

Stress Eaters and Stress Undereaters: A Field Study

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Learning Objectives

- + To define what is meant by stress eaters and stress undereaters
- + To determine how these two populations change their food intake patterns when in a state of stress

Stress = Less

- + Acute severe stressors typically decrease food consumption
 - + Restraint
 - + Foot shock
 - + Noise

Stress Leads to Undereating

- When under moderate stress, rats show a decrease in food consumption (Macht et al., 2001)
- Studies have shown female rats exhibit more pervasive effects of stress on feeding behaviour than males rats (Paré et al., 1999)
- Kuriyama & Shibasaki found that female rats showed a greater decrease in feeding behaviour than males when exposed to emotional/psychological stress (2004).

Possible Reasons For Stress Undereating

- **Stress Response** - sympathetic nervous system activation and corticosterone release decrease food intake at a physiological level
- **Stress Demands** - demands of the stressor limit your time available for eating

Stress = Excess?

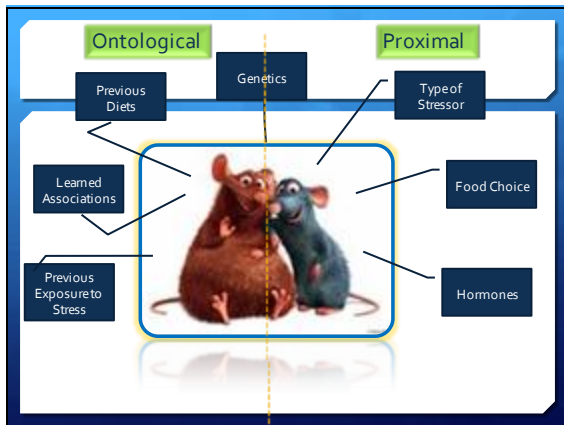
- + In some conditions stress can increase food consumption
 - + Tail pinching
 - + Mild noise
 - + Restrained eaters
 - + Survey studies in students

Stress Leads to Increased Eating

- Experimentally induced stress is associated with strong urges to binge eat in females (Tuschen-Caffier and Voegelé, 1999)
- Royal & Kurtz (2010) showed induced stress causes females to eat more compared to a non-stressed condition
- Females have consistently demonstrated a preference towards foods high in fats when under stress (Wansink et al., 2003)

Possible Reasons for Stress Overeating

- **Escape Theory** – try to distract yourself from the stressor(s) through eating
- **Cognitive Effort** – people who restrain their eating don't have the cognitive resources to keep up this restraint when under stress
- **Emotional Eating** – using the positive consequences of food to regulate your negative emotions



Purpose

- To better understand the effects of stress on food intake and food choice in the two distinct populations of stress overeaters and stress undereaters

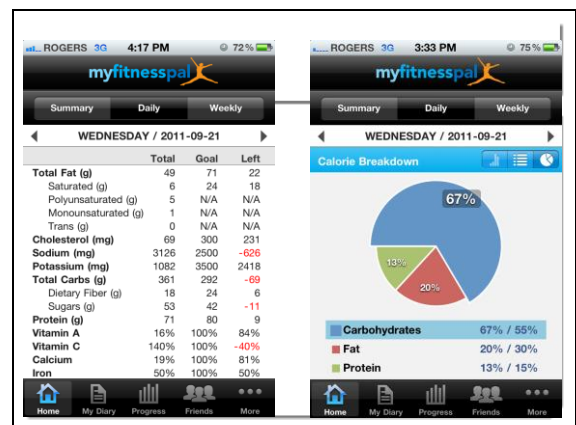
Methods

Participants

- 30 undergraduate students
- (90% females; 10% males)

Materials

- *MyFitnessPal*
- Allowed participants to record their meals
- *Microsoft OneNote*
- Allowed participants access to stress surveys



Methods

Independent Variables

- **Type of Stress Eater**
 - Overeaters
 - Undereaters
- **Stress Level**
 - Determined through a 4 question survey and converted into a 7 point Likert scale

Methods

Dependent Variables

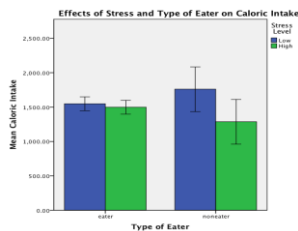
- **Caloric Intake**
- **Caloric Quality**
 - Fat Intake
 - Sugar Intake
 - Healthy versus Unhealthy foods

Procedure

- Participants given a tutorial on how to use the programs
- Once a week, they were randomly requested to record their food intake and their stress level for that day (over 8 weeks)
- Meals were then converted into caloric, fat, sugar and sodium intake

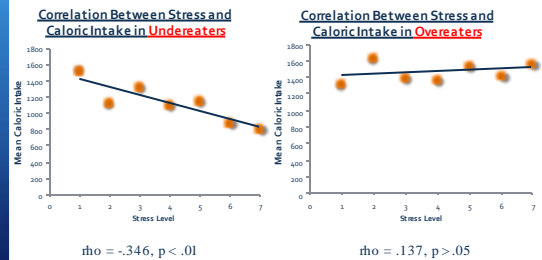
RESULTS

Caloric Intake



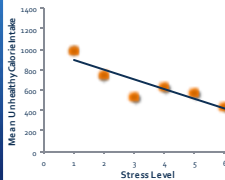
- No significant interaction between stress level and type of stress eater on the amount of calories consumed, $F(1,18) = 2.46, p > .05$

Stress vs. Calories: Spearman Correlation



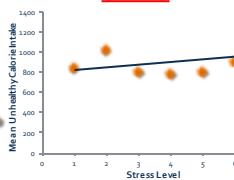
Stress vs. Unhealthy Calories: Spearman Correlation

