Mass General Brigham
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Is “Stressed” Really “Desserts” Spelled Backwards?

How More Objective Assessment of Eating Behavior Can Refine Our Understanding of Stress Eating

Kristin N Javaras, DPhil, PhD

May 2025

HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL

Disclosures

- In the past three years, Dr. Javaras has held shares in Centene Corporation and Sanofi and served on the Clinical Advisory Board for Beanbag Health.

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With Gratitude

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Katherine Fry

The Big Picture: Stress & Health

Stress & Health

Amount and Types of Stress

In 2023, about one-quarter of Americans reported that their average stress over the past month was extreme (8-10 out of 10).

The top types of stress were health- and finance-related stress.

Stress in America 2023

A nation recovering from collective trauma

The COVID-19 pandemic, global conflicts, racism and racial injustice, inflation, and climate-related disasters are all weighing on the collective consciousness of Americans

Sources

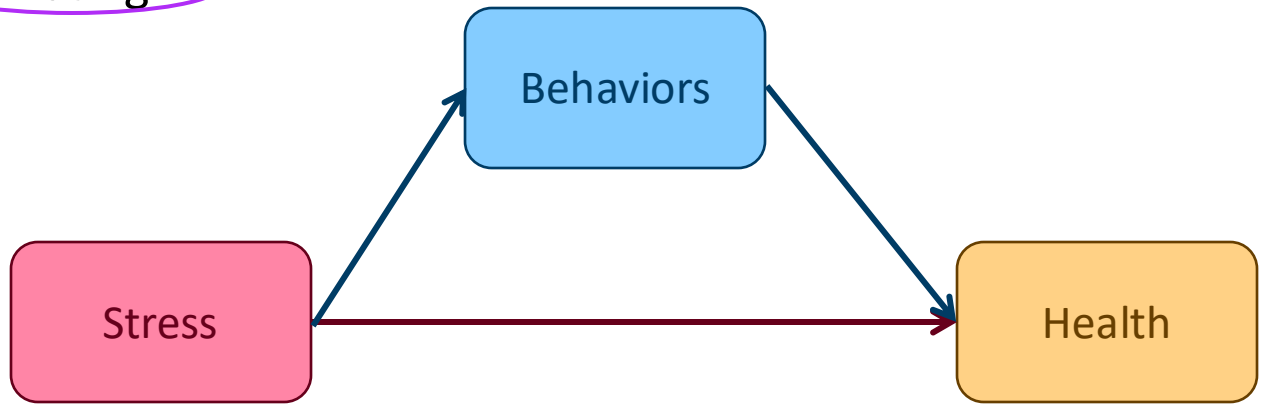
- Stress in America™ (2023); URL: https://www.apa.org/news/press/releases/stress/2023/collective-trauma-recovery

Stress & Health

The relationship between stress and health is complex, with stress-related changes in behavior one part of the picture.

Examples of behaviors include . . .

- Use of tobacco, alcohol, and other drugs
- Sleep
- Physical activity
- Eating



Annual Review of Psychology

Stress and Health: A Review of Psychobiological Processes

Daryl B. O'Connor,[1] Julian F. Thayer,[2] and Kavita Vedhara[3]

Annu. Rev. Psychol. 2021. 72:663–88

Sources

- O'Connor *et al* (2021): DOI: 10.1146/annurev-psych-062520122331

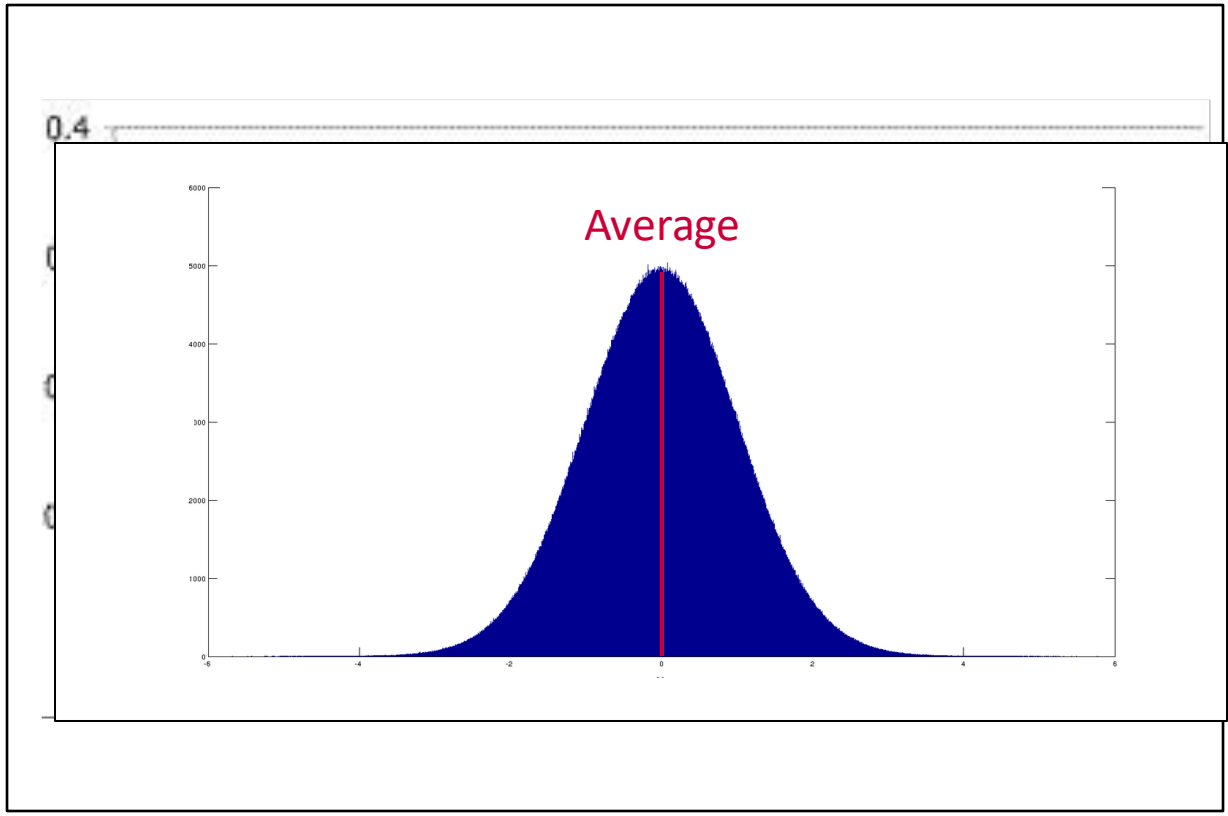
Stress-Related Eating: An Overview

Overview of Stress-Related Eating

A Brief Statistical Digression

Many research methods and findings focus on the average, often the mean.

But the average may not be that informative when there are two (or more) different phenomena occurring.



Overview of Stress-Related Eating

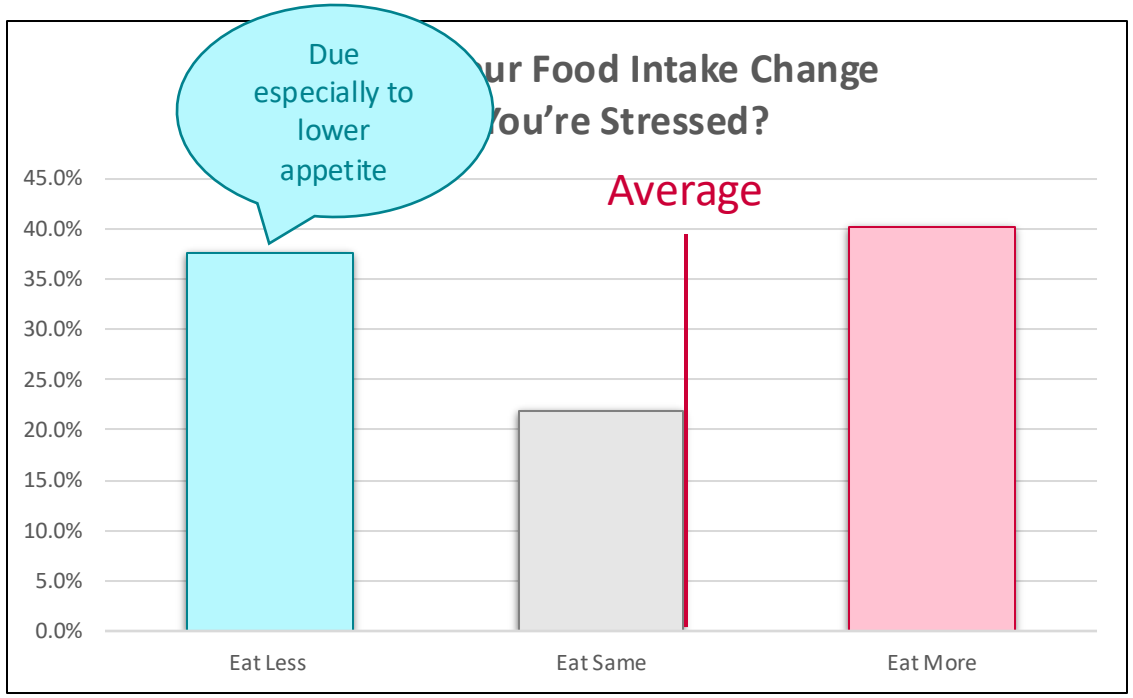
Strong cultural messages that stress is associated with eating more, especially more comfort food . . . .

