
UCLA
Health


DAVID GEFFEN SCHOOL OF MEDICINE
UCLA
David Geffen
School of Medicine

The Experts Weight In

Tuesday, April 14 at 3pm	The Inflamed Body	Vijaya Surampudi, MD, MS
Tuesday, April 21 at 3pm	Activity for Weight Loss	Lauren Lemieux, MD
Tuesday, April 28 at 3pm	Eat Well, Live Healthy During COVID-19	Zhaoping Li, MD, PhD
Tuesday, May 3 at 3pm	**Food: Necessity, Habit & Addiction**	**Michael Garcia, MD**

Food: Necessity, Habit, and Addiction

Michael Garcia, MD
UCLA Center for Human Nutrition

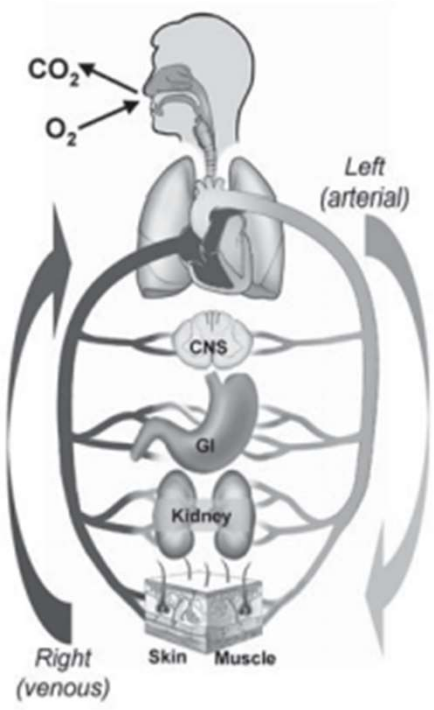





UCLA Health | David Geffen School of Medicine

Images source: Pexels

The Necessity of Food



Major Physiological Functions of the Body

Organ System	Principal Function	BMR (% Total)
Lungs	Gas Exchange	2%
Heart	Blood Circulation	15%
Central Nervous System (CNS)	Integration of Systems	20%
Gastrointestinal (GI)	Nutrition	15%
Kidneys	Excretion Fluid Regulation	10%
Skeletal Muscle	Work Thermogenesis	35%
Skin	Barrier Thermoregulation	1%

Piantadosi, CA. 2003.

Food as Fuel

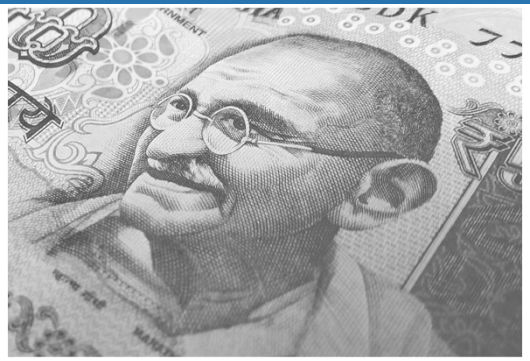
Vegetables

Lean protein

Whole grains

Fruit, healthy fats

Human Survival Without Food



- Adults can survive weeks-months without food, assuming adequate salt/water intake
  - Metabolism slows; fuel used for metabolism changes
  - Reduced capacity to adapt to change (temperature, disease, stress)

Piantadosi, CA. 2003.
Steinhauser ML, et al. 2018
Image source: Pexels

Vital Nature of Water

- Water required to excrete metabolic waste
- We cannot recycle water
- Survival without drinking water: **~7-days (sometimes up to 8-10 days)**

Image source: Pexels

Human Dependence on Food

“Addiction”

Immoderate or compulsive consumption of a drug or other substance; *spec.* a condition characterized by regular or poorly controlled use of a psychoactive substance despite adverse physical, psychological, or social consequences, often with the development of physiological tolerance and withdrawal symptoms; an instance of this.

