

Rediscover Dairy Evidence-Based Nutrition Forum

Beyond Processing: Understanding Food, Health and Modern Nutrition

2 October 2026

Future Africa Conference Centre, University of Pretoria, South Africa

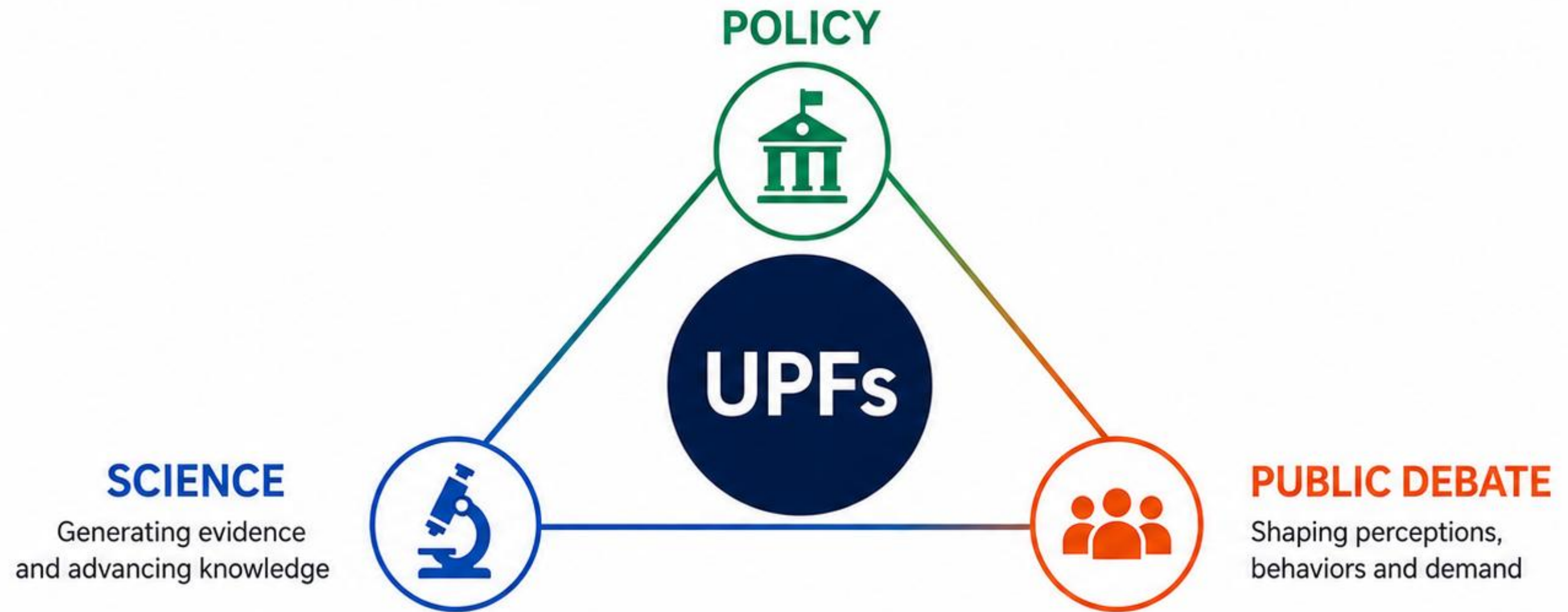
Understanding Ultra-Processed Foods: Current Science, Classification Systems and Food Policy



Prof. Daniela Martini

Department of Food, Environmental and Nutritional Sciences (DeFENS)
University of Milan, Italy

Why UPF are attracting attention?



UPFs sit at the intersection of science, policy and public attention.

Food Classification

1 CEREALS, CEREAL PRODUCTS AND TUBERS
pasta, bread, rice, maize, potatoes

2 FRUITS AND VEGETABLES
fruit, vegetables, including low-sugar options

3 MEAT, FISH, EGGS AND LEGUMES
different foods, grouped mainly by their protein role

4 MILK AND DAIRY PRODUCTS
milk, yogurt, cheese

5 ADDED FATS
olive oil, other vegetable oils and fats

The underlying logic is nutritional: each group indicates the main role of the food within the diet.

Foods within a group are not identical; they share nutritional functions that are useful when planning the diet.

Why does this help build a complete and varied diet?

Variety including different food groups throughout the day

Complementarity ensuring different nutrient contributions

Substitution alternating foods with a similar nutritional role

Practicality translating nutrient requirements into practical behaviours

Food processing as an emerging dimension

But does food quality depend only on what a food contains?

Do we need to consider additional dimensions, or is current nutritional knowledge sufficient for recommendations?

In recent years, a different perspective has emerged: considering the nature, extent and purpose of food processing.

A framework to understand food processing

Three key questions



NATURE

What processes
are involved?



EXTENT

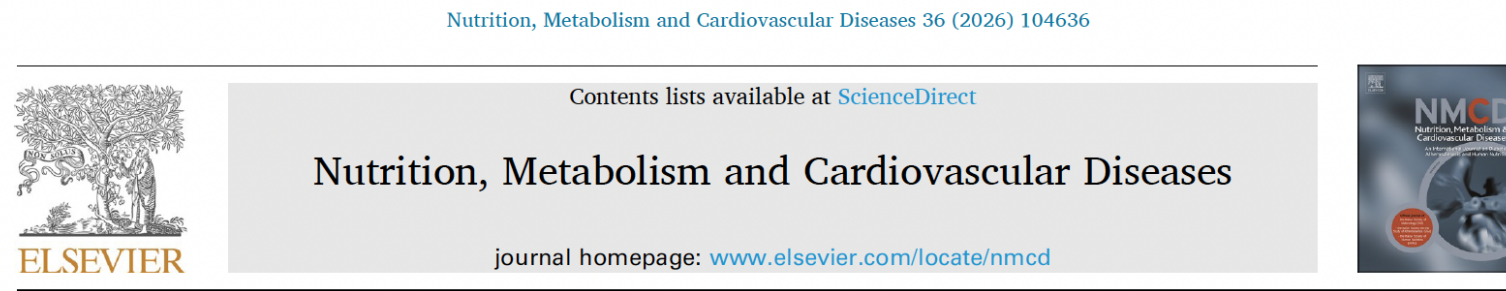
To what degree
is food transformed?



PURPOSE

For what purpose
is it done?

Food processing as an emerging dimension



Toward a comprehensive definition of diet quality: perspectives from the Italian Society of Human Nutrition (SINU)

Monica Dinu¹, Daniela Martini¹, Sofia Lotti, Cristian Del Bo^{*}, Luca Scalfi², Anna Tagliabue²

Ad hoc Working Group on behalf of the Italian Society of Human Nutrition (SINU), Italy



Food processing proposed as an emerging dimension (but with limitations)

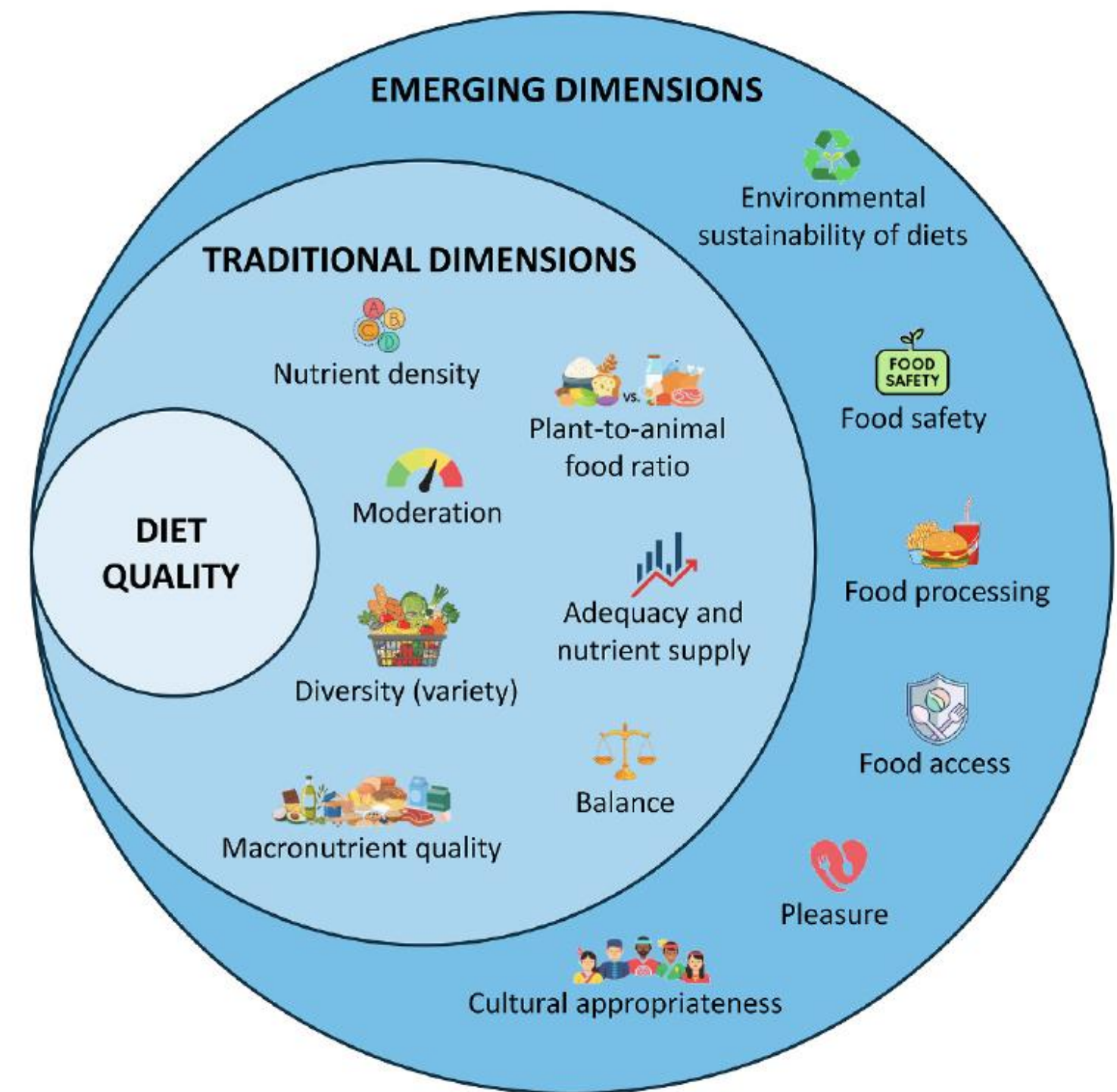


Fig. 1. Conceptual model of DQ integrating traditional and emerging dimensions.

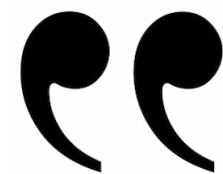
The NOVA classification

Public Health Nutrition: 12(5), 729–731

doi:10.1017/S1368980009005291

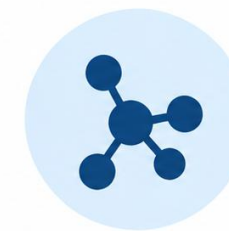
Invited commentary

Nutrition and health. The issue is not food, nor nutrients, so much as processing



The most important factor now, when considering food, nutrition and public health, is not nutrients, and is not foods, so much as what is done to foodstuffs and the nutrients originally contained in them, before they are purchased and consumed. That is to say, the issue is food processing—or, to be more precise, the nature, extent and purpose of processing, and what happens to food and to us as a result of processing.

BEYOND NUTRIENTS AND FOODS



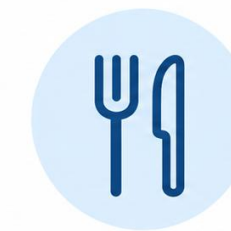
NUTRIENTS

What does
the food contain?



FOODS

Which food
is chosen?



DIETARY PATTERNS

How much
and how often?



FOOD PROCESSING

How, to what extent
and for what purpose
has it been transformed?

The NOVA classification

NOVA is a name, not an acronym.

It is a food classification system developed in 2009 by a group of Brazilian epidemiologists (Centre for Epidemiological Studies in Health and Nutrition, NUPENS, School of Public Health, University of São Paulo, Brazil).

It classifies foods according to the nature, extent and purpose of processing.

It divides foods into four groups.

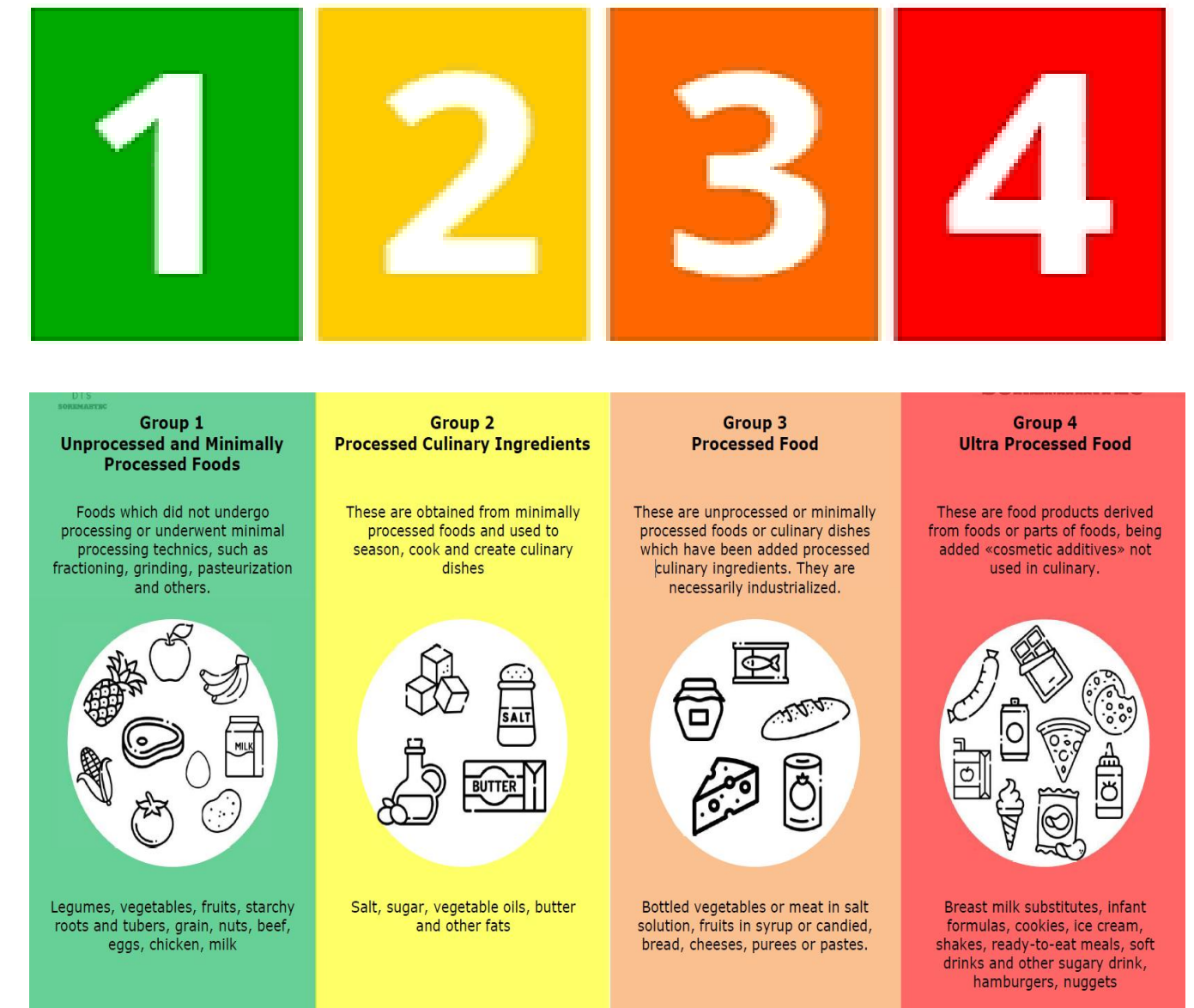
NOVA 1: unprocessed or minimally processed foods

NOVA 2: processed culinary ingredients

NOVA 3: processed foods

NOVA 4: ultra-processed foods

NOVA NOVA NOVA NOVA



What are UPFs?

1 2 3 4

NOVA-1 Unprocessed or minimally processed foods

Edible parts of plants or animals that remain whole or undergo minimal alterations like cutting, drying, or freezing. No added salt, sugar, or fat.



Examples: Fresh fruits, vegetables, meat, eggs, milk, grains, nuts, herbs

NOVA-2 Processed culinary ingredients

Substances extracted from NOVA-1 foods through pressing, refining, grinding, or milling. Used for cooking, not direct consumption.



Examples: Oils, butter, sugar, salt, honey, starch

NOVA-3 Processed foods

NOVA-1 foods with added NOVA-2 ingredients. Simple modifications using traditional methods such as canning, pickling, curing, smoking or fermentation.



