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

Biopsychology of Obesity

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FOOD AND APPETITE

Hunger, Satiety and Reward

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Satin
Satiety Innovation

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)

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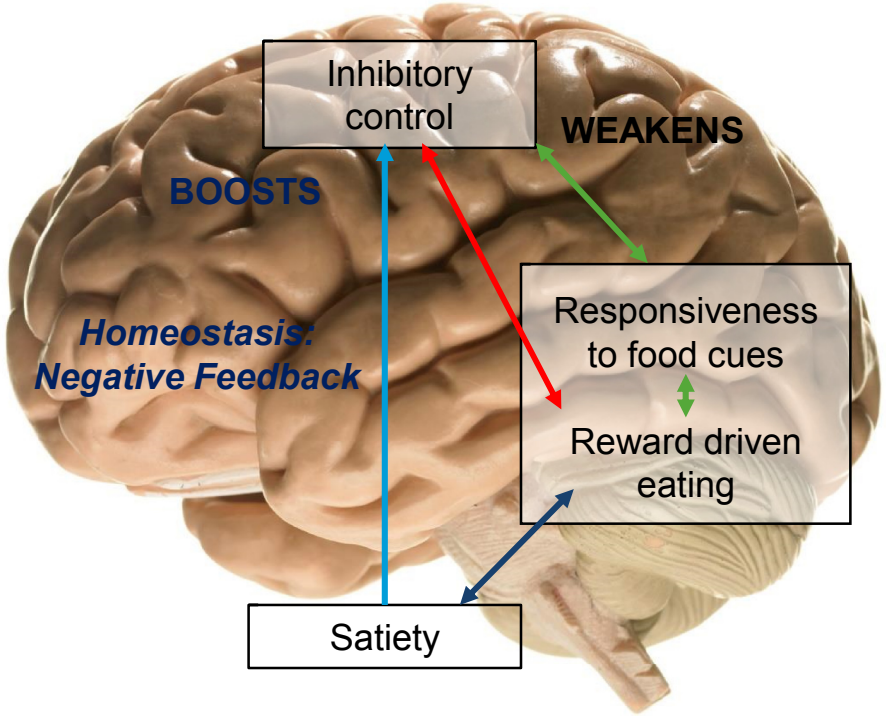
Finlayson after Halford (2008)

Regulatory control (satiety) and reward:

