

Social, Clinical, and Policy Implications of Ultra-Processed Food Addiction

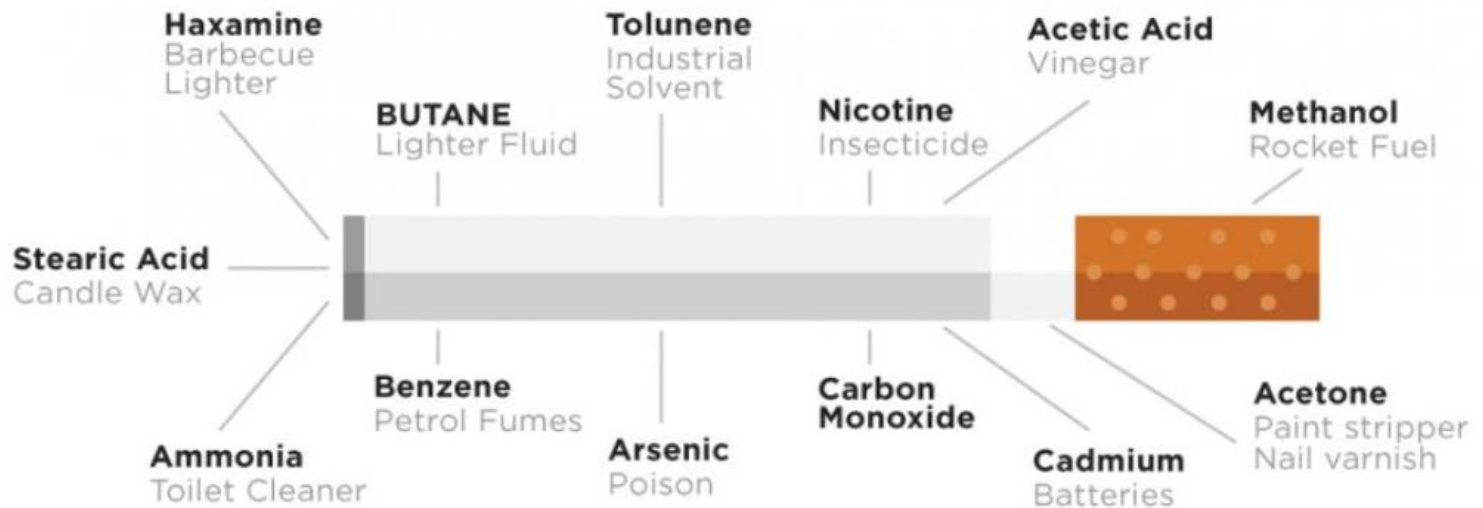


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University of Michigan



How Do You Create an Addictive Substance?


There are 4000 chemicals in every cigarette



Ultra Processed Foods?



US tobacco companies selectively disseminated hyper-palatable foods into the US food system: Empirical evidence and current implications

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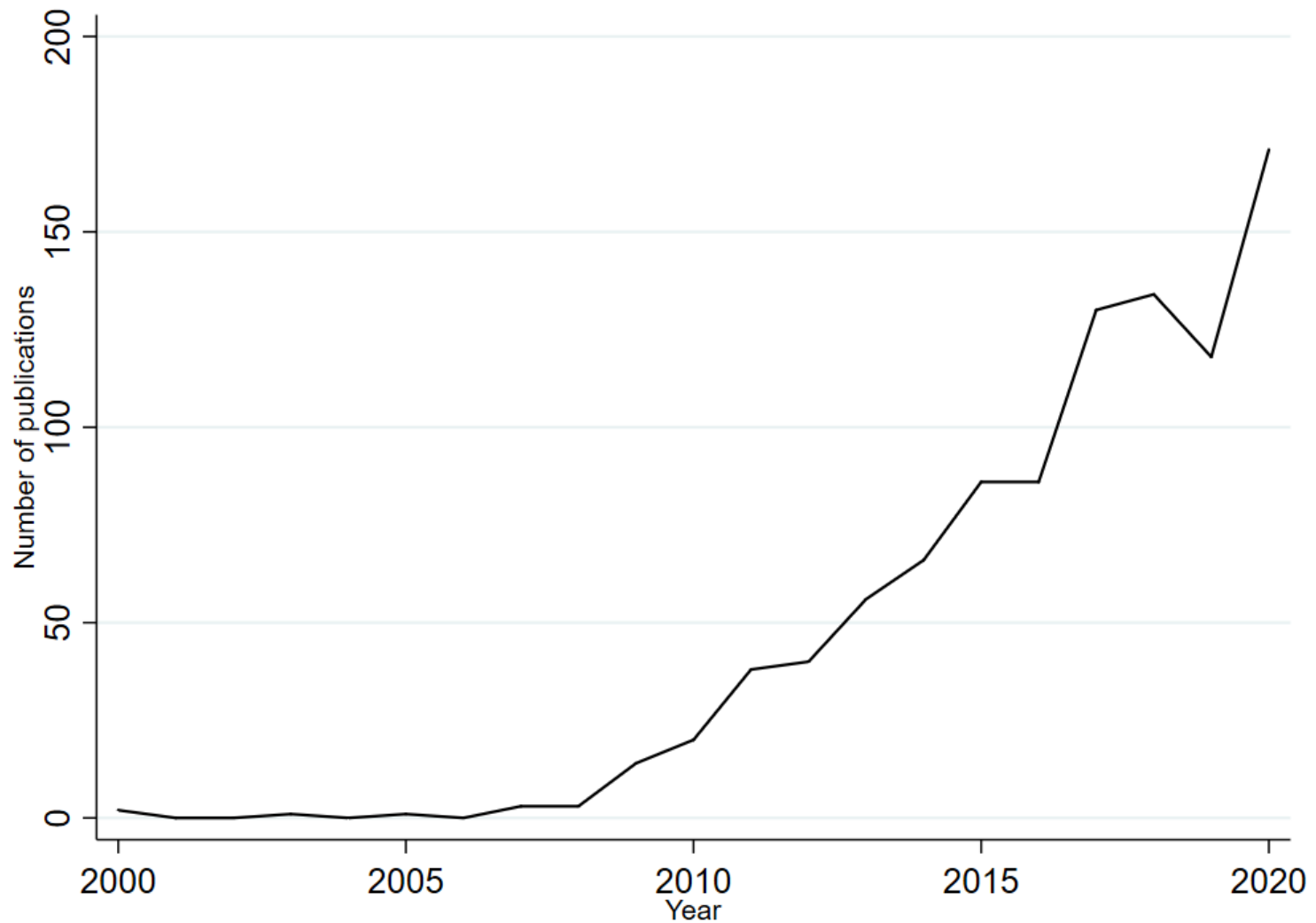
Abstract

Background and aims: US tobacco companies owned leading US food companies from 1980 to 2001. We measured whether hyper-palatable foods (HPF) were disproportionately developed in tobacco-owned food companies, resulting in substantial tobacco-related influence on the US food system.