Examples: Canned vegetables in brine, fruits in syrup, artisan cheese, freshly made bread, cured meats, plain oat milk, soy sauce

NOVA-4 Ultraprocessed foods

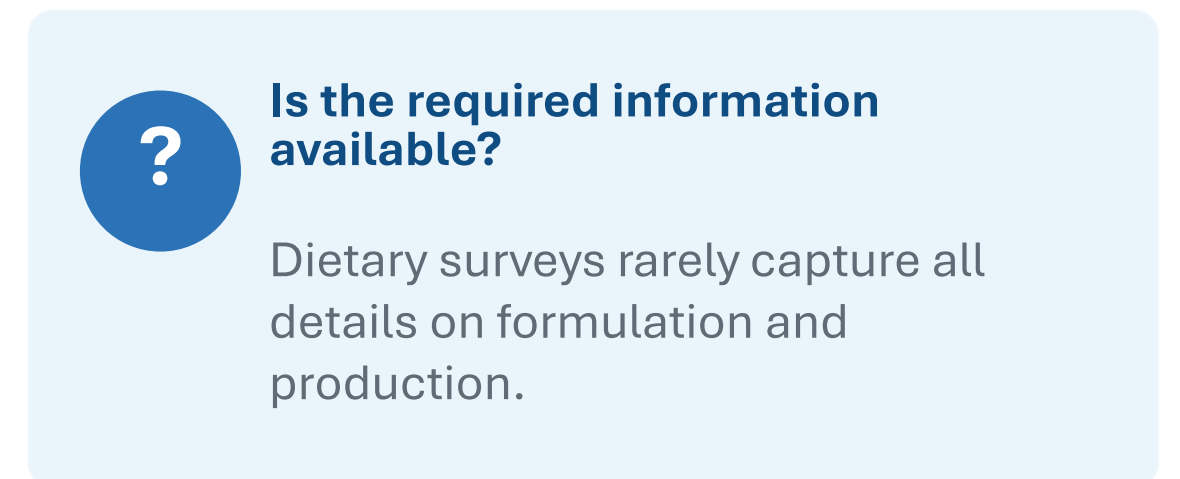
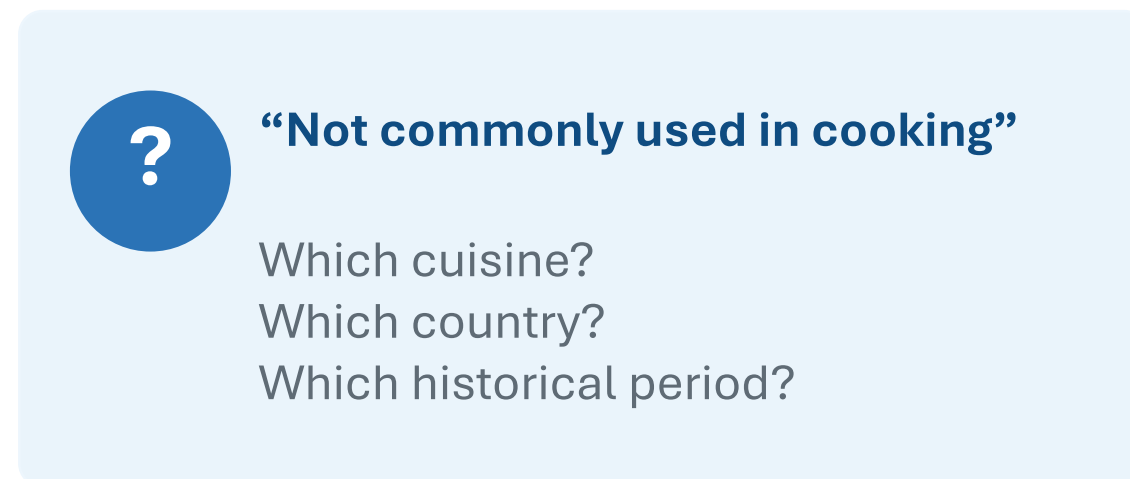
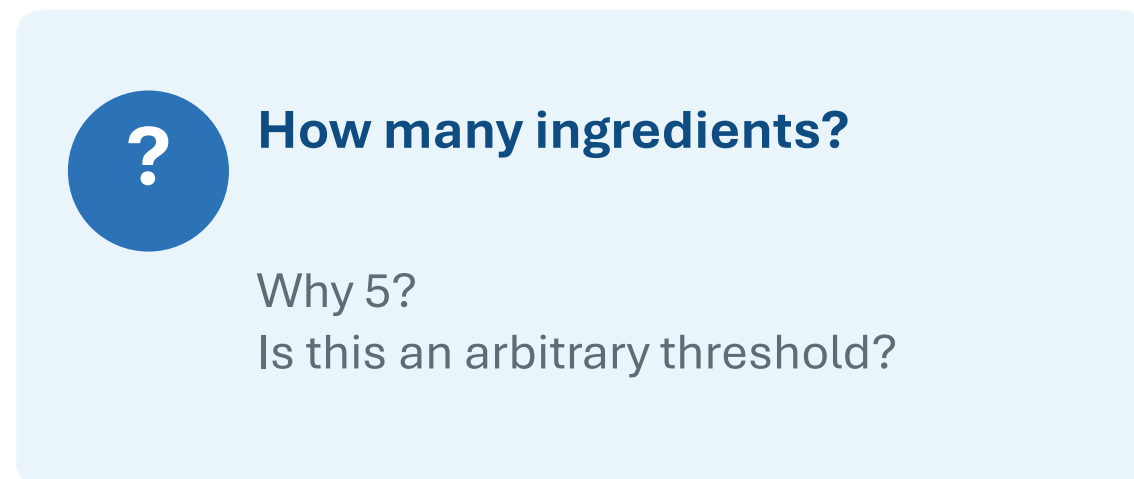
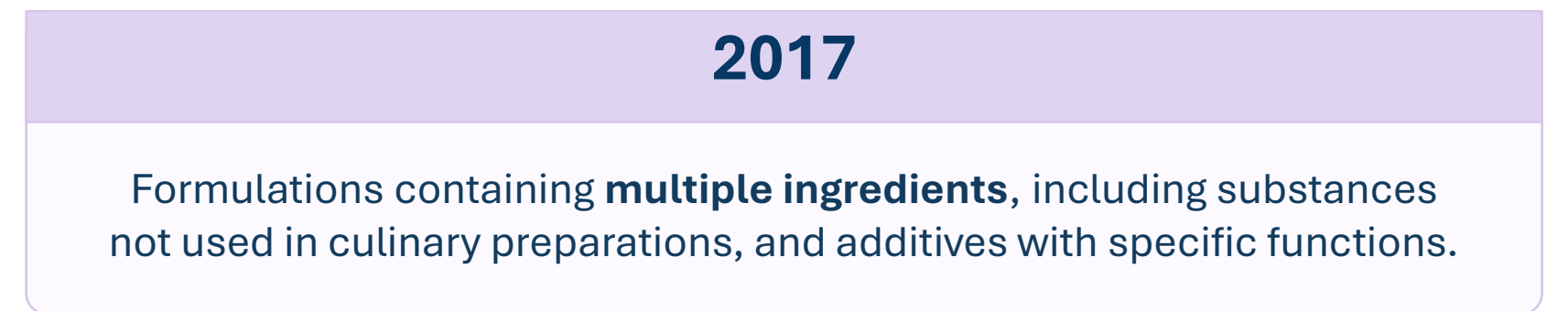
Industrial formulations using extracted substances, chemically modified ingredients, and cosmetic additives. Multiple processing steps.



Examples: Soft drinks, processed meat products, instant foods, packaged snacks, breakfast cereals, packaged bread, flavoured soy milk

Increasing level of processing

What does NOVA classify?



What are UPFs?

UPFs are industrial formulations made mostly or entirely from substances extracted from foods or synthesized in laboratories, with little or no whole foods.



INDUSTRIAL FORMULATIONS

Made through a series of industrial processes and techniques.



SUBSTANCES OF CONCERN

Contain ingredients not commonly used in culinary preparations (e.g., additives, flavourings, emulsifiers, sweeteners, colors).



LITTLE OR NO WHOLE FOODS

Typically low in or devoid of whole foods and nutritionally unbalanced.



WIDESPREAD IMPACT

Highly palatable, convenient and affordable, contributing to dietary shifts and public health concerns.

Nutritional classification vs NOVA classification

Examples of foods across the NOVA classification



Whole wheat grains

NOVA

1

Unprocessed or minimally processed foods



Oat flakes (100% cereals)

NOVA

1

Unprocessed or minimally processed foods



Corn flakes (with sugar or salt)

NOVA

3

Processed foods



Muesli (with glucose-fructose syrup, flavours, etc.)

NOVA

4

Ultra-processed foods



Breakfast biscuits

NOVA

4

Ultra-processed foods

Less processed

More processed

1

CEREALS, CEREAL PRODUCTS AND TUBERS

pasta, bread, rice, maize, potatoes

2

FRUITS AND VEGETABLES

fruit, vegetables, including low-sugar options

3

MEAT, FISH, EGGS AND LEGUMES

different foods, grouped mainly by their protein role

4

MILK AND DAIRY PRODUCTS

milk, yogurt, cheese

5

ADDED FATS

olive oil, other vegetable oils and fats

Foods belonging to the same nutritional group may fall into different NOVA groups depending on production process and formulation.

Nutritional classification vs NOVA classification

Examples of dairy products across the NOVA classification



- 1 CEREALS, CEREAL PRODUCTS AND TUBERS**
pasta, bread, rice, maize, potatoes
- 2 FRUITS AND VEGETABLES**
fruit, vegetables, including low-sugar options
- 3 MEAT, FISH, EGGS AND LEGUMES**
different foods, grouped mainly by their protein role
- 4 MILK AND DAIRY PRODUCTS**
milk, yogurt, cheese
- 5 ADDED FATS**
olive oil, other vegetable oils and fats

Nutritional classification mainly describes what a food provides; NOVA mainly considers how it has been formulated and processed. Even within the same food category, small formulation differences may change NOVA assignment.

Publications on UPFs

NIH National Library of Medicine
National Center for Biotechnology Information

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PubMed®

((ULTRAPROCESSED) OR (ultra processed) OR (UPF)) AND HEALTH

Search

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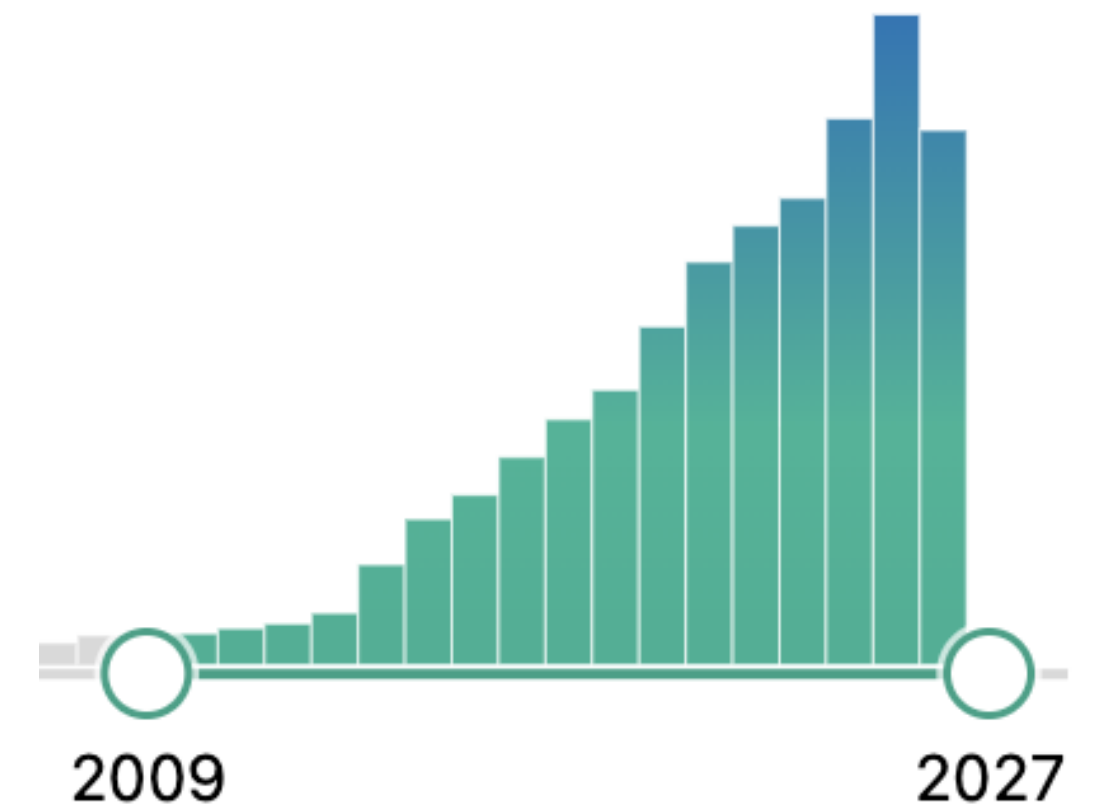
Sort by: Best match

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10,163 results

<< < Page 1 of 1,017 > >>



In 2026 alone, 1,339 articles have already been published on so-called ultra-processed foods, which have rapidly become one of the most studied and debated topics in nutrition research.

How do we measure UPF consumption?

Common dietary assessment sources

1

Food consumption databases

Population-level estimates; often based on existing food group or nutrient databases.

2

Food records and 24-hour recalls

Detailed intake data, but processing details may be incomplete or inferred.

3

Food-frequency questionnaires

Practical for large cohorts, but usually not designed to identify NOVA categories.

Key issue

Were these dietary assessment tools developed and validated to capture food processing?

Validated for this purpose?

Or validated for other purposes?



Taylor & Francis
Taylor & Francis Group

TA SECCA

FREQUENZA											QUANTITÀ						
Indicare 1 sola opzione per ogni alimento											Indicare 1 sola opzione per ogni alimento						
FRUTTA E FRUTTA SECCA	Mai o meno di 1 volta al mese	1-3 volte al mese	1 volta a settimana	2 volte a settimana	3 volte a settimana	4 volte a settimana	5 volte a settimana	6 volte a settimana	Tutti i giorni	Se tutti i giorni, quante volte al giorno?	PORZIONE DI RIFERIMENTO	LA SUA PORZIONE IN OGNI OCCASIONE D'USO					
Frutta (fresca, tagliata, frullata, surgelata)	☐	☐	☐	☐	☐	☐	☐	☐	☐		150 g (es. 1 mela, 1 arancio, 2 mandarini)	☐	☐	☐	☐	☐	☐
Succhi 100% frutta (freschi o pastorizzati, senza aggiunta di zuccheri o altri ingredienti)	☐	☐	☐	☐	☐	☐	☐	☐	☐		200 mL (1 bicchiere medio)	☐	☐	☐	☐	☐	☐
Succhi di frutta/nettari (con aggiunta di zuccheri o altri ingredienti)	☐	☐	☐	☐	☐	☐	☐	☐	☐		200 mL (1 bicchiere medio)	☐	☐	☐	☐	☐	☐
Frutta sciroppata	☐	☐	☐	☐	☐	☐	☐	☐	☐		150 g (es. 3 mezze pesche sciroppate)	☐	☐	☐	☐	☐	☐
Frutta essicata (es. albicocche, prugne, fichi, datteri)	☐	☐	☐	☐	☐	☐	☐	☐	☐		30 g (es. 3 fichi secchi, 2 cucchiaini rasi di uvetta)	☐	☐	☐	☐	☐	☐
Frutta secca e semi (senza aggiunta di sale, zucchero o altri ingredienti)	☐	☐	☐	☐	☐	☐	☐	☐	☐		30 g (es. 7-8 noci, 15-20 mandorle, 3 cucchiaini rasi di semi di girasole)	☐	☐	☐	☐	☐	☐
Frutta secca e semi (con aggiunta di sale, zucchero o altri ingredienti)	☐	☐	☐	☐	☐	☐	☐	☐	☐		30 g (es. 15-20 mandorle/nocciole, 3 cucchiaini rasi di semi di girasole)	☐	☐	☐	☐	☐	☐
Olive da tavola	☐	☐	☐	☐	☐	☐	☐	☐	☐		35 g (es. 5 olive)	☐	☐	☐	☐	☐	☐

How do we express UPF exposure?

Once foods have been classified as UPF, exposure can be quantified in different ways.

Common metrics

- **g/day of UPFs** *absolute intake*
- **% of total food weight** *weight-based exposure*
- **% of total energy intake** *energy contribution*
- **servings/day or % of servings** *frequency or portions*
- **intake categories** *tertiles, quartiles or quintiles*

Same metric ≠ same meaning



Different choices may change rankings, comparisons across countries and interpretation of “high UPF intake”.

Different metrics are not interchangeable. A “high UPF consumer” may represent very different absolute intakes across studies and populations.