Dual System Model of CNS integration



Hedonic Drive: Positive Feedback

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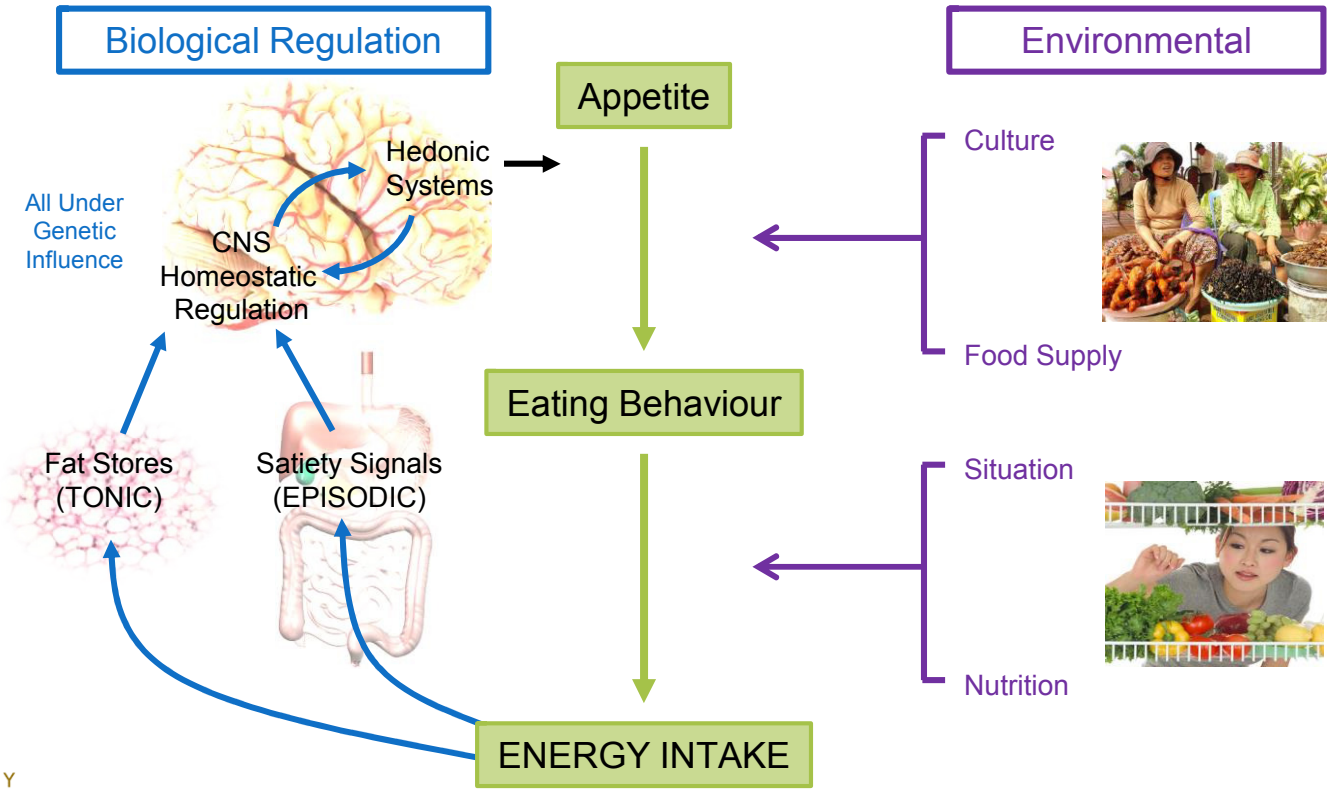
Why is appetite important?

Interaction between biology and environment in the control of energy intake in body weight



Blundell Cica 1993 modified by Finlayson

APPETITE CONTROL AND OBESITY

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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’?

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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).

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Castellanos, E. H., (2009). IJO 33(9), 1063–1073, Werthmann, J.(2011). Health Psychology 30(5), 561–9. Nijs, I. (2010).. Appetite, 54(2), 243–54., Delahanty et al (2002) Diabetes Care 25 (11): 1991-8, Chao et al (2014) 15, 478-82

IMPACT OF DIETING AND ENERGY RESTRICTION

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The Challenge of Dieting

Psychology of Deprivation and Physiological Consequences of Energy Deficit

FIGURE 2 *Life* magazine photograph of conscientious objectors during starvation experiment. July 30, 1945. Volume 19, Number 5, p. 43. Credit: Wallace Kirkland/Time Life Pictures/Getty Images.

- 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.

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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

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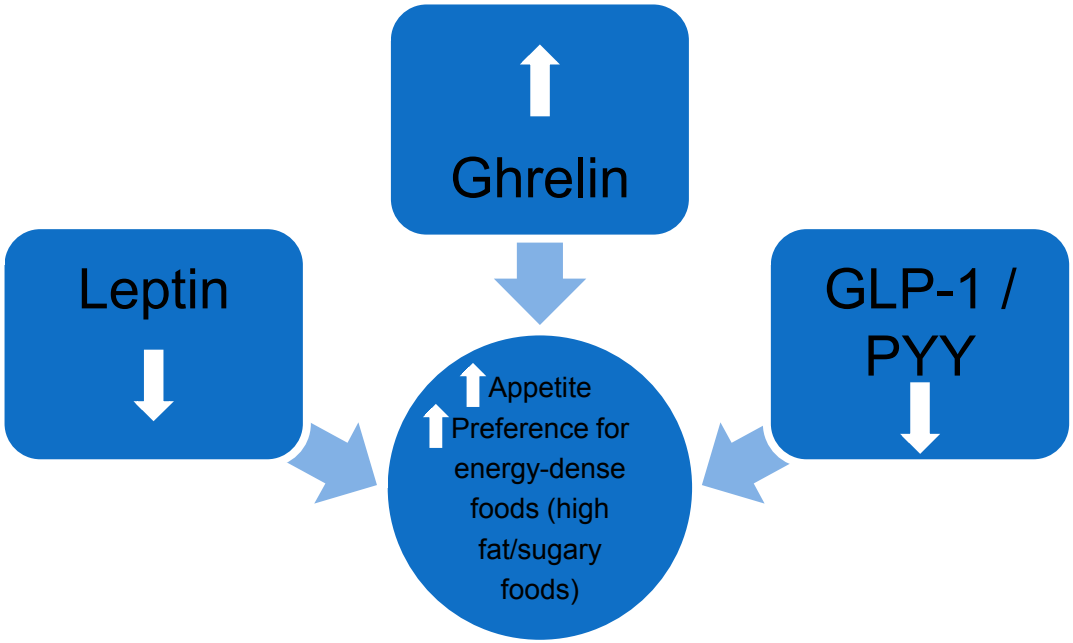
1. Nijs et al (2008) Eating Behaviors 9, 462-70; 2. Piech et al (2010) Appetite 54; 579-82;
3. Murdaugh et al, (2012) Neuroimage 59(3); 2709-21; 4. Ouwehand & Papies (2010) Appetite 55; 55-60;
5. Massey and Hill (2012) Appetite 58 (3) 781-5; 6. Meule et al (2012) Appetite 38 (1) 88-97,