I. Eating more = ‘food intake’

II. Eating more comfort food = ‘food choice’

Overview of Stress-Related Eating

Stress' Impact on Food Intake



Sources

- Epel *et al* (2004); DOI: 10.1196/annals.1314.022
- Wallis & Hetherington (2009); DOI: 10.1016/j.appet.2008.11.007
- Oliver & Wardle (1999); DOI: 10.1016/S0031-9384(98)00322-9
- Stress in America™ (2014); URL: https://www.apa.org/news/press/releases/stress/2013/stress-report.pdf

Overview of Stress-Related Eating

Associations with Metabolic Health

Reporting increased food intake and/or more comfort food choice was associated with . . .

- Increased odds of prediabetes and diabetes
- Higher levels of glucose, insulin, insulin resistance, and HbA_{1c} among those without diabetes

Appetite 69 (2013) 151–155

Contents lists available at SciVerse ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

Research report

Stress eating and health. Findings from MIDUS, a national study of US adults ☆

Vera Tsenkova *, Jenifer Morozink Boylan, Carol Ryff

Institute on Aging, University of Wisconsin–Madison, 1300 University Ave., 2245 MSC, Madison, WI 53706, United States

ARTICLE INFO

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ABSTRACT

The epidemic of obesity and its related chronic diseases has provoked interest in the predictors of eating behavior. Eating in response to stress has been extensively examined, but currently unclear is whether stress eating is associated with obesity and morbidity. We tested whether self-reported stress eating was associated with worse glucose metabolism among nondiabetic adults as well as with increased odds of prediabetes and diabetes. Further, we investigated whether these relationships were mediated by central fat distribution. Participants were 1138 adults (937 without diabetes) in the Midlife in the US study (MIDUS II). Glucose metabolism was characterized by fasting glucose, insulin, insulin resistance (HOMA-IR), glycosylated hemoglobin (HbA_{1c}), prediabetes, and diabetes status. Multivariate-adjusted analyses showed that stress eating was associated with significantly higher nondiabetic levels of glucose, insulin, insulin resistance, and HbA_{1c} as well as higher odds of prediabetes or diabetes. Relationships between stress eating and all outcomes were no longer statistically significant once waist circumference was added to the models, suggesting that it mediates such relationships. Findings add to the growing literature on the relationships among psychosocial factors, obesity, and chronic disease by documenting associations between stress eating and objectively measured health outcomes in a national sample of adults. The findings have important implications for interventive targets related to obesity and chronic disease, namely, strategies to modify the tendency to use food as a coping response to stress.

Sources

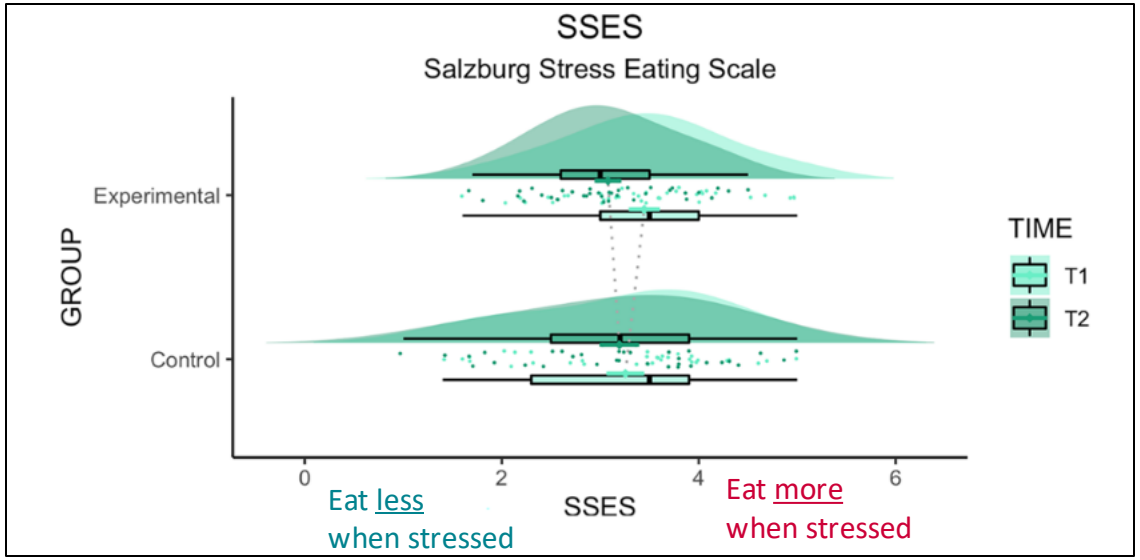
- Tsenkova *et al* (2013); DOI: 10.1016/j.appet.2013.05.020

Overview of Stress-Related Eating

Interventions

Mindfulness meditation intervention may lead to. . .

- (Small) decrease in stress-related food intake



scientific reports

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OPEN

Mindfulness meditation modulates stress-eating and its neural correlates

Alyssa Torske[1,2,3,4]✉, Benno Bremer[1,2,4], Britta Karen Hölzel[1,2], Alexander Maczka[1,2] & Kathrin Koch[1,2,3]

