Obesity and Psychology; environment, appetite, & behavioural control:

Biopsychology of Obesity

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FOOD AND APPETITE

Hunger, Satiety and Reward
Components of appetite

- **Hunger**
  - The drive to consume, eliciting and sustaining a behavioural response (eating) to a biological need (but with a strong situational component)

- **Wanting**
  - The motivation to consume a specific food, manifesting explicitly (craving) or implicitly (food cue responsiveness)

- **Liking**
  - The sensory pleasure elicited by contact with food contributing to the hedonic motivation to consume (wanting)

- **Satiation**
  - Processes during a meal that generate the negative feedback leading to its termination (within-meal inhibition) (strengthened by meal volume and weakened by palatability)

- **Satiety**
  - The end state of satisfaction. The further suppression of the drive to consume and post meal intake (between meal inhibition)

Finlayson after Halford (2008)
Regulatory control (satiety) and reward:

Dual System Model of CNS integration

Inhibitory control

WEAKENS

BoosT

Homeostasis: Negative Feedback

Responsiveness to food cues

Reward driven eating

Satiety

Hedonic Drive: Positive Feedback
Why is appetite important?
Interaction between biology and environment in the control of energy intake in body weight

Biological Regulation

Appetite

Eating Behaviour

Energy Intake

Environmental

Culture

Food Supply

Situation

Nutrition

Fat Stores (TONIC)

Safety Signals (EPISODIC)

Homeostatic Regulation

CNS

Hedonic Systems

All Under Genetic Influence

Blundell Cica 1993 modified by Finlayson
APPETITE CONTROL AND OBESITY
Behavioural phenomena associated with adiposity

Individuals with obesity tend to demonstrate weaker regulatory control of eating behaviour. Moreover, appetite regulation is more likely to be overwhelmed by environmental cues to over-consume.

Inadequate impact of ingestants

- Often increases in eating rate and a failure to develop normal satiation during the course of a meal
- After consumption demonstrate weakened satiety responsiveness
- Physiological weakness – cause and/or consequence of abnormal behaviour?

Less control of ingestion

- Greater responsiveness to food cues
- Heightened hedonic responses to palatable food
- Experiences of uncontrolled hunger and greater disinhibition of eating behaviour
- Food ‘addiction’?
Food cues reactivity, cravings and obesity

**FOOD CUE REACTIVITY**

- Individuals with obesity are more reactive to food cues (Castellanos et al, 2009) i.e. their attention is more easily grabbed and held by these cues.
- When hungry, these effects become more potent “attention grabbing”, an effect more pronounced in overweight/obese participants (Nijs et al, 2010).

**CRAVINGS**

- High BMI correlates with cravings while dieting (Delahanty et al, 2002).
- Subjective cravings in overweight individuals associated with food cue responsiveness (Werthamnn et al, 2011).
- Increased BMI is associated with more frequent craving, and craving for specific foods was associated with increased intake of them (Chao et al, 2014).

IMPACT OF DIETING AND ENERGY RESTRICTION
The Challenge of Dieting
Psychology of Deprivation and Physiological Consequences of Energy Deficit

- Obsession with food, increased response to food cues, cravings, loss of concentration and dysphoric mood all contribute to failure in dieting
- Energy restriction and weight loss reduce satiety hormone levels – so change may outlast the diet

Hunger is a barrier to and a consequence of dieting

1. Increase in preoccupation with food.
2. Relentless thoughts of food and eating inhibited concentration on usual daily activities.
3. Serious difficulties in adhering to the diet when confronted with unlimited access to food.
Food cue reactivity, cravings in dieters

Food cue responsiveness

- Hunger predicts EEG response to\(^1\) and heightens perception of food cues.\(^2\)
- Lower food cue reactivity predicts more successful weight loss in dieters.\(^3,4\)

Cravings

- Dieters experience stronger cravings that are harder to resist and typically for the foods being restricted.\(^5\)
- Trait (not state) cravings discriminate between successful and unsuccessful dieters.\(^6\)

Therefore, FCR and cravings act as barriers to weight loss success
Biological mechanisms act to increase appetite

After weight reduction, the brain is stimulated to increase caloric intake by changes in levels of circulating hormones:

- **Ghrelin**
- **Leptin**
- **GLP-1 / PYY**

Appetite Preference for energy-dense foods (high fat/sugary foods)

References:

Interaction between biology and environment in the control of appetite and energy intake in obesity

**Biological Regulation**
- Weak effect of energy intake on wanting
- Fat Stores (TONIC)
- Satiety Signals (EPISODIC)
- CNS Homeostatic Regulation
- Weak inhibitory control
  - Implicit processing
  - CNS
  - Hedonic Systems
  - Hedonic Hunger
  - Drive To Eat

**Appetite**

**Eating Behaviour**
- Energy Density
- Passive & Active
- Over-consumption

**Environmental**
- Culture and Societal Practices
  - Snacking, eating out / alone
- Food Environment
  - Cheap, ready prepared, easy available
- Branding and promotion
  - Extensive and poorly controlled
- Food Formulation
  - HFSS (High Fat, Sugar, Salt)
- Portion Size
  - Steadily increasing
- Nutrition information and Knowledge
  - Labelling and education

**Implicit processing**
- Weak inhibitory feedback with weight gain

Blundell Cica 1993 adapted by Finlayson
PSYCHOLOGY OF OBESITY
Obesity negatively affects quality of life

- Sleep apnoea
- Joint pain
- Urinary incontinence
- Impaired fertility
- Depression
- Anxiety
- Decreased mobility

External Factors: Stigma

Anti-obese prejudice starts young

Children as young as six will designate ‘fat’ individuals as lazy, dirty, stupid, ugly, liar and cheat¹⁻³

Hill & Silver (1995)⁴

- 180 boys & girls (aged 9) rated 4 silhouettes (2 lean, 2 obese)
- Children rated the obese silhouettes significantly as:
  - Having fewer friends (thin girl rated as most popular)
  - Doing less well at school
  - Less healthy (obese boy least healthy)

The Medical Profession (Practitioners & Students)

Negative attitudes toward the obese exist within the health care profession (same key character deficits ascribed by children!)

