Diet-induced impulsivity: The effect of high-fat and high-sugar diets on the mechanisms of impulsive choice

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Methods

- **Subjects:** 36 male Sprague Dawley rats
- **8 week diet manipulation**
  - Chow: 100% rat chow
  - Fat: 60% rat chow and 40% Crisco
  - Sugar: 60% rat chow and 40% powdered sugar
- **Behavioral testing**
  - Two impulsive choice tasks (delay and magnitude) to test the effect of diet on impulsive choice
  - Two discrimination tasks (time and reward discrimination) to test the effect of diet on the mechanisms of impulsive choice
- **Data analysis:** multilevel logistic regression

Results

**Impulsive Choice: Delay**
- High-fat and high-sugar diets led to more impulsive choices when the SS delay was 5 and 10 s.

**Time Discrimination**
- High-fat diet led to deficits in overall time discrimination ability.
- High-sugar diets led to reduced sensitivity to shorter delays compared to chow rats.

Summary: Diet-induced impulsive choice seen on the delay task may be a result of timing deficits, particularly in the high-fat diet group.

Discussion

- Diets high in fat and sugar induced impulsive behavior, likely due to deficits in time discrimination.
- Impulsive behavior was not induced by the high-sugar diet on the magnitude task, possibly due to increased preferences for the larger reward.
- Despite the increased preference for the larger reward in the reward discrimination task, the high-sugar diet induced impulsive behavior on the delay task indicating the importance of time discrimination.
- Time-based interventions have been shown to reduce impulsive choice by improving time discrimination.
- Behavioral interventions could be used to treat obesity by addressing the timing deficits that contribute to impulsive choice.
- Promoting self-controlled choices may break the vicious cycle in which poor diet leads to impulsive, unhealthy food choices and potentially help reduce obesity rates.

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References


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