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 Vogele, 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.

### Possible Reason 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.

### Type of Stressor

- Ontological
- Proximal
- Genes
- Genetics
- Food Choice
- Learned Associations
- Hormones
- Previous Diets
- Previous Exposure to Stress
- Food Choice

### 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

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
- Correlation Between Stress and Caloric Intake in Undereaters: $\rho = -.346, p < .01$
- Correlation Between Stress and Caloric Intake in Overeaters: $\rho = .137, p > .05$
Stress vs. Unhealthy Calories: Spearman Correlation

Correlation Between Stress and Unhealthy Calorie Intake in Undereaters

\[ \rho = -0.256, \ p < 0.05 \]

Correlation Between Stress and Unhealthy Calorie Intake in Overeaters

\[ \rho = 0.133, \ p > 0.05 \]

Stress vs. Fats: Spearman Correlation

Correlation Between Stress and Fat Intake in Undereaters

\[ \rho = -0.433, \ p < 0.01 \]

Correlation Between Stress and Fat Intake in Overeaters

\[ \rho = 0.155, \ p > 0.05 \]

Stress vs. Sodium: Spearman Correlation

Correlation Between Stress and Sodium Intake (mg) in Undereaters

\[ \rho = -0.360, \ p < 0.01 \]

Correlation Between Stress and Sodium Intake (mg) in Overeaters

\[ \rho = 0.054, \ p > 0.05 \]

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 caloric 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

• 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 behavioral 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.

**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) = 5.22, p<0.05)
- Stress (F(1, 27) = 33.54, p<0.0001)

**Effects of Stress, Strain and Gender on Food Consumption**

- Strain (F(1,27) = 5.22, p<0.05)
- Stress (F(1, 27) = 33.54, p<0.0001)
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