Design: The study involved a review of primary industry documents to identify food brands that were tobacco company-owned. Data sets from the US Department of Agriculture were integrated to facilitate longitudinal analyses estimating the degree to which foods were formulated to be hyper-palatable, based on tobacco ownership.

Setting and cases: United States Department of Agriculture data sets were used to identify HPF foods that were ($n = 105$) and were not ($n = 587$) owned by US tobacco companies from 1988 to 2001.

Number of Publications including the Term “Food Addiction”



Yale Food Addiction Scale 2.0

- DSM 5 SUD Criteria
- Loss of control
- Cravings
- Inability to Cut Down
- Negative consequences
- Tolerance
- Withdrawal
- 35-items
- Symptom count (0-11)
- Diagnostic Threshold



Gearhardt et al., 2009; Gearhardt et al., 2012; Meule et al., 2012; Gearhardt & Schulte, 2021

The Lived Experience

- “I can't even be in the same vicinity as Krispy Kreme or any type of donuts, 'cause I will finish a dozen all by myself and I'm type 2 diabetic. So, that could kill me, and I know that and I know that I shouldn't be eating all those. I shouldn't be eating one, let alone a whole dozen. But for some reason I just can't stop eating them.”
(participant with severe food addiction)

Prevalence of Food Addiction

- 31% in clinical samples of adults
- 14% non-clinical samples of adults
- 19% in samples of children with overweight
- 12% in non-clinical samples of children



Which Foods?

Addictive Drugs

Increased dose of addictive agent

+

Rapid rate of absorption

=

High addictive potential

Ultra Processed Foods

Increased dose of rewarding ingredients

+

Rapid rate of absorption

=

High addictive potential

Dr. Erica LaFata
(Schulte), Drexel
University



Which Foods?

Rank	Food	Frequency
1	Chocolate	27.60
2	Ice Cream	27.02
3	French Fries	26.94
4	Pizza	26.73
5	Cookie	26.72
6	Chips	25.38
7	Cake	24.84
8	Popcorn (Buttered)	23.39
9	Cheeseburger	21.26
10	Muffin	20.81

Which Foods?

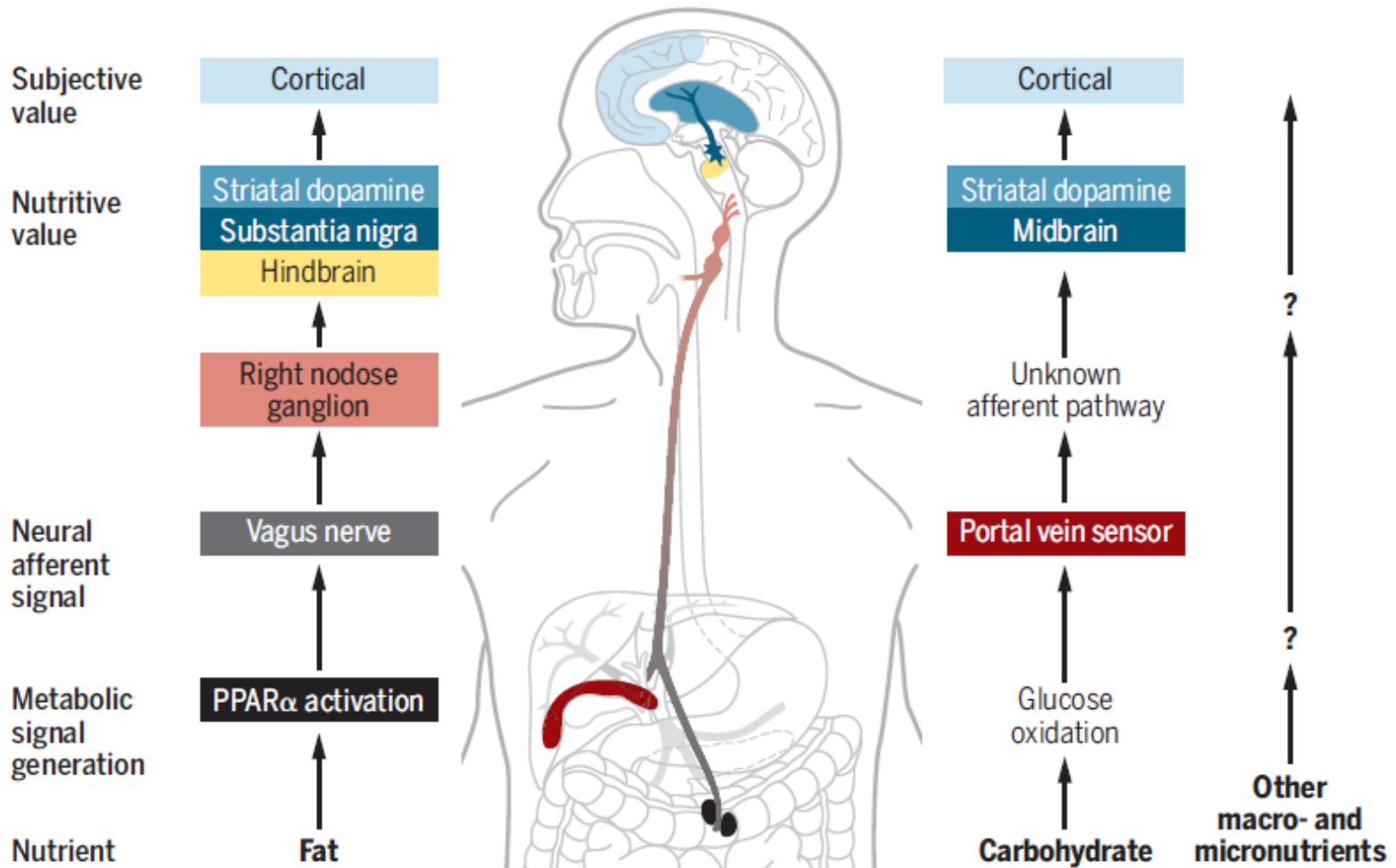
Rank	Food	Frequency
26	Apple	10.21
27	Corn (No Butter or Salt)	9.92
28	Salmon	9.44
29	Banana	9.34
30	Carrots (Plain)	9.08
31	Brown Rice (Plain, No Sauce)	8.79
32	Water	6.91
33	Cucumber (No Dip)	6.83
34	Broccoli	6.48
35	Beans	6.47