Biological mechanisms act to increase appetite

After weight reduction, the brain is stimulated to increase caloric intake by changes in levels of circulating hormones[1]



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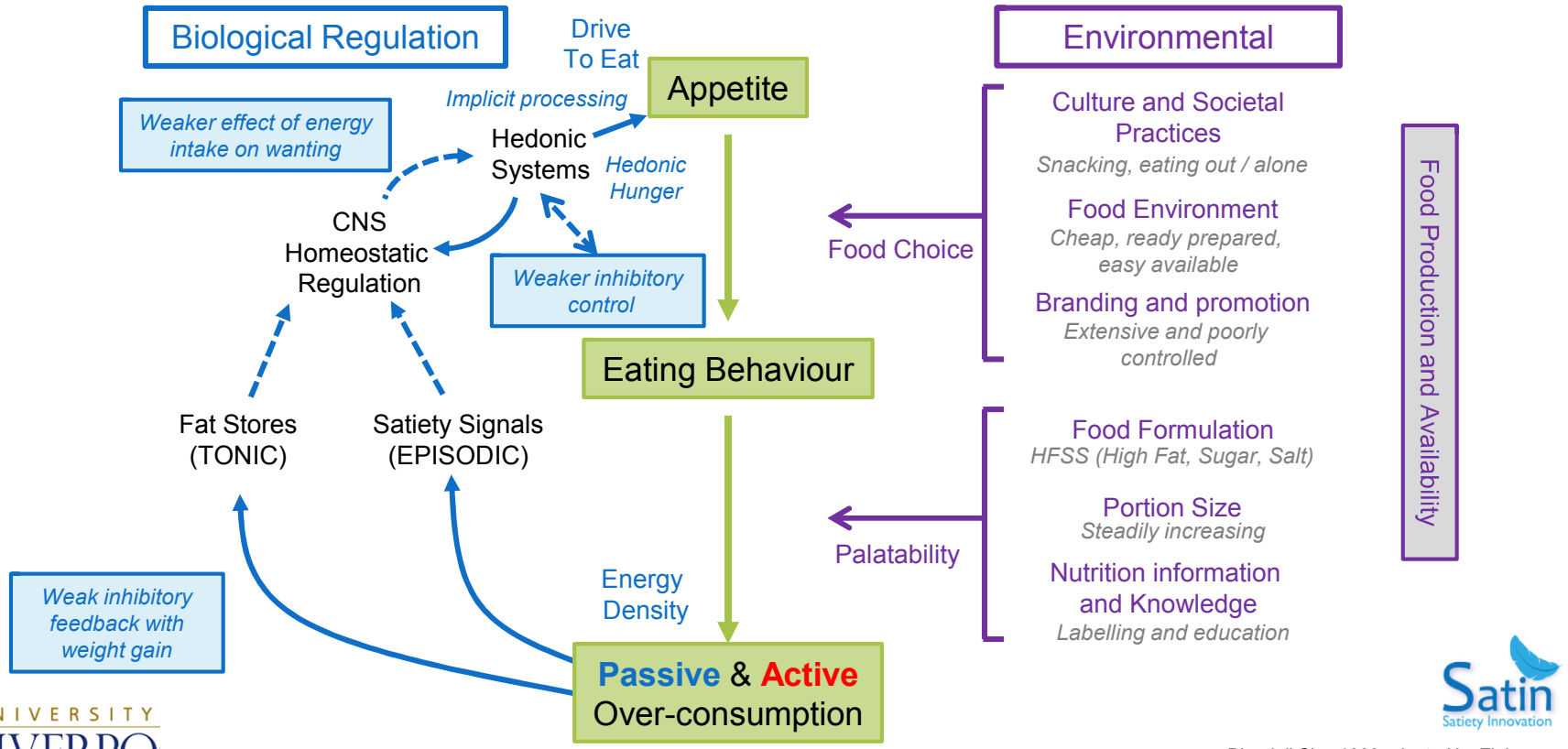
Eckel RH. N Engl J Med 2008;358:1941–1950.
Murphy KG et al. Nature 2006;444:854–859.

