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Dietary Patterns

Reliability and Reproducibility of Systematic Reviews Informing the 2020–2025 Dietary Guidelines for Americans: A Pilot Study

Alexandra M. Bodnaruc, Hassan Khan, Nicole Shaver, Alexandria Bennett, Yiu Lin Wong, Catherine Gracey, Valentina Ly, et. al. *AJCN*, Vol. 121, Issue 1, Jan. 2025. doi.org/10.1016/j.ajcnut.2024.10.013. [Article link](#)

Background: Although high-quality nutrition systematic reviews (SRs) are important for clinical decision making, there remains debate on their methodological quality and reporting transparency. **Objectives:** The objective of this study was to assess the reliability and reproducibility of a sample of SRs produced by the Nutrition Evidence Systematic Review (NESR) team to inform the 2020–2025 Dietary Guidelines for Americans (DGAs). **Methods:** We evaluated a sample of 8 SRs from the DGA dietary patterns subcommittee for methodological quality using the Assessment of Multiple Systematic Reviews 2 (AMSTAR 2) tool and for reporting transparency using the PRISMA 2020 and PRISMA literature search extension (PRISMA-S) checklists. We assessed the quality and reproducibility of the original search strategy of one selected SR using the Peer Review of Electronic Search Strategies checklist. The reporting transparency of the SR's narrative data synthesis was assessed using the Synthesis Without Meta-Analysis (SWiM) checklist. Interpretation bias was evaluated using existing spin bias classifications in systematic reviews. **Results:** The AMSTAR 2 assessment identified critical methodological weaknesses, and all included SRs were judged to be of critically low quality. Overall, 74% of the PRISMA 2020 checklist items and 63% of the PRISMA-S checklist items were satisfactorily fulfilled. We identified several errors and inconsistencies in the search strategy and could not reproduce searches within a 10% margin of the original results. The SWiM assessment identified concerns regarding the reporting transparency of the narrative data synthesis, but the spin bias assessment revealed no evidence of interpretation bias. **Conclusions:** Several methodological quality and reporting concerns were identified, which could lead to reliability and reproducibility issues should a full reproduction attempt be made. However, additional research is needed to confirm the impact of these findings on conclusions statements and their generalizability across the NESR team SRs.

Carbohydrates

Types of Dietary Sugars and Carbohydrates, Cardiometabolic Risk Factors, and Risk of Diabetes: A Cohort Study from the General Danish Population

Marta Trius-Soler, Maja Bramming, Majken K. Jensen, Janne S. Tolstrup & Marta Guasch-Ferré, *Nutrition Journal*, Vol. 24, Art. Number: 8, 16 Jan. 2025. doi.org/10.1186/s12937-025-01071-2. [Article link](#)


Background: The role of carbohydrates in diabetes risk is of particular interest due to conflicting results. This study aims to examine the prospective association between types of dietary carbohydrates (fiber, starch, total sugar, glucose, fructose, lactose, maltose, and added sugar) and the risk of diabetes. Further, this study examines the cross-sectional associations between these nutrients and cardiometabolic risk factors. **Methods:** Danish Health Examination Survey (2007–2008) investigated 76,484 Danes in a representative sample using online questionnaires. Dietary information using a food frequency questionnaire was obtained from 42,836 participants. Information on incident cases of diabetes was obtained from the Danish National Diabetes Register. Cox proportional hazard models were used to estimate Hazard Ratios (95% CI). Multiple linear regression analyses were used to assess the associations between carbohydrate types and cardiometabolic risk factors measured in a subsample of 12,977 participants. **Results:** During a median follow-up of 4.9 years, 970 participants developed diabetes. A higher consumption of fructose, but a lower consumption of glucose was associated with a lower risk of diabetes. In subgroup analyses, these associations were only significant among individuals with other risk

factors, such as older age, obesity, low fiber consumption, sedentary behavior, smoking status, and hypertension. Participants with a higher intake of fiber tend to have a lower risk of diabetes and healthier anthropometric parameters compared to those with a lower intake. **Conclusions:** Our findings suggest that a higher intake of dietary fiber and fructose is associated with a lower risk of diabetes and healthier metabolic status, while higher glucose intake is associated with a higher diabetes risk.