The Lived Experience

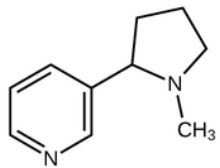
“I do it all the time, but just one example is, I went to [name of mall], which is 30 or 40 minutes away from my house just to get a Cinnabon [chuckle] and I got extra sauce on it... If I have other foods in the house... I might have my fruits and vegetables in there but I'll still go to the store and get the Reese's peanut butter cups and then Doritos and two or three pops.” (participant with severe food addiction and very low food security)

Reinforcing metabolic signals to the brain

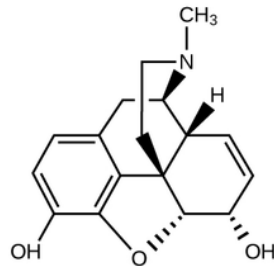
In this proposed model for reinforcing metabolic neural afferent (MNA) signals, the signal for fat depends on PPAR α -mediated activation of vagal sensory afferents that project to the right nodose ganglion, hindbrain, substantia nigra, and dorsal striatum. The signal for carbohydrate is generated during glucose oxidation and activates an unknown portal vein sensor, which induces a signal that activates midbrain dopamine neurons projecting to the striatum. An independent cortical network integrates MNA signals with conscious value.



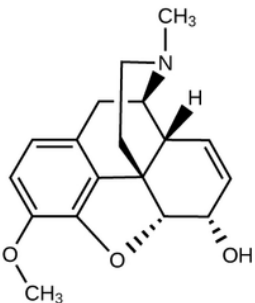
Critique: Addictive Agent?



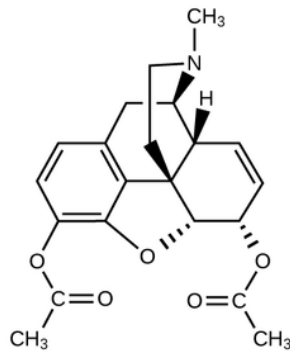
nicotine



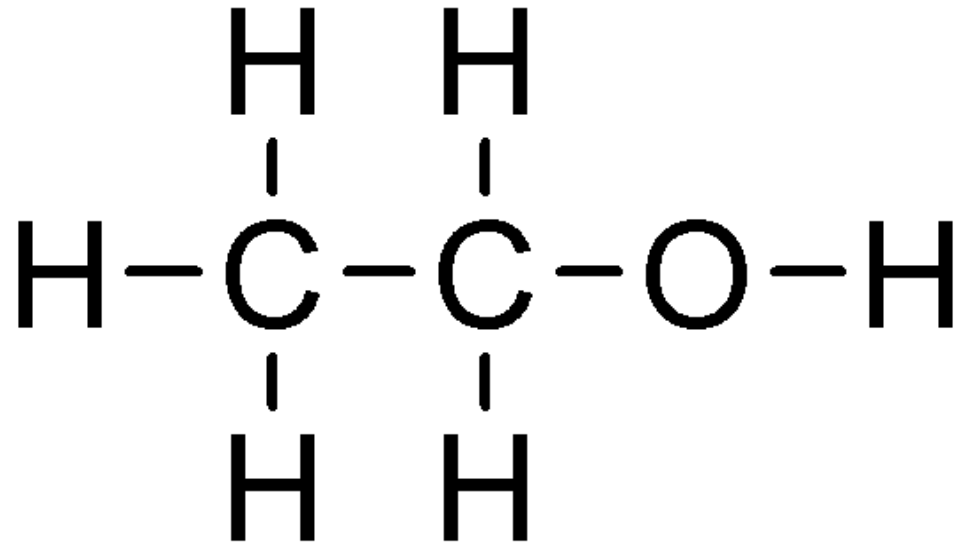
morphine

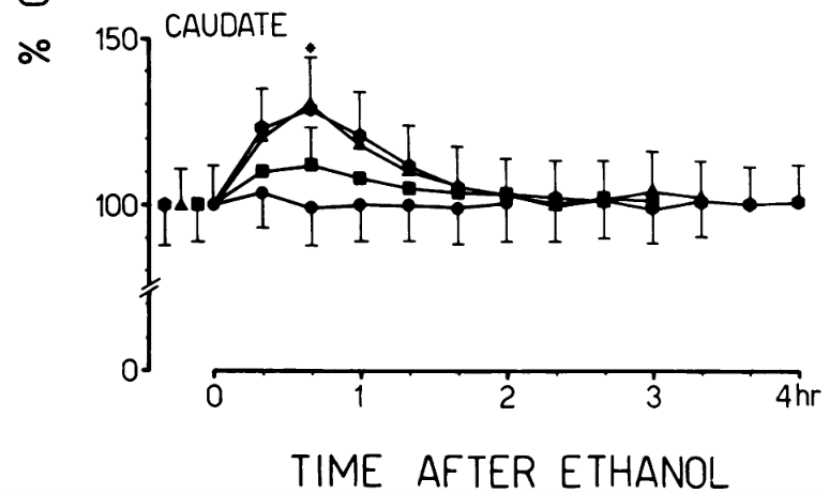
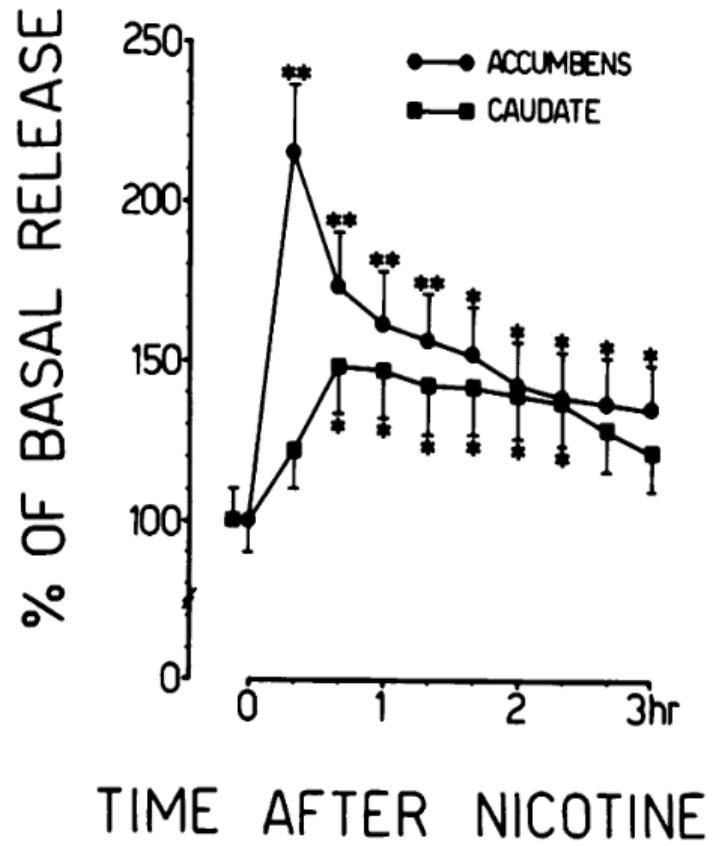
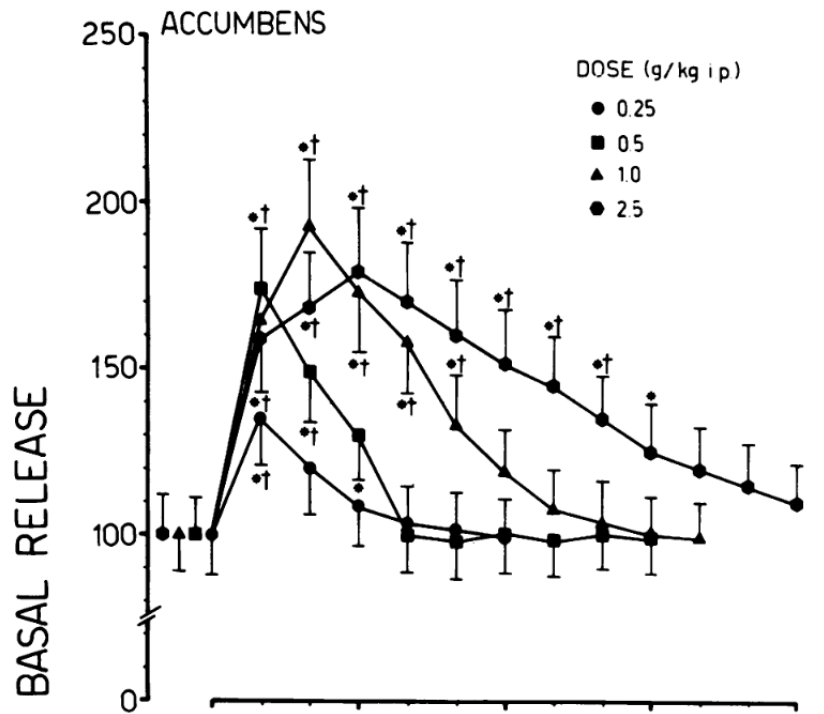


