



# The Relationship Between Percent Body Fat and Liking and Wanting



Jessica R. A. Pirkle\*, Catherine C. Steele, & Kimberly Kirkpatrick  
Department of Psychological Sciences | Kansas State University

## Introduction

- People who consume foods high in fat and sugar have an increased percent body fat<sup>1</sup>
- Individuals with a higher percent body fat show an increased liking, or enjoyment, for foods high in fat<sup>2,3</sup>
- Obese individuals also show a higher wanting of, or willingness to work for, fatty and sugary foods<sup>2,3</sup>
- However, it is unclear whether this increased liking is a product of increased percent body fat or dietary consumption
- This experiment sought to determine how:
  1. Diet affects percent body fat, wanting, and liking
  2. Percent body fat correlates with liking and wanting in rats

## Methods

**Subjects:** 36 Male Sprague-Dawley rats

All groups had access to the same number of calories per day:

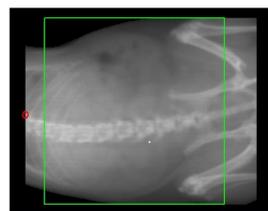
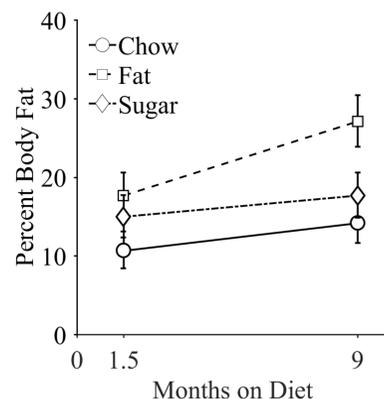
- Chow: 100% rat chow
- Fat: 60% rat chow and 40% Crisco
- Sugar: 60% rat chow and 40% powdered sugar icing

**Percent Body Fat (PBF):** Rat's abdominal body fat was measured at 6 weeks and 9 months post-dietary exposure

**Incentive Motivation Task (wanting):** The number of reinforcers earned during training was used to measure wanting

**Taste Reactivity Task (liking):** The proportion of time the rats spent performing hedonic (liking) responses in 60 s was measured while 1 mL of sucrose (.01, .1, 1 M) and corn oil (.06, 1, 32%) solutions was infused into the mouth of the rodent through an intraoral fistula

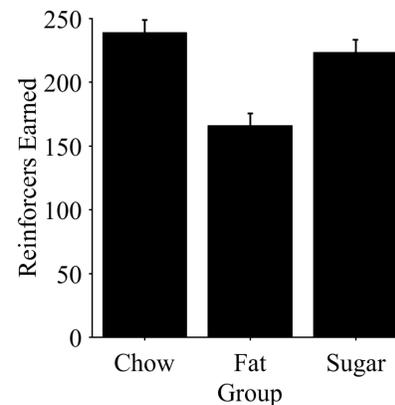
## Percent Body Fat



The mean percent body fat measurements after approximately 5 months on the diet show that the fat and sugar group had a significantly higher percent body fat when compared to the control

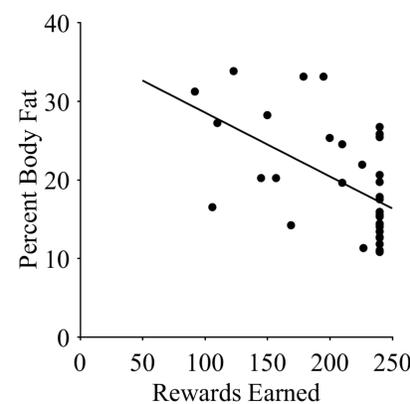
## Wanting

### Dietary Effects on Incentive Motivation



Rats fed a high fat diet earned significantly fewer reinforcers than the chow control group, suggesting a decreased incentive motivation (or wanting)

