What does the evidence say about UPFs and health?

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Conflicts of interest

- I have received grant funding from:
  - Diabetes UK, Diabetes Research and Wellness Foundation, Medical Research Council, Oviva.

- I have received consultancy fees from:
  - Nestle Health Sciences, Fixing dad (a low carb app), Diet Doctor (a low carb website), Beyond Meat, Heartland Food Products Group, MyFitnessPal, Ingeus Ltd, Babylon Health.

- I have received speaking fees from:
  - Boeringer Ingelheim, Lilly, AstraZenica, Sigma Nutrition, UK Sports Institute.

Why are we worried about UPFs?

- We do get a ton of our calories (~60%kcal) from ultra-processed foods
- We are as a population metabolically unwell.

The observational evidence

Research

Ultra-processed food exposure and adverse health outcomes: umbrella review of epidemiological meta-analyses

BMJ 2024 ; 384 doi: https://doi.org/10.1136/bmj-2023-077310 (Published 28 February 2024)
Cite this as: *BMJ* 2024;384:e077310

Conclusion: Greater exposure to UPF was associated with a higher risk of cardiometabolic disease and common mental health disorders..

Nuance in observational evidence

People who consume UPF-rich diets:

- Have poorer nutrient profiles - lower fibre, protein, and micronutrients
- Consume higher levels of added sugars, saturated fat, and sodium
- Consume fewer fruits, vegetables, legumes, nuts, and seeds
- Tend to come from more economically-deprived communities
- Have more energy dense diets

It is very, very difficult to control for this co[illegible]

Is it the processing?

Observational evidence: “not all UPFs”

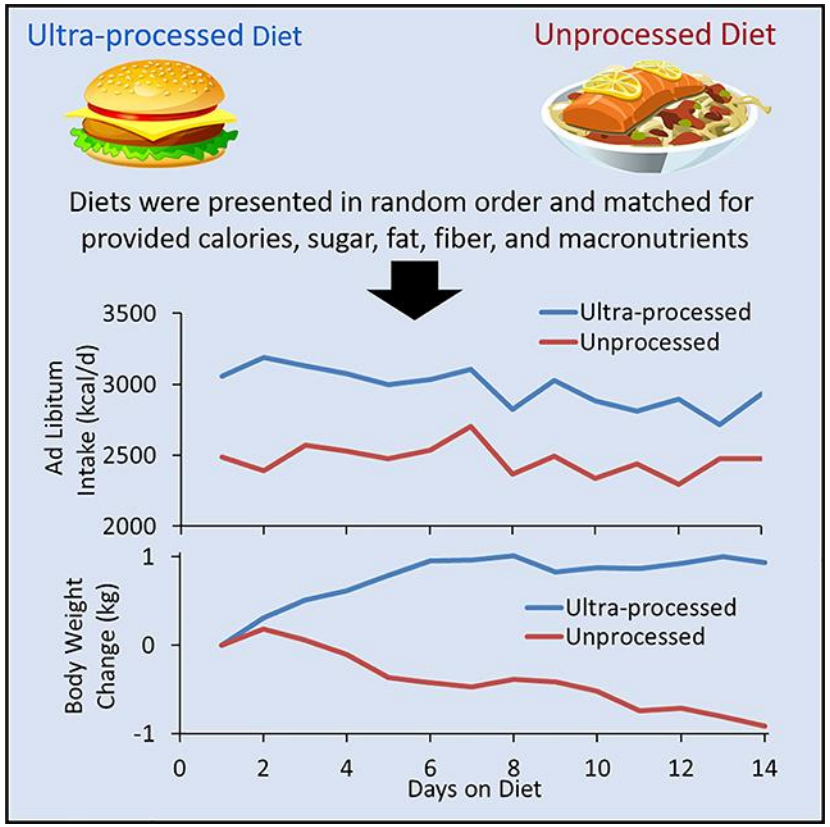
Higher risk of T2D:
Refined breads; sauces, spreads, and condiments; artificially and sugar-sweetened beverages; animal-based products; and ready-to-eat mixed dishes.

Lower risk of T2D:
Cereals; dark and whole-gra
savoury snacks; fruit-based
based desserts.

Is it the processing?

Chen Z et al. Diabetes Care. 2023 Jul 1;46(7):1335-44.

