Exploring mechanisms underlying compulsive behaviour in anorexia nervosa: implications for treatment

Caitlin Lloyd¹, Dr Anne Haase¹ & Dr Ian Frampton²

¹ University of Bristol, UK ² University of Exeter, UK
Overview

• Presentation of a novel model of the development and maintenance of anorexia nervosa (AN)

• Exploration of how the model may inform prevention interventions

• Group activity: How can the model inform current treatment?
Anorexia nervosa as a compulsive disorder

• Compulsive behaviour is repeated persistently despite maladaptive outcomes (Gillan & Robbins, 2014).
  -experienced with a conscious urge (Everitt & Robbins, 2016).

• Persistent dietary restriction central to AN.
  -maladaptive to limit caloric intake at severely low weight.
  -AN sufferers report urges to engage in behaviour conducive to dietary restriction (Godier & Park, 2014a; 2014b).
Compulsive behaviour

Imbalance between habit system (dorsal striatum) and goal-directed system (prefrontal cortex and ventral striatum) dominance of habit system
Dominance of the habit system

May be because the influence of the habit system is particularly strong:

Or because of a weakness in the goal-directed system:
Dietary restriction: a habit in AN

Foerde, Steinglass, Shohamy & Walsh (2016)

• In binary choice task individuals with AN and healthy women indicated preferences for a snack they would be required to eat.
• Selections correlated with caloric intake at buffet meal the following day.
• Individuals with AN less likely to choose high calorie foods and displayed enhanced caudate activation during selections.
• Caudate hyperactivity related to reliance on behavioural habits (Gillan et al., 2015).
The development of compulsive behaviour in AN

- Model presented by Park, Godier & Cowdrey (2014) and Godier & Park (2015) suggests goal-directed system weakness and strength of starvation habits responsible for development of compulsive starvation in AN.

- Habits develop and strengthen with behavioural repetition
  - proposed starvation is more rewarding for individuals with AN (Park et al., 2014).
  - leading to continued engagement to the point it becomes a strong habit (Steinglass & Walsh, 2006; Walsh, 2013; Steinglass & Walsh, 2016).
Unanswered questions

• How does goal-directed system dysfunction develop?

• Why is starvation more reinforcing for certain individuals?
The role of anxiety in goal-directed system dysfunction

• Stress implicated in goal-directed system dysfunction, and related to reliance on habit system for learning and behavioural control (Soares et al., 2012).

• Changes in structure and function of goal-directed and habit system regions result from stress (Luksys & Sandi, 2011; Schwabe & Wolf, 2010; Soares et al., 2012).

• Individuals with anxiety disorders rely on habit system for learning (Alvares et al., 2014).
Anxiety and reinforcement

• Anxiolytic effects are negatively reinforcing.

• Anxiety is easier to reduce, and reductions are more beneficial, when baseline levels of anxiety are higher (Hadjistavropoulos et al., 2016; Hedman et al., 2015).

• Addictive substances are more reinforcing when one is in an aversive emotional state (Hogarth et al., 2015; Owens et al., 2015; Rosseau et al., 2011).
Dietary restriction is negatively reinforcing

• Serotonin (5-HT) and noradrenalin (NA) systems mediate anxiety. Activity of these systems reduces when caloric intake is limited due to lower consumption of neurotransmitter precursors (Brockmeyer et al., 2012; Kaye et al., 2003).
Anxiety and AN

• Suggested anxiety increases the reinforcing effects of starvation, leading to excessive engagement in dietary restriction via development of AN drives, fears and preoccupations (O’Hara, Campbell & Schmidt, 2015).

• The excessive repetition of behaviour conducive to starvation, combined with a tendency to rely on the habit system for learning and control of behaviour, causes starvation to become compulsive.
Anxiety and AN

• Prolonged starvation upregulation of 5-HT and NA receptors.

• Anxiety relief evoked by starvation is temporary (Kaye et al., 2003).

• Starvation becomes necessary to maintain an acceptable emotional state.

• Anxiety is able to trigger restrictive behaviour.
Relationship between anxiety and AN is well supported

• Higher rates of anxiety disorders in AN populations, and individuals with AN display enhanced trait anxiety (Guarda et al., 2015).

• Anxiety present prior to AN onset (Kaye et al., 2004).

• Greater childhood anxiety related to lower BMI (Dellava et al., 2010).
Anxiety and dietary restriction in AN

• Ecological momentary assessment studies show anxiety is related to, and seems to actually precede, starvation behaviour in individuals with AN (Lavender et al., 2013).

• Greater pre-meal anxiety predicted lower calorie intake at meal for individuals with AN (Steinglass et al., 2010).
Considering how anxiety operates gives rise to a novel model of AN development/maintenance.
Activity: Model Walkthrough
Implications for prevention interventions

• Parallel cognitive dissonance programmes for body image and dieting (e.g. Healthy Living, Body Project)

• Management through emotion regulation training and anxiety reduction interventions (dieting)

• Aim to reduce need for habitual or repetitive behaviours
Small Group Work

• In small groups develop a novel intervention (standalone or adjunctive) that is based on the presented model.

• After 20 minutes be ready to feedback to the group outlining:
  
  - the targets of your intervention.
  - how the treatment addresses these targets.
  - particular considerations that should be made when delivering/evaluating the intervention.
  - expected costs of the intervention.
Group Feedback

The task: In small groups develop a novel intervention that is based on the presented model.

Presentations should outline:

- Intervention targets.
- How the treatment addresses these targets.
- Particular considerations that should be made when delivering/evaluating the intervention.
- Expected costs of the intervention.
THANK YOU

for your attention
Thank you

Dr Joanna Steinglass
References


References


References