codeine



heroin

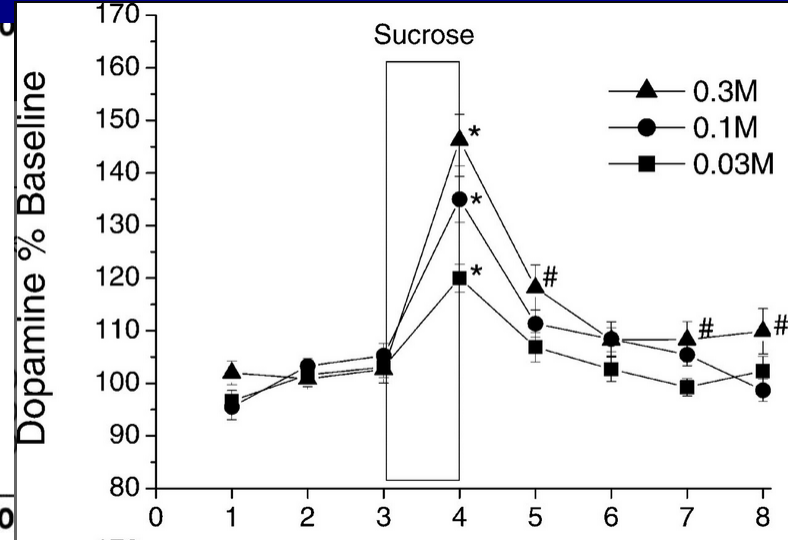
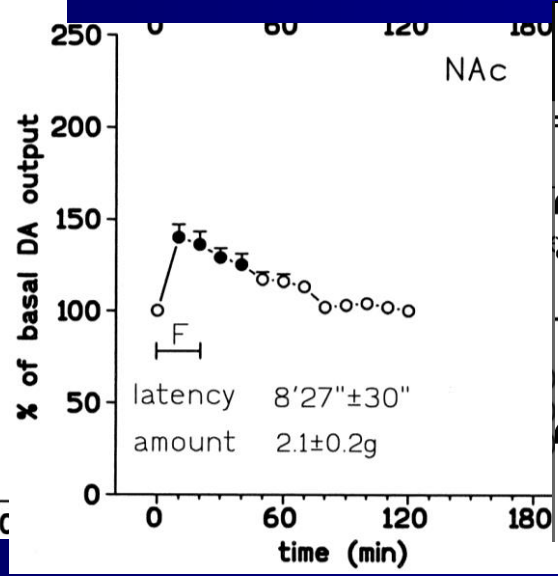
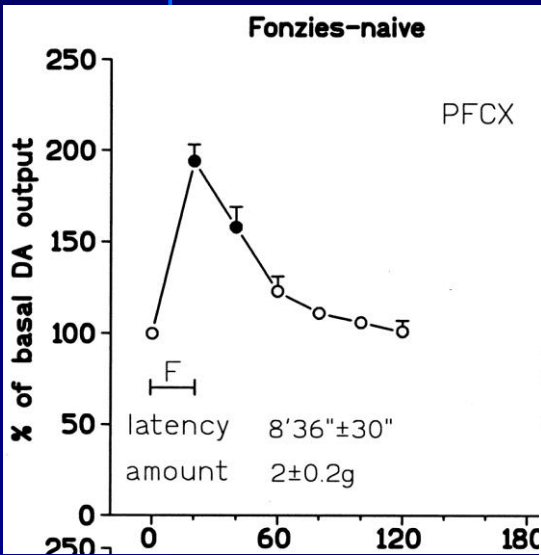




Di Chiara and Imperato 1988

Thank you to Dr. Alexandra DiFeliceantonio for these slides

What Action Does UPF Have in the Brain?



Bassereo and di Chiara, 1997
Hajnal et al 2004

Thank you to Dr. Alexandra DiFeliceantonio for these slides

Transferring Racial/Ethnic Marketing Strategies From Tobacco to Food Corporations: Philip Morris and Kraft General Foods

Kim H. Nguyen, ScD, MPH, Stanton A. Glantz, PhD, Casey N. Palmer, RN, MS, and Laura A. Schmidt, PhD, MSW, MPH

BMJ:



Objectives. To investigate the transfer of marketing knowledge and infrastructure for targeting racial/ethnic minorities from the tobacco to the food and beverage industry in the United States.