"Addiction"

- American Psychological Association:
  - "A chronic disorder with **biological, psychological, social and environmental factors influencing its development and maintenance**. Genes affect the degree of reward that individuals experience when initially using a substance (e.g., drugs) or engaging in certain behaviors (e.g., gambling), as well as the way the body processes alcohol or other drugs. Heightened desire to re-experience use of the substance or behavior, potentially influenced by **psychological** (e.g., stress, history of trauma), **social** (e.g., family or friends' use of a substance), and **environmental factors** (e.g., accessibility of a substance, low cost) can lead to regular use/exposure, with chronic use/exposure leading to brain changes."

Gordon, et al. Nutrients. 2018

Substance Use Disorder Criteria (DSM-5)

Impaired Control

1. Consuming a substance in greater amounts or over longer periods of time than intended.
2. Having a persistent desire or unsuccessfully attempting to decrease or limit substance use.
3. Spending a significant amount of time acquiring, using, or recovering from a substance.
4. Craving the substance or having a strong urge to use it.

Social Impairment

5. Being unable to fulfill obligations at work, school, or home due to use of a substance.
6. Continually using a substance despite its effects causing or exacerbating persistent or recurrent social or interpersonal problems.
7. Giving up or reducing social, occupational, or recreational activities due to substance use.

Risky Use

8. Continually using a substance in situations in which it is physically dangerous (e.g., driving under the influence of a substance).
9. Continually using a substance despite physical or psychological problems that are caused or made worse by the substance use.

Pharmacological Criteria

10. Needing a substantially higher dose of the substance to achieve the desired effect; or experiencing a substantially reduced effect of the substance when the usual dose is consumed (i.e., tolerance).
11. Experiencing negative physical and psychological symptoms when the substance is not consumed at the typical dose or frequency (i.e., withdrawal).

Gordon, et al. Nutrients. 2018

Features Of a Substance Use Disorder

- Tolerance
- Craving
- Limited Control
- Withdrawal
- Unsuccessful attempts at behavioral change

- Time spent obtaining/using/recovering
- Other responsibilities
- Use despite negative consequences

Lennerz. Clin Chem. 2018

Yale Food Addiction Scale

The following question asks about your eating habits in the past year. People sometimes have difficulty controlling their intake of certain foods such as sweets, starches, salty snacks, fatty foods, sugary drinks and others.

1) I find myself consuming certain foods even though I am no longer hungry. **4**
2) I worry about cutting down on certain foods **4**
3) I feel sluggish or fatigued from overeating. **3 OR 4**
4) I have spent time dealing with negative feelings from overeating certain foods, instead of spending time in important activities such as time with family, friends, work, or recreation. **3 OR 4**
5) I have had physical withdrawal symptoms such as agitation and anxiety when I cut down on certain foods. (Do NOT include caffeinated drinks: coffee, tea, cola, energy drinks, etc.) **3 OR 4**
6) My behavior with respect to food and eating causes me significant distress. **3 OR 4**
7) Issues related to food and eating decrease my ability to function effectively (daily routine, job/school, social or family activities, health difficulties). **3 OR 4**

Answer options for this section:
0 - Never
1 - Once per month
2 – 2-4 times per month
3 - 2-3 times per week
4 - 4+ times per week

IN THE PAST 12 MONTHS…

8) I kept consuming the same types or amounts of food despite significant emotional and/or physical problems related to my eating. **YES**
9) Eating the same amount of food does not reduce negative emotions or increase pleasurable feelings the way it used to. **YES**

Neurobiology Of Food

- Opioid expression: role in food-related reward
- Functional MRI: increased activation in brain areas related to reward / decreased activation in areas related to inhibition
- Food cravings and appetite following ingestion of palatable food(s)

