Attention Deficit/Hyperactivity Disorder (ADHD) and Obesity

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ADHD

Developmentally inappropriate signs of:

- Distractibility
- Impulsiveness
- Hyperactivity
- Inattention
Based on data published in 2008
Figure 1. Percentage of children aged 5–17 years ever diagnosed with attention deficit hyperactivity disorder, by sex: United States, 1998–2009.
Causes of ADHD

- Neuro-biological
- Genetic
Hypo-Dopaminergic Functioning in the Common Reward Pathways
Executive Function

- Working Memory
- Set Shifting
- Information Processing

Intelligence, judgement, and behavior
Memory
Language
Causes of ADHD

- Biological/Genetic
- Environmental

Pre-Natal Exposure to Alcohol

Pre-Natal Exposure to Nicotine

Pre-Natal Exposure to a Calorie-Rich Diet
Fetal Alcohol Spectrum Disorder

**Symptoms:**
inattention, restlessness, impulsivity, difficulty anticipating future consequences.

- About 70% of FASD children also diagnosed with ADHD.

In the late 1980’s estimates suggest that 30% of women were still drinking alcohol during their pregnancy despite harsh warning labels.
Pre- and Pregnancy Diet

- Population studies in Norway and Sweden
- Maternal pre-pregnancy overweight and obesity associated with increased ‘inattentive’ symptoms at kindergarten.
- Effects remained after controlling for parental ADHD symptoms.

‘Fetal Sugar Spectrum Disorder’

- Alcohol and sugar are biochemically congruent.
- High sugar intake can produce addictive-like behaviours and compulsive intake.
- Brain neuro-adaptations similar to drugs of abuse.
- *In utero* consequences may be similar to those produced by alcohol.
Chronic Excessive Sugar (and sweetener) intake

Marked Stimulation of Striatal DA Release

Reduction of striatal DA D₂ Receptors

Compensatory Increase in Sugar Intake

Progressive reduction in DA response to sugar

Inhibition of prefrontal cortex control mechanisms

Obesity & Binge Eating ↔ ADHD

Johnson et al (2011) *Postgraduate Medicine*
Attention Deficit Hyperactivity Disorder

Alcohol

Gambling

Cocaine

Nicotine

Amphetamine
AD(H)D and Obesity

1. In a morbidly obese bariatric sample, 43% were diagnosed with AD(H)D (Altfus 2002, *BMC Psychiatry*).

2. Mean BMI of AD(H)D boys was higher than population norms (Holtkamp et al 2004, *Int J Obesity*).

AD(H)D Symptoms

χ² = 10.82  p < 0.0001
Obese vs Normal: p < 0.0001
Obese vs BED: p = 0.358

Davis et al. (2009) *J Psychiatric Res*
Causal Mechanisms?

Self-Medication

Comfort Eating

Poor Meal Planning

Poor Impulse Control
Executive Function (EF), ADHD, and Weight Status

- Stimulant-medicated children with ADHD had lower BMI than stimulant-naïve children.
- The latter had BMI > average.
- EF significantly moderated children’s weight status.
- Those with poor EF performance more likely to be overweight/obese.