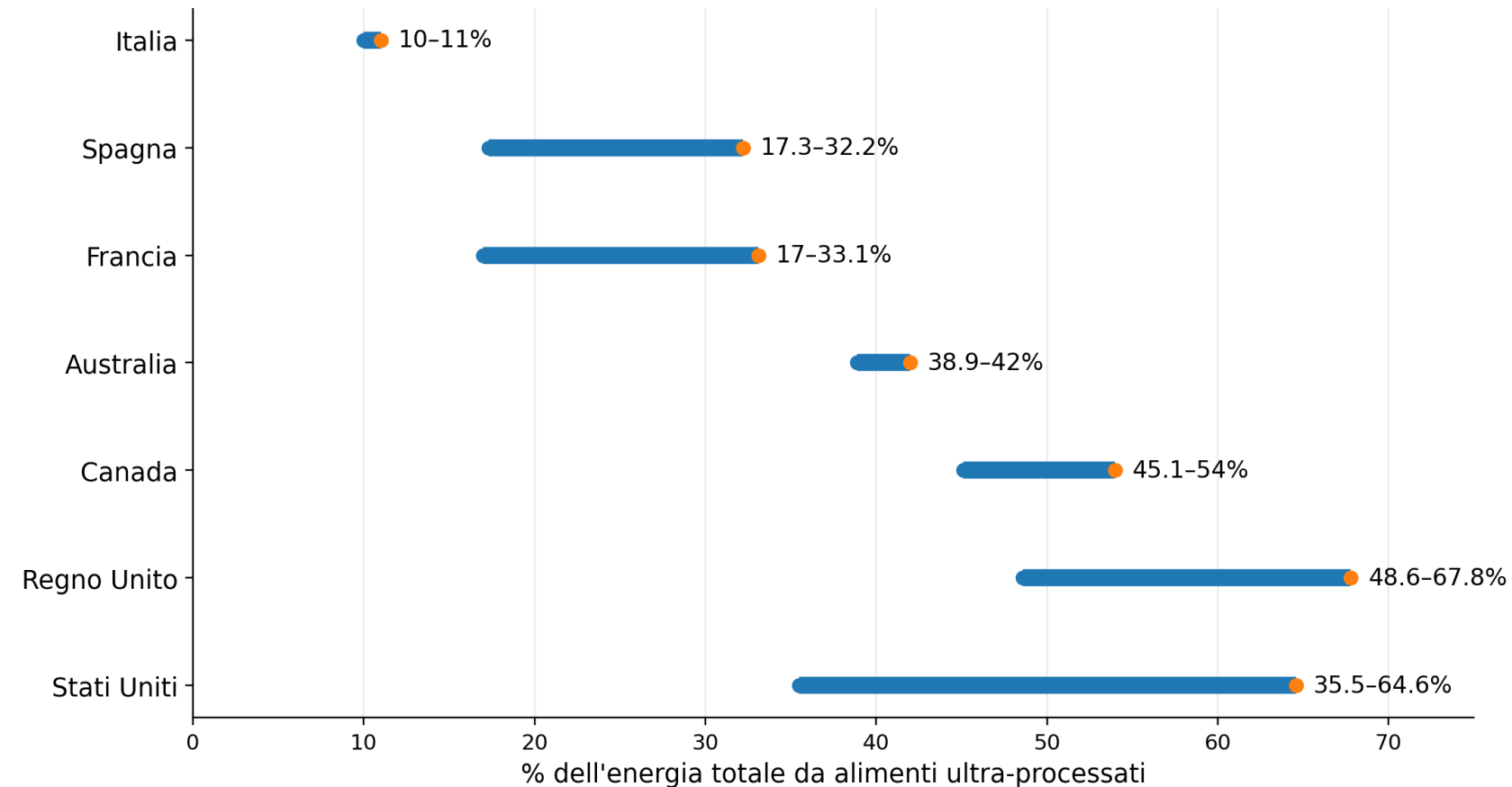
How much UPF is consumed worldwide?



Review

A Systematic Review of Worldwide Consumption of Ultra-Processed Foods: Findings and Criticisms

Mirko Marino ^{ID}, Federica Puppo, Cristian Del Bo' ^{*ID}, Valentina Vinelli, Patrizia Riso ^{ID}, Marisa Porrini ^{†ID} and Daniela Martini ^{†ID}



- The contribution of UPFs varies across countries and populations:
- Lower values in Italy (around 10-15% of energy intake)
 - In the United States and the United Kingdom, UPFs provide more than 50% of total energy intake
- Large variability also exists within the same country.

Which UPFs are consumed worldwide?

Different UPF sources in Italy and the United States

Top contributors to UPF energy intake



It is not only the amount of so-called UPFs that varies: their composition also differs. NOVA 4 may therefore represent qualitatively different dietary patterns across countries.

Ruggiero et al, 2025

Steele et al, 2023

What does observational evidence show?



CLINICAL NUTRITION 93 (2024) 1200–1209

Contents lists available at ScienceDirect

Clinical Nutrition

journal homepage: <http://www.elsevier.com/locate/clnu>



Original article

Ultra-processed foods and human health: An umbrella review and updated meta-analyses of observational evidence

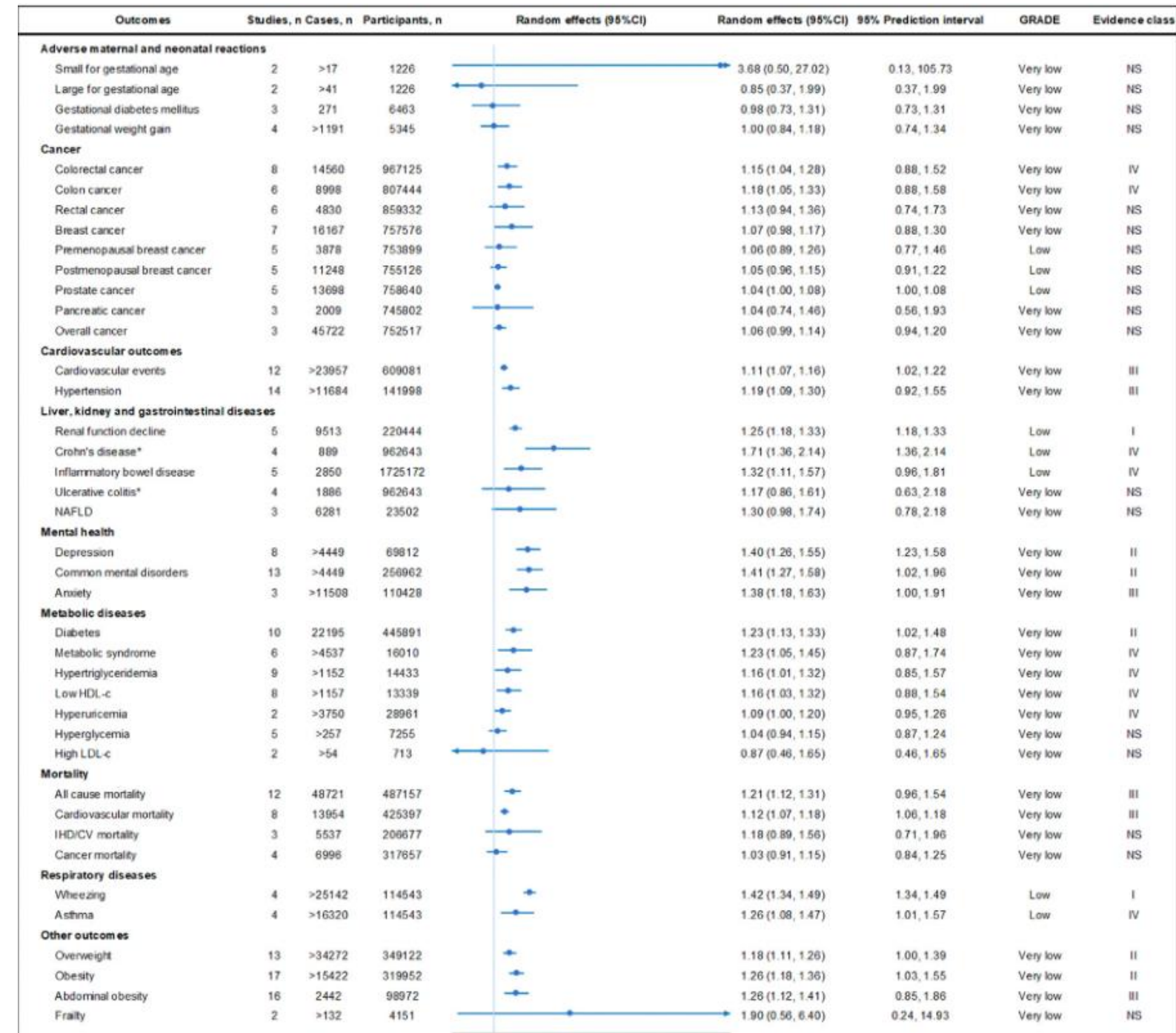
Shuhui Dai ^{a,1}, Judith Wellens ^{b,c,1}, Nan Yang ^a, Doudou Li ^d, Jingjing Wang ^a, Lijuan Wang ^{a,c}, Shuai Yuan ^{a,f}, Yazhou He ^g, Peige Song ^h, Ron Munger ⁱ, Monique Potvin Kent ^j, Amanda J. MacFarlane ^k, Patrick Mullie ^{l,m}, Susan Duthie ⁿ, Julian Little ^j, Ewgeni Theodorou ^{e,o,2}, Yue Li ^{a,p,2,*}



Key reading

- Several outcomes show positive associations with UPF intake.
- Credibility is often low or very low, reflecting study design and heterogeneity.
- The question is not only whether associations exist, but how robust and explainable they are.

Summary of pooled estimates across health outcomes



What does the observational evidence show?

RESEARCH

OPEN ACCESS

Check for updates

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

Melissa M Lane,¹ Elizabeth Gamage,¹ Shutong Du,^{2,3} Deborah N Ashtree,¹ Amelia J McGuinness,¹ Sarah Gauci,^{1,4} Phillip Baker,⁵ Mark Lawrence,⁶ Casey M Rebholz,^{2,3} Bernard Srour,⁷ Mathilde Touvier,⁷ Felice N Jacka,^{1,8,9} Adrienne O'Neil,¹ Toby Segasby,¹⁰ Wolfgang Marx¹

45

pooled analyses

32

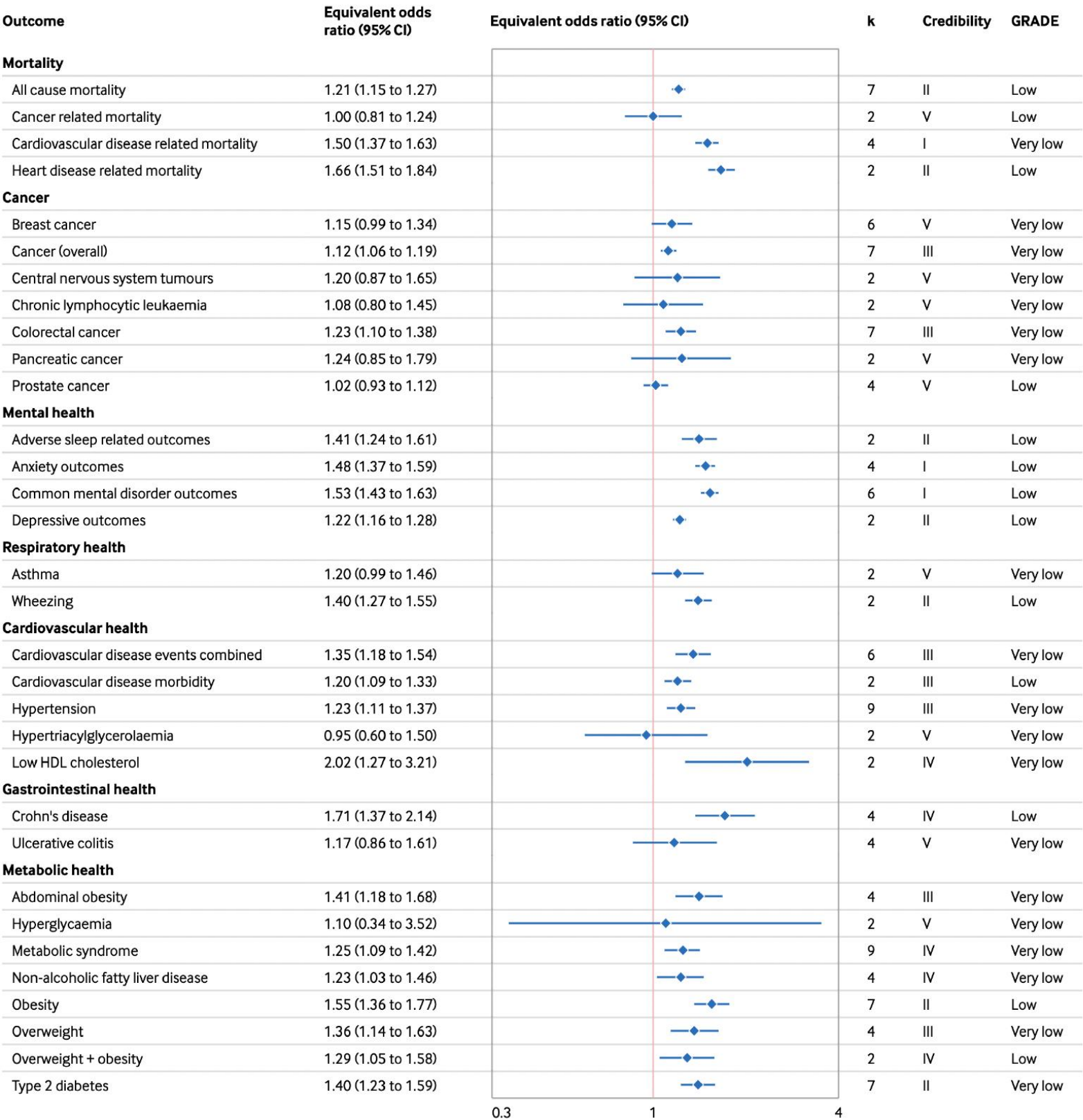
outcomes with direct associations

GRADE

mostly low or very low certainty

The signal is broad, but not decisive: most associations come from observational meta-analyses and require cautious interpretation.

Useful for hypothesis generation — not sufficient, alone, to establish causality.



Are all UPFs the same?