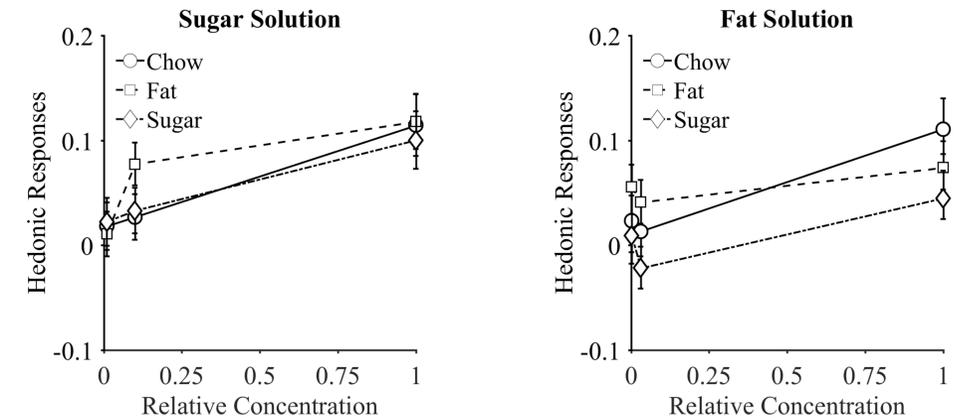
### Incentive Motivation Correlations



The mean reinforcers earned during the last initial training session was significantly correlated with percent body fat ( $r = -.729$ )

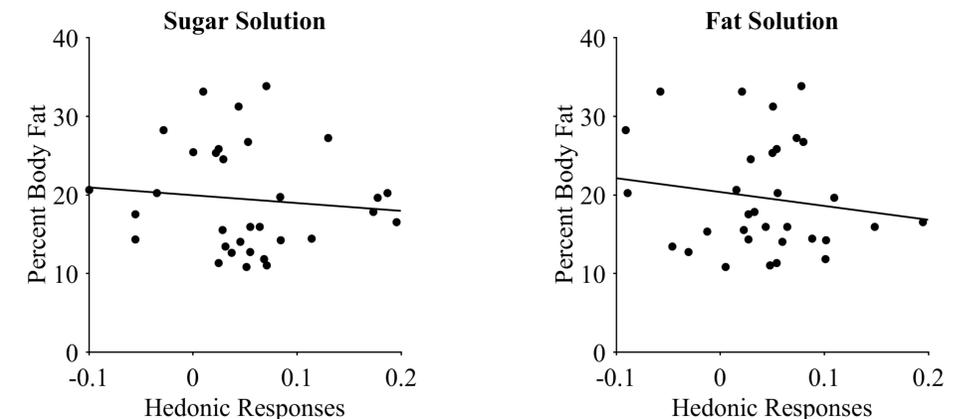
## Liking

### Dietary Effects on Taste Reactivity



The groups did not significantly differ in the proportion of time rats spent performing hedonic responses in 60 s to varying oil and sucrose concentrations indicating that the groups did not differ in their liking of the fat and sucrose solutions

### Taste Reactivity Correlations



The proportion of time rats spent performing hedonic responses in 60 s to varying oil and sucrose concentrations was not correlated with percent body fat for the sucrose ( $r = -.379$ ) or fat ( $r = -.339$ ) substance

## Discussion

- Rats fed diets high in fat and sugar had increased percent body fat percentages
- Rats fed a high-fat diet showed a decreased wanting for food rewards.
- Wanting was negatively correlated with percent body fat, consistent with previous literature<sup>2</sup>
- Impaired incentive motivation could cause a potential challenge for behavioral interventions needed to treat obesity
- Diet did not alter liking nor was percent body fat correlated with liking
- Overall, wanting may play a bigger role in long-term overconsumption of unhealthy foods, as a result of motivational changes associated with dietary exposure

## References and Acknowledgements

1. Miller, W. C. (1990). Diet composition, energy intake, and exercise in relation to body fat in men and women. *The American Journal of Clinical Nutrition*, 52(3), 426-430.
2. Rodin, J. (1973). Effects of obesity and set point on taste responsiveness and ingestion in humans. *Journal of Comparative and Physiological Psychology*, 89(9), 1003-1009.
3. Lampure, A. et al. (2016). Associations between liking for fat, sweet or salt and obesity risk in French adults: A prospective cohort study. *The International Journal of Behavioral Nutrition and Physical Activity*, 74(13).

Thank you to the members of the Kirkpatrick RTD lab, especially Ian Davis, Dr. Stephen Kiefer, and Jeremy Lott for their help with this project.

\*Email: jesspirkle@ksu.edu