ANALYSIS

Tobacco industry involvement in children's sugary drinks market

Kim H Nguyen and colleagues examine how tobacco companies applied their knowledge of flavours, colours, and child focused marketing to develop leading children's sugar sweetened drink brands. These techniques continue to be used by drinks companies despite industry agreement not to promote unhealthy products in this way

Kim H Nguyen *research scientist*¹, Stanton A Glantz *professor*^{2 3 4}, Casey N Palmer *research analyst*¹, Laura A Schmidt *professor*^{1 5 6 7}

Future Direction: Clinical Implications

- Not an Official Diagnosis
- Missing Clinical Need
 - Eating Disorders?
- Psychopharmacology
 - Naltrexone/Bupropion
 - GLP-1 Agonists
- Psychosocial Treatments
 - 12-Step
 - MI
 - CBT
 - Harm Reduction



Schulte et al., 2020; Carbone et al., 2021;
Gearhardt & LaFata, 2022

Why Would Addiction Matter?

In fact, a Tobacco Institute document noted: “...the entire matter of addiction is the most potent weapon a prosecuting attorney can have in a lung cancer/cigarette case. We can’t defend continued smoking as a “free choice” if the person was “addicted.” –

Multi-Pronged Policy Action

- UPF and beverage taxes
- Mandatory or voluntary front-of-pack or shelf-tag labeling systems.
- Mandatory or voluntary reformulation of the food supply.
- Marketing restrictions, particularly to children

Thank You!

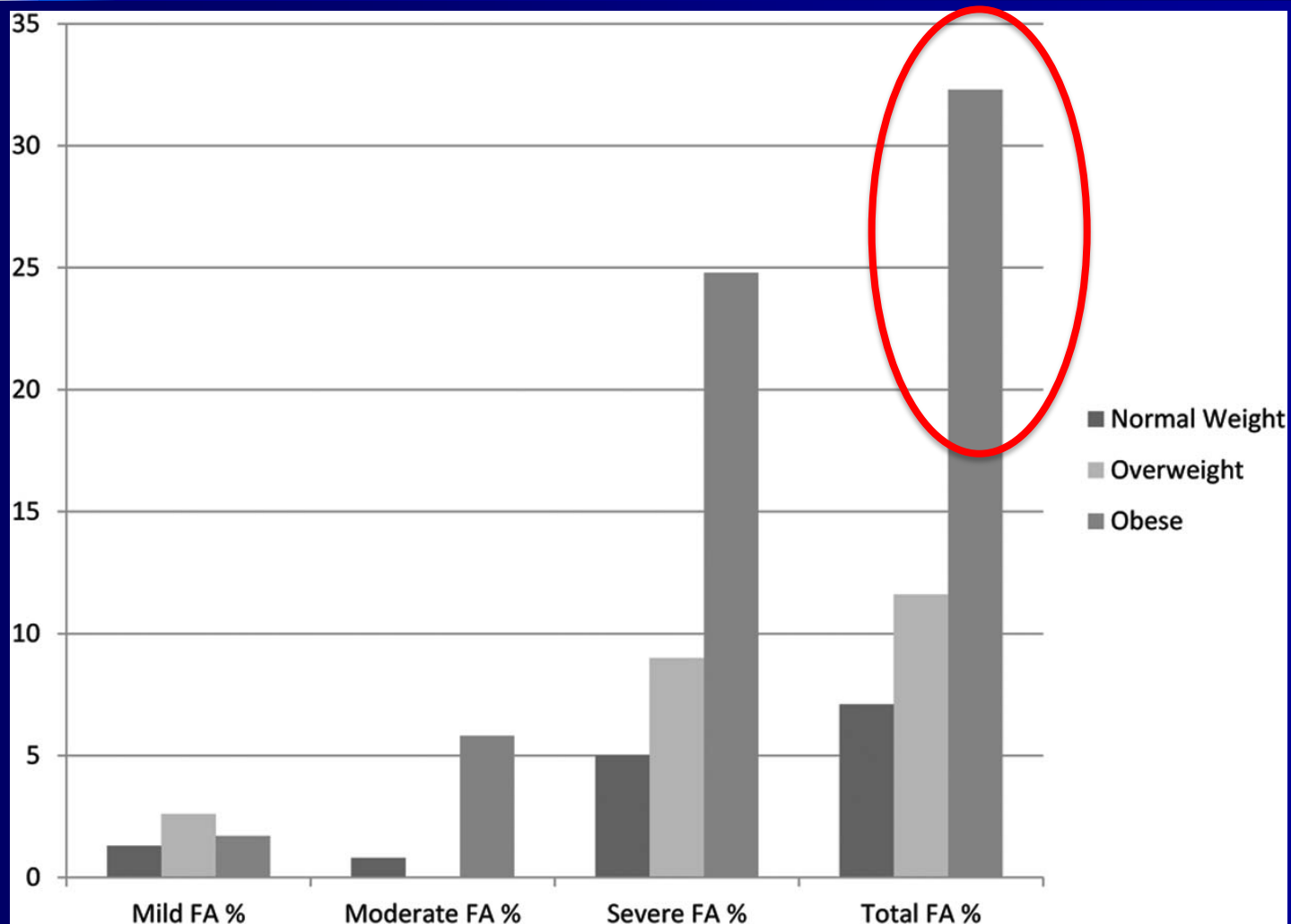
- Nassib B. Bueno, Alexandra G. DiFeliceantonio, Christina A. Roberto, Susana Jiménez-Murcia, and Fernando Fernandez-Aranda
- Food Addiction Science & Treatment Lab at the University of Michigan
- National Institute of Diabetes and Digestive and Kidney Diseases (R01DK098983)
- National Institute of Drug Abuse (R01DA055027)