Sources

- Torske *et al* (2024); DOI: 10.1038/s41598-024-57687-7

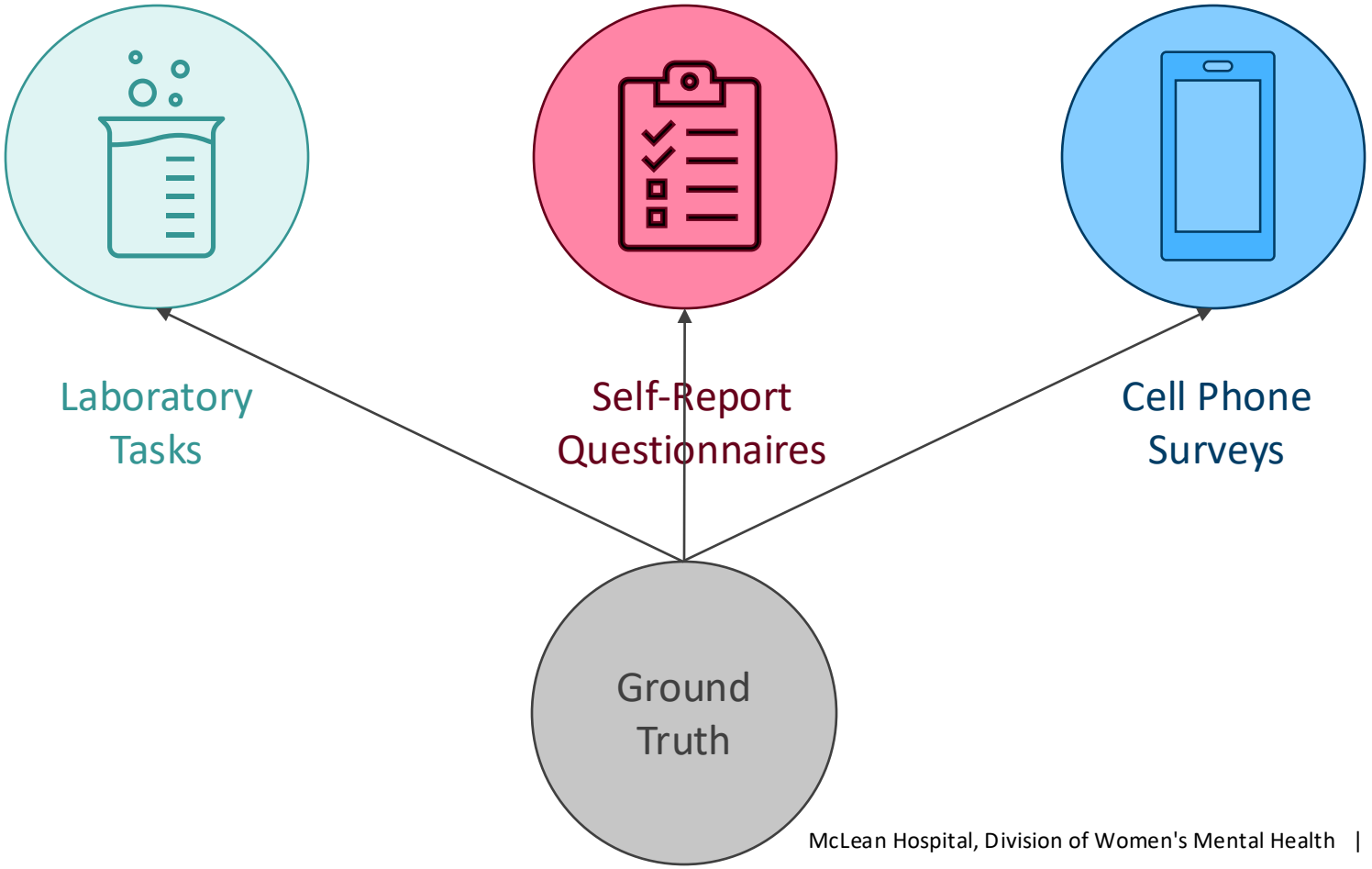
Stress-Related Eating: An Overview

Stress-Related Eating: An Overview Based on Self-Report

Stress-Related Eating: Measuring It

Measuring Stress-Related Eating

Three Approaches to Measurement

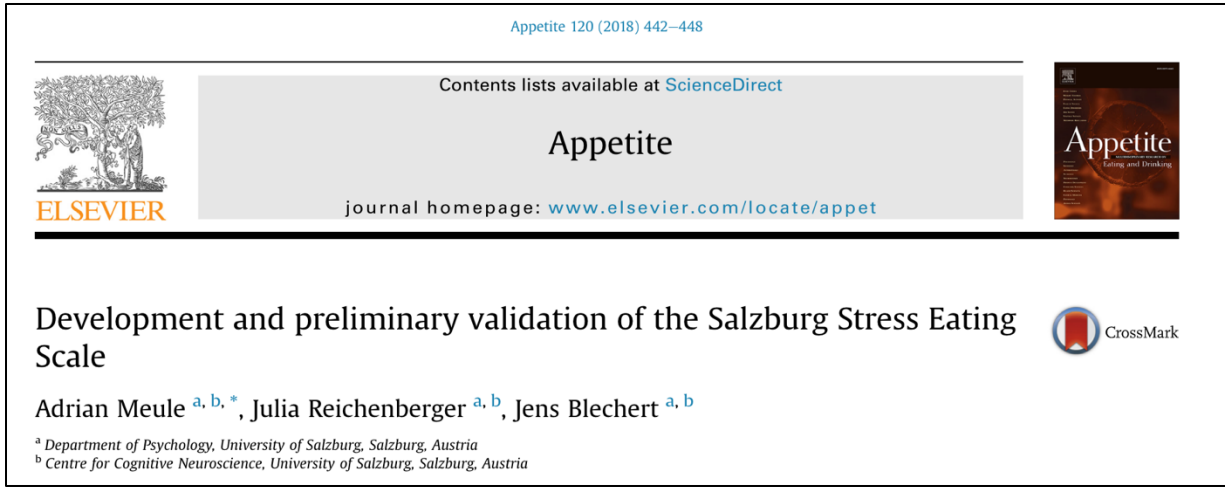


Measuring Stress-Related Eating

Self-Report Questionnaires

Measures of stress-related food intake include

- One or two 'direct' questions asking how stress affects food intake Tsenkova *et al* (2013); Wallis & Hetherington (2009); Epel *et al* (2004); Oliver & Wardle (1999)
- Salzburg Stress Eating Scale Meule *et al* (2018)



Appetite 120 (2018) 442–448

Contents lists available at ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

Development and preliminary validation of the Salzburg Stress Eating Scale

Adrian Meule [a, b, *], Julia Reichenberger [a, b], Jens Blechert [a, b]

[a] Department of Psychology, University of Salzburg, Salzburg, Austria
[b] Centre for Cognitive Neuroscience, University of Salzburg, Salzburg, Austria

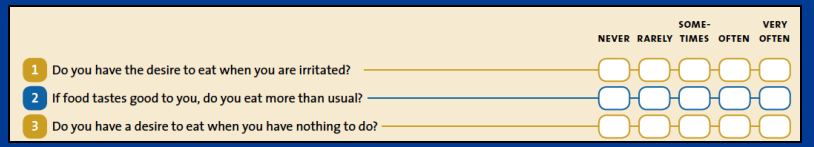
Sources

- MIDUS 2 Using Food to Cope (e.g., Tsenkova *et al*, 2013); URL: https://midus.wisc.edu/Projects/M2P1/M2P1_Survey/Documentation/M2_P1_DocumentationOfPsychosocialConstructsAndCompositeVariables_20201103.pdf
- Wallis & Hetherington (2009); DOI: 10.1016/j.appet.2008.11.007
- Epel *et al* (2004); DOI: 10.1196/annals.1314.022
- Oliver & Wardle (1999); DOI: 10.1016/S0031-9384(98)00322-9
- Meule *et al* (2018); DOI: 10.1016/j.appet.2017.10.003 0195-6663

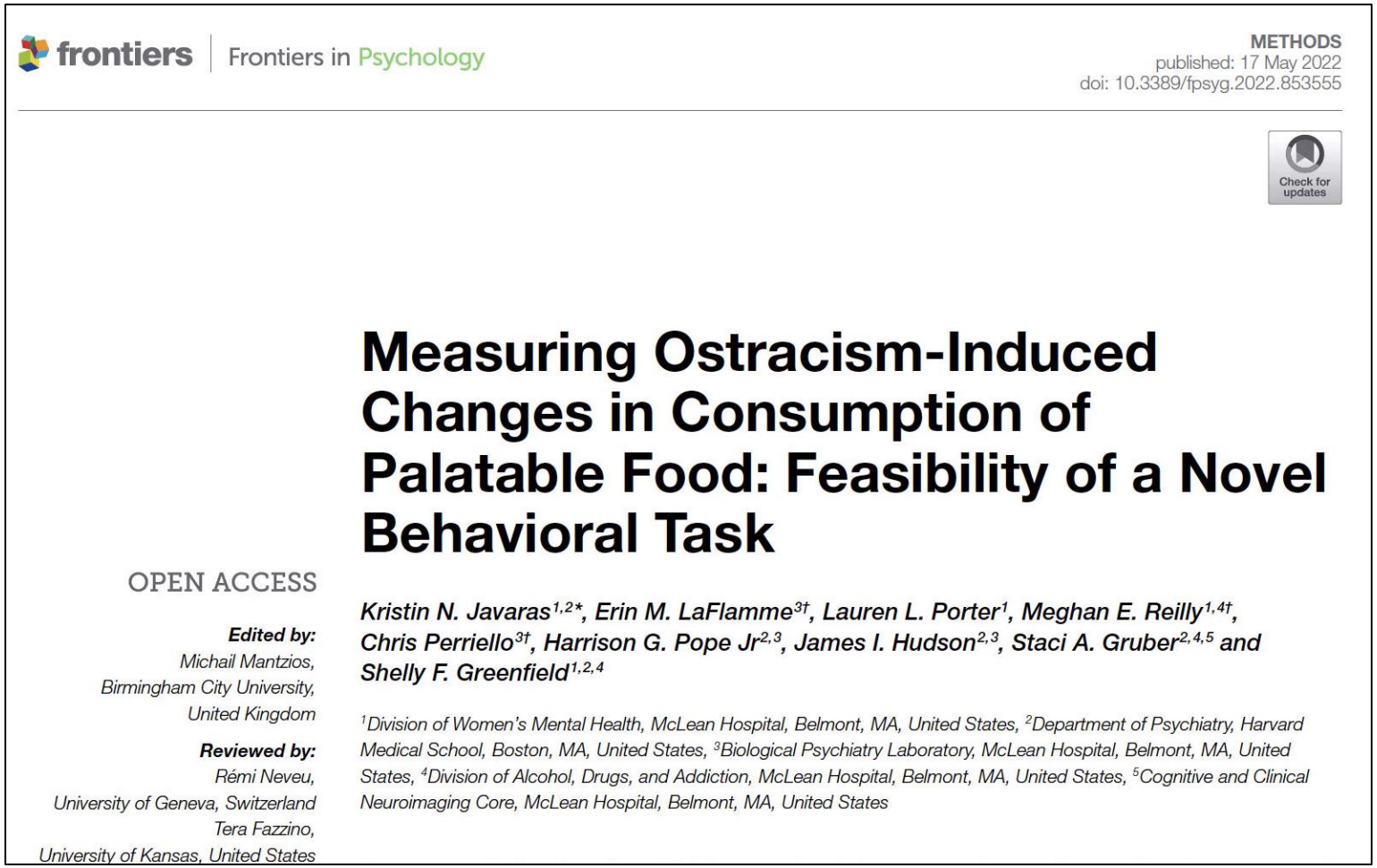
Measuring Emotion-Related Eating

Self-Report of Emotion-Related Eating

e.g., Dutch Eating Behavior Questionnaire (van Strien et al., 1986)



Measuring Emotion-Related Eating



frontiers | Frontiers in Psychology

METHODS
published: 17 May 2022
doi: 10.3389/fpsyg.2022.853555

Check for updates

Measuring Ostracism-Induced Changes in Consumption of Palatable Food: Feasibility of a Novel Behavioral Task

OPEN ACCESS

Kristin N. Javaras[1,2], Erin M. LaFlamme[3†], Lauren L. Porter[1], Meghan E. Reilly[1,4†], Chris Perriello[3†], Harrison G. Pope Jr[2,3], James I. Hudson[2,3], Staci A. Gruber[2,4,5] and Shelly F. Greenfield[1,2,4]*

[1]Division of Women's Mental Health, McLean Hospital, Belmont, MA, United States, [2]Department of Psychiatry, Harvard Medical School, Boston, MA, United States, [3]Biological Psychiatry Laboratory, McLean Hospital, Belmont, MA, United States, [4]Division of Alcohol, Drugs, and Addiction, McLean Hospital, Belmont, MA, United States, [5]Cognitive and Clinical Neuroimaging Core, McLean Hospital, Belmont, MA, United States