Gordon, et al. Nutrients. 2018

Human Reward System

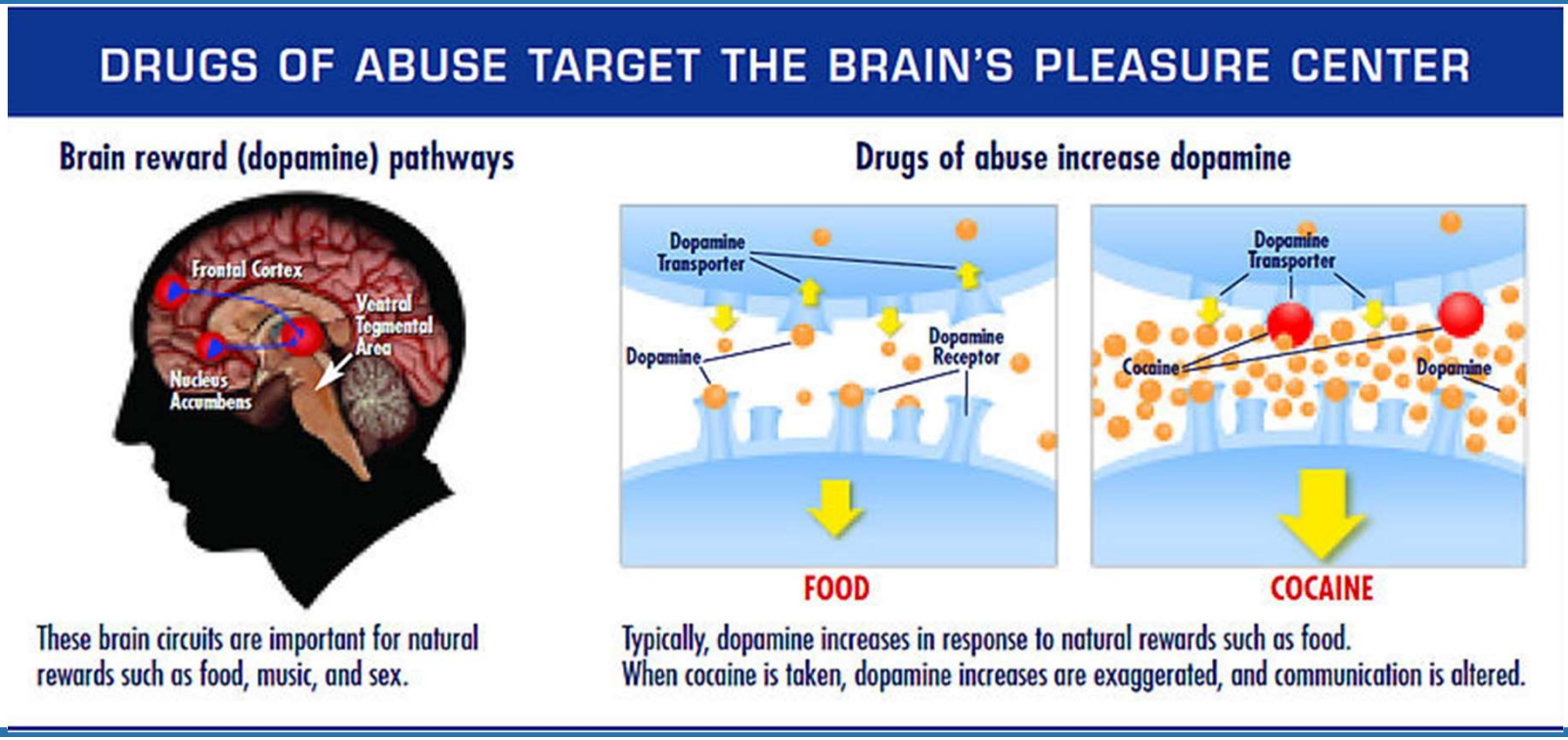
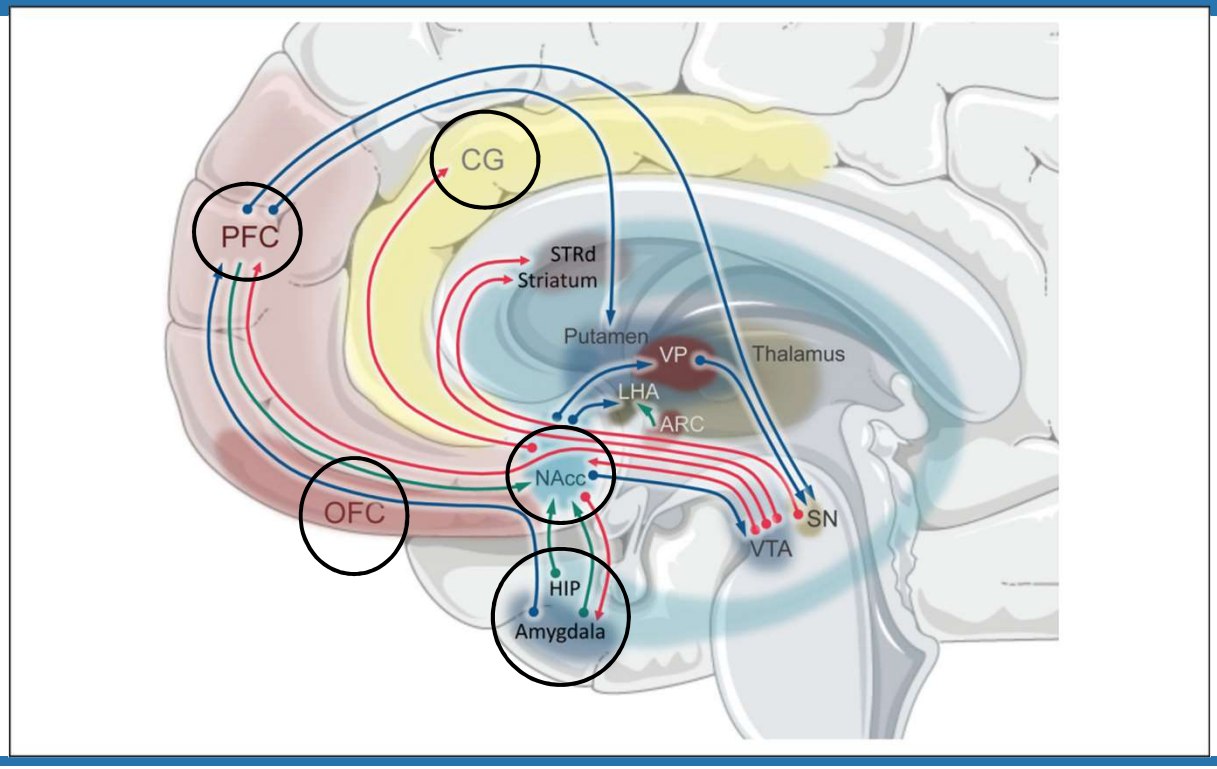


