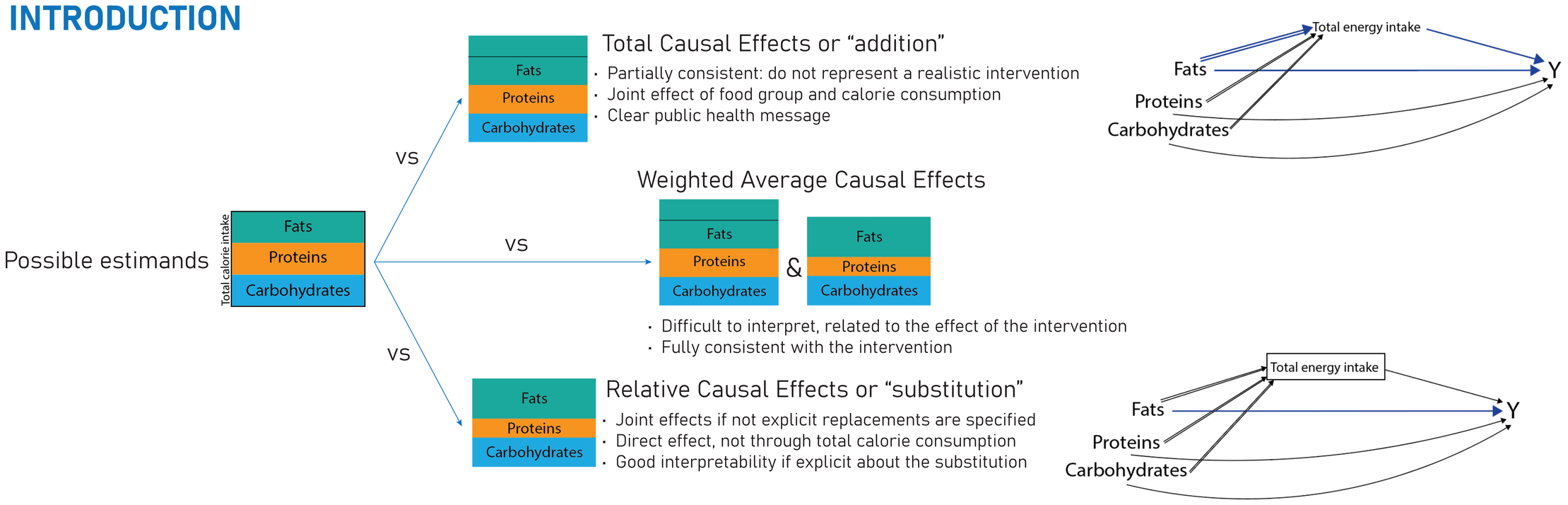
Targeting identifiable estimands for foods in Nutritional Epidemiology: a case-study on the relationship between dairy and cognition

Natalia Ortega[1,2], Fanny Villoz[3], Tommaso Filippini[4], Pedro Marqués-Vidal[5], Nicolas Rodondi[1,6], Patricia O. Chocano-Bedoya[1], Arnaud Chiolero[2]

[1] Bern Institute for Primary Health Care (BIHAM), University of Bern, 3012 Bern, Switzerland [2] Population Health Laboratory (#PopHealthLab), University of Fribourg, Fribourg, Switzerland [3] Service of Old Age Psychiatry, Department of Psychiatry, Lausanne University Hospital, University of Lausanne, Prilly, Switzerland [4] Department of Psychiatry, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland [5] Department of Medicine, Internal Medicine, Lausanne University Hospital, Lausanne, Switzerland [6] Department of General Internal Medicine, Inselspital University Hospital Bern, Bern, Switzerland

INTRODUCTION



METHODS

Case study

13 observational studies included in a previous systematic review on the relationship between dairy and cognition were analysed for estimand selection

Analysis in PsyColaus

· Adults >55 years old with an average follow-up of 5.6 years (n= 1,500)
· Exposure: Total dairy // Outcome: Mini-Mental State Examination