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



Blundell Cica 1993 adapted by Finlayson

PSYCHOLOGY OF OBESITY

Obesity negatively affects quality of life

EMA, 2014. Draft guideline on clinical evaluation of medicinal products used in weight control (EMA/CHMP/311805/2014)

External Factors: Stigma

Anti-obese prejudice starts young

Children as young as six will designate **'fat'** individuals as **lazy**, **dirty**, **stupid**, **ugly**, **liar** and **cheat**[1–3]

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 **examinations**[5,6]

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

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1. Latner & Stunkard (2003) Obes. Research, 11: 452-6; 2. Lerner & Geller (1969) Dev. Psychol. 1: 456-62;
3.Staffieri et al. (1967) J. Personality & Sco. Psychol. 7: 101-4; 4. Hill & Silver (1995) Int. J. Obes. 19: 423-30;
5. Adams et al. (1993) Women & Health 20: 45-57; 6 .Wigton et al. (2001). J Gen Internal Med 16: 262-5; 7. Hebl & Xu (2001) int. J. Obes. 25: 1246-52

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)

Karris (1977) J. Soc. Psychol. 101: 159-60
Klesgas et al. (1990) Int. J. Obesity 14: 525-35

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- 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

Sarlio-Lähteenkorva et al., (2004) Am. J. Public Health 94, 468-72
Kebl et al;. (2003) Pers. Soc. Psych. Bull., 29 :28-38

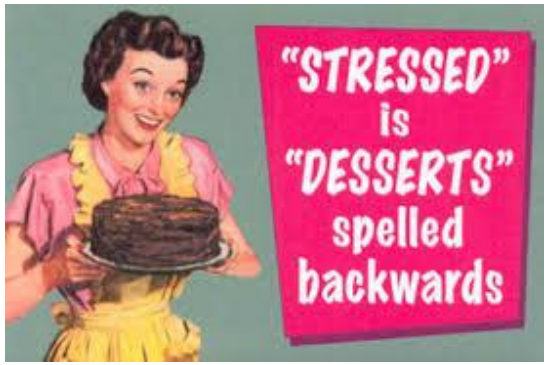
Personal circumstance plays a role in weight gain as well as mental health issues

1. **Current events:** Traumatic life events such relationship break ups or widowhood or other forms of loss can effect body weight (Jeffry & Rick, 2002; Eng et al 2005).
2. **Past trauma:** Serious and sustained abuse and neglect may focus self care behaviour 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).