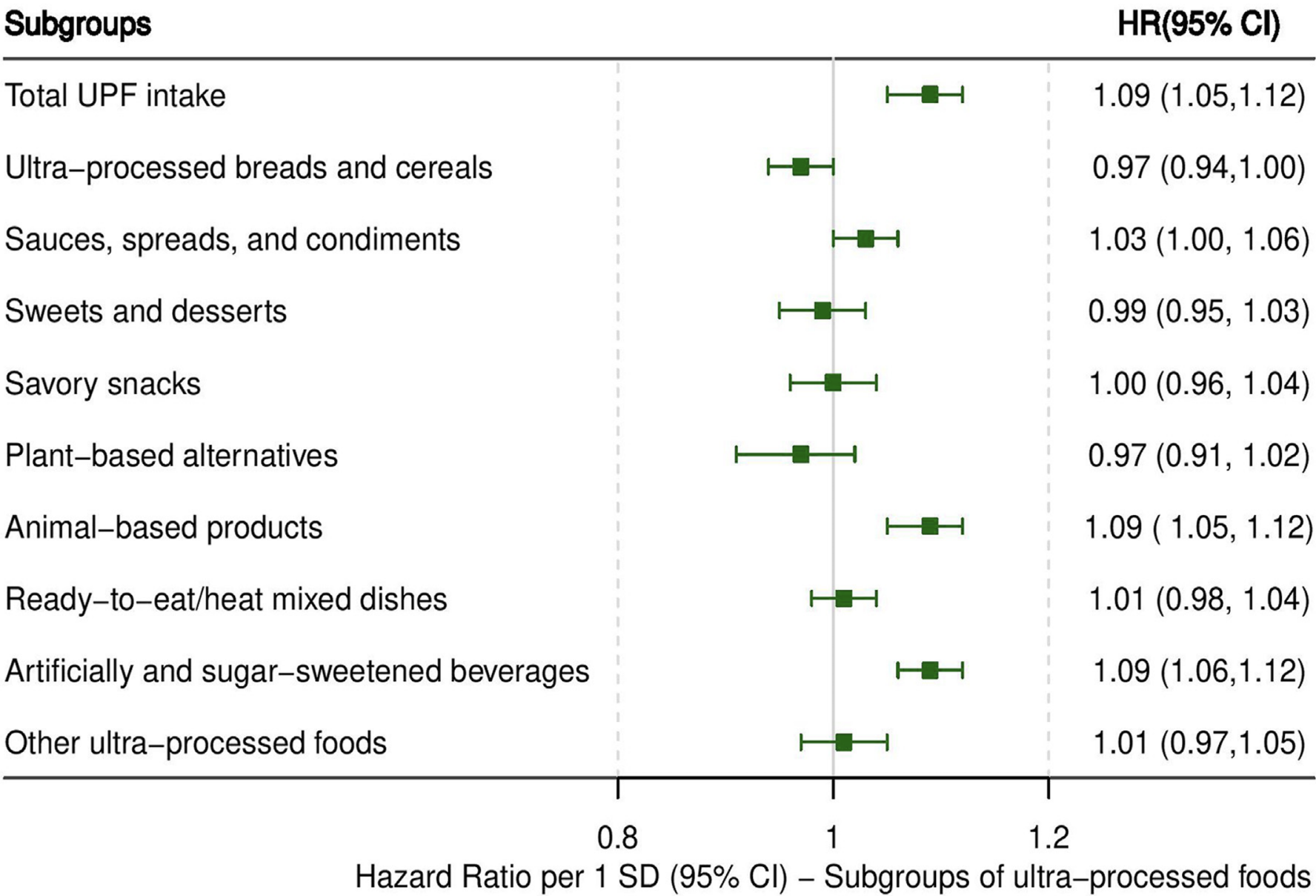
Consumption of ultra-processed foods and risk of multimorbidity of cancer and cardiometabolic diseases: a multinational cohort study

Reynalda Cordova,^{a,b} Vivian Viallon,^a Emma Fontvieille,^a Laia Peruchet-Noray,^a Anna Jansana,^a Karl-Heinz Wagner,^b Cecilie Kyrø,^c Anne Tjønneland,^{c,d} Verena Katzke,^e Rashmita Bajracharya,^e Matthias B. Schulze,^{f,g} Giovanna Masala,^h Sabina Sieri,ⁱ Salvatore Panico,^j Fulvio Ricceri,^k Rosario Tumino,^l Jolanda M. A. Boer,^m W. M. Monique Verschuren,^{m,n} Yvonne T. van der Schouw,ⁿ Paula Jakszyn,^{o,p} Daniel Redondo-Sánchez,^{q,r,s} Pilar Amiano,^{s,t,u} José María Huerta,^{s,v} Marcela Guevara,^{s,w,x} Yan Borne,^y Emily Sonestedt,^y Konstantinos K. Tsilidis,^{z,aa} Christopher Millett,^{ab,ac} Alicia K. Heath,^{aa} Elom K. Aglago,^{aa} Dagfinn Aune,^{aa,ad,ae} Marc J. Gunter,^{a,aa} Pietro Ferrari,^a Inge Huybrechts,^a and Heinz Freisling^{a,*}

Key reading

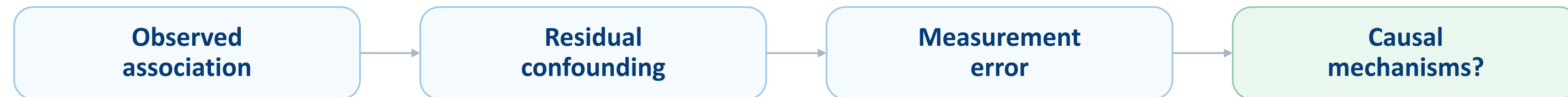
- higher consumption of UPFs increases the risk of cancer and cardiometabolic multimorbidity.
- associations were most notable for animal-based products, and artificially and sugar-sweetened beverages. UPF breads and cereals or plant-based alternatives were not associated with risk.

Forest plot of Hazard Ratios



Association vs causality

**Most evidence linking UPFs to health outcomes is observational.
This is important evidence — but it does not, by itself, prove causation.**

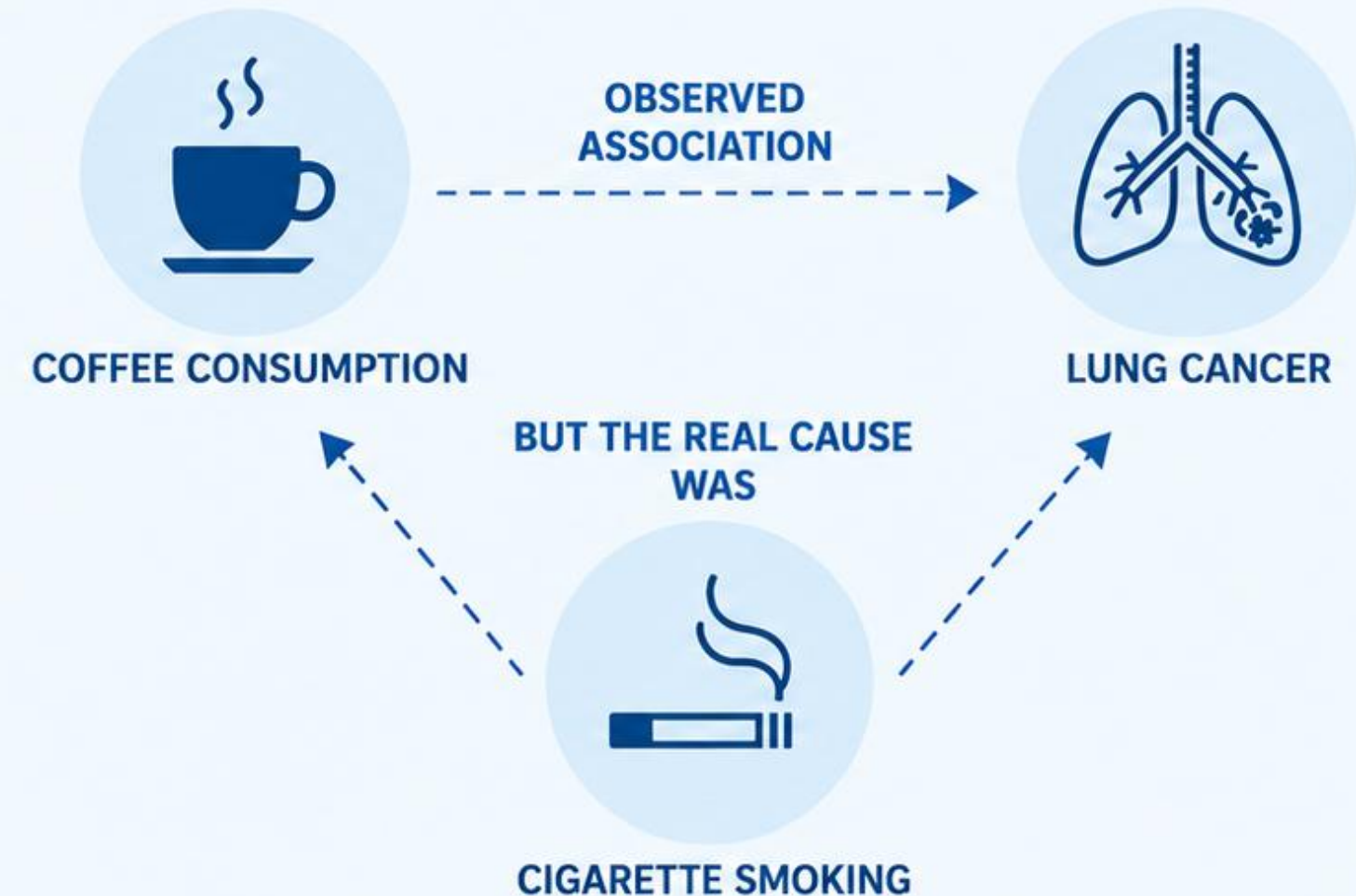


**The key question is not only whether UPF intake is associated with health,
but what exactly explains the association.**

Association vs causality



Without intervention studies (RCTs), the risk is to mistake an **association** for a **causal relationship**.



Why intervention studies?



Observational associations

are essential to generate hypotheses, but **do not establish causality**.



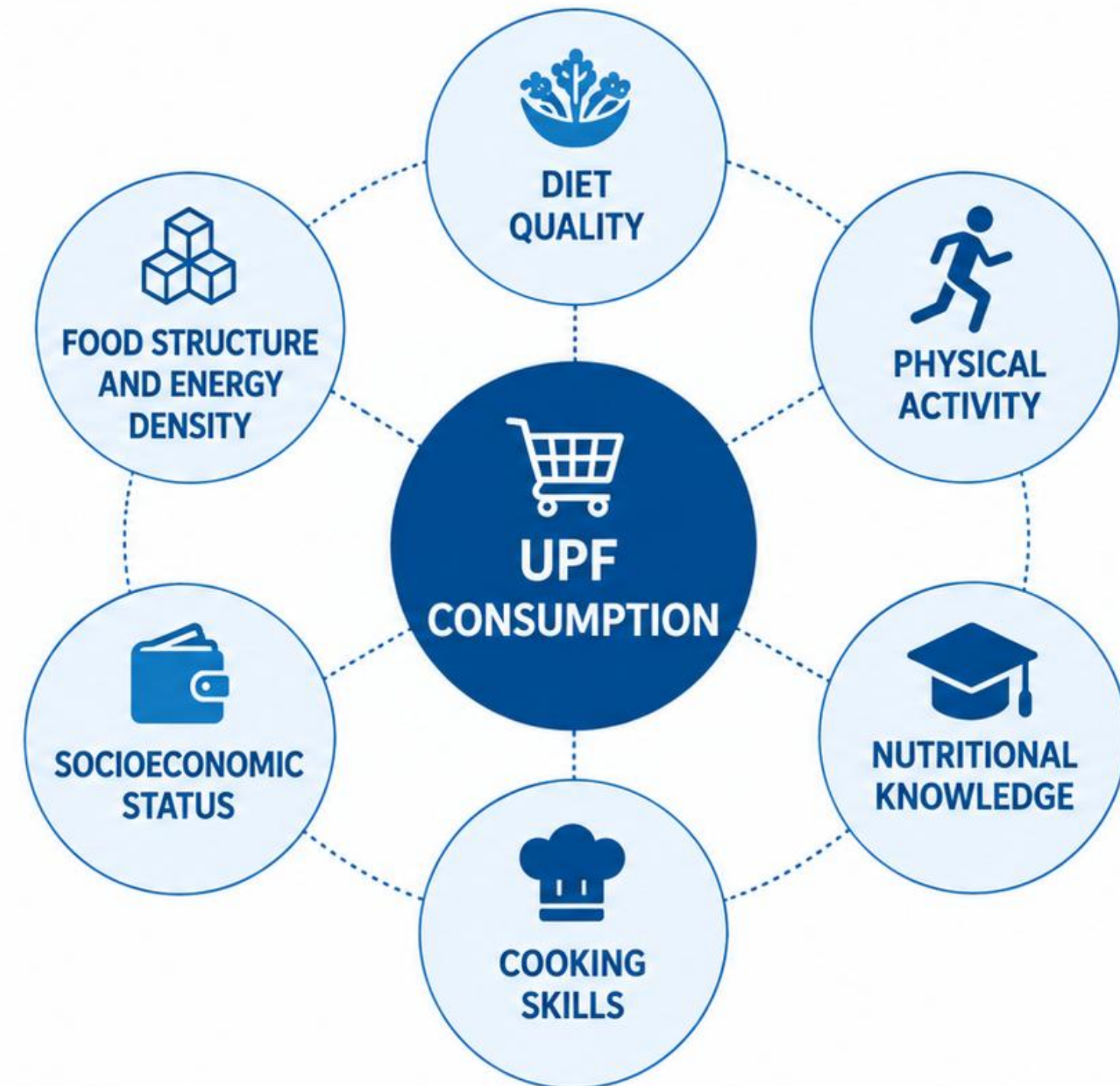
Many variables change together

and residual confounding is **unavoidable**.



RCTs allow isolation

of the effect of UPF exposure while keeping the rest of the **dietary context constant**.



From intervention studies? NO!

ALARMING
HEADLINES

Health | Ultra-processed foods
also harm muscles

Ultra-processed foods
cause heart attacks and stroke

CLAIMS OF
CAUSALITY

RESEARCH

Association of ultra-processed food
consumption with all cause and cause
specific mortality: population based
cohort study

Zhe Fang,¹ Sinara Laurini Rossato,^{2,3} Dong Hang,^{3,4} Neha Khandpur,^{3,5,6}
Kai Wang,¹ Chun-Han Lo,⁷ Walter C. Willett,^{1,3,8} Edward L. Giovannucci,^{1,3}
Mingyang Song^{1,3,9}

OBSERVATIONAL
STUDIES

POPULATION-BASED
COHORT STUDY

PROSPECTIVE
COHORT

ASSOCIATIONS,
NOT CAUSALITY

ESC
European Society
of Cardiology

European Heart Journal (2022) 43, 213–224
<https://doi.org/10.1093/eurheartj/ehab783>

CLINICAL RESEARCH
Epidemiology and prevention

Ultra-processed food intake and all-cause and
cause-specific mortality in individuals with
cardiovascular disease: the Moli-sani Study

Marialaura Bonaccio ^{1*}, Simona Castanzo ¹, Augusto Di Castelnuovo ²,
Mariarosaria Persichillo ¹, Sara Magnacca ², Amalia De Curtis ¹,
Chiara Cerletti ¹, Maria Benedetta Donati ¹, Giovanni de Geatano ¹, and
Licia Iacoviello ^{1,3}; for the Moli-sani Study Investigators[†]

What about intervention studies?



Systematic review

**Rethinking ultra-processed foods:
evidence and controversies from
intervention trials**



Overall dietary quality
often **confounds**
associations



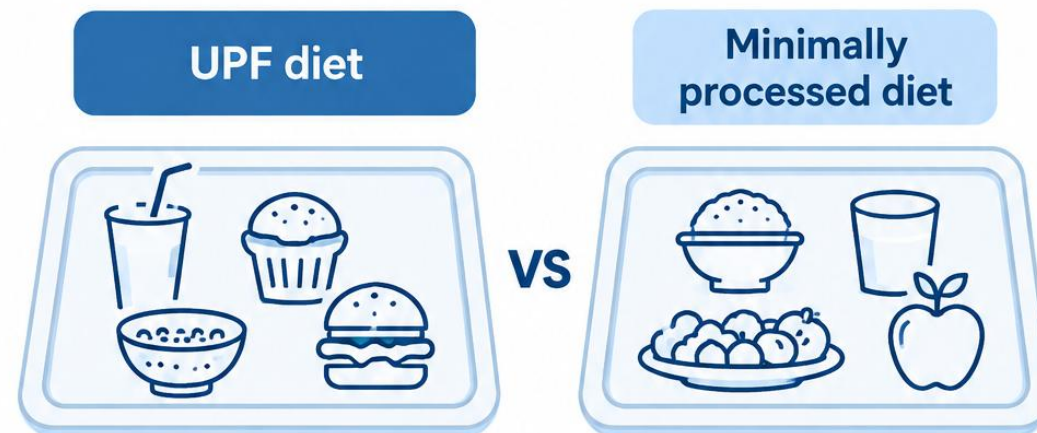
Limited information
on **dietary context**
is available