Controlled trial



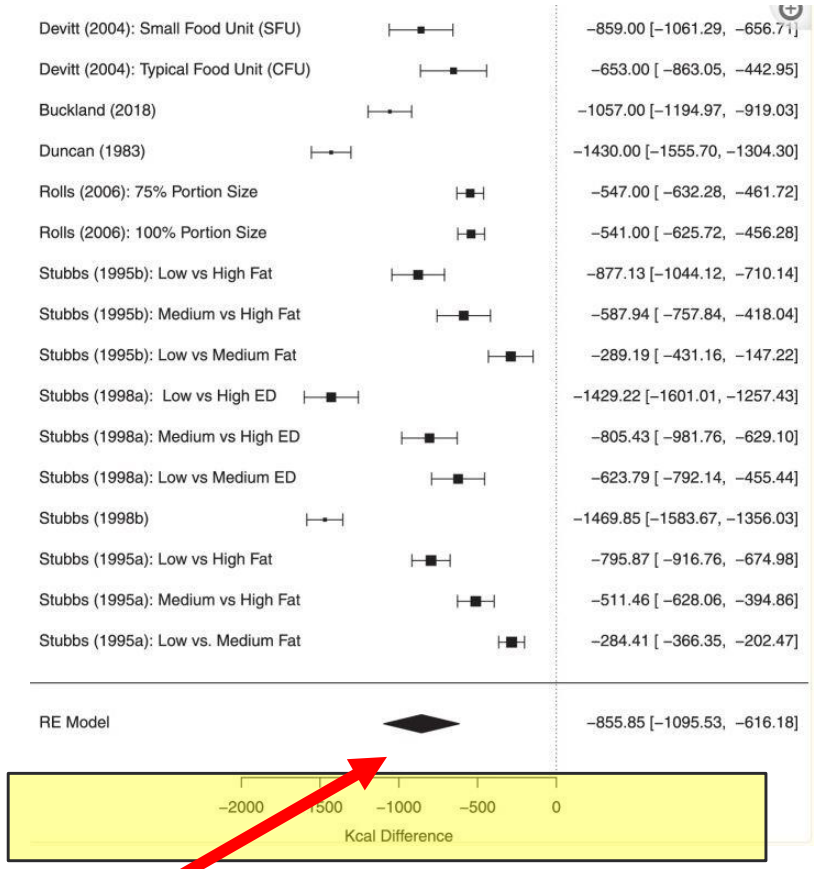
Hall KD et al. Cell metabolism. 2019;30(1):67-77.

Controlled trial

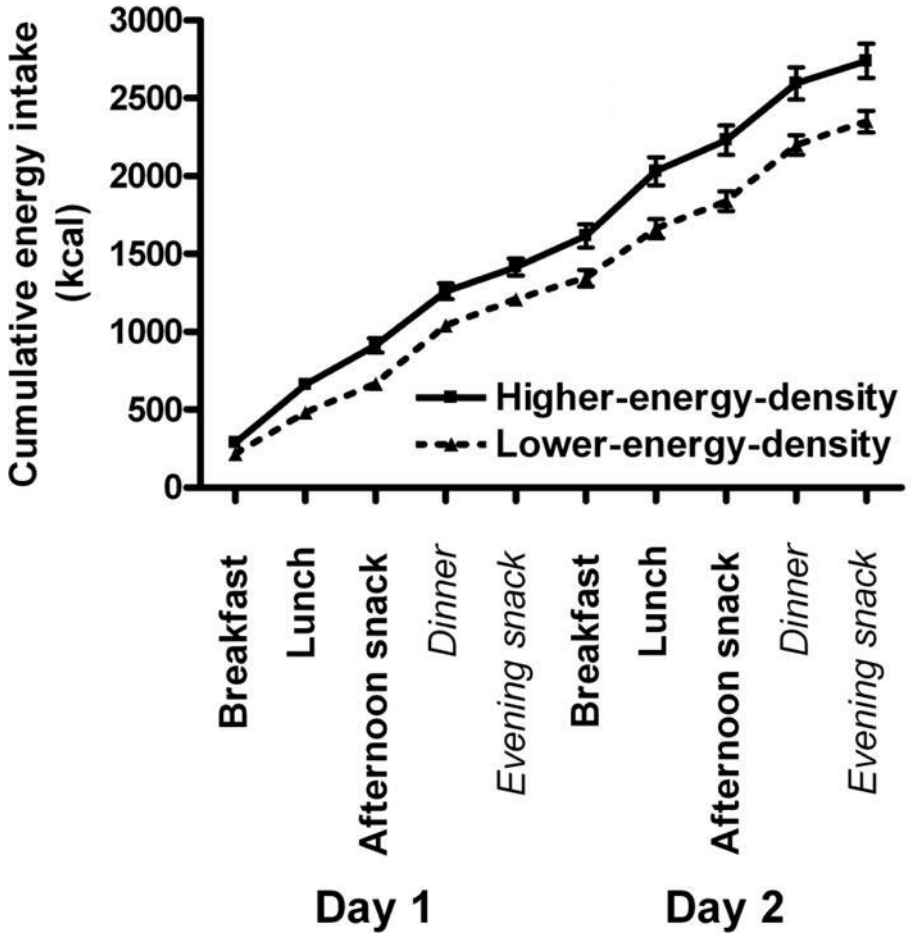
Three Daily Meals		
Energy (kcal/d)	3905	3871
Carbohydrate (%)	49.2	46.3
Fat (%)	34.7	35.0
Protein (%)	16.1	18.7
Energy Density (kcal/g)	1.024	1.028
Non-beverage Energy Density (kcal/g)	1.957	1.057
Sodium (mg/1000 kcal)	1997	1981
Fiber (g/1000 kcal)	21.3	20.7
Sugars (g/1000 kcal)	34.6	32.7