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



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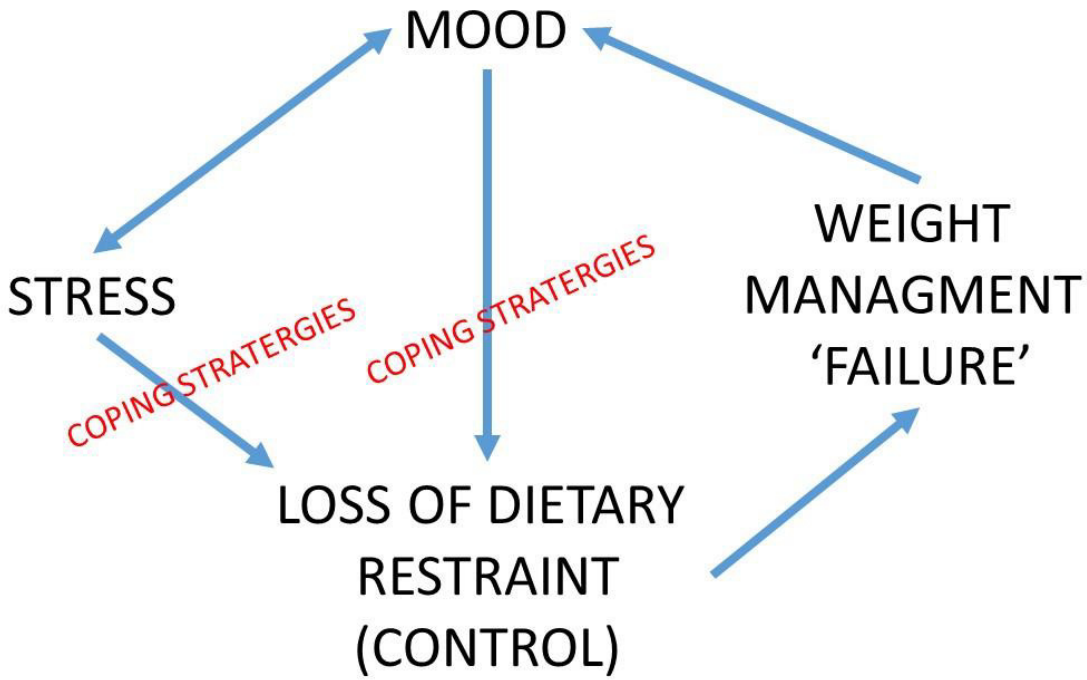
Stress, mood, dietary restraint and weight management



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Overweight, Obesity, and Depression

A Systematic Review and Meta-analysis of Longitudinal Studies

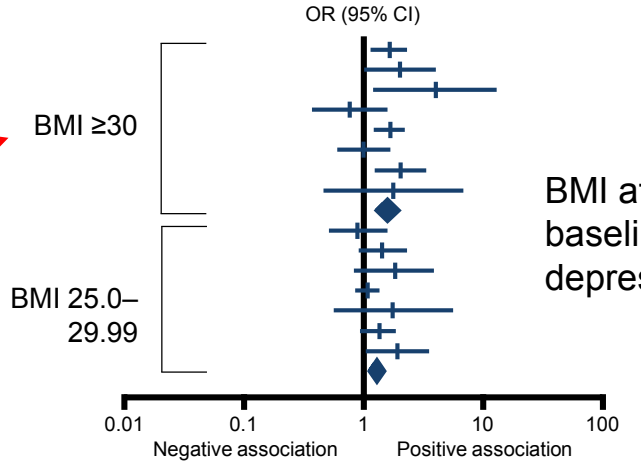
Floriana S. Luppino, MD; Leonore M. de Wit, MS; Paul F. Bouvy, MD, PhD; Theo Stijnen, PhD; Pim Cuijpers, PhD; Brenda W. J. H. Penninx, PhD; Frans G. Zitman, MD, PhD

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

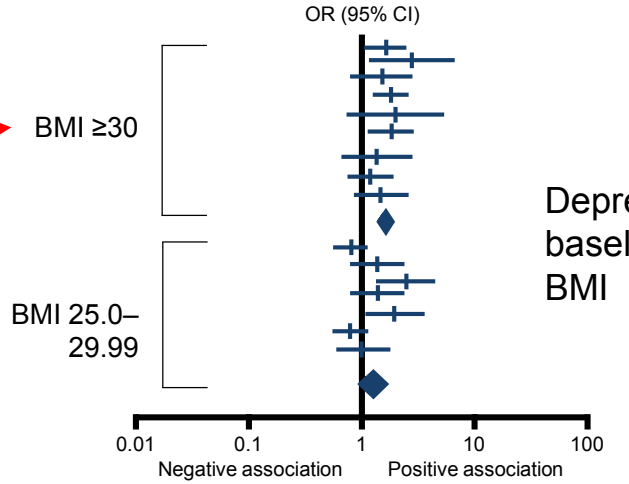
2. Overweight increased the risk of onset of depression at follow-up. This association was significant among adults but not among younger persons