Protein

Exploring Opportunities to Better Characterize the Effects of Dietary Protein on Health across the Lifespan

Carbone JW, Phillips SM, Weaver CM, Hughes JM, Pasiakos SM. *Advances in Nutrition*. Vol. 16, Issue 1, Jan 2025, doi.org/10.1016/j.advnut.2024.100347. [Article link](#)

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Remarkable advances have been made over the last 30 y in understanding the role of dietary protein in optimizing muscle health across the lifespan. That is, acute (<24 h) stable isotope-derived measures of muscle protein synthesis have led to established recommendations for protein quantity, quality, source, and timing of protein ingestion to support muscle health at rest, post exercise, and to overcome age-related anabolic resistance in older adults. Although muscle health is undoubtedly important, moving from muscle to other associated or disease-specific outcomes is a critical next step for the field, given the mounting evidence documenting the effects of dietary protein on measures of chronic disease and age-related decline (for example, cardiovascular disease, type 2 diabetes mellitus, obesity, frailty, and osteoporosis). In this narrative review, we posit that future studies evaluating the potential role of dietary protein build off of the existing knowledge base generated from decades of past research and focus their efforts on closing unanswered knowledge gaps pertaining to dietary protein and health across the lifespan. Throughout this review, we highlight potential methodologies and novel outcome measures that researchers may consider as starting points to facilitate the next 30 y of advances in the field of dietary protein and health.

Comparison of the Effectiveness of Protein Supplementation Combined with Resistance Training on Body Composition and Physical Function in Healthy Elderly Adults: A Systematic Review and Network Meta-Analysis

Haiping Tian, Wanwan Qiao, Xianxiu Wen. *Journal of Nutrition*. Jan. 29, 2025. DOI: 10.1016/j.tjn.2025.01.017. [Article link](#)

Background: The global population of individuals over 65 is expected to reach 426 million by 2050. Aging is associated with a progressive loss of muscle mass, strength, and function, leading to sarcopenia and adverse outcomes such as physical disability and increased mortality. Interventions such as resistance training and protein supplementation have shown promise in mitigating these effects. **Objective:** To determine the comparative effectiveness of protein supplementation, resistance training, and their combination on body composition and physical function in healthy older adults through a network meta-analysis. **Methods:** We conducted a systematic review and network meta-analysis following PRISMA guidelines and registered in PROSPERO (CRD42021226561). We included randomized controlled trials comparing protein supplementation, resistance training, and their combination in participants aged 50 years or older. Data were extracted from PubMed, Web of Science, Embase, and Cochrane Library. The risk of bias was assessed using the Cochrane Collaboration Risk of Bias Tool. **Results:** A total of 38 randomized controlled trials involving 2,610 participants were included. The combined intervention of protein supplementation and resistance training significantly improved lean body mass (SMD, 0.44; 95% CI, 0.05 to 0.95) compared to protein supplementation alone. The combined intervention also showed significant improvements in muscle mass (SMD, 1.49; 95% CI, 0.11 to 2.67). The combined intervention (SMD, 2.74, 95% CI 0.76 to 4.74) and resistance training alone (SMD, 2.53, 95% CI 0.29 to 4.84) significantly improved muscle strength compared to controls. The combined intervention (SMD, 4.98, 95% CI 2.72 to 7.17) and resistance training alone (SMD, 4.52, 95% CI 2.30 to 6.64) significantly improved physical function compared to protein supplementation alone. **Conclusion:** Combining exercise and protein supplementation is the most effective for improving muscle mass, strength, and physical function in older adults. This approach should be considered for enhancing physical health in this population. Future large-scale trials are necessary to confirm these findings.

Food Classification

A Meal with Ultra-Processed Foods Leads to a Faster Rate of Intake and to a Lesser Decrease in the Capacity to Eat When Compared to a Similar, Matched Meal Without Ultra-Processed Foods

Maria Bárbara Galdino-Silva, Karine Maria Moreira Almeida, Ana Debora Santos de Oliveira, João Victor Laurindo dos Santos, Mateus de Lima Macena, Dafiny Rodrigues Silva, Micnéias Roberth Pereira, et. al. *Nutrients* Dec. 2024, 16, 4398. doi.org/10.3390/nu16244398. [Article link](#)