Image source: Wikimedia commons:
https://commons.wikimedia.org/wiki/File:Soa_014_large.jpg

Human Reward System



Lennerz. Clin Chem. 2018

How Do We Process Food?

- Food → pleasure, motivation, positive sensation
- Cues/triggers → anticipation of pleasure/motivation
- Cues → craving → consumption (which may become a habit)

Which Foods Trigger Strong Responses?

RESEARCH ARTICLE

Which Foods May Be Addictive? The Roles of Processing, Fat Content, and Glycemic Load

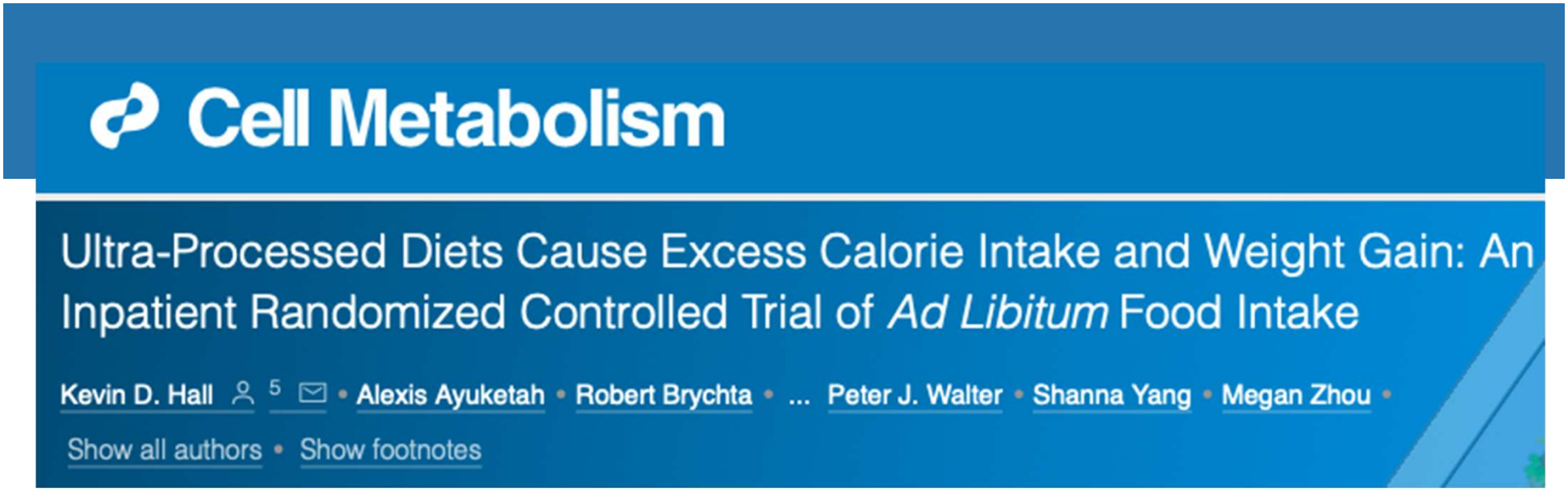
Erica M. Schulte[1], Nicole M. Avena[2], Ashley N. Gearhardt[1]*

1 Department of Psychology, University of Michigan, Ann Arbor, Michigan, United States of America,
2 Department of Medicine, New York Obesity Research Center, Mount Sinai- St. Luke's Hospital, New York, New York, United States of America

- Survey of undergraduates and recruited individuals
  - Completed YFAS
  - List of 35 foods to determine “problem foods”

Which Foods Trigger Strong Responses?

Highly processed
High glycemic load



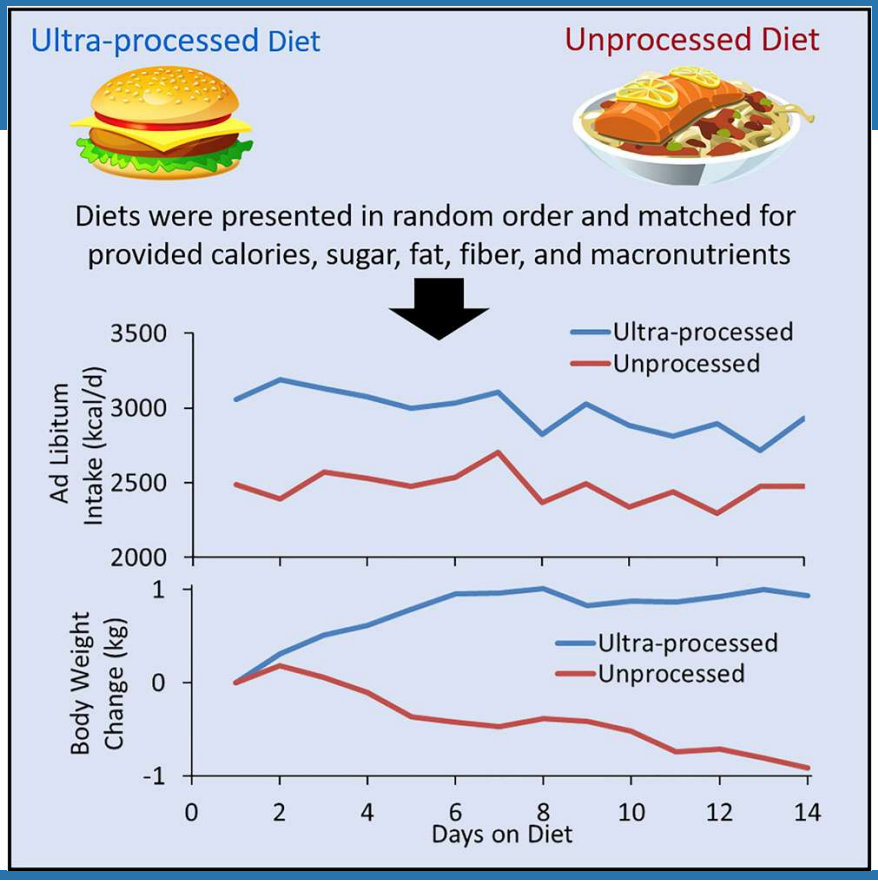
- NIH Clinical Center: 20 inpatients (ages 31.2 ± 1.6 yrs; BMI 27 ± 1.5 kg/m^2
- Ultra-processed versus unprocessed diets x14 days each
- Meals matched for calories, energy density, macronutrients, sugar, sodium, fiber

