion Estimation Plot

First Level Model: models data across all trials in a single run

Cope (Contrast of Parameter Estimate): Set contrasts between all EVs (explanatory variables). Allows for assessment of main effects of face, body, and control images and also for contrasts between each of these variables.

Second Level Model: combines all first level models for all runs of a single subject

Third Level Model: combines all second level models to create a model across all subjects for each cope that breaks down trial types

Whole Brain Contrast:

ROI (Region of Interest) Results:

Results have not yet reached significance.

Conclusions

• A basic model of brain activation to face, body, and control pictures has been established.
• Bash programs and FSL template files have been created that can be utilized in future analysis.

Future Directions

• Use the basic model for comparison between healthy subjects and subjects with AN
• Develop a parametric model of brain activation to increasing attractiveness and weight in faces and bodies
• Extract parameter estimates for additional regions of interest (ventromedial PFC, ventral striatum, amygdala, anterior insula)

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