Correlation Between Stress and
Unhealthy Calorie Intake in
Undereaters



$\rho = -.256, p < .05$

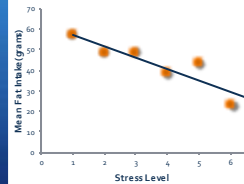
Correlation Between Stress and
Unhealthy Calorie Intake in
Overeaters



$\rho = .133, p > .05$

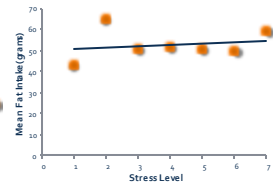
Stress vs. Fats: Spearman Correlation

Correlation Between Stress and
Fat Intake (g) in **Undereaters**



$\rho = -.433, p < .01$

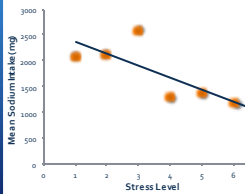
Correlation Between Stress and Fat
Intake (g) in **Overeaters**



$\rho = .155, p > .05$

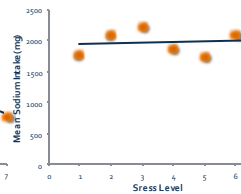
Stress vs. Sodium: Spearman Correlation

Correlation Between Stress and
Sodium Intake (mg) in **Undereaters**



$\rho = -.360, p < .01$

Correlation Between Stress and
Sodium Intake (mg) in **Overeaters**



$\rho = .054, p > .05$

Conclusions

- Correlation data suggests a negative relationship between level of stress and the amount of calories, fats, and sodium consumed in undereaters
 - As stress level increases, caloric intake, fat intake, and sodium intake all decrease
- Correlations also suggest that undereaters are not necessarily making more unhealthy choices
 - Reflected by the negative correlation between stress and unhealthy calorie intake
- ANOVA interaction results approach significance
 - Predicted that a larger sample size will reflect the above significant correlations

Implications

- Field design allows for a more realistic measure of stress and is able to better account for individual differences
 - Great complement to past experimental designs
- Methodology used allows for the collection of a wide variety of nutrients
 - Creates opportunity for further expansion of research

Implications

- This study recognizes that there are two distinct populations of stress eaters (undereaters and overeaters), and both make distinctly different food choices
- This study helps us better understand how these two populations differ in both the *quantity* and *quality* of food consumption under stress
- Research indicates that people often have little behavioural awareness of the food choices they make when under stress (Royal & Kurtz, 2010)
 - Want to acquire a greater understanding of the negative effects stress has on health in terms of food intake and food choice
 - Create greater awareness in people susceptible to making poor choices under times of high stress

The Effects of Stress on Food Consumption in Rats Selectively Bred for the Tendency to Stress Eat or Non-Eat

+ **PURPOSE:** To examine the effects of strain differences on stress-related food consumption in a population of Wistar rats selectively bred for the tendency to increase or decrease food consumption when under stress.

The Effects of Stress on Food Consumption in Rats Selectively Bred for the Tendency to Stress Eat or Non-Eat

+ **TRANSLATION:** Are there genetic factors behind the tendencies to become a Stress-eater or a Stress non-eater?

Breeding for Stress-Related Eating

- + Stress-Eater (SE) rats had been selected for their tendency to eat the same or more when exposed to a noise-stress, in comparison to their baseline feeding
- + Stress Non-Eater (NE) rats had been selected for their tendency to eat the least when exposed to a noise-stress, in comparison to their baseline feeding.
- + These rats were the 5th generation of this selective breeding

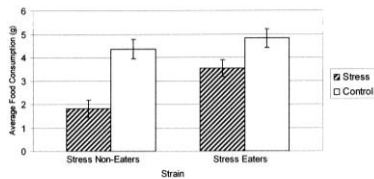
Method

TRAINING: Rats were overnight food deprived and placed into individual test cages. In the test cages they were allowed to ingest powdered rat chow at 9:00 am for 30 minutes. They were then returned to their home cages and allowed ad lib access to dry chow for the remainder of the day

Stress Day: While rats were feeding in the test cage they were exposed to a noise-stress. The tone used was a high frequency fragmented tone with an intensity of 97 dB.

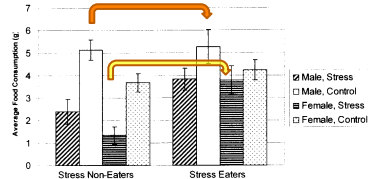
Control Day: While the rats were feeding they were not exposed to any tone.

Effects of Stress and Strain on food Consumption

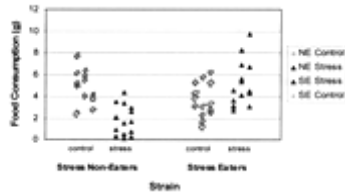


Strain ($F(1,27) = 5.72, p < 0.05$)
 Stress ($F(1,27) = 33.54, p < 0.0001$)

Effects of Stress, Strain and Gender on Food Consumption



Average Food Consumption by Stress and Strain: Individual Differences in Food Consumption



Conclusions:

- + Replicated previous studies which showed stressors reduce food intake in rats
- + First time it has been demonstrated that rats can be bred to have specific stress-related food consumption.
- + Specifically, the stress eater (SE) rats ate more during stress than the stress non-eater (NE) rats.

Conclusions:

- + Differences in food consumption were directly related to stress induced eating, since both strains ate comparable amounts during the control condition.
- + There was also a trend for female rats to be more pronounced in their stress reactions.

References

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