Food and Addiction Science and Treatment Lab



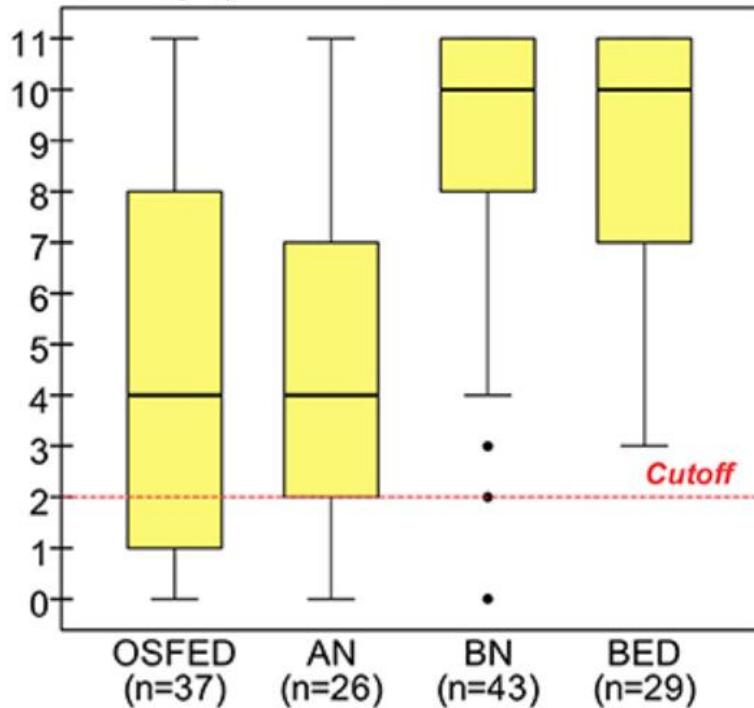
<https://sites.lsa.umich.edu/fastlab/>

Prevalence of FA by Weight Status

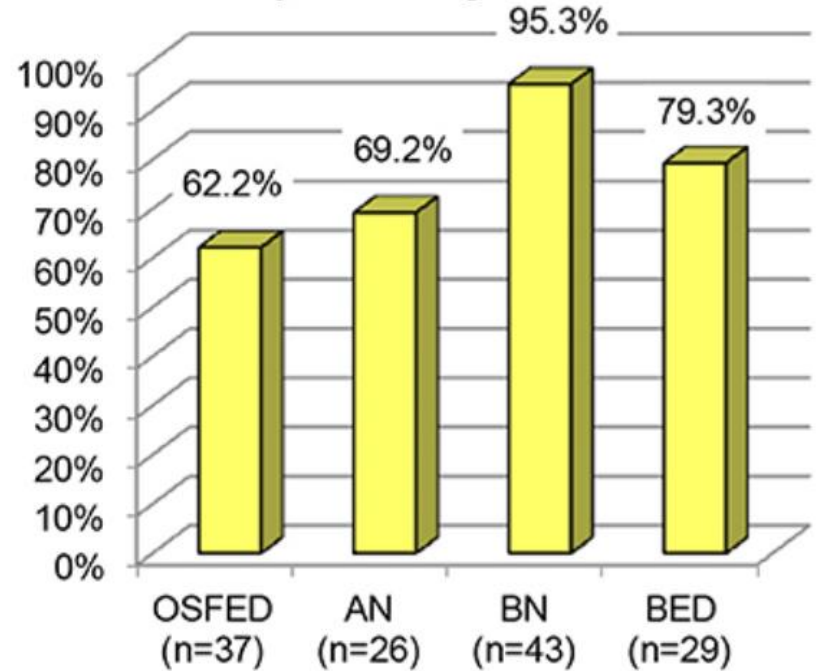


Overlap within Eating Disorders

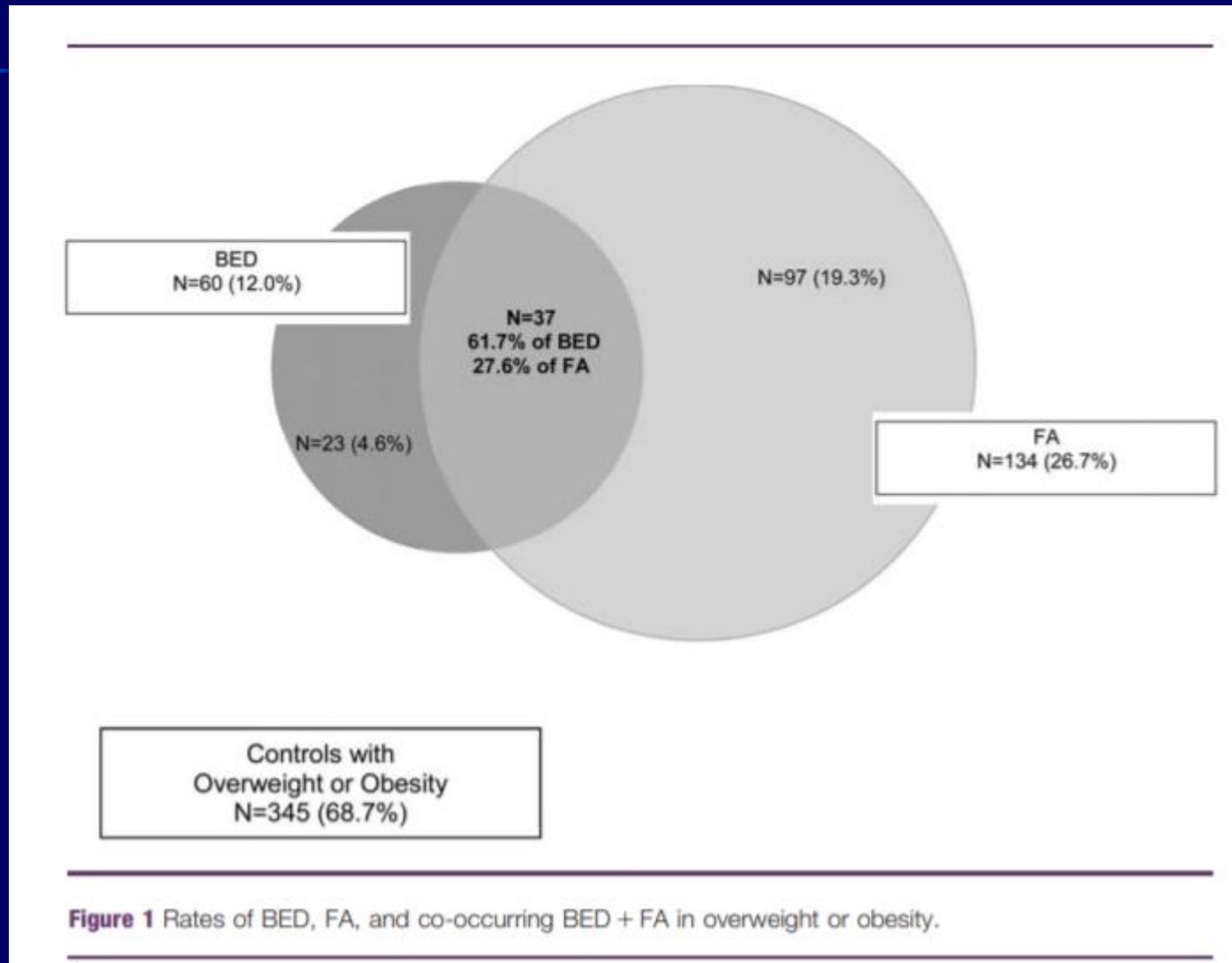
YFAS 2.0 symptom count



Prevalence of subjects meeting food addiction threshold



Overlap with Eating Disorders