Background/Objectives: It is unknown whether the negative health effects associated with ultra-processed foods (UPFs) are due to their nutritional composition or to the extent of food processing itself. We evaluated the impact of a test meal composed only of UPF, according to the NOVA classification, compared to a similar meal without UPF in adults with obesity. **Methods:** This is a parallel, randomized trial. Adult individuals with obesity, according to BMI, % body fat, and/or waist circumference were included. Individuals ate one out of two test meals, matched for energy density, macronutrients, sodium, and fiber, differing in NOVA classification, as a breakfast after a 12-h fast. The rate of intake, appetite, satiety hormones, energy expenditure, and autonomic function were measured. Data were analyzed using mixed analysis of variance. **Results:** Forty-two individuals were included. We found a significantly faster intake rate ($07:52 \pm 3:00$ vs. $11:07 \pm 03:16$ min), with less chewing and bites, and greater capacity to eat (39.68 ± 22.69 vs. 23.95 ± 18.92 mm) after the UPF meal, without observed differences in the metabolic outcomes. In an exploratory analysis, after adjusting by sex, leptin levels showed a greater decrease after the test meal in the control group. **Conclusions:** Although we found a faster intake rate in the UPF meal, only marginal effects were found on the participants' capacity to eat after the UPF meal. The high similarity between meals, despite differences according to the NOVA classification, may explain these results. As our study was small, these findings require further investigation.

Low- and No-Calorie Sweeteners

Educational Intervention Boosts Dietitians' Knowledge of the Safety and Approval of Low- and No-Calorie Sweeteners

Alissa A. Nolden, James Makame. *Nutrients* 2025, 17(1), 32; doi.org/10.3390/nu17010032. [Article link](#)



This research was supported by IAFNS [Low- and No-Calorie Sweeteners Committee](#)

Background/Objectives: Low- and no-calorie sweeteners (LNCSs) provide sweetness in food applications that are suggested to support consumers' reduced consumption of caloric sweeteners and added sugar intake. Consumers seek guidance and advice on using LNCSs from healthcare providers, including dietitians and nutritionists. However, prior research suggests there may be inconsistent guidance on the use of LNCSs. The main goal is to assess dietitians' and nutritionists' perceptions and knowledge of LNCSs. We also evaluate the impact of educational intervention on the perceptions and knowledge of low- and no-calorie sweeteners (LNCSs) among healthcare professionals. **Methods:** Participants completed an online questionnaire on their perceptions of LNCSs before and after viewing a webinar given by a member of the FDA on the safety and approval process of LNCSs. A total of 187 participants completed the pre-questionnaire, and 58 participants completed the post-questionnaire. **Results:** The LNCSs most familiar to participants was aspartame, followed by stevia, with thaumatin, advantame, and neotame being the least familiar sweeteners. While all sweeteners were FDA-approved, there were differences in perceived safety and suitability for dietary use. Following the intervention, there was a significant improvement in the participant's knowledge, understanding, and confidence in the safety and approval process of LNCSs and reduced negative perceptions of LNCSs on health. **Conclusions:** With nutritionists and dietitians being the primary sources of nutritional guidance, consumers may seek their recommendations regarding using LNCSs. However, this study revealed differences in suitability across FDA-approved LNCSs and a lack of confidence regarding the safety and approval process. Education programs regarding the safety and approval process of LNCSs increase confidence in advising patients and clients on the use of LNCSs.

Classifying Sources of Low- and No-Calorie Sweeteners within the Canadian Food Composition Database

Lesley Andrade, Isabelle Rondeau, Allison C. Sylvetsky, Sanaa Hussain, Navreet Singh, Michael P. Wallace, Kevin W. Dodd. *JFCA*, Vol. 138, Feb. 2025. doi.org/10.1016/j.jfca.2024.106992. [Article link](#)

Low- and no-calorie sweeteners are sugar substitutes that impart sweetness. Examining exposure to low- and no-calorie sweeteners is challenging because the amounts of sweeteners in food and beverage products are not standard elements of food composition databases. We identified food codes representing sources of low- and no-calorie sweeteners in the food composition database used for Canadian surveillance data using multiple approaches. First, food code descriptions were searched for keywords (e.g. low calorie) potentially representing low and no-calorie sweeteners. Next, the U.S. Food and Nutrient Database for Dietary Surveys food code descriptions, matched to food codes within the Canadian database, were examined for keywords representing confirmed sweetener sources. Finally, using websites for three Canadian grocers, ingredient lists for brand-specific products were examined for sources of low- and no-calorie sweeteners. Recipe codes often required an examination of ingredient-level food codes. Of 5180 food codes, 76 were classified as sources of low- and no-calorie sweeteners and an additional 46 recipe codes were identified as containing a source of sweetener. The classification system can be applied to national survey data to describe exposure to low- and no-calorie sweeteners and identify key sources of sweeteners. Standardized identification of food codes as sources of low- and no-calorie sweeteners will contribute to an evidence base that can be synthesized to inform nutrition policy.