Hall KD et al. Cell metabolism. 2019;30(1):67-77.

Energy density & energy intake



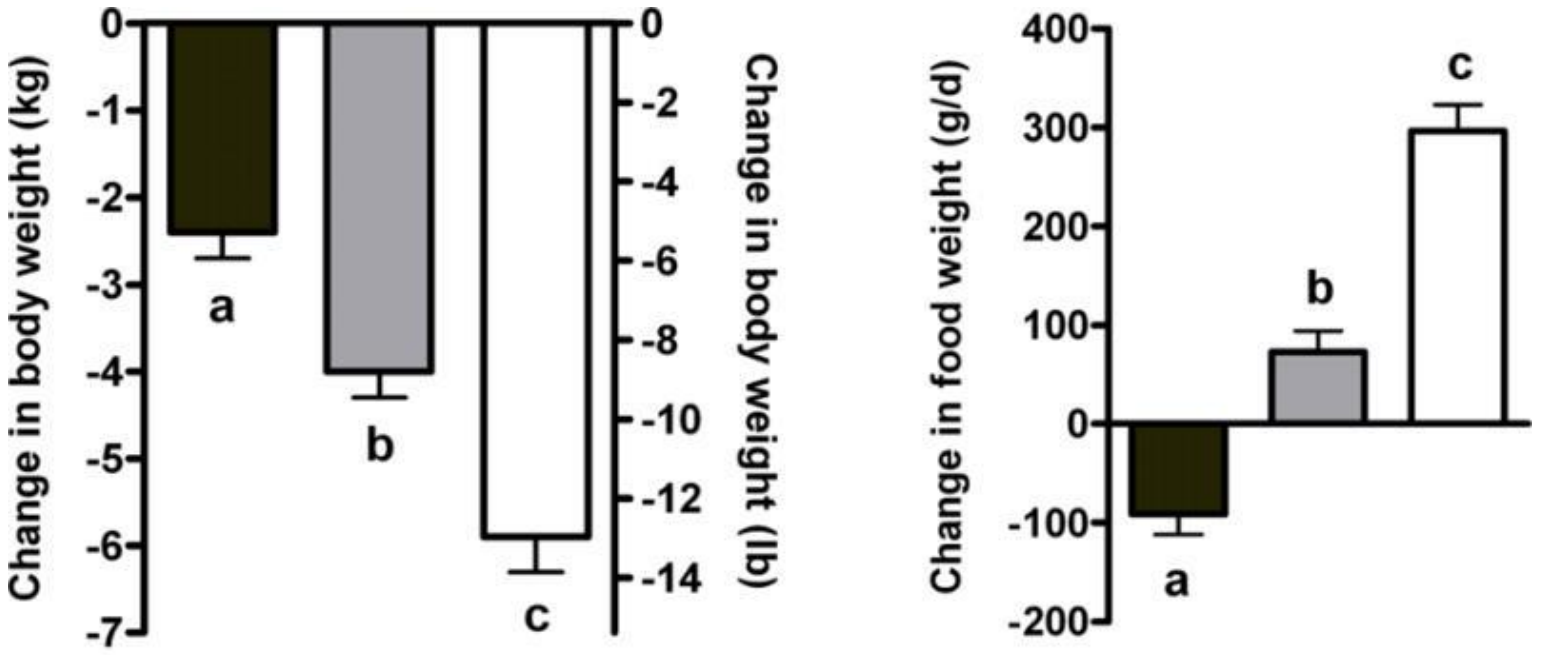
>500kcal/day difference