Example Study Meals

Hall, et al. 2019

Dietary Quality

- Results:
  - Energy intake greater on ultra-processed diet: higher carbohydrate/fat intake
  - Weight change correlated with energy intake



Hall, et al. 2019

The Habit of Eating Food

- “Some thinkers hold that it is by nature that people become good, others that it is by **habit**, and others that it is by instruction. . . just as a piece of land has to be prepared beforehand if it is to nourish the seed, so the mind of the pupil has to be prepared in its **habits** if it is to enjoy and dislike the right things.”

Aristotle, The Nicomachean Ethics

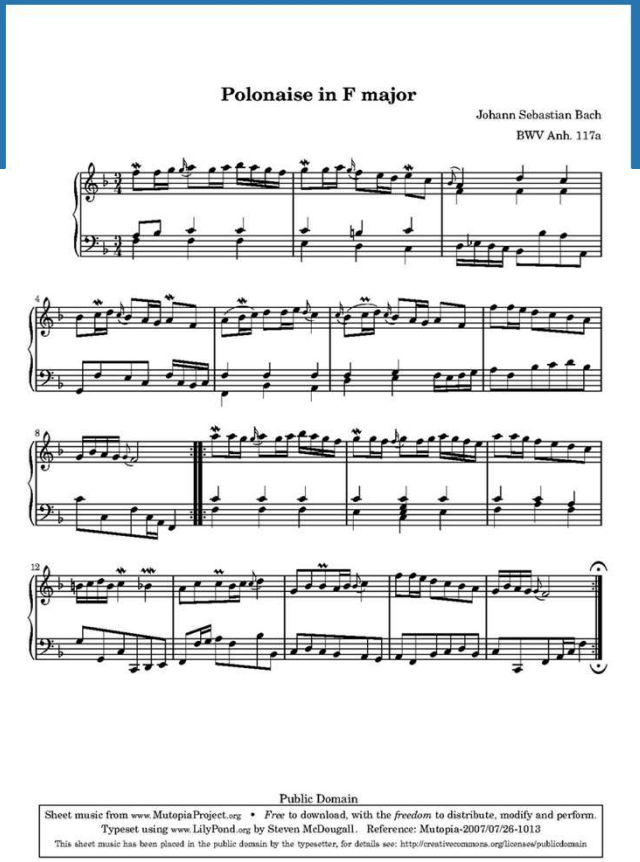
New Learning Versus Habits

- New tasks vs. task repetition occur in different parts of the brain
- Daily actions habitual ~40-50% of the time
- Shopping, cooking, eating → habit?
- **Knowledge alone does not change behavior**

Image source: Wikimedia commons

Habit

- Cognitive associations between context cues and responses
  - Context cues
  - Repetition
  - Reward



Lin, et al. Appetite. 2016

Image Source: Wikimedia Commons

Habit Formation

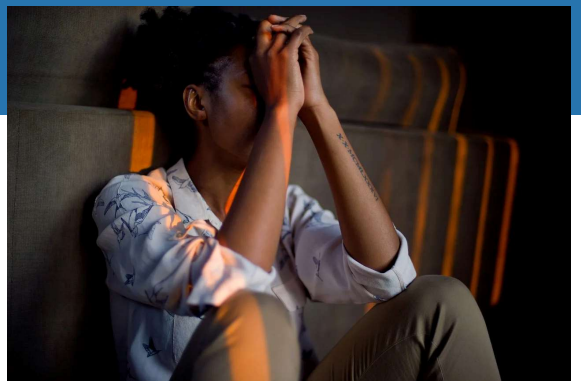
- Occurs over 2-weeks to several months
  - Stable context cues
  - Long interventions with frequent repetitions often most successful
- Connect new behavior to existing habit
- Associated reward(s):
  - Increase positive consequences – reduce negative consequences