Edited by:
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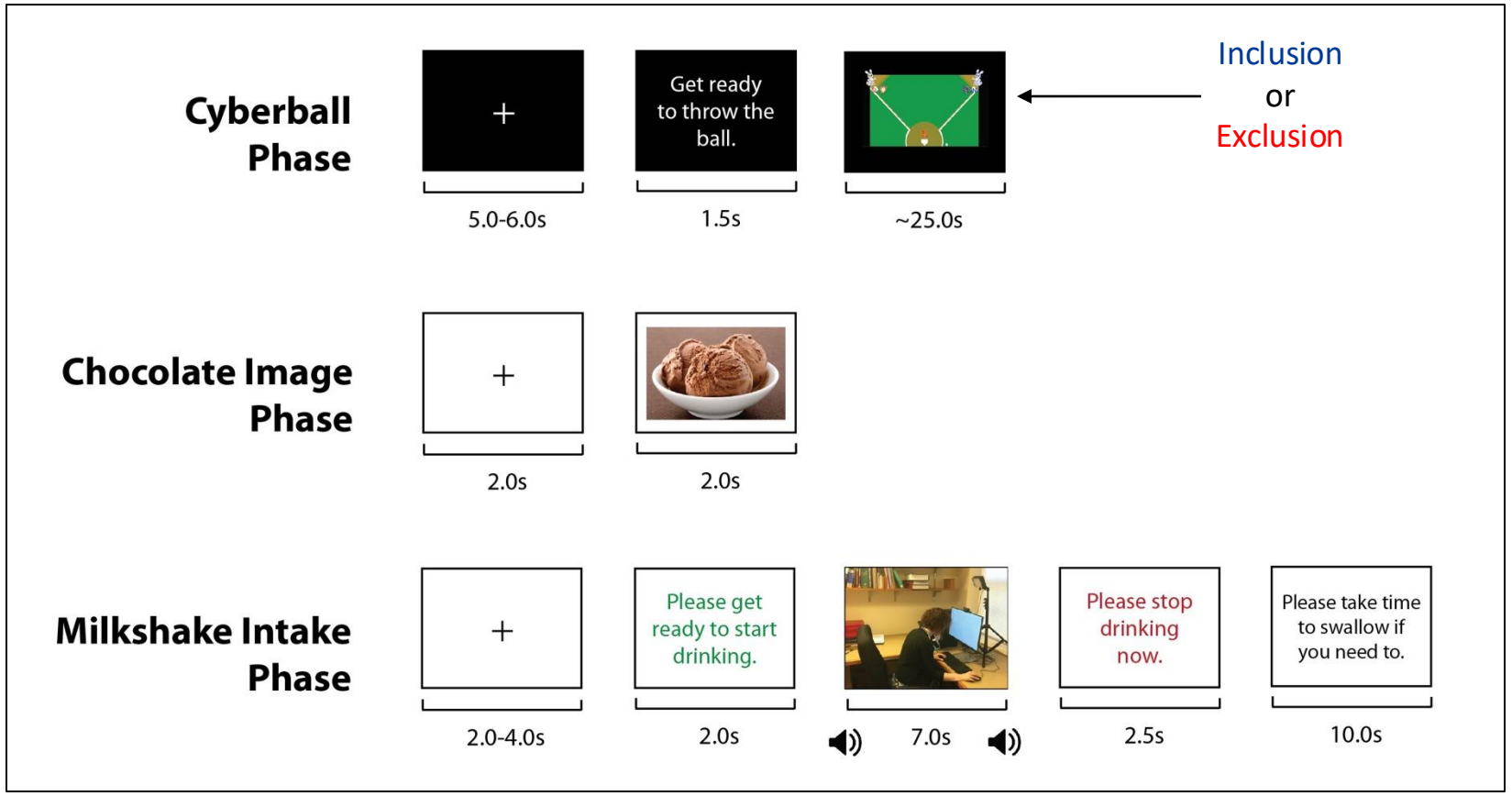
Reviewed by:
Rémi Neveu, University of Geneva, Switzerland
Tera Fazzino, University of Kansas, United States

Pilot Study of Novel Task included 20 young adult women (40% with current or past bulimia nervosa or binge-eating disorder)

Sources
- Javaras *et al* (2022); DOI: 10.3389/fpsyg.2022.853555

Measuring Emotion-Related Eating



Task Design
includes 12 full trials
(6 inclusion, 6 exclusion)

Sources
- Javaras *et al* (2022); DOI: 10.3389/fpsyg.2022.853555

Measuring Emotion-Related Eating

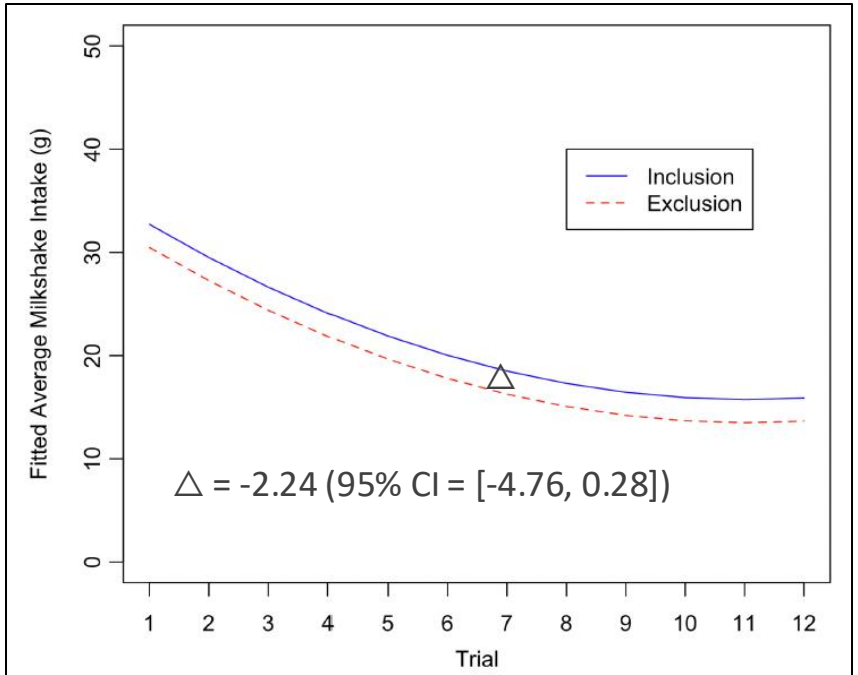
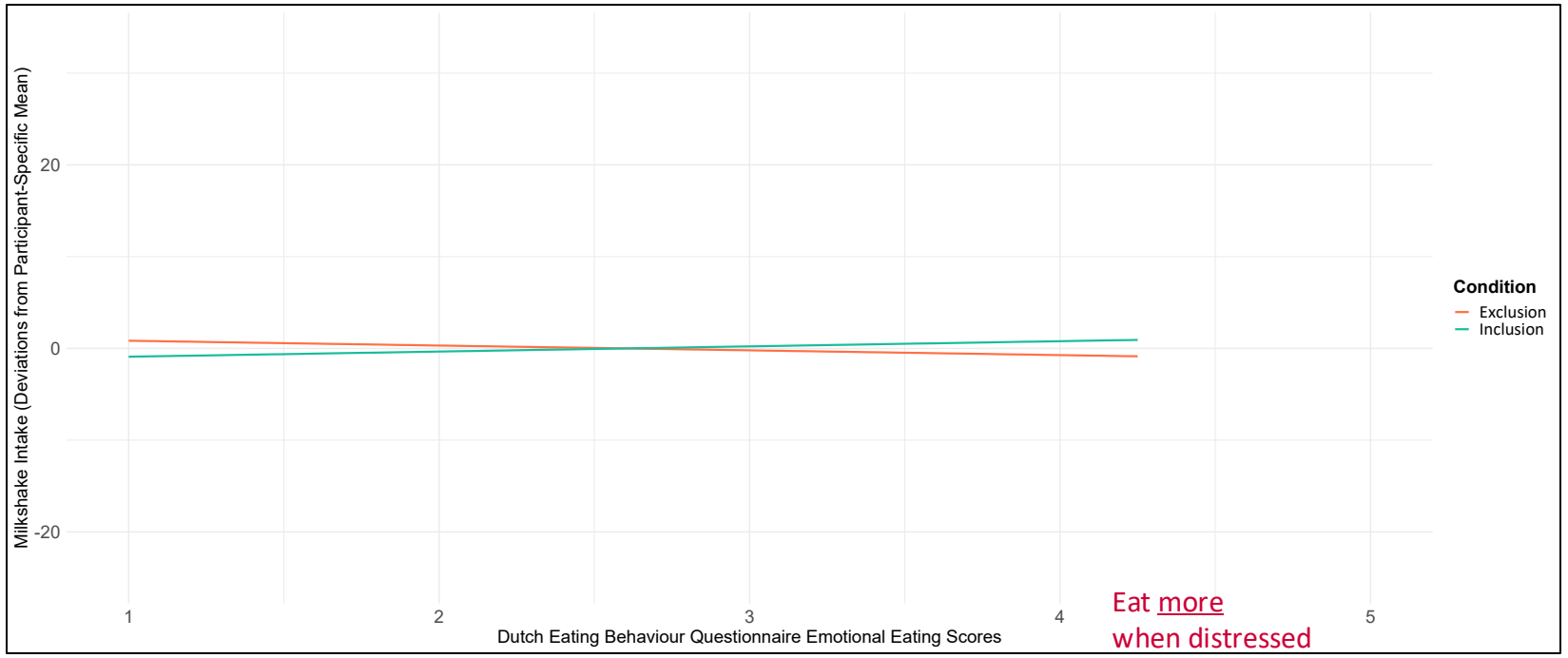


FIGURE 3 | Plot of fitted values of milkshake consumption versus trial number, by condition. Fitted values were calculated from the results of Model 1, for an average participant's chocolate milkshake intake and for an average chocolate image.