Robinson E et al. International Journal of Behavioral Nutrition and Physical Activity. 2022;19(1):48.

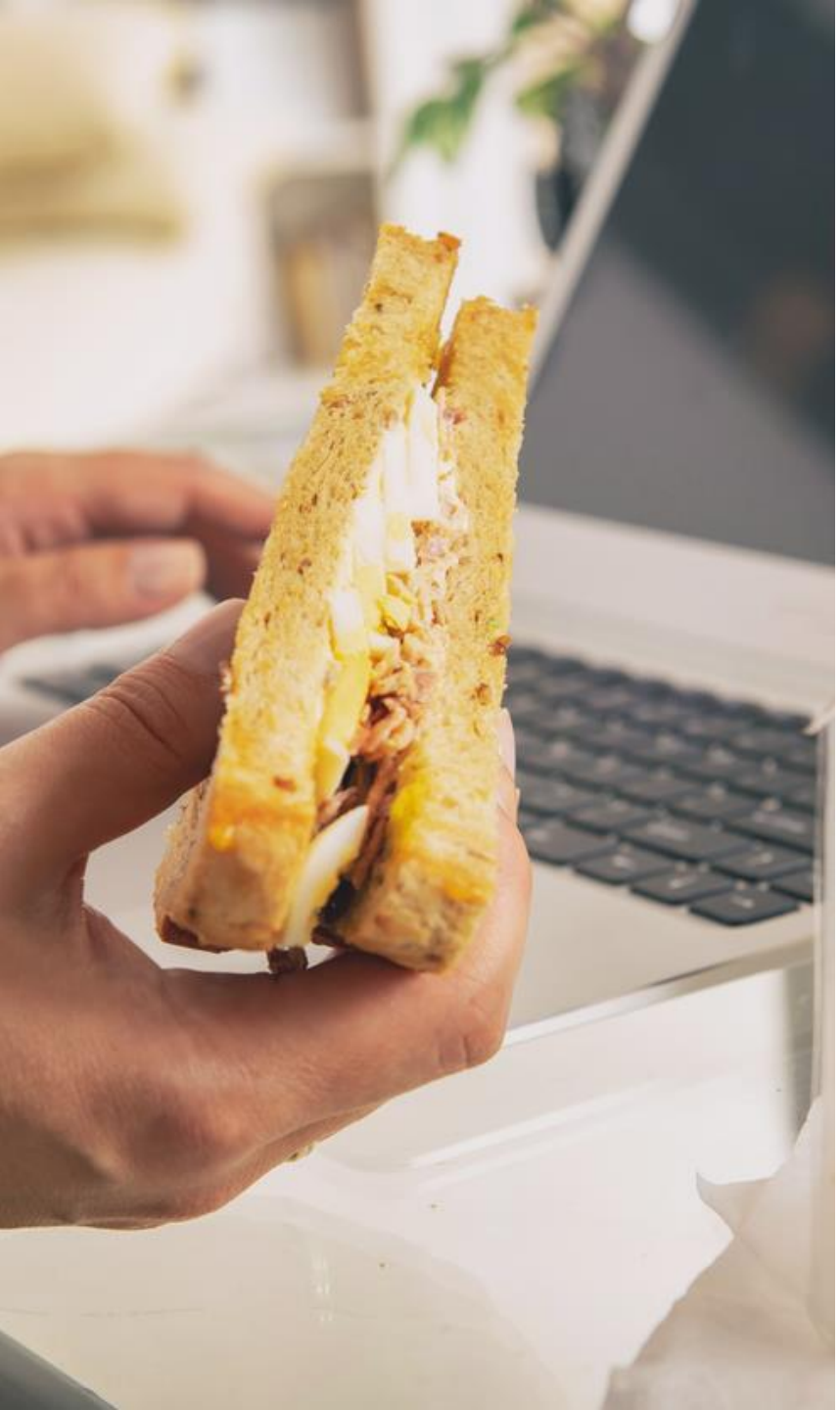
Leahy KE et al. AJCN. 2008;88(6):1459-68.