The first study

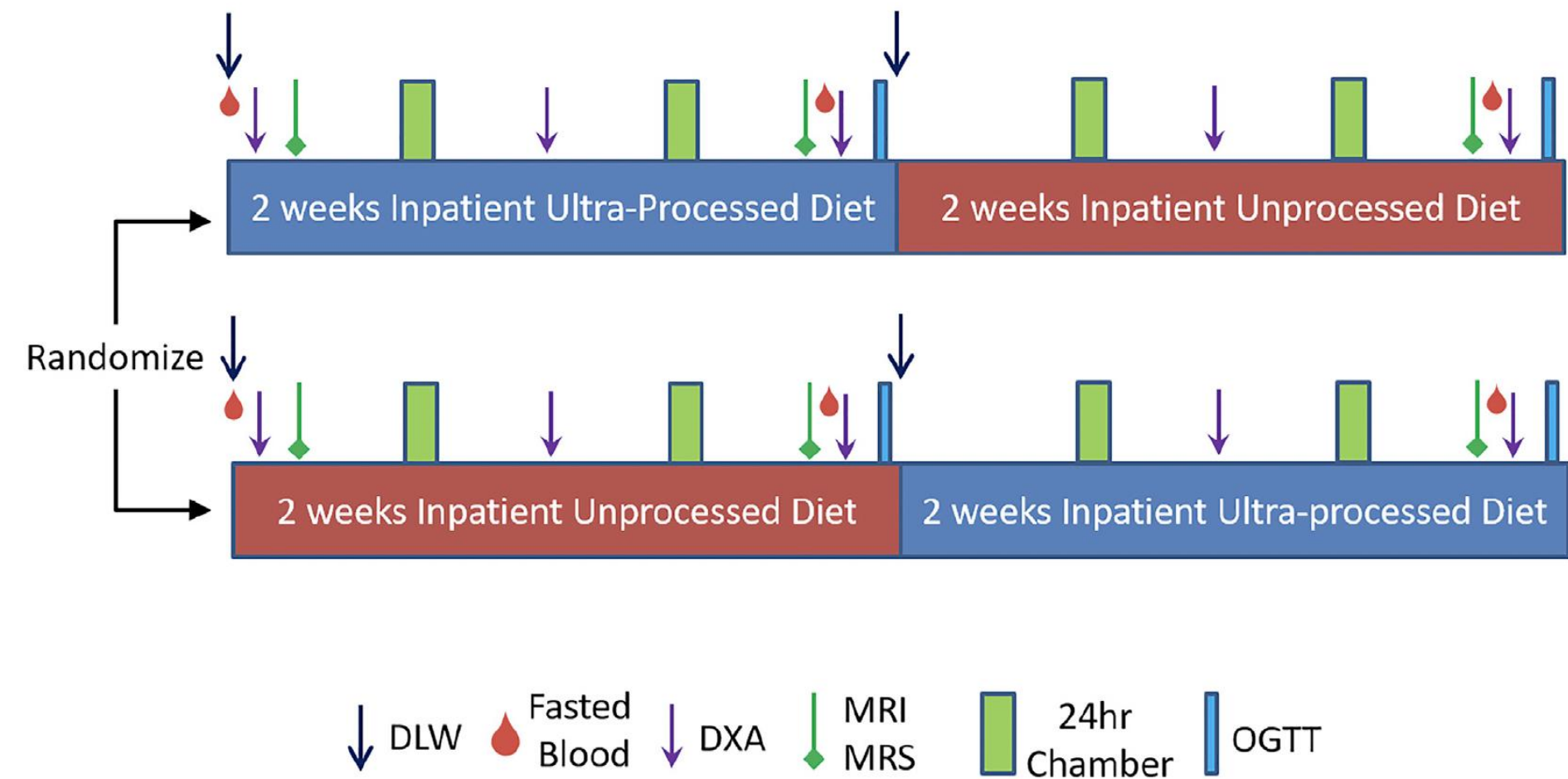


DESIGN

- Randomised cross-over study
- Inpatient metabolic ward
- 2 weeks per diet (2-week wash-out)
- Ad libitum
- Iso-caloric diets in the interventions (partial matching)
- UPF diet vs minimally processed diet



20 healthy adults with overweight/obesity



Hall et al., Cell Metabolism 2019

The first study



MAIN RESULTS



+508 kcal/day
with the UPF diet
compared with the minimally
processed diet



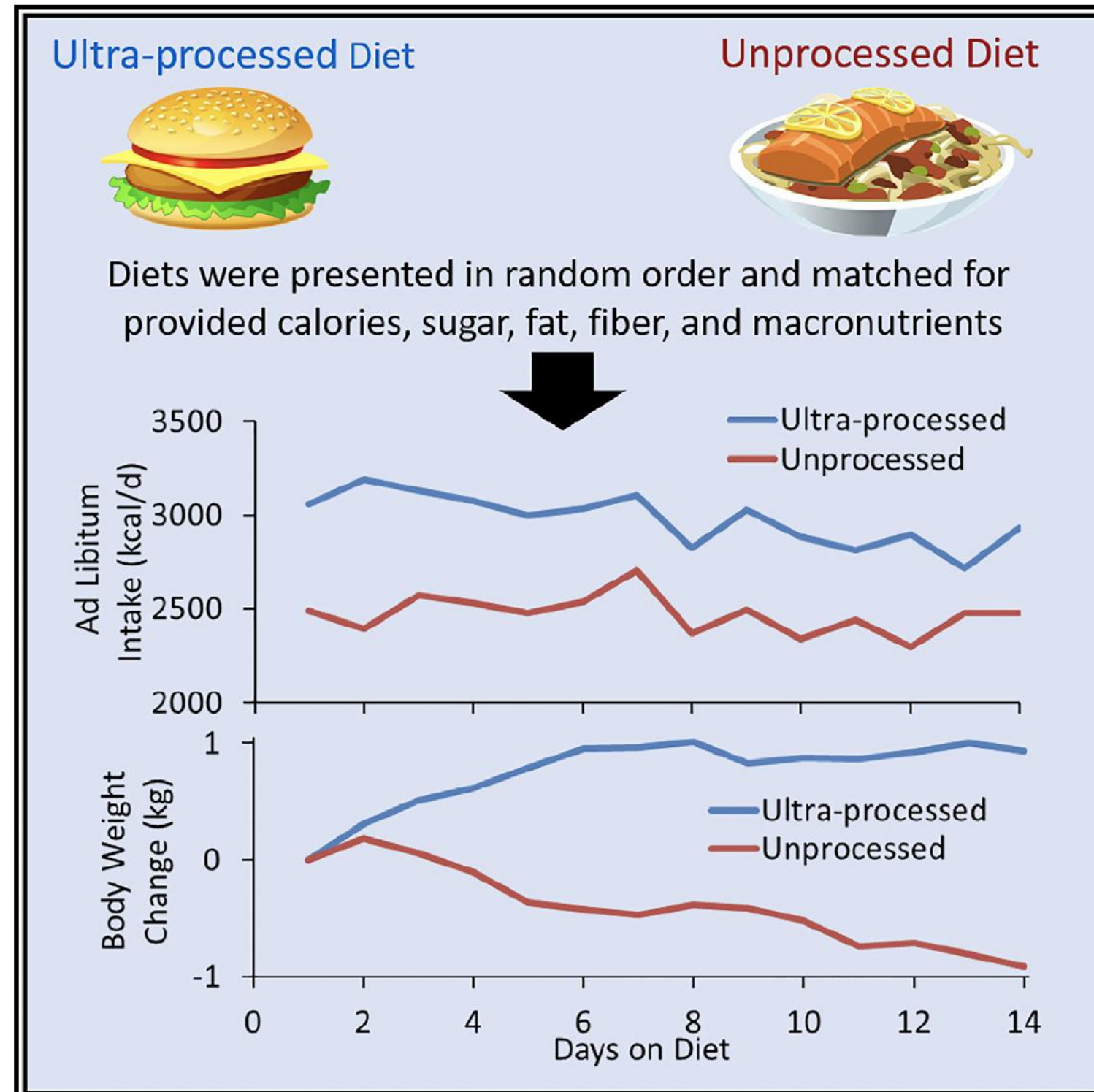
+0.9 kg
body weight
with the UPF diet



+48%
eating rate
with the UPF diet



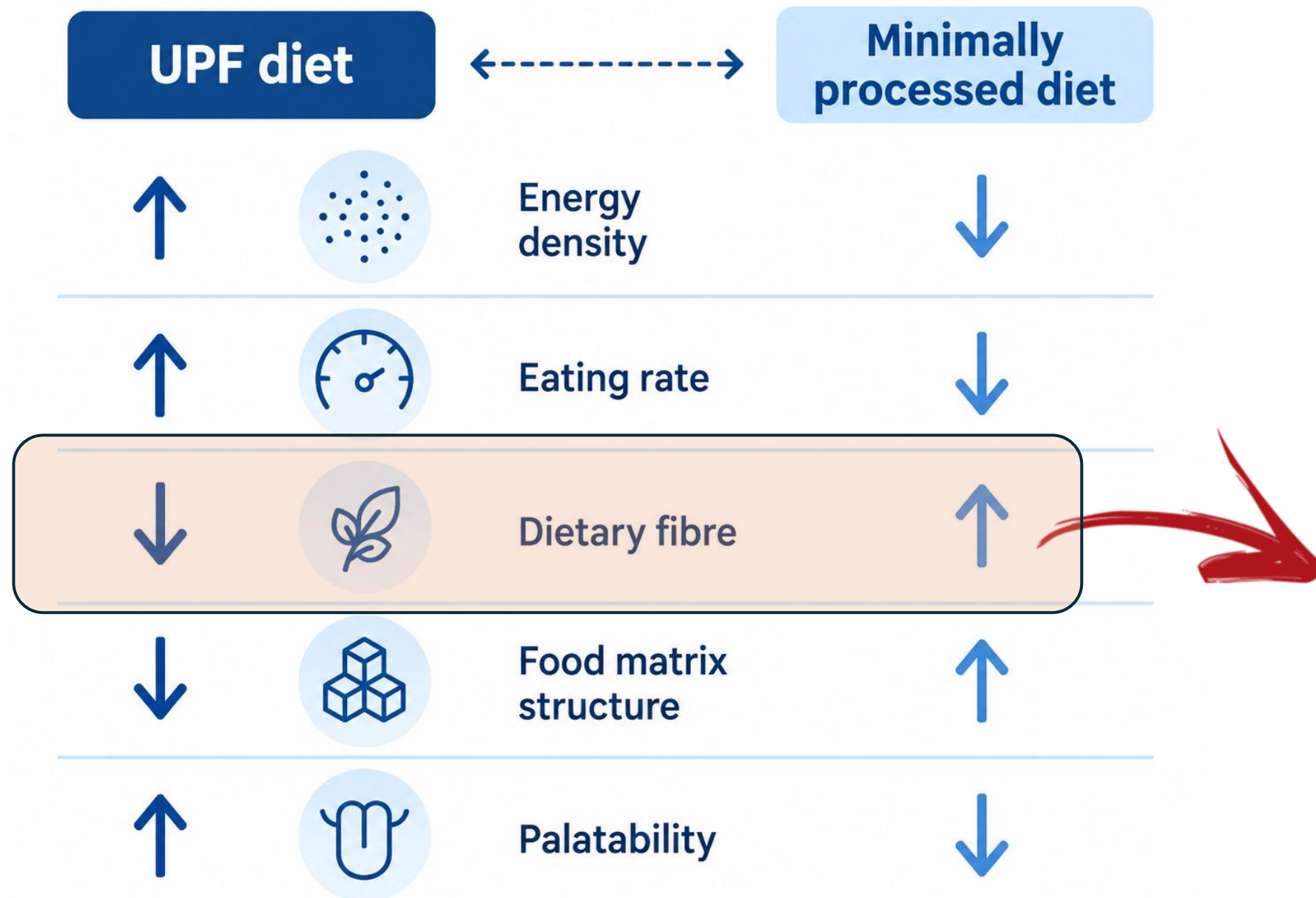
The UPF diet significantly increased
energy intake and body weight
compared with the minimally
processed diet.



Was it really “processing”?

UPF diet			Minimally processed diet	
↑		Energy density		↓
↑		Eating rate		↓
↓		Dietary fibre		↑
↓		Food matrix structure		↑
↑		Palatability		↓

Was it really “processing”?

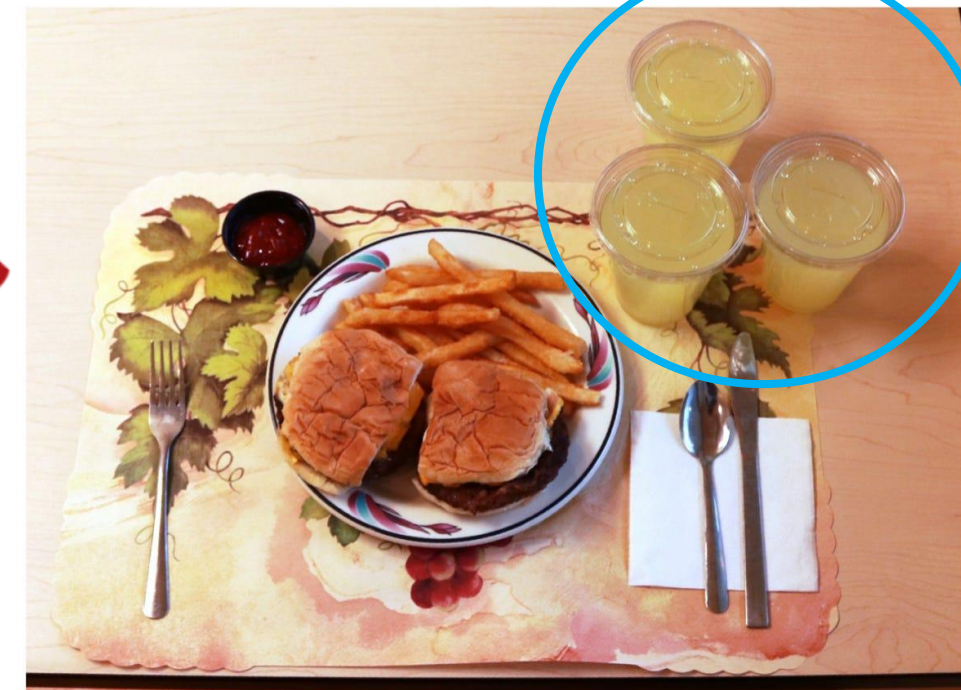


Ultra-processed Menu

Day 6

Lunch

Cheeseburger with American cheese (Glenview Farms) on a Kaiser roll (Anzio & Sons)
 French fries (Monarch)
 Ketchup (Heinz)
 Diet lemonade (Crystal Light) with NutriSource fiber



Unprocessed Menu

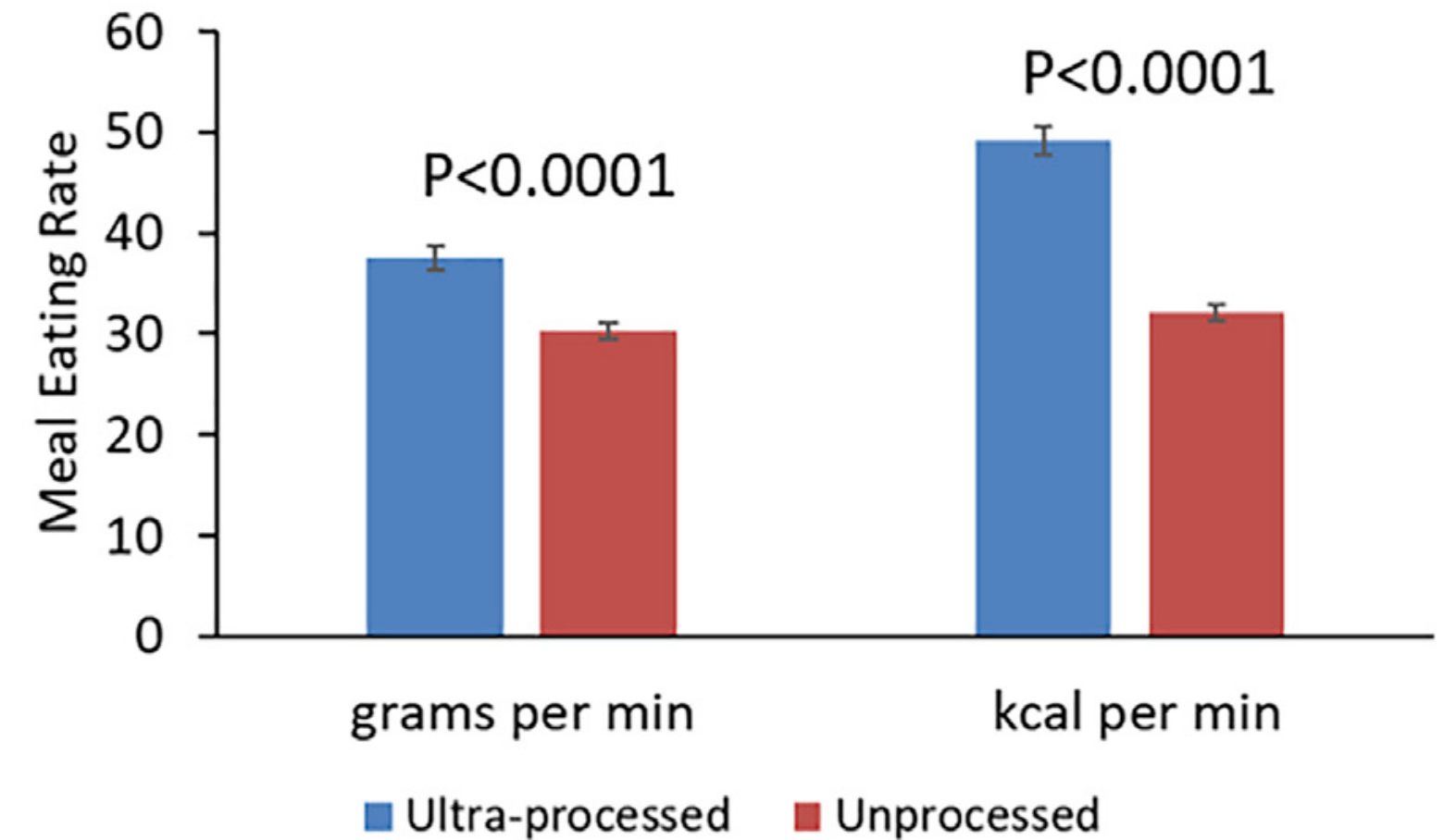
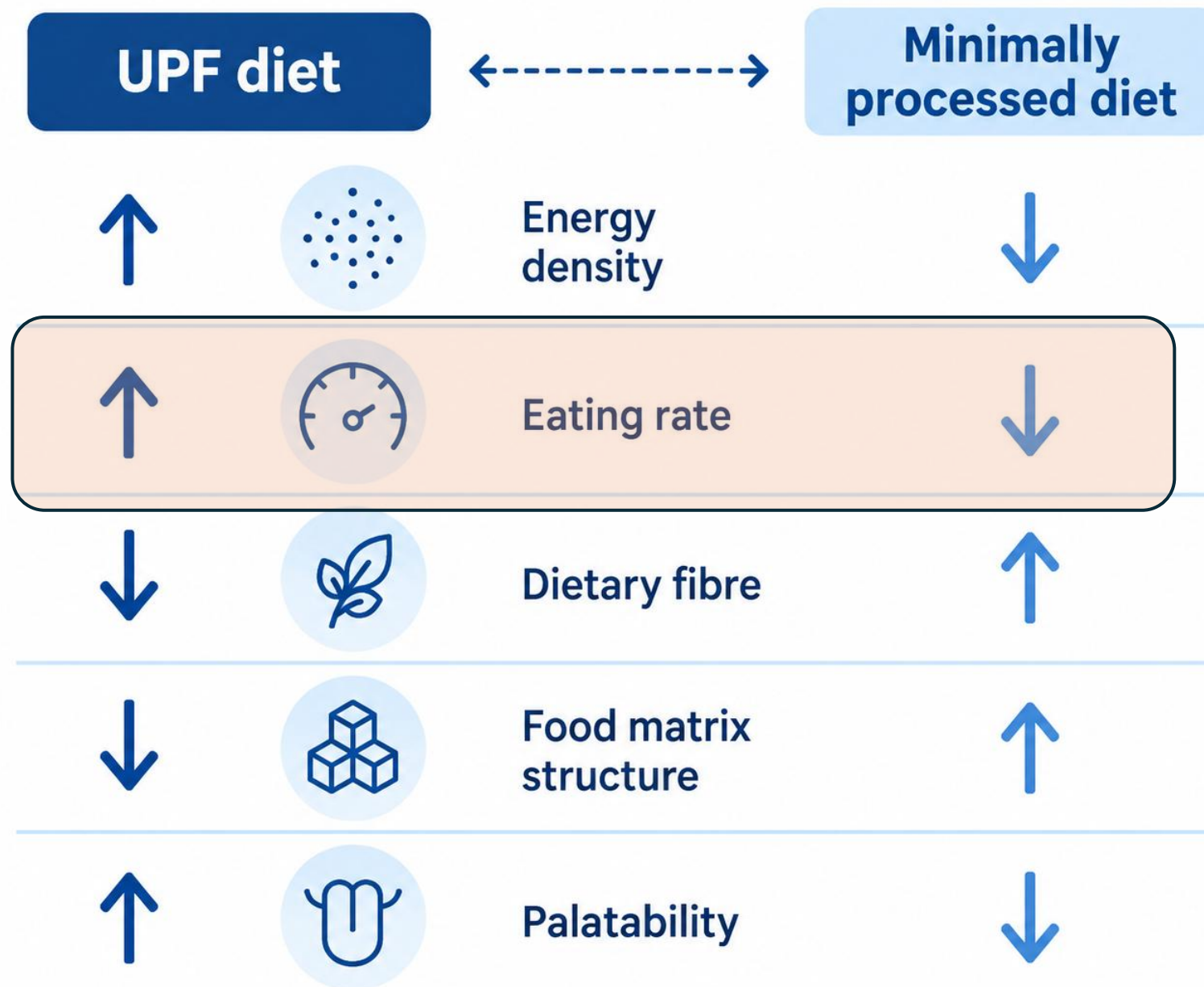
Day 6