The idea still persists they are weak willed & medics are reluctant to perform examinations⁵,⁶

Hebl & Xu (2001)⁷

- Physicians in US asked to evaluate the medical chart of normal, over weight and obese men and women. Physicians:
  - Less likely to spend time with the obese
  - Obese rated negatively on 12 of 13 indices

Discrimination: Society and Prospects

- Scenarios using obese and normal weight actors in have demonstrated subjects will reliably discriminate against the obese actor
  
- Obese students seeking accommodation were more likely to fail landlord interviews (Karris, 1977)
  
- Sale assistants in shoe stores reliably reacted more slowly to the arrival of an obese customer in the shop (Klesgas et al. 1990)
  
- When matched for social status and education it was found that obese women in white collar professions earned significantly less (Sarlio-Lähteenkorva et al., 2004)
  
- Potential employee’s who attended a job interview accompanied position near a ‘perceived’ obese partner were less likely to be given a job (Kebl et al.; 2003)
  
- Such prejudice may, along with worse health may in part explain the higher prevalence of depression seen in the obese
  
  Karris (1977) J. Soc. Psychol. 101: 159-60
  Klesgas et al. (1990) Int. J. Obesity 14: 525-35
Personal circumstance plays a role in weight gain as well as mental health issues

1. **Current events:** Traumatic life events such as relationship breakups or widowhood or other forms of loss can affect body weight (Jeffry & Rick, 2002; Eng et al. 2005).

2. **Past trauma:** Serious and sustained abuse and neglect may focus self-care behavior in adulthood.
   - Childhood maltreatment/neglect predict excessive weight gain in adolescence (Hessey et al. 2006; Bentley & Widom, Lissau, 2009 & Sorensen, 1994).
   - Childhood physical/sexual abuse associated with obesity in women (Midei et al. 2010).
   - Childhood bullying, rejection or emotionally abuse is associated with obesity in men (Gundstad et al. 2006).
   - Physical and verbal abuse up to 18 years old associated with later obesity (Williamson et al. 2002).
   - Severity rather than the type of trauma is associated with the likelihood of becoming obese (D’Argeno et al. 2009).

Coping strategies and stress
Stress, Mood and Weight Management

• The effects of stress and mood on dietary restraint and weight management success are widely acknowledged phenomenon (McElroy et al, 2004; Greeno & Wing, 1994).

• In pairs of identical twins discordant for body weight, the difference in visceral fat accumulation between siblings is associated with psychosocial stress (Marniemi et al, 2002).

• Repeated exposures to stressful life situations are associated with a greater preference for energy dense and nutrient dense foods rich in sugar and fat (Torres & Nowson, 2007).

Stress management and appropriate / in appropriate coping mechanisms critical factors
Stress, mood, dietary restraint and weight management

MOOD

STRESS

LOSS OF DIETARY RESTRRAINT (CONTROL)

WEIGHT MANAGEMENT ‘FAILURE’

COPING STRATEGIES

COPING STRATEGIES
1. Obesity at baseline increased the risk of onset of depression at follow up. Association more pronounced in Americans than Europeans and for disorder than for symptoms.

2. Overweight increased the risk of onset of depression at follow-up. This association was significant among adults but not among younger persons.

3. Baseline depression increased the odds for developing obesity. But baseline depression (symptoms and disorder) was not predictive of overweight.

**Conclusion:** a reciprocal link between depression and obesity.

**Binge Eating Disorder (BED), OVERWEIGHT & OBESITY**

15-30% of patients in weight control clinics could meet DSM IV BED criteria

**Nature of the Binge**
Food typical includes sweet, high-calories foods characterised by:
- hedonic pleasantness
- forbiddeness
- ease of rapidly consumption

**Triggers of a binge**
- Dysphoric mood
- Negative affect
- Stress (food = comfort and relief)
- Potent stressors → interpersonal
- Intense hunger
- Presence of food
- Food Craving
- Alcohol ingestion

**BED** sufferers can have varying degrees of obesity and a long history of attempting to diet and restrict daily food intake.

But in weight control clinics obese **BED** sufferers tend to have a greater degree of obesity.

Obese **BED** sufferers also have high degrees of:
- self loathing
- disgust with body size
- depression
- anxiety
- somatic concern
- interpersonal sensitivity

**Extreme lack of control**
INHIBITORY CONTROL FOR FOOD INTAKE
What is inhibitory control?

- The ability/inability to stop, change or delay an inappropriate response, in the environment (Logan et al, 1986)

Inhibitory control and food

- Exposure to high-calorific food cues reduces ability to inhibit behaviour in healthy weight, and overweight individuals
- Associations between impairments and craving for food and BMI – possible risk factor for obesity (Jones et al, in prep)
Inhibitory control

Boosts

Homeostasis
Negative Feedback

Persistent

Cravings

Hedonic Drive:
Positive Feedback

Impaired

Increased BMI

Satiety