Source: https://www.flickr.com/photos/gea79on/7689043636/

Wood, Neal. Behavior Science & Policy. 2016

Cues & Habits

- Non-habitual decisions require executive control
  - Affected by distractions, simultaneous tasks, recent tasks
- "Healthy" or "unhealthy" habits can dictate a response when executive control is not at peak level
  - Stress, exhaustion, commitments

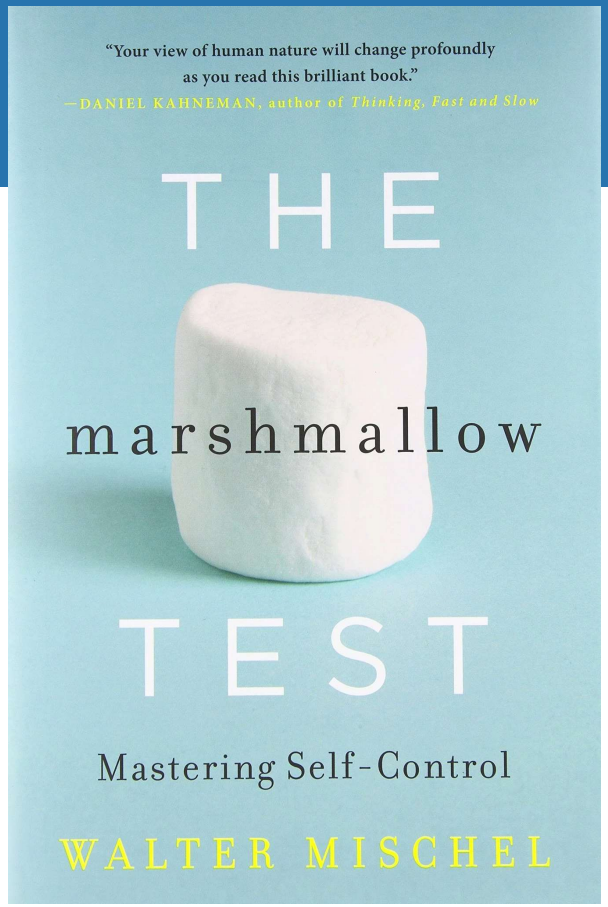


Lin, et al. Appetite. 2016

Wood, Neal. Behavior Science & Policy. 2016

Adjusting Unwanted Habits

- Habits remain despite development of new habits
- Habit-breaking:
  - Cue disruption
  - Environmental modification
  - Vigilant monitoring/inhibition


"Your view of human nature will change profoundly
as you read this brilliant book."
—DANIEL KAHNEMAN, author of Thinking, Fast and Slow
THE
marshmallow
TEST
Mastering Self-Control
WALTER MISCHEL

The Marshallow Experiment

SUMMARY

- We require (certain) foods to sustain life
  - Vegetables, lean proteins, whole grains, fruit, healthy fats
- Our brains interpret foods differently: reward, anticipation, emotions, inhibition, energy balance
- Habit formation requires:
  - Cues, repetition, reward
- Actions involve habits and executive functioning

Food for Thought

- How can we restructure our environment?
- How can we use conscious effort to analyze our habits? (Time, place, emotional state, other people, action prior to habitual act)
- What are our cues?
- How can we make healthy choices convenient (and unhealthy choices inconvenient)?
- How can we create uncertain reward?

Center for Human Nutrition

- Clinical Nutrition Clinic
  - (310) 825-7921
- UCLA Medical Weight Management Program (previously RFO)
  - (310) 825-8173
- COMET Program
  - (310) 825-7163

Website: https://www.uclahealth.org/clinicalnutrition/


Questions
Answers

References

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