Lunch

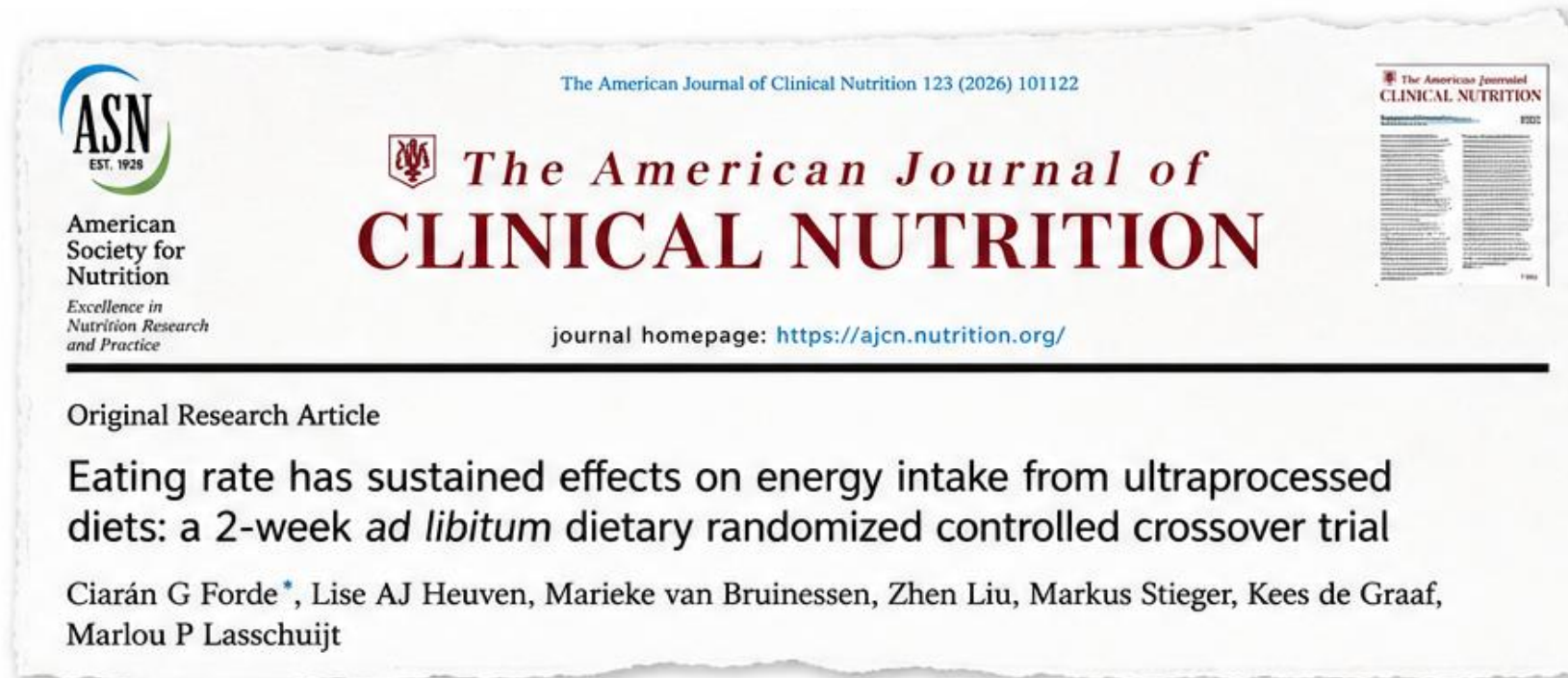
Salmon (Harbor Banks) with garlic and fresh squeezed lemon juice
 Baked sweet potato with olive oil, ground cumin (Monarch) and chili powder (Giant)
 Green beans (from frozen, Monarch) with olive oil and garlic
 Plain Greek yogurt (Fage) with strawberries (from frozen, no sugar added (Giant)
 Salt and Pepper (Monarch)



Was it really “processing”?



The role of eating rate



Diets rich in **UPF** are associated with a **higher energy intake**.



This association may depend on the **food texture** and **eating rate**.

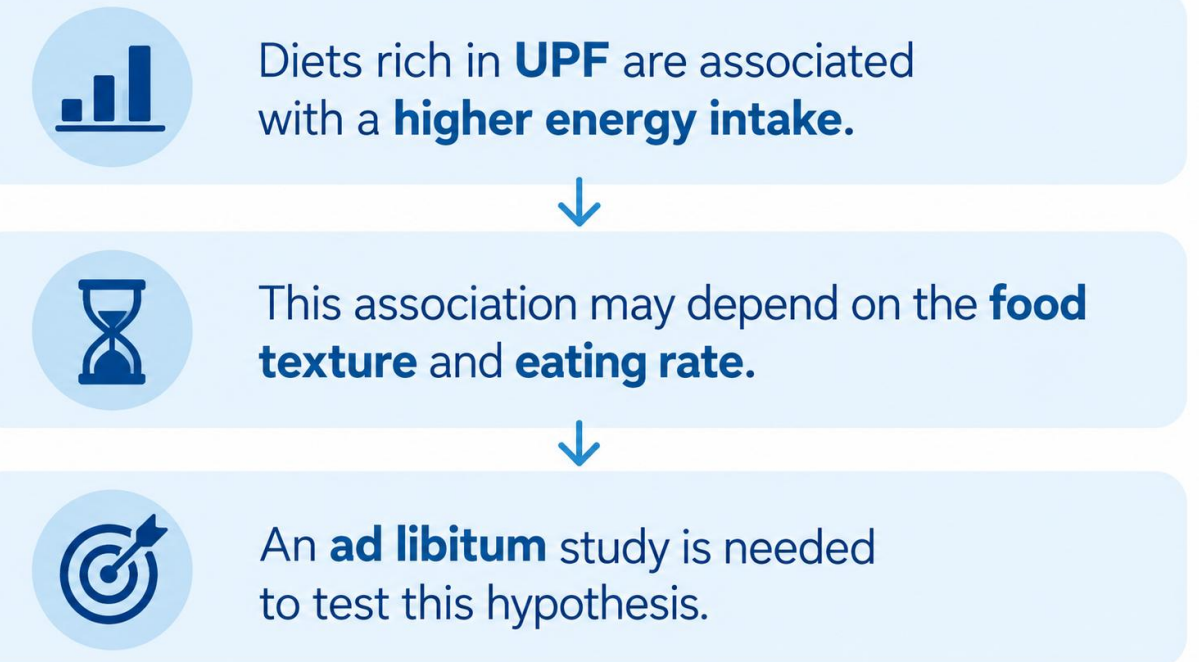
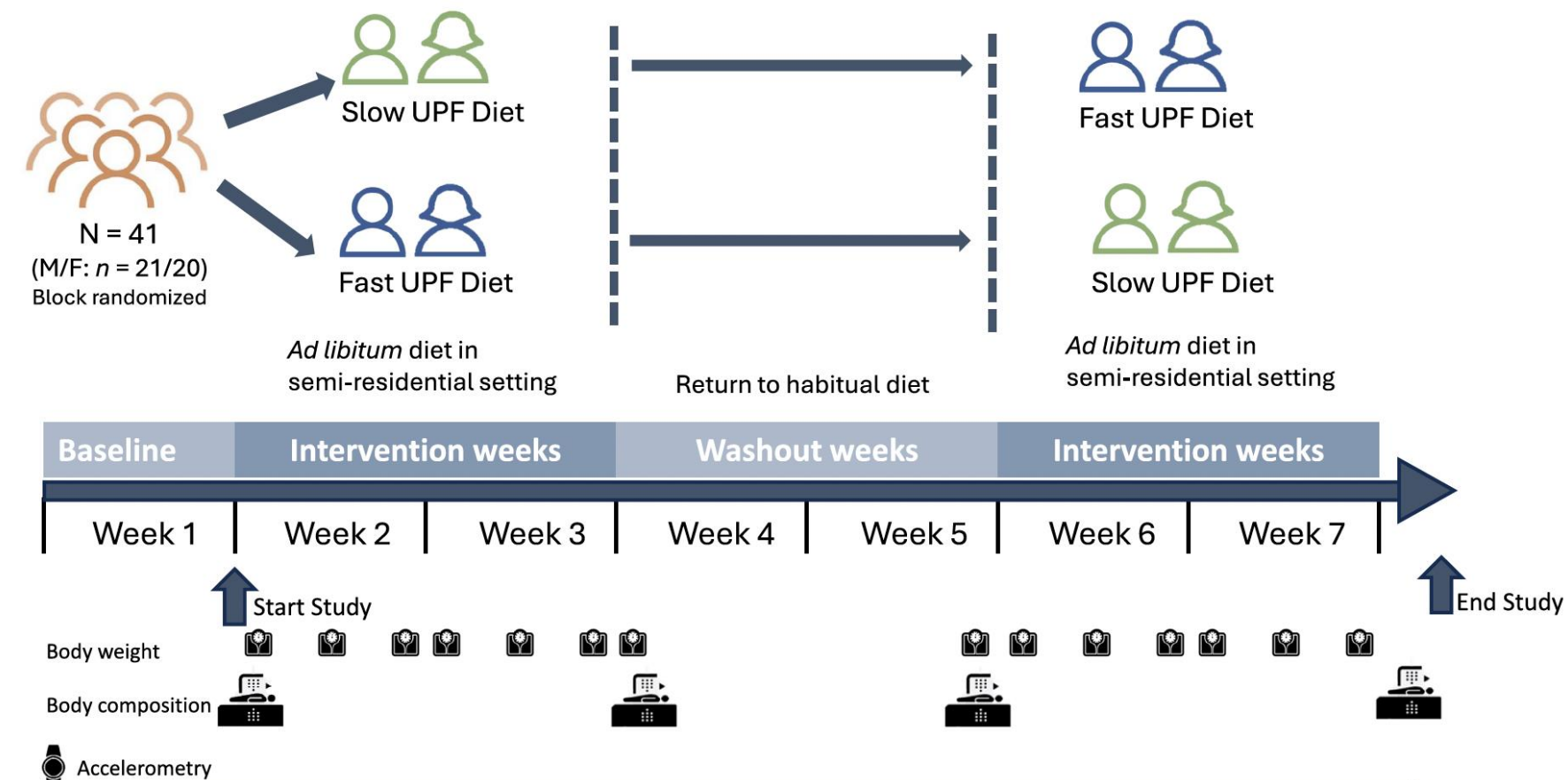
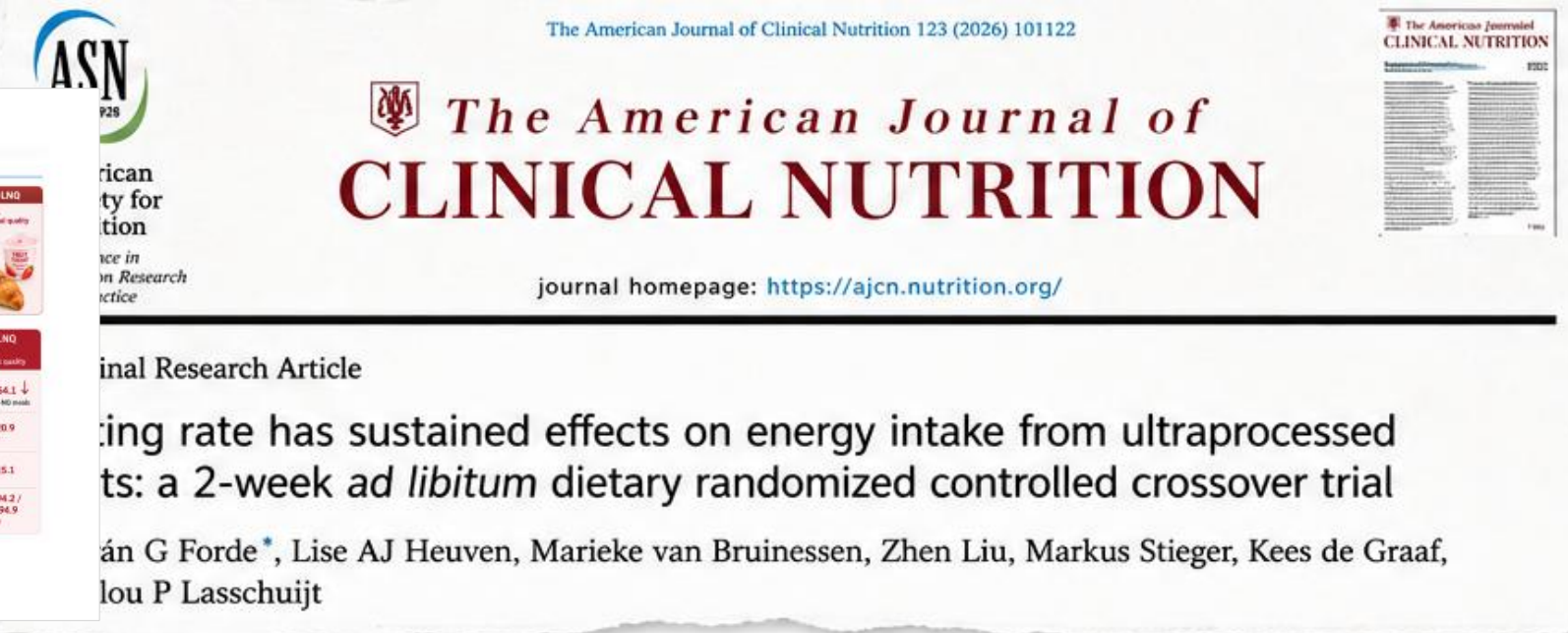


An **ad libitum** study is needed to test this hypothesis.