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



BMI at baseline and depression



Depression at baseline and BMI

Luppino FS et al. Arch Gen Psychiatry 2010;67:220–229.

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

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INHBITORY CONTROL FOR FOOD INTAKE

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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)

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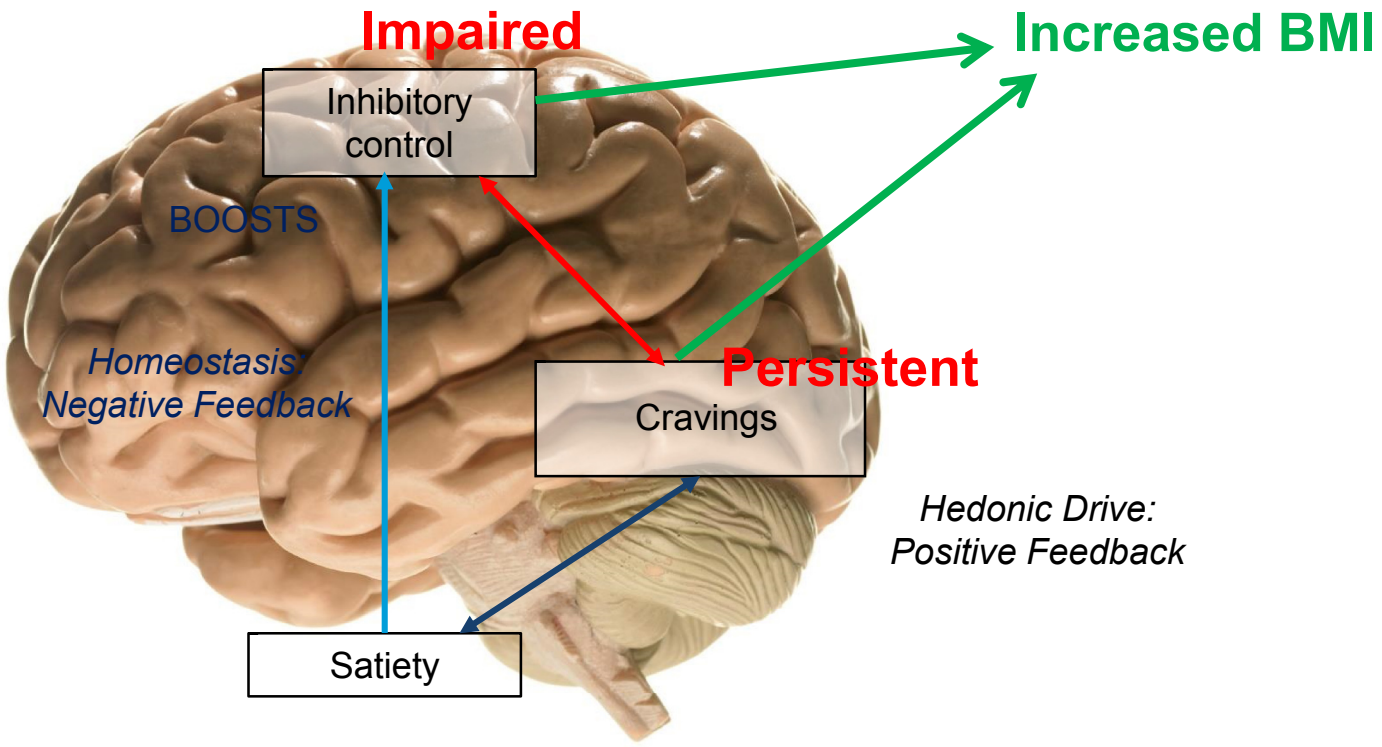

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