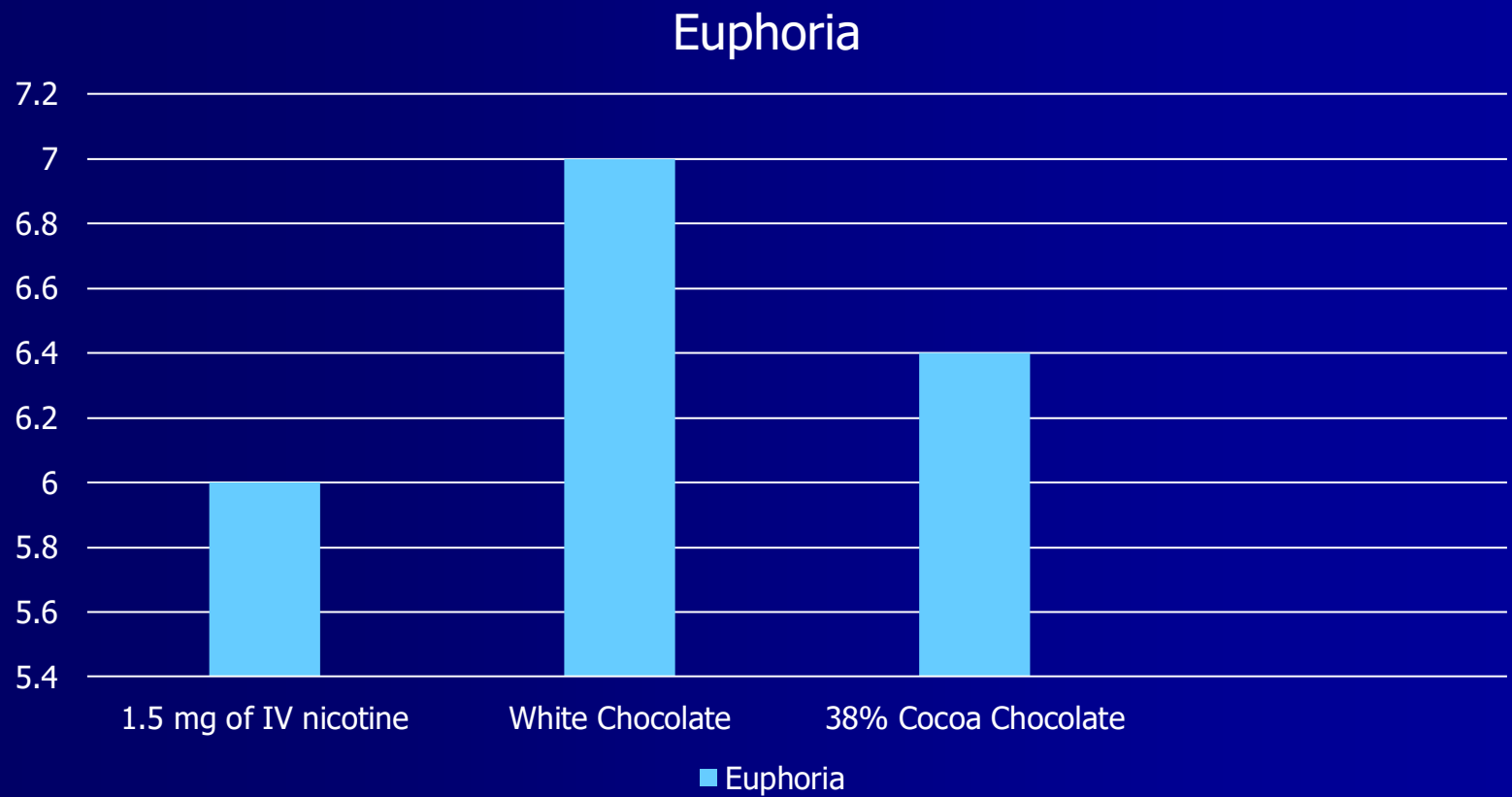


Role of Intoxication

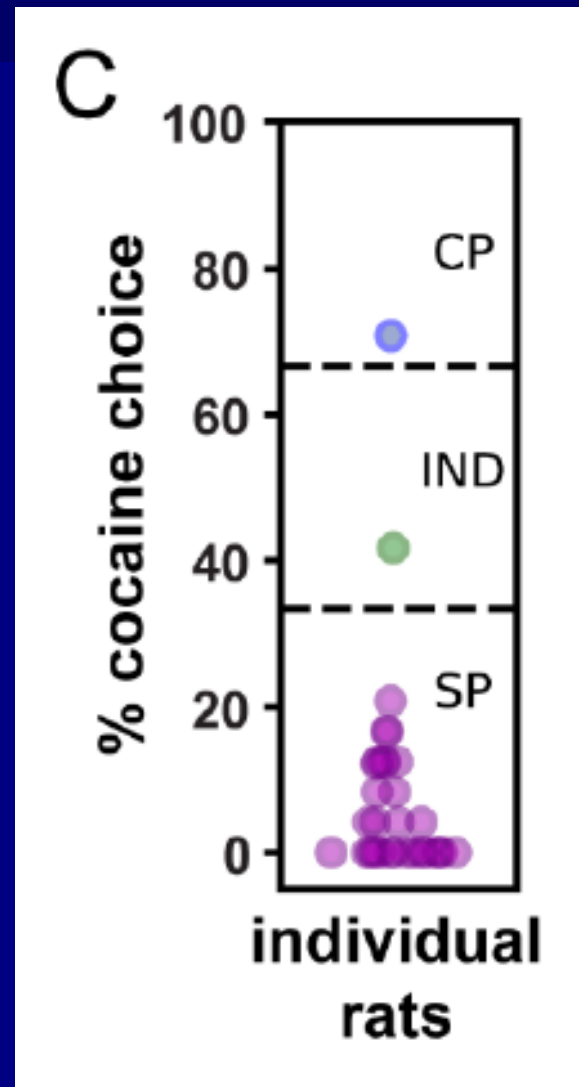
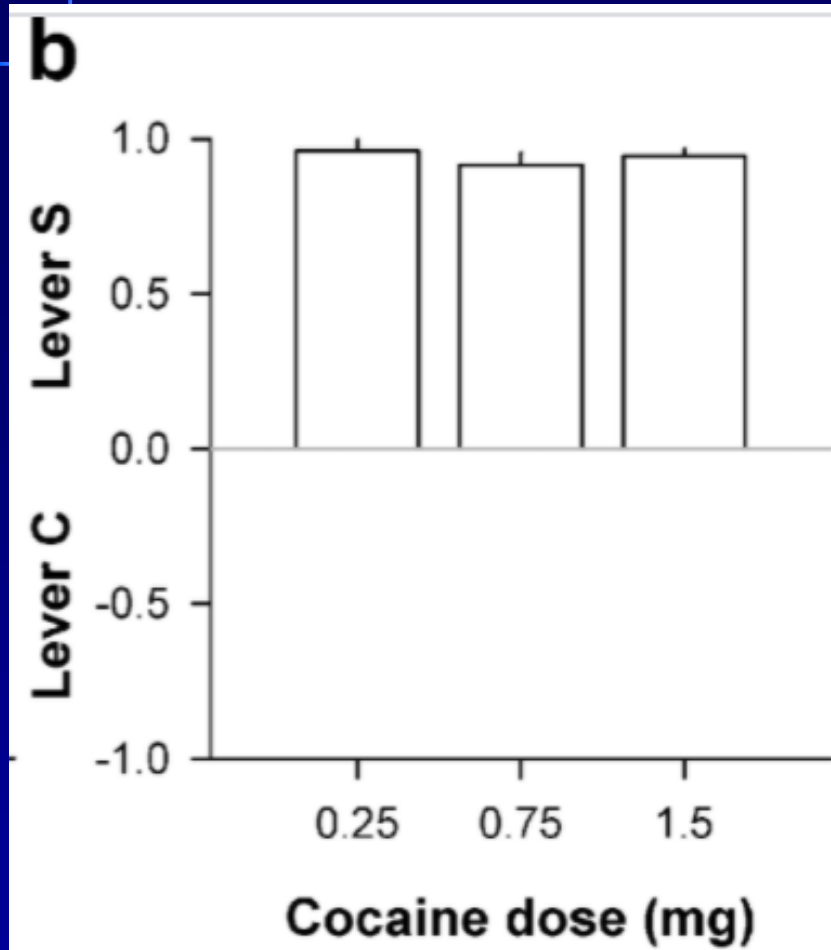
The concept of "intoxication", central to the issue of whether or not a drug is addicting, simply does not apply to nicotine. Moreover, smoking/nicotine is clearly compatible with performing everyday tasks and is perceived by the smoker as providing psychological benefits.