The role of eating rate

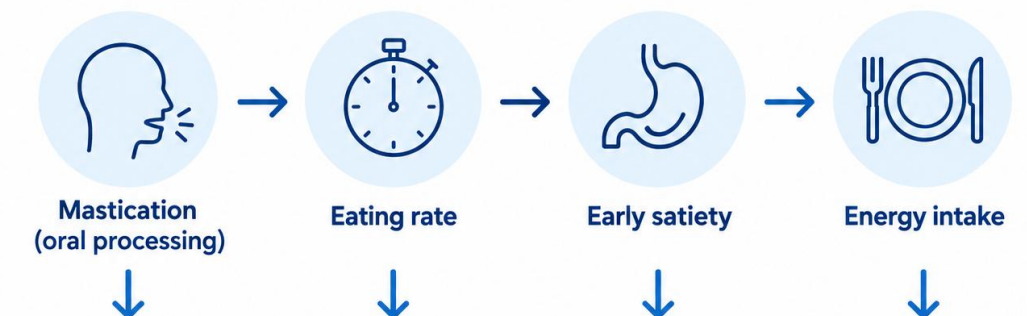
texture, velocity of ingestion e energy intake

the role of palatability



HYPOTHESIS

Greater oral processing (more chewing) → reduced eating rate and energy intake.



OUTCOMES MEASURED



The role of palatability



PARTICIPANTS

40 healthy young adults (age 24.7 ± 5.1 years; 70% women; BMI 25.3 ± 4.4 kg/m²)



STUDY DESIGN

Randomised crossover design.
Three ad libitum meals on separate days.



MEASUREMENTS

Appetite (before, after and every 30'), palatability (VAS), composite hedonic score (CHS).
Energy intake (EI), eating time (ET), eating rate (ER), energy intake rate (EIR), hunger, satiety, desire to eat (DTE).

3 BREAKFASTS COMPARED



	1. NUPF-HNQ Non-UPF, high nutritional quality	2. UPF-HNQ UPF, high nutritional quality	3. UPF-LNQ UPF, low nutritional quality
 ENERGY INTAKE (kcal)	585.7 ± 163	609.7 ± 151.8	503.0 ± 164.1 ↓ lower than high-NQ meals
 COMPOSITE HEDONIC SCORE (CHS, mm)	65.3 ± 22.9 higher	~ 60 intermediate	45.4 ± 20.9 lower
 ENERGY INTAKE RATE (kcal/min)	54.1 ± 18.4	67.7 ± 23.1 higher	50.1 ± 15.1
 HUNGER AND DESIRE TO EAT (mm*min)	98.4 ± 69.9 / 107.3 ± 70.3	~ similar	159.7 ± 94.2 / 168.2 ± 94.9 higher



Selection of foods
representative of the
UPF diet



Diet preparation
in UPF and minimally
processed versions
(isocaloric)

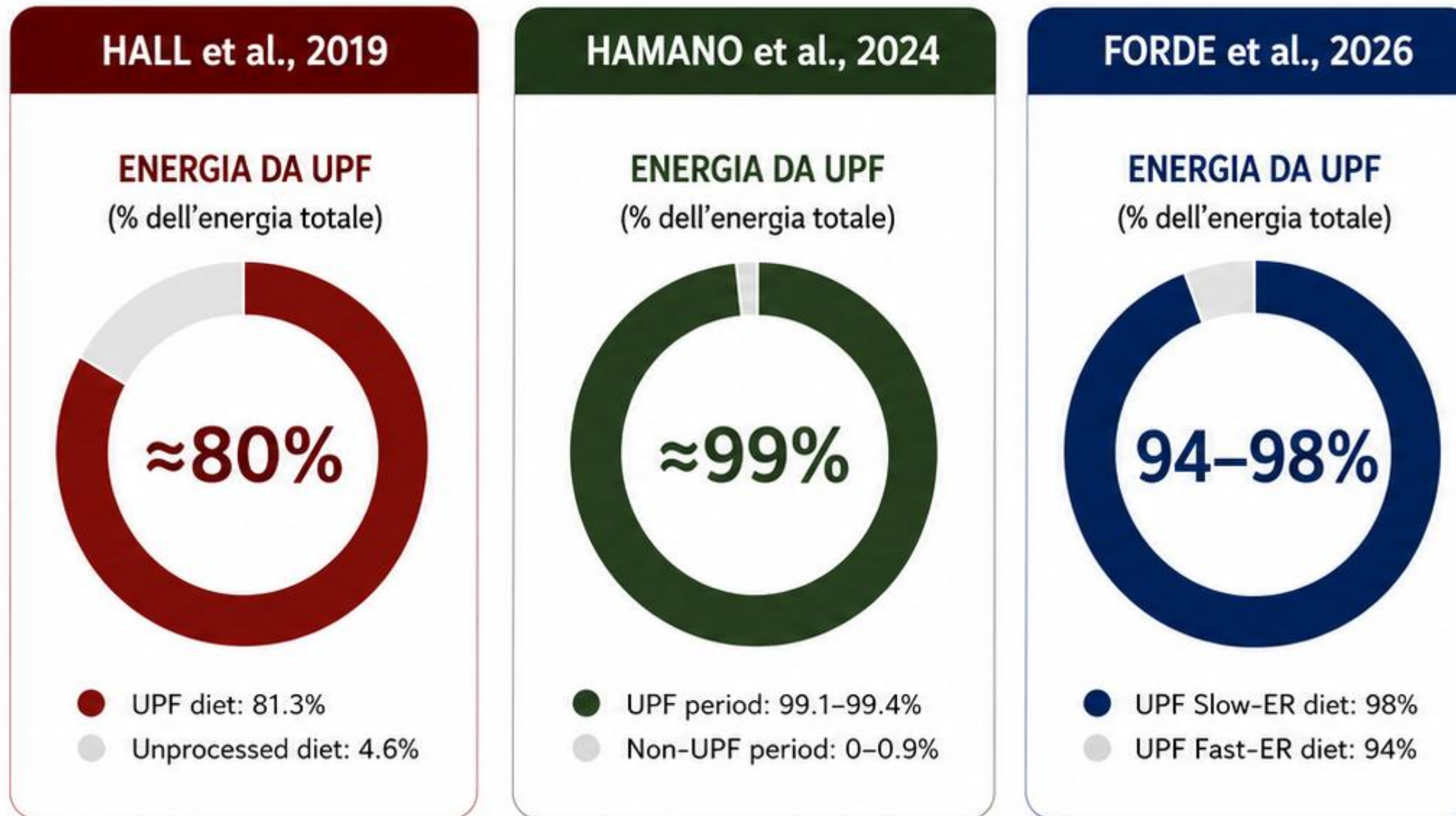


Administration
in a randomised
crossover design



Outcomes assessment
on appetite, satiety,
eating rate and
energy intake

From extreme exposure to a balanced model



UPF and diet quality

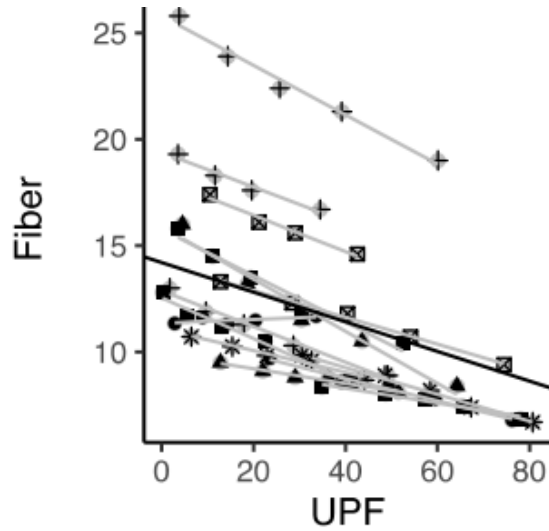
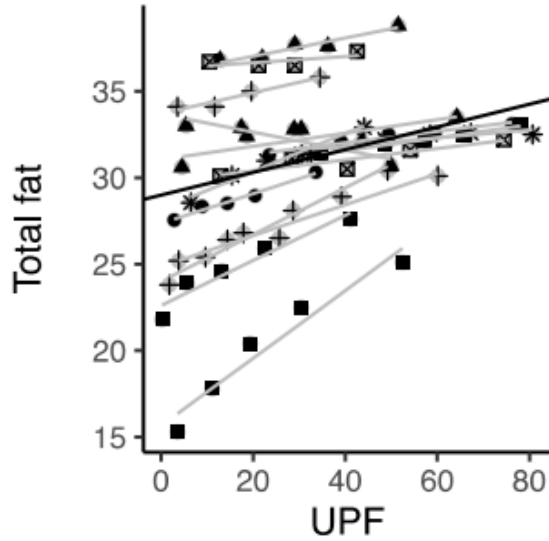
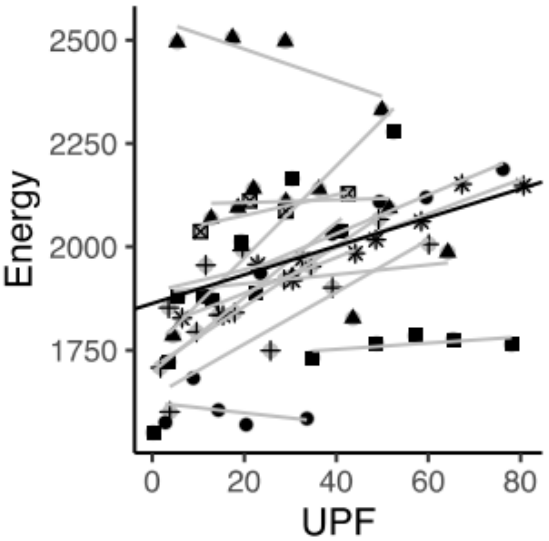


Review

Ultra-Processed Foods and Nutritional Dietary Profile: A Meta-Analysis of Nationally Representative Samples

Daniela Martini ^{1,†}, Justyna Godos ^{2,*,†}, Marialaura Bonaccio ³, Paola Vitaglione ⁴ and Giuseppe Grosso ²

Variable	Datasets (Studies)	Estimates (95% CI) in Categories of UPF Contribution			
Ultra-Processed Foods (%)		15% UPF	50% UPF	75% UPF	Slope
Energy (kcal)	14 (12)	1915.25 (1804.35; 2026.15)	2036.70 (1934.50; 2138.90)	2123.45 (2000.51; 2246.38)	3.47 (1.47; 5.47)
Nutrients					
Protein (%)	13 (11)	17.23 (15.95; 18.51)	15.19 (14.38; 16.01)	13.74 (12.84; 14.64)	−0.06 (−0.08; −0.03)
Carbohydrate (%)	13 (11)	48.29 (42.46; 54.12)	48.37 (42.65; 54.09)	48.43 (42.12; 54.74)	0.00 (−0.07; 0.08)
Total fat (%)	15 (13)	29.97 (27.58; 32.36)	32.27 (30.55; 33.98)	33.91 (32.41; 35.41)	0.07 (0.04; 0.10)
Saturated fats (%)	15 (13)	10.03 (8.94; 11.11)	11.65 (10.79; 12.50)	12.81 (11.95; 13.66)	0.05 (0.03; 0.06)
Trans fats (%)	3 (3)	0.70 (0.08; 1.33)	0.96 (−0.05; 1.98)	1.14 (−0.15; 2.44)	0.01 (0.00; 0.02)
Fiber (g/1000 kcal)	14 (12)	13.16 (11.00; 15.33)	10.73 (8.89; 12.57)	8.99 (7.26; 10.72)	−0.07 (−0.09; −0.05)



«Increased UPF intake correlated with an increase in free sugars, total fats, and saturated fats, as well as a decrease in fiber, protein, potassium, zinc, and magnesium, and vitamins A, C, D, E, B12, and niacin. In conclusion, the data indicate that increased UPF consumption negatively affects the nutritional quality of diets.»

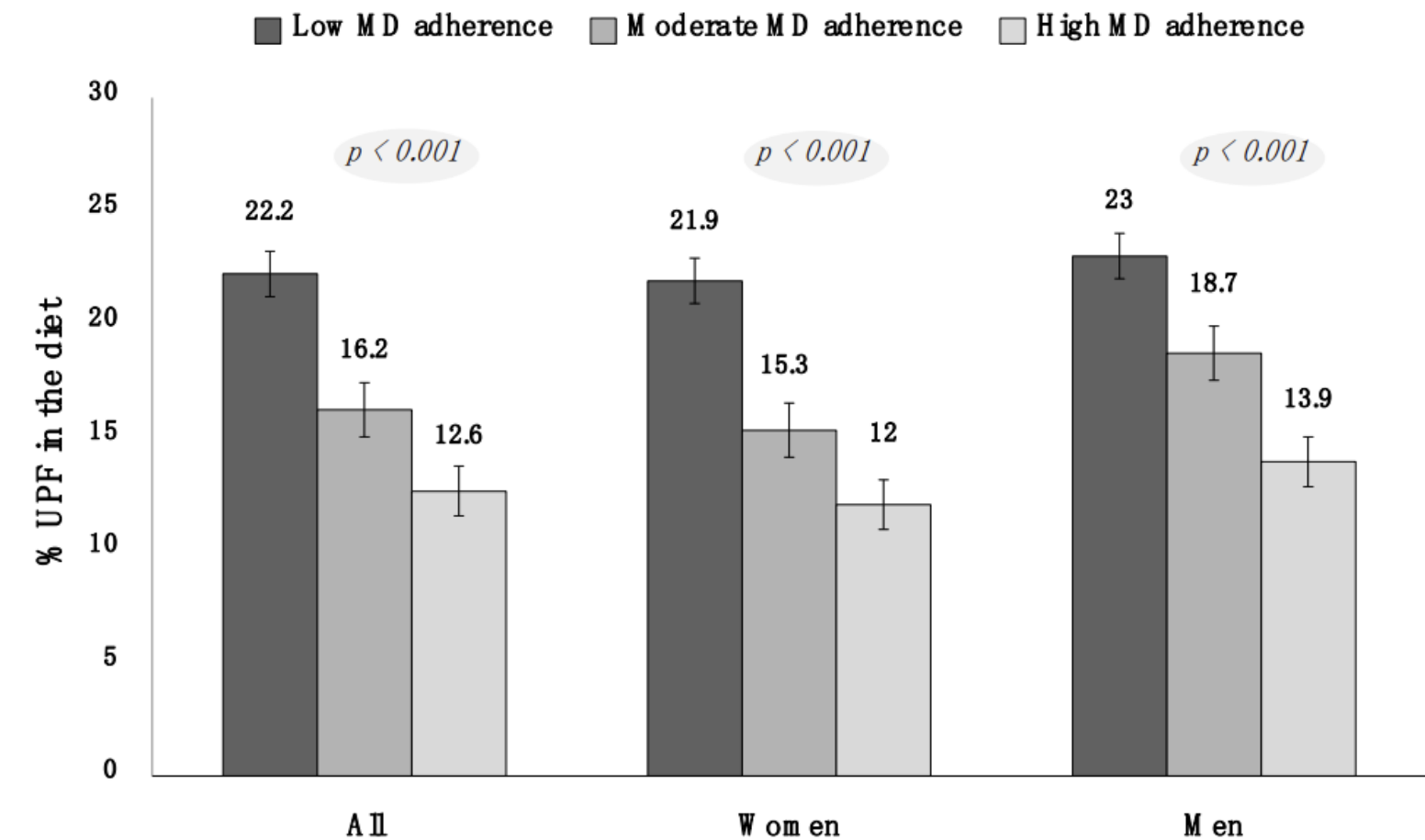
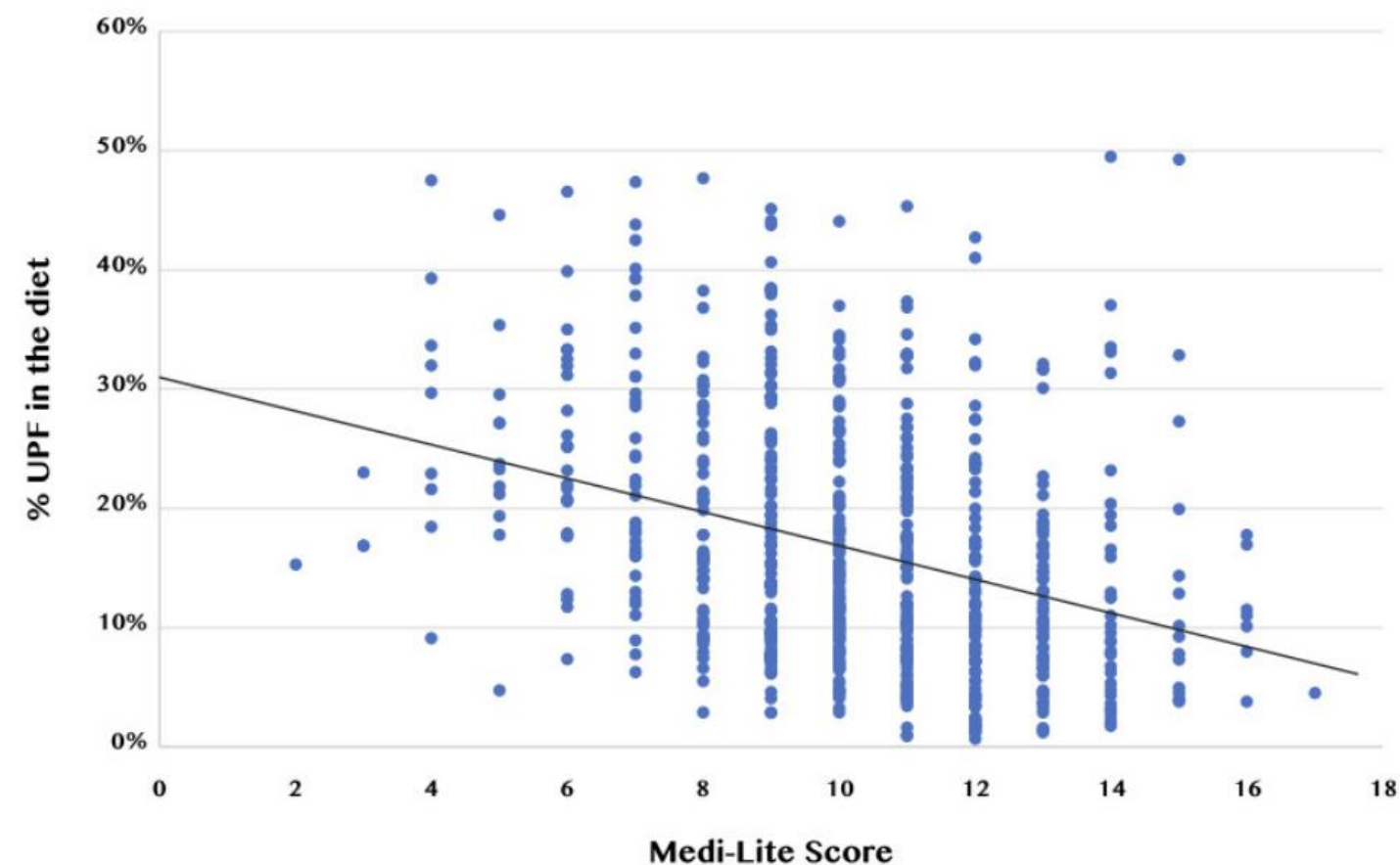
UPF and Mediterranean diet