Statistical analysis

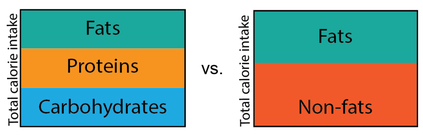
· All-components models to compute both additive and substitution effects to compute the estimates and bootstrapped the CIs.

$$\widehat{Cog} = \widehat{a_0} + \widehat{a_1}dairy + \widehat{a_2}veg + \widehat{a_3}fruits + \widehat{a_4}fish + \widehat{a_5}meat + \widehat{a_6}eggs + \widehat{a_7}grains + \widehat{a_8}alcohol + \widehat{a_9}sugary + \widehat{a_{10}}fats + covariates + \varepsilon$$

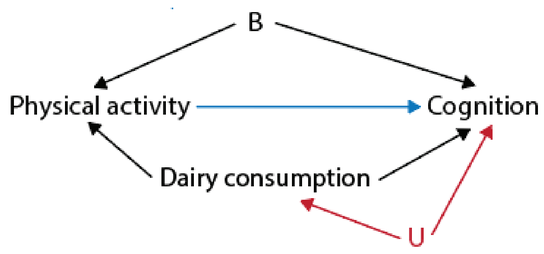
· Generalized additive models with flexible splines between age and cognitive function

RESULTS

· All but one (Ylirauri et al. 2020) were interpreted causally, so we assumed they were targeting a causal estimand.
· **None** were explicit about targeted causal estimand.
· The 13 studies were interpreted as total effects (the effect of adding an amount of food) and 10 adjusted for total energy (done for relative causal effects).
· Main issues:
  - Consistency:
    · Not explicit replacements
    · The estimand targeted does not have an application in the real world



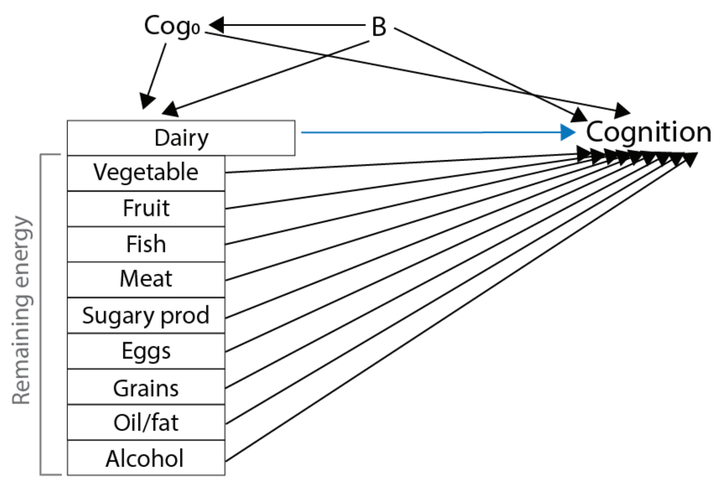
  - Exchangeability – table 2 fallacy, missing confounders



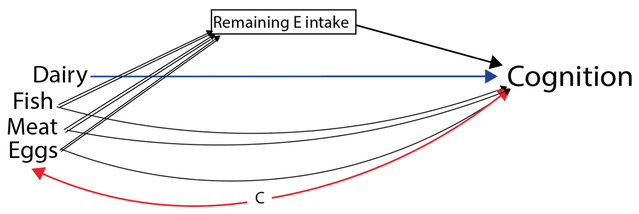
  - Positivity Pr[A = a|L = l] > 0

Overcoming some limitations

  - Relative causal effects with explicit replacements



  - Total causal effects without the effect of total calories by remaining energy adjustment



CONCLUSION

- Nutritional epidemiology studies should be explicit about their estimands
- We should only compare studies focusing on foods targeting the same causal estimands in systematic reviews and meta-analyses.
- Computing relative causal effects should make clear the food substitution
- Total causal effects should exclude energy from the food of interest and adjust for remaining energy if they do not aim at computing joint effects
- Positivity remains a problem
- Other levels of exposure (diets, nutrients) need different estimands.

#Pop Health Lab

BIHAM UNIVERSITÄT BERN

colaus psycolaus

Natalia Ortega