Robinson & Pritchard, 1992

Psychoactive – Euphoria Subscale of the ARC



Highly Reinforcing



Strong Urges and Craving

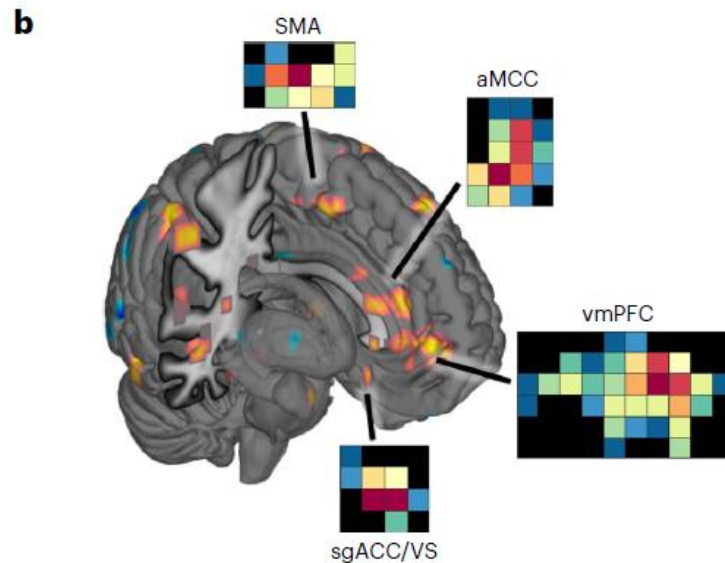


Fig. 2 | Thresholded display of the NCS. Note that unthresholded patterns are used for prediction; this thresholded pattern is shown for illustration at $P < 0.005$ uncorrected. **a**, Medial, lateral and insula displays of the most consistent pattern weights. **b**, Pop-out rectangles show the multivariate pattern for selected clusters of interest. Warm (yellow-red) color indicates positive weights; cold (cyan-purple) color indicates negative weights in predicting drug and food craving. P values are based on bootstrapping and indicate the areas that contribute most consistently with positive or negative weights. See Table 1 for a list of FDR-corrected weights. The NCS weight map and code to apply it to new data are available for download at https://github.com/canlab/Neuroimaging_Pattern_Masks/tree/master/Multivariate_signature_patterns/2022_Koban_NCS_Craving. aMCC, anterior midcingulate cortex; sgACC, subgenual anterior cingulate cortex; SMA, supplementary motor area.

Strong Urges and Craving

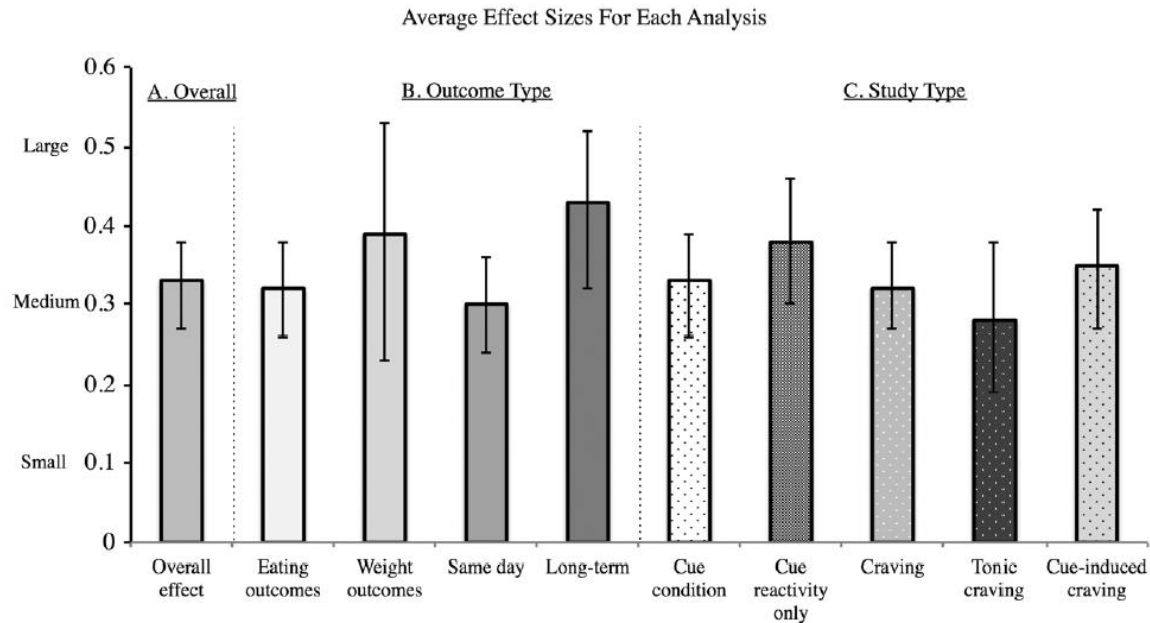


Figure 3 Average effect sizes for Hypotheses 1–3. Average effect sizes and confidence interval: (A) overall, across all study types; (B) separately by outcome type; and (C) separately by study type. All effect sizes are medium or medium-to-large following Cohen's *d* convention. 'Cue condition' includes all studies that measured responses to cue exposure, including cue-condition, cue reactivity (physiological and neural) and cue-induced craving. 'Craving' includes both tonic and cue-induced craving. The effect size in males represents $N_{\text{STATISTICS}} = 1$.