Article

Consumption of Ultra-Processed Foods Is Inversely Associated with Adherence to the Mediterranean Diet: A Cross-Sectional Study

Monica Dinu ^{1,*} , Marta Tristan Asensi ¹, Giuditta Pagliai ¹, Sofia Lotti ¹, Daniela Martini ² , Barbara Colombini ¹ and Francesco Sofi ^{1,3}



«Participants with a low adherence to the MD had a significantly higher contribution of UPF in the diet (22.2%) compared to those with a moderate (16.2%) and high (12.6%) adherence.»

UPDATE: the first “balanced” trial

nature medicine

Article

<https://doi.org/10.1038/s41591-025-03842-0>

Ultraprocessed or minimally processed diets following healthy dietary guidelines on weight and cardiometabolic health: a randomized, crossover trial



NO PRIOR TRIAL
had evaluated UPF
within the context of national
dietary guidelines.



BOTH DIETS
followed the UK
Eatwell Guide.

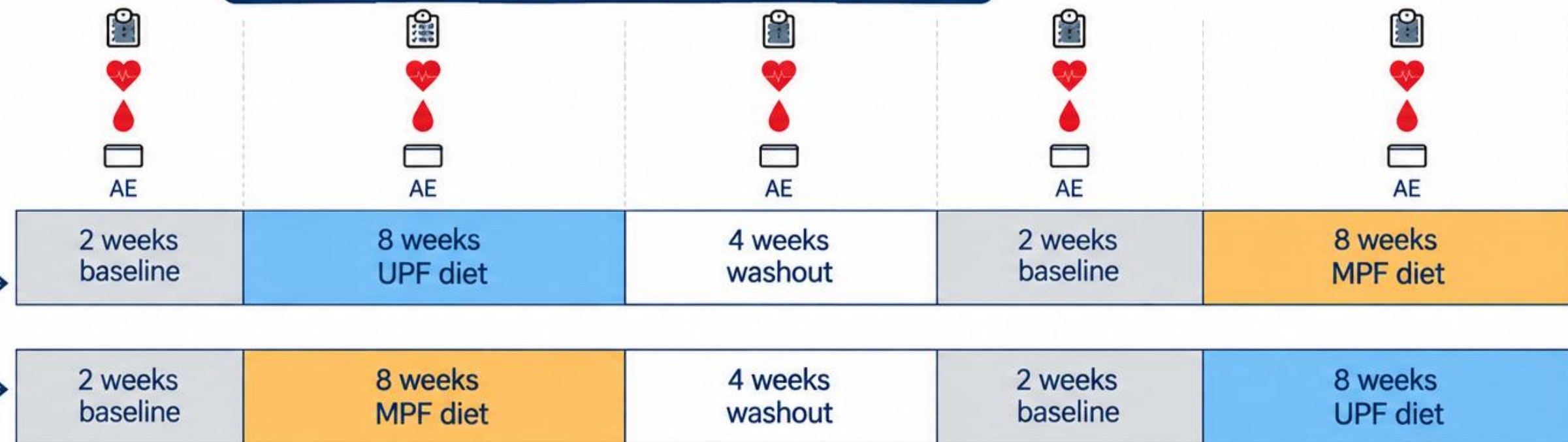


UPF vs MPF
within balanced
dietary patterns.

RANDOMIZED, CROSSOVER TRIAL

- Body weight and body composition
- Cardiometabolic markers (e.g. fasting glucose, PA)
- Blood biomarkers
- Adverse events
- Dietary assessments
- Questionnaires

Randomization
to sequence



Dicken et al., Nature Medicine 2026

The PROMENADE study

Role of ultra**PRO**cessed foods in **M**odulating the effect of
m**E**diterra**NeAn** Diet on human and planet **hE**alth – the PROMENADE study



To evaluate the effect of UPF inclusion, at different levels, within a Mediterranean diet on cardiometabolic health, circulating and gut biomarkers, environmental impact and food intake, under real-life conditions.

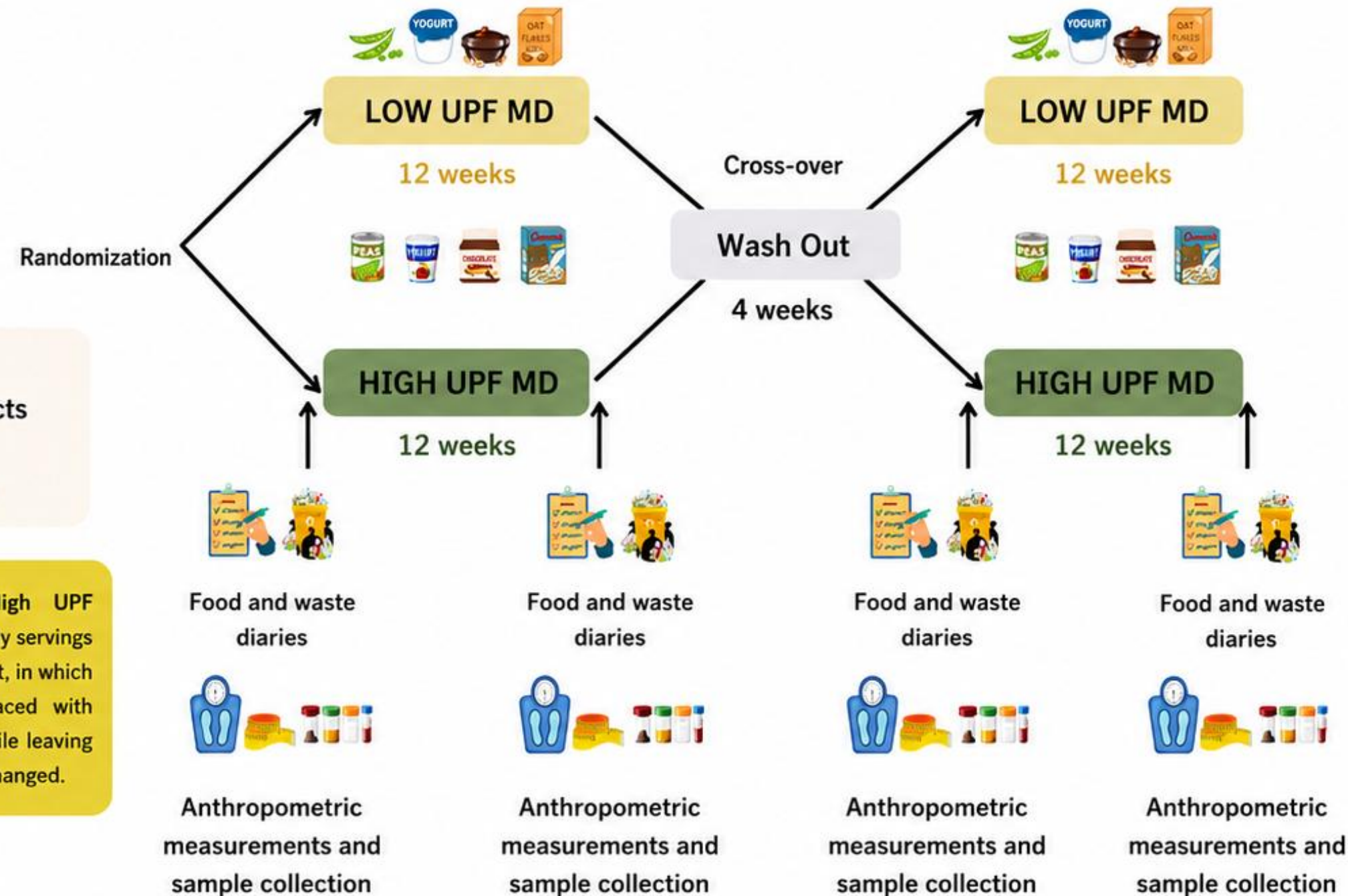


The PROMENADE study



ENROLLMENT:
50 clinically healthy subjects
with a low-to-moderate
cardiovascular risk profile

Subjects follow an isocaloric High UPF Mediterranean diet (including five daily servings of UPFs) or an isocaloric Low UPF diet, in which those five UPF servings are replaced with minimally processed alternatives, while leaving their baseline UPF consumption unchanged.



OUTCOMES

PRIMARY OUTCOME

- LDL-C

SECONDARY OUTCOMES

- Body weight and body composition
- Lipid profile
- Glucose profile
- Blood pressure
- Inflammation
- Intestinal permeability

EXPLORATORY OUTCOMES

- Gut microbiota (16S rRNA)
- Sustainability/waste
- Adherence
- Diet quality

Reflections

CRITICAL REVIEWS IN FOOD SCIENCE AND NUTRITION
<https://doi.org/10.1080/10408398.2026.2664043>



Taylor & Francis
by Informa

REVIEW ARTICLE

OPEN ACCESS

Check for updates

Is the experimental evidence on ultra-processed food and obesity reliable?

David S. Ludwig^{a,b,c,d}

^aDepartment of Pediatrics, Boston Children's Hospital, Boston, MA, USA; ^bDepartment of Pediatrics, Harvard Medical School, Boston, MA, USA; ^cDepartment of Nutrition, Harvard T.H. Chan School of Public Health, Boston, MA, USA; ^dSteno Diabetes Center Copenhagen, Herlev, Denmark

ABSTRACT

Public health experts have issued widespread calls to target ultra-processed foods (UPF) in nutrition policy to prevent obesity and other diet-related chronic diseases. Several short-term crossover feeding studies have examined the effects of UPF consumption on energy intake and body weight, but their findings remain inconclusive, largely due to methodological limitations and imprecision in the Nova classification used to define UPF exposure. Long-term data demonstrating the effectiveness of reducing UPF intake are lacking. Consequently, the available evidence does not establish a causal role of UPF consumption in obesity. Additional research is needed to determine whether UPF, as defined by Nova, exerts effects on energy intake and body weight beyond those attributable to established dietary factors such as energy density and nutrient composition.

KEYWORDS

Clinical trial methodology; diet; obesity; public health policy; scholarly debate



Available experimental evidence **does not establish a causal role** of UPF consumption in obesity.



Many short-term studies are limited by **methodological issues and imprecise Nova classification**, leading to inconclusive results.



Long-term data are lacking to demonstrate that reducing UPF intake improves body weight and health.



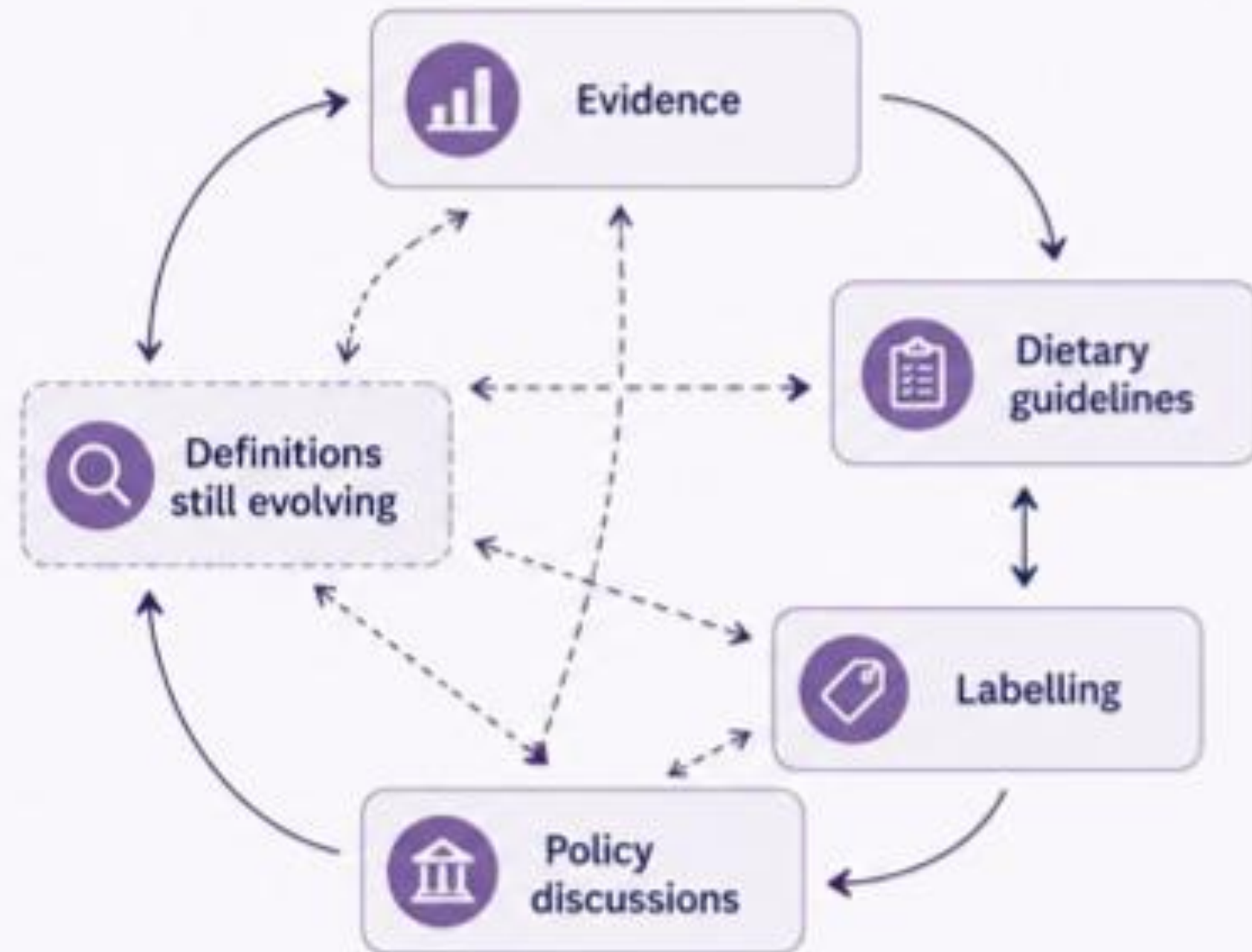
It is important to consider **well-established dietary factors**, such as energy density and nutrient composition.

From guidance to consumers

In an ideal world



Today's reality?



THANK
YOU!



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