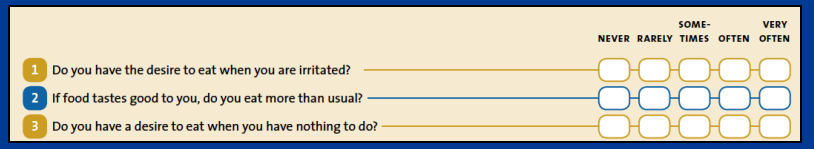
Milkshake Intake
on average decreases for later trials, but is not significantly different for exclusion (vs. inclusion)

Sources
- Javaras *et al* (2022); DOI: 10.3389/fpsyg.2022.853555

Measuring Emotion-Related Eating



Self-Report of Emotion-Related Eating
is not associated with changes in milkshake intake after exclusion



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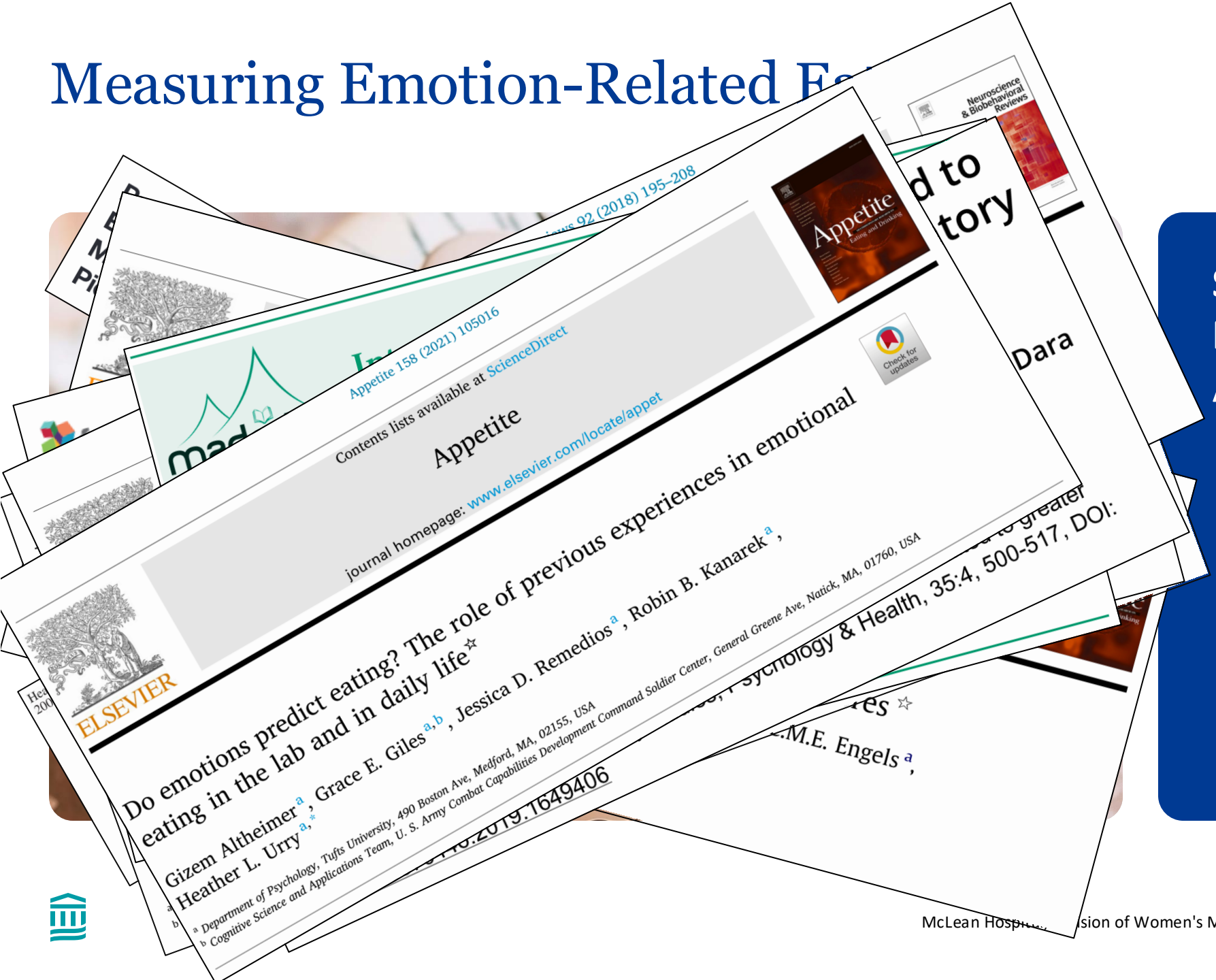
Measuring Emotion-Related Ea



Self-Report of Emotion-Related Eating

A cautionary tale?

Ground Truth

Measuring Stress-Related Eating

Self-Report of Stress-Related Eating

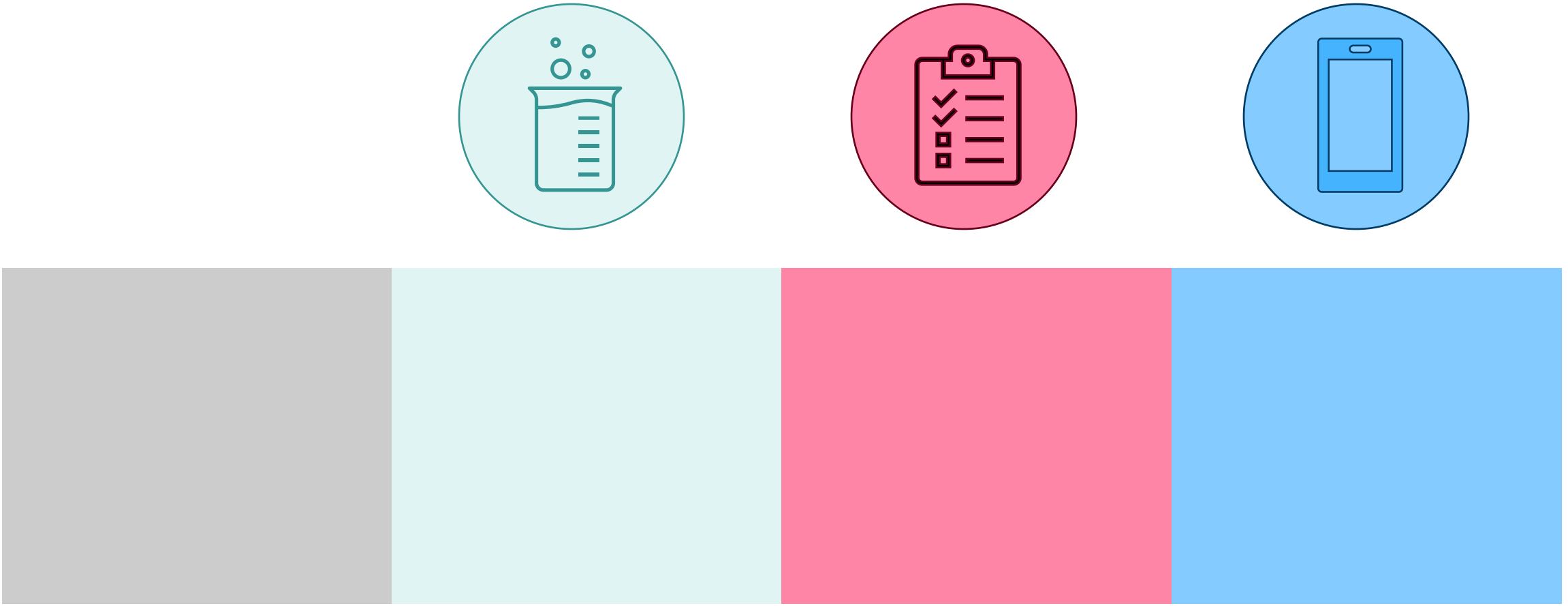
Measuring Stress-Related Eating

Self-Report of Behavior is (at best) weakly correlated with behavioral tasks for many behaviors

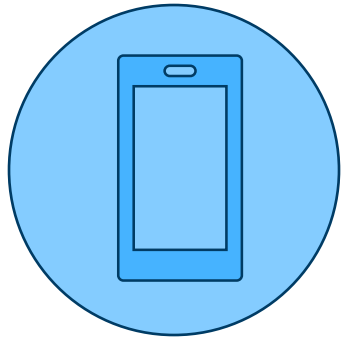
Sources

- Dang *et al* (2020); DOI: 10.1016/j.tics.2020.01.007

Measuring Stress-Related Eating

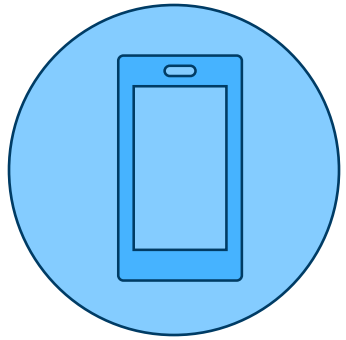


Measuring Stress-Related Eating



Emotion/Stress	• Laboratory induction • Single, specified type • Objectively selected	• Naturally occurring • Unspecified type(s) • Subjectively selected	• Naturally occurring • Unspecified type(s) • Both options

