Diet-induced impulsivity:
An investigation of bias and sensitivity

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Obesity & Impulsive Choice
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The correlation between obesity and impulsive choice could be due to:

1. trait impulsivity as the cause of obesity
2. obesity as the cause of trait impulsivity
3. another related factor, such as diet, causing both
Primary goal:

Understand how high-fat and high-sugar diets affect impulsive choice behavior
General Methods

- 2 experiments
- Male Sprague Dawley rats
- 8-week diet manipulation
- Control for calories across groups

Control
25 g of chow

High-fat
15 g of chow
4.38 g of lard

High-sugar
15 g of chow
10.33 g of sucrose
Impulsive Choice Task

SS = 5→10→20 s, 1 p

LL = 30 s, 2 p

Bias versus Sensitivity
Experiment 1: on versus off

On Diet

Bias for immediate reward (0-s SS delay):
- Chow: 0.095
- Fat: 0.018*
- Sugar: 0.010*

Sensitivity to delay
- Chow: 4.41
- Fat: 5.75*
- Sugar: 7.48*
Experiment 1: on versus off

Bias for immediate reward (0-s SS delay):
- Chow: 0.033
- Fat: 0.028
- Sugar: 0.093

Sensitivity to delay
- Chow: 4.33
- Fat: 4.95*
- Sugar: 5.58*
Experiment 2: mechanisms

Impulsive Choice

Bias for immediate reward (0-s SS delay):
- Chow: 0.099
- Fat: 0.052
- Sugar: 0.035*

Sensitivity to delay
- Chow: 5.76
- Fat: 6.25*
- Sugar: 6.96*
Experiment 2: mechanisms

**Bisection**
- Short = 4 s
- Long = 12 s

**Signal Duration (s)**

**Proportion of Long Responses**

**Slope:**
- Chow: 0.41
- Fat: 0.26*
- Sugar: 0.32
Conclusions

Unhealthy diet

Impulsive choices (i.e. poor food choices)

Obesity
Questions?
Body Weight

![Graph showing Body Weight (g) vs. Age (PND) for different groups: HF, HS, and C. The graph illustrates the progression of body weight over time with distinct patterns for each group.]
### Body Fat (abdomen)

![Image of body fat measurement](image-url)

**SUBJECT INFORMATION**
- Subject ID: FN7
- Description:
- Comments:
- Weight: 269.00 grams

**SUBJECT RESULTS**

<table>
<thead>
<tr>
<th>Component</th>
<th>ROI</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td>BMD</td>
<td>0.1401</td>
<td>0.1370 g/cm²</td>
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<tr>
<td>BMC</td>
<td>1.267</td>
<td>1.931 grams</td>
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<tr>
<td>Area</td>
<td>9.04 cm²</td>
<td>14.09 cm²</td>
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<tr>
<td>Tissue</td>
<td>0.33</td>
<td>107.2 grams</td>
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<tr>
<td>Lean</td>
<td>03.4</td>
<td>29.6 grams</td>
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<tr>
<td>Fat</td>
<td>25.0</td>
<td>108.4 grams</td>
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<tr>
<td>Total</td>
<td>100.4</td>
<td>136.7 grams</td>
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<tr>
<td>% Fat</td>
<td>23.1</td>
<td>21.6</td>
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</tbody>
</table>

**INCLUSION ROI (in pixels)**
- Width: 340
- PosX: 239
- Length: 353
- PosY: 219
- Angle: 0 (deg.)
Body Fat (abdomen)

Overall percent body fat:
- Chow: 12.15
- Fat: 21.59*
- Sugar: 15.89*