Does reducing energy density help weight loss?



Tertile 1: Small change in energy density (less than 0.11 kcal/g)
Tertile 2: Modest decrease in energy density (0.11 to 0.51 kcal/g)
Tertile 3: Large decrease in energy density (0.52 kcal/g or more)

Rolls BJ. The relationship between dietary energy density and energy intake. Physiology & behavior. 2009;97(5):609-15.



Do we know what effect processing *per se* has on energy intake?

Does making food sensory characteristics more attractive/pleasurable cause us to eat more ?

- Administration of a semisolid vanilla custard dessert with various concentrations of cream aroma presented retro-nasally showed increased aroma was associated with smaller bite sizes.
- Consuming foods with higher *umami* intensity has been shown to reduce subsequent energy intake
- Even if people say they like a sweeter yoghurt more than a less sweet-tasting yogurt, consumption showed the opposite effect: more sweetness led to earlier fullness (satiation!)
- Longer oral sensory exposure to and higher intensity of saltiness *decreases* ad libitum food intake in healthy men.

de Wijk RA. Flavour. 2012;1:1-6.
Bolhuis DP, The Journal of nutrition. 2011;141(12):2242-8.
Vickers Z. Food Qual Prefer. (2001) 12:521–6.

Are additives independently harmful?

- In humans, observational studies show there is a relationship between some additives and CVD

  The HR are tiny

- In a human trial 15 g/day of carboxymethylcellulose over 11 days increased markers of gut inflammation and reduced gut microbiota diversity compared with an additive-free diet.

  Actual intakes are probably ~4mg/day

- In humans, exploratory studies (not trials) found some sweeteners changes the microbiome

  Everything changes the microbiome

Sellem L et al. BMJ. 2023 Sep 6;382.
Chassaing B et al. Gastroenterology. 2022;162(3):743-56.
Suez J et al. Cell. 2022 Sep 1;185(18):3307-28

Does altering food texture change energy intake?

	Unprocessed		(Ultra-)processed	
	Hard	**Soft**	**Hard**	**Soft**
Breakfast	Fresh mixed fruit	Homemade smoothie	Canned mixed fruit	Store bought smoothie
Morning snack	Apple pieces	Apple sauce -no additives	Apple pieces	Store bought Apple juice
Lunch	Fresh Tagliatelle pasta with homemade tomato sauce, hard-steamed vegetables and large pieces of	Fresh tagliatelle pasta with homemade tomato sauce, soft-steamed vegetables and homemade pulled	Store bought, pork meat tortellini with pre-canned tomato sauce, hard-cooked vegetables and grated cheese	Ready-to-eat macaroni Bolognese with grated cheese

Lasschuijt M et al. EJCN. 2023;62(7):2949-62.

Does altering food texture change energy intake?

- Harder meals were consumed at a slower eating rate, with twice as many chews.
- Daily energy intake was 33% lower in the hard compared to the soft texture.
- This is not to say processing didn't affect energy intake – it was just less important than hardness vs softness.
- Supports findings from other study showing energy intake is lowest when meals are hard and "minimally processed".

Teo PS, et al: AJCN. 2022;116(1):244-54.

Summary of evidence

- A lot of the effect of UPFs on energy intake be explained by factors we already know about?
- Relationship between palatability and energy intake is not as straight-forward as you would think
- Energy density and texture seem to be important mediators of energy intake.
- Processing can affect energy intake and texture, but not necessarily.

Conclusion

- “Ultra-processed or not” doesn’t seem to be a useful way of describing the healthiness of a food (or its propensity to cause over-eating)