Measuring Stress-Related Eating



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Measuring Stress-Related Eating

Personality and Individual Differences 49 (2010) 565–569

Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

I ate what?! The effect of stress and dispositional eating style on food intake and behavioral awareness

Justin D. Royal [a], Jaime L. Kurtz [b,*]

[a] Center for Human Genetic Research, Massachusetts General Hospital, 185 Cambridge St., Boston, MA 02114, USA
[b] Department of Psychology, James Madison University, MSC 7704 Harrisonburg, VA 22807, USA

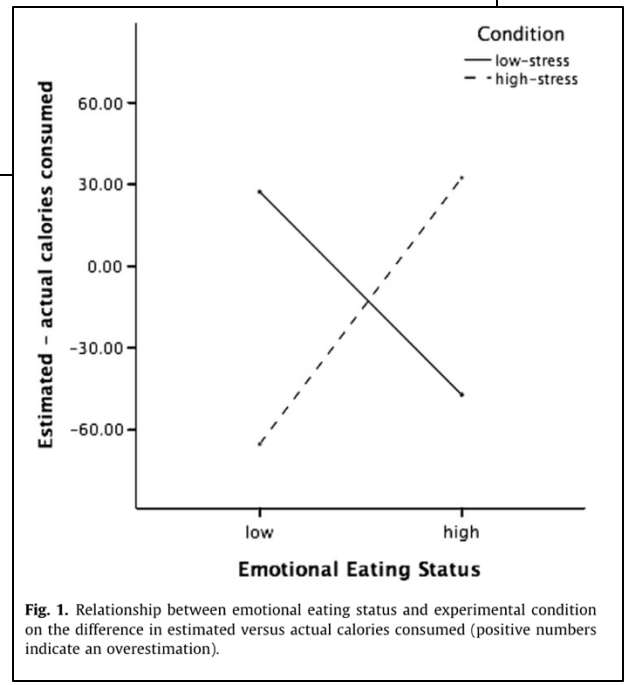


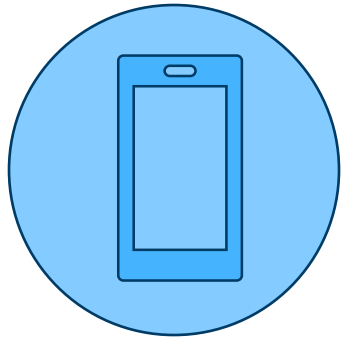
Fig. 1. Relationship between emotional eating status and experimental condition on the difference in estimated versus actual calories consumed (positive numbers indicate an overestimation).

Self-Report of Emotion-Related Eating was significantly associated with overestimating one's food intake, but not with actual food intake, in the high (vs. low) stress condition

Sources

- Royal & Kurtz (2010); DOI: 10.1016/j.paid.2010.04.022

Measuring Stress-Related Eating



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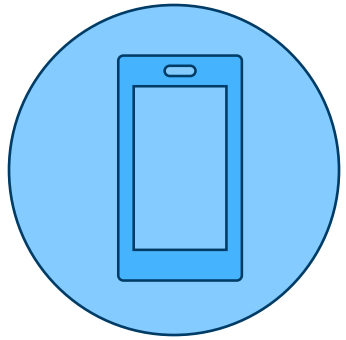
Measuring Stress-Related Eating



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Association	• Objectively assessed	• Subjectively assessed	• Objectively assessed

Measuring Stress-Related Eating

Direct Approach #1 . . . .

Do you eat more when you're stressed?

Measuring Stress-Related Eating

Direct Approach #2 . . . .

Think of a time you were stressed in the past two weeks . . . .

Did you eat more?

Measuring Stress-Related Eating

Comparison of Direct Approaches

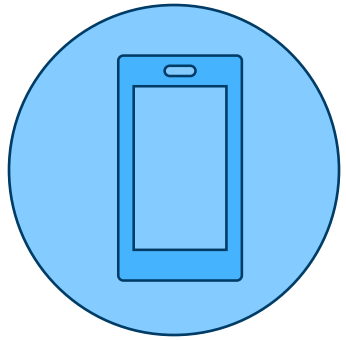
In a sample of 89 undergraduates . . . .

	Self-Reported Changes in Food Intake		
	Eat Less	Eat Same	Eat More
Approach #1 (General)	48%	9%	43%
Approach #2 (Specific Recent Stressor)	49%	18%	33%

Sources

- Wallis & Hetherington (2009); DOI: 10.1016/j.appet.2008.11.007

Measuring Stress-Related Eating



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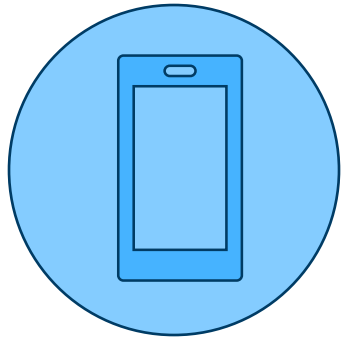
Measuring Stress-Related Eating



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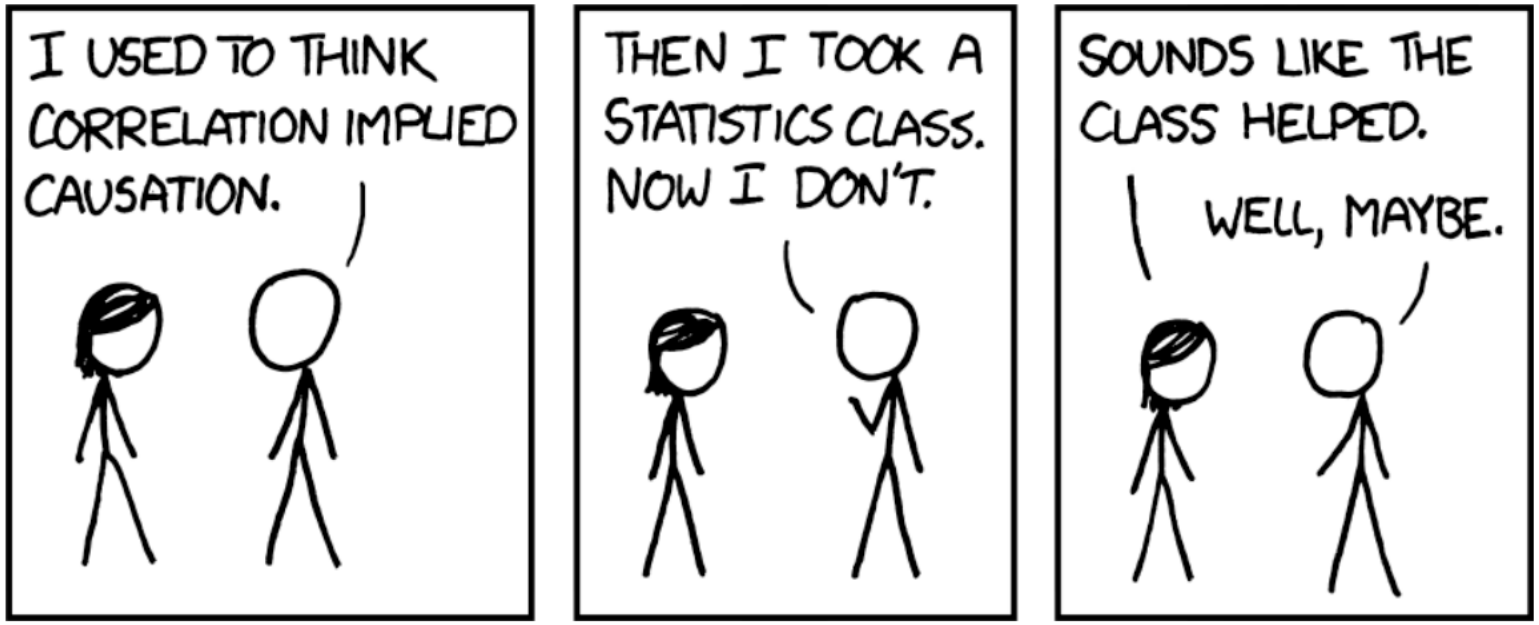
Association	• Objectively assessed • Causal	• Subjectively assessed • Correlational	• Objectively assessed • Correlational

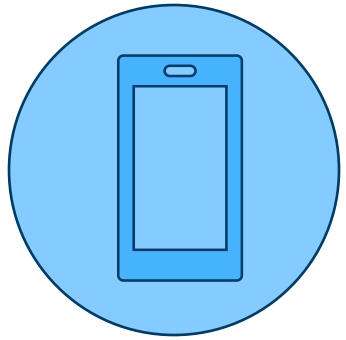
Measuring Stress-Related Eating



Sources

- xkcd; URL: https://xkcd.com/552/

Measuring Stress-Related Eating



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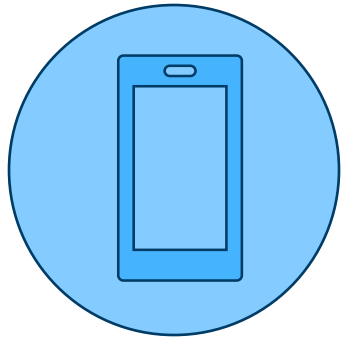
Measuring Stress-Related Eating



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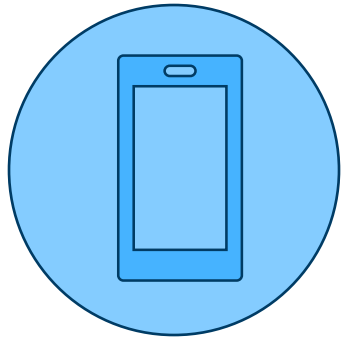
Measuring Stress-Related Eating



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Stress-Related Eating: Some Findings From Laboratory Studies

Laboratory Studies of Stress-Related Eating

Acute Stressors Average Impact on Immediate Food Intake?

Stress and eating behaviours in healthy adults: a systematic review and meta-analysis

Deborah Hill, Mark Conner, Faye Clancy, Rachael Moss, Sarah Wilding, Matt Bristow & Daryl B. O'Connor

To cite this article: Deborah Hill, Mark Conner, Faye Clancy, Rachael Moss, Sarah Wilding, Matt Bristow & Daryl B. O'Connor (2022) Stress and eating behaviours in healthy adults: a systematic review and meta-analysis, Health Psychology Review, 16:2, 280-304, DOI: 10.1080/17437199.2021.1923406

To link to this article: https://doi.org/10.1080/17437199.2021.1923406

Acute Stressors
cause an extremely small increase in food intake on average among adults without pre-existing medical conditions

Sources
- Hill *et al* (2022); DOI: 10.1080/17437199.2021.1923406

Laboratory Studies of Stress-Related Eating

What Predicts Acute Stressors' Impact on Food Intake?

Cognitive (dietary) restraint refers to an intention to eat less overall and/or less of foods viewed as unhealthy.

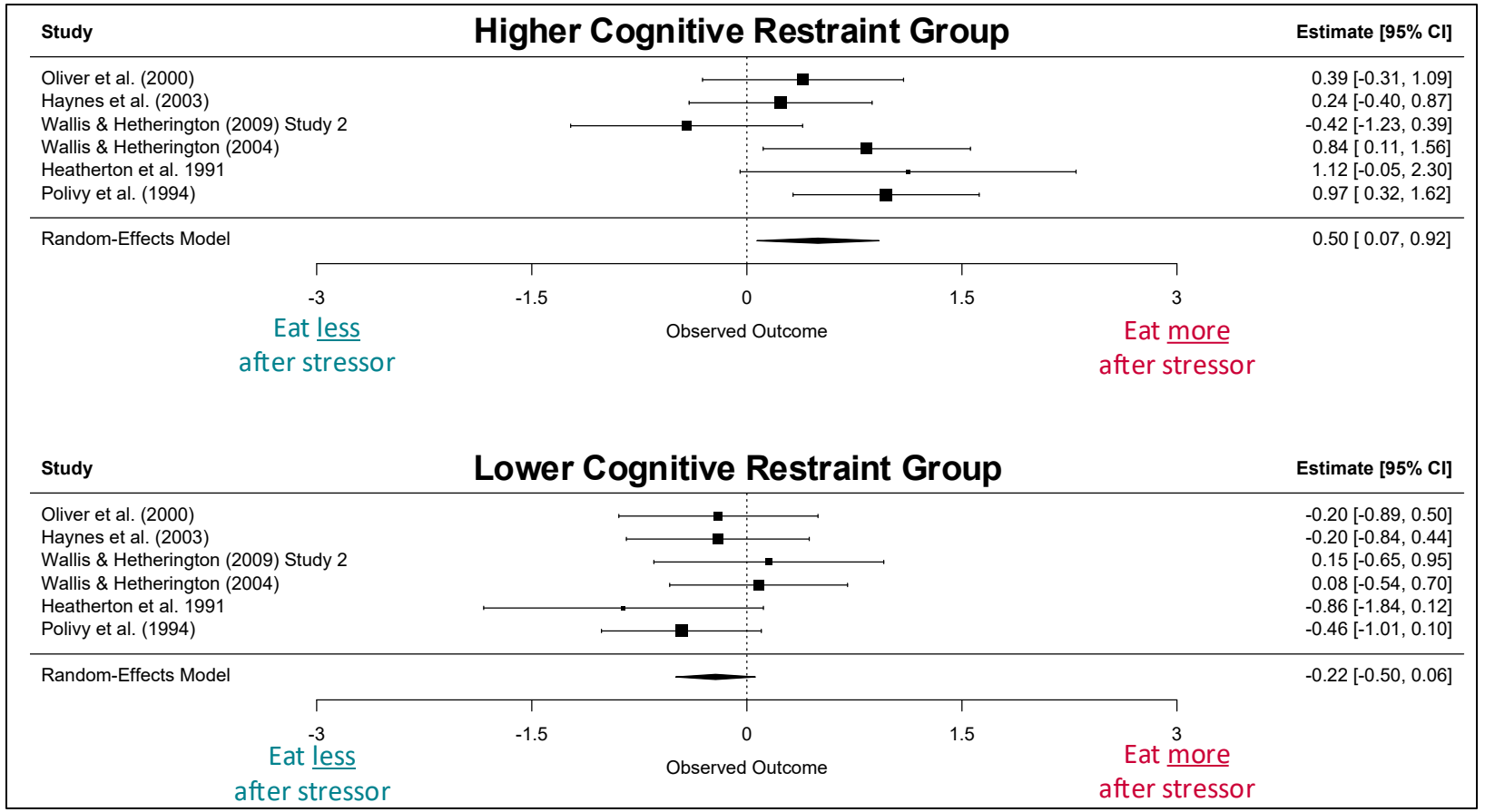
Cognitive Restraint?

Sources

- Lowe & Thomas, Chapter 5 in *Handbook of Assessment Methods for Eating Behaviors* (2009); URL: https://us.sagepub.com/en-us/nam/handbook-of-assessment-methods-for-eating-behaviors-and-weight-related-problems/book230593#contents

Laboratory Studies of Stress-Related Eating

What Predicts Acute Stressors' Impact on Food Intake?



Self-Report of Higher Cognitive Restraint is associated with more food intake when stressed among adults

Sources

- Javaras (2025); Unpublished

Laboratory Studies of Stress-Related Eating

Does Food Intake Alter the Impact of Acute Stressors?

Psychoneuroendocrinology 107 (2019) 26–36

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Psychoneuroendocrinology

journal homepage: www.elsevier.com/locate/psyneuen

Cookie or clementine? Psychophysiological stress reactivity and recovery after eating healthy and unhealthy comfort foods

Laura E. Finch*,[1], Jenna R. Cummings[2], A. Janet Tomiyama

University of California, Los Angeles, Department of Psychology, 1285 Franz Hall, 502 Portola Plaza, Los Angeles, CA 90095, USA

Eating Comfort Foods does not (on average) reduce subjectively experienced stress or biological measures of stress, either when consumed while anticipating the stressor or immediately after the stressor

Sources

- Finch *et al* (2019); DOI: 10.1016/j.psyneuen.2019.04.022

Stress-Related Eating: Take-Away Messages

Take-Away Messages on Stress-Related Eating

Food Intake Immediately After a Single Acute Stressor . . .

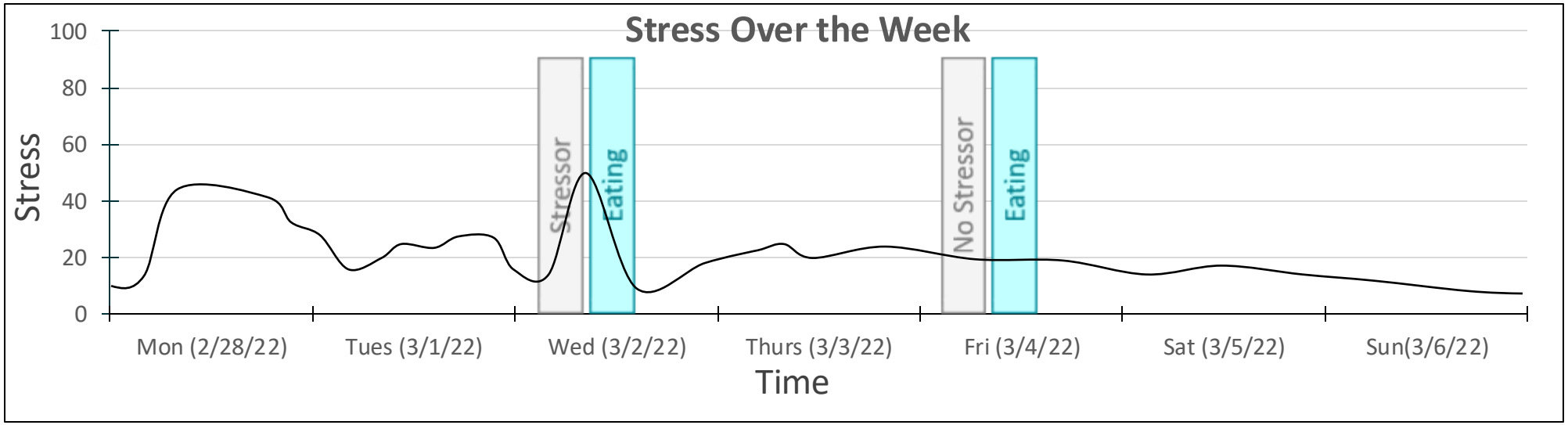
- Some people do seem to eat more
  - They are not necessarily the people who report eating more when stressed in general
  - They are more likely to be people who report higher cognitive restraint

- A similar number of people seem to eat less
  - They are not necessarily the people who report eating less when stressed in general
  - They are (slightly) more likely to be people who report lower cognitive restraint

Take-Away Messages on Stress-Related Eating

What Does Self-Report of Stress-Related Eating Not Seem to Measure?

How single acute stressors affect people's eating behavior immediately after the stressor

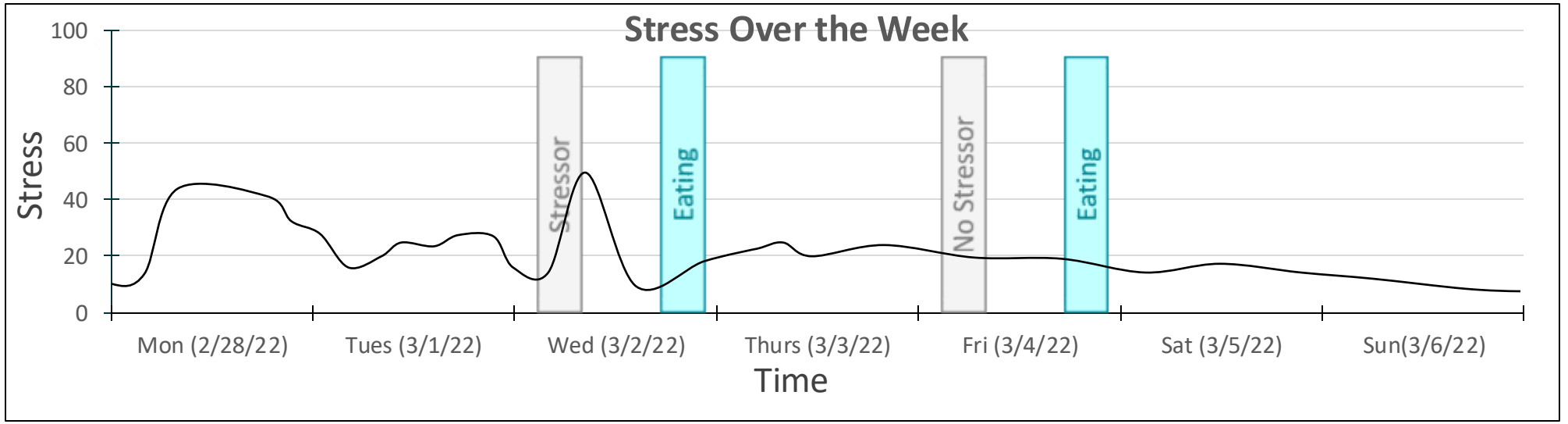


Take-Away Messages on Stress-Related Eating

What Might Self-Report of Stress-Related Eating Actually Measure?

A Different Aspect of Stress-Related Eating?

- Delayed response to acute stressors?
  Reichenberger *et al* (2021)



Sources
- Reichenberger *et al* (2021); DOI: 10.1080/08870446.2020.1781122

Take-Away Messages on Stress-Related Eating

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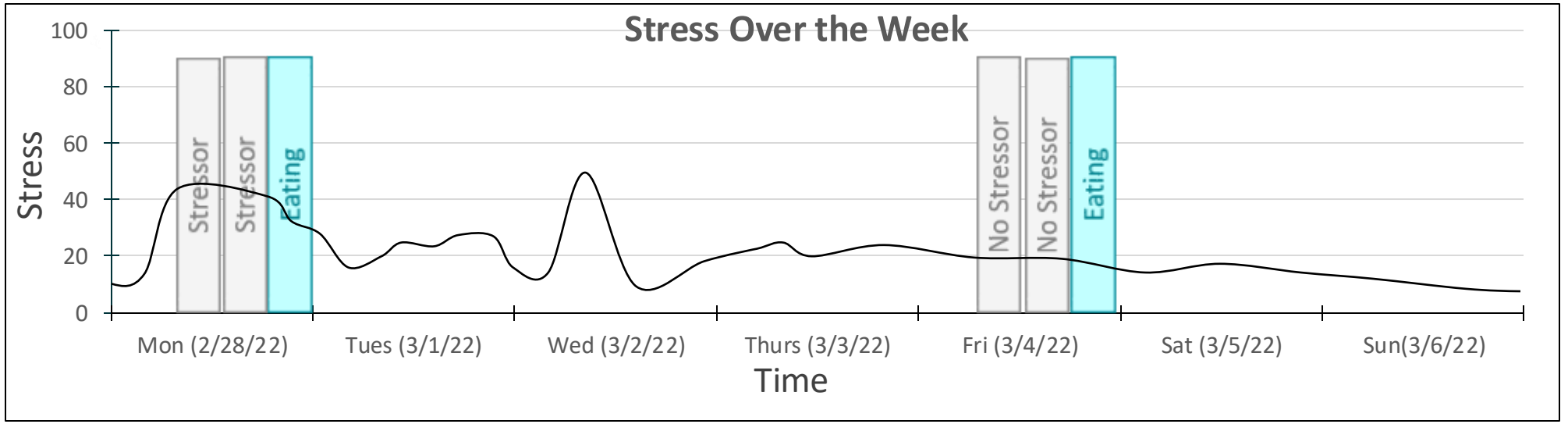
- Response to pileup of acute stressors?



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Take-Away Messages on Stress-Related Eating

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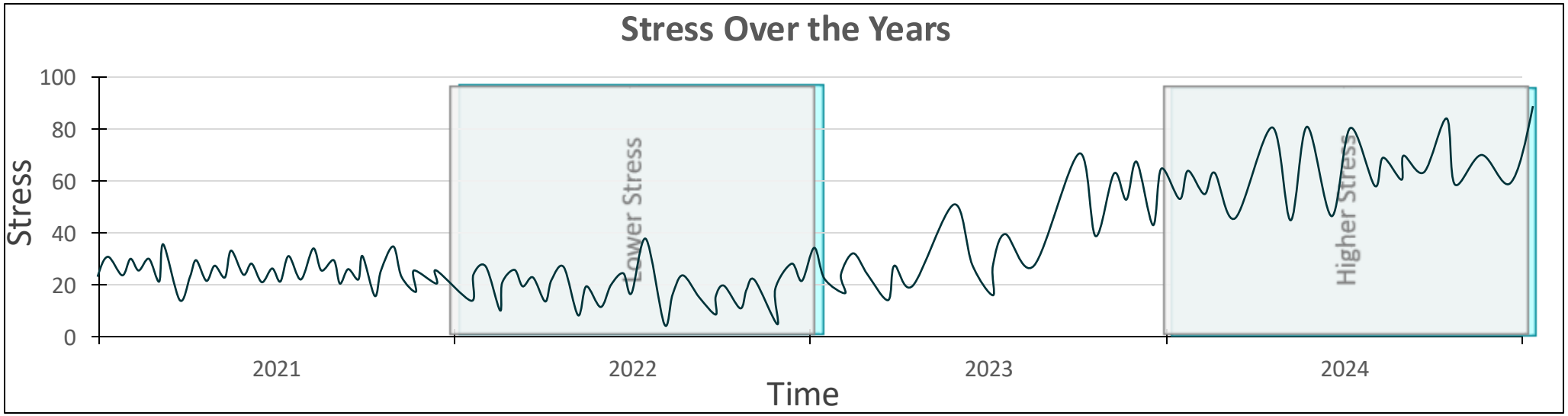
- Response to pileup of acute stressors?
- Response during periods of generally high or prolonged stress?



Sources
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Take-Away Messages on Stress-Related Eating

What Might Self-Report of Stress-Related Eating Actually Measure?

A Different Aspect of Stress-Related Eating?

- Delayed response to acute stressors? Reichenberger *et al* (2021)
- Response to pileup of acute stressors?
- Response during periods of generally high or prolonged stress?

Something Else?

- Greater concern about one's eating (Adriaanse et al., 2011; Jansen et al., 2011)
- Tendency to erroneously attribute past overeating to negative emotions or stress (Adriaanse et al., 2016)
- Tendency to overestimate one's eating when stressed (Royal & Kurtz, 2010)

Sources

- Reichenberger *et al* (2021); DOI: 10.1080/08870446.2020.1781122
- Adriaanse *et al* (2011); DOI: 10.1080/08870440903207627
- Jansen *et al* (2011); DOI: 10.1002/eat.20799
- Adriaanse *et al* (2016); DOI: 10.1016/j.appet.2016.04.028
- Royal & Kurtz (2010); DOI: 10.1016/j.paid.2010.04.022

Take-Away Messages on Stress-Related Eating

Is “stressed” really “desserts” spelled backwards?

- For some people . . . . Yes
- But for other people . . . . .

Take-Away Messages on Stress-Related Eating

Is “stressed” really “desserts” spelled backwards?

- For some people . . . . Yes
- But for other people . . . . .

Mass General Brigham

Thank You for Listening!