Cognitive Health

The Impact of Continuous Calorie Restriction and Fasting on Cognition in Adults without Eating Disorders

John O'Leary, Chloé Georgeaux-Healy, Lucy Serpell. *Nutrition Reviews*, Vol. 83, Issue 1, Jan. 2025, doi.org/10.1093/nutrit/nuad170. [Article link](#)

Research into the effects of calorie restriction continues to intrigue those interested in whether it may allow humans to live longer and healthier lives. Animal studies of continuous calorie restriction (CCR) and fasting have demonstrated substantial advantages to health and longevity. However, concerns remain about the impact of restricting calorie intake on human health and cognition. Given the emerging evidence of cognitive impairments in eating disorders, studies investigating restricted calorie intake in healthy humans (in an ethical way) may also have implications for understanding restrictive eating disorders. In this review, the published literature on the impact of CCR and fasting on cognitive function in healthy human participants is synthesized. Of the 33 studies of CCR and fasting in humans identified, 23 demonstrated significant changes in cognition. Despite variation across the cognitive domains, results suggest CCR benefits inhibition, processing speed, and working memory, but may lead to impairments in cognitive flexibility. The results of fasting studies suggest fasting is associated with impairments in cognitive flexibility and psychomotor abilities. Overall, the results of these studies suggest the degree (ie, the severity) of calorie restriction is what most likely predicts cognitive improvements as opposed to impairments. For individuals engaging in sustained restriction, this may have serious, irreversible consequences. However, there are mixed findings regarding the impact of CCR and fasting on this aspect of human functioning, suggesting further research is required to understand the costs and benefits of different types of calorie restriction.

Lipids

Changes in Fatty Acid Intake and Subsequent Risk of All-Cause and Cause-Specific Mortality in Males and Females: A Prospective Cohort Study

Yuxi Liu, Xiao Gu, Yanping Li, Eric B. Rimm, Walter C. Willett, Meir J. Stampfer, Frank B. Hu. *AJCN*, Vol. 121, Issue 1, Jan. 2025. DOI: 10.1016/j.ajcnut.2024.11.012. [Article link](#)

Background: The associations between changes in fatty acid intake over time and subsequent mortality are unclear. **Objectives:** The objective of this study was to prospectively examine associations between changes in fatty acid intake (as percentage of total energy) and mortality. **Methods:** Among 65,179 adults from the Nurses' Health Study and Health Professionals Follow-up Study, free from cardiovascular disease, cancer, and diabetes at baseline in 1994, we documented 20,571 deaths through 2020 (1,334,603 person-years). Diets were assessed every 4 years using validated questionnaires. Hazard ratios (HRs) and 95% confidence intervals (CIs) for mortality risk were estimated from Cox proportional hazards models. **Results:** A 5% energy increment in total fat intake was associated with 5% lower all-cause mortality (HR: 0.95; 95% CI: 0.93, 0.96; isocaloric comparison was total carbohydrate). The HRs of all-cause mortality (95% CI) were 0.83 (0.78, 0.89) and 0.91 (0.87, 0.94) for a 5% increment in energy intake from polyunsaturated fatty acid (PUFA) and monounsaturated fatty acid (MUFA), respectively, and was 1.10 (1.04, 1.17) for a 1% increase in

energy intake from trans fatty acid (TFA; all $P_{trend} \leq 0.001$). Changes in saturated fatty acid (SFA) were not associated with all-cause mortality. Increases in intakes of linoleic acid, marine n-3 PUFA, and MUFA from plant sources were each significantly associated with lower all-cause mortality. In substitution analyses, replacing 5% energy from SFA with PUFA was associated with 19% lower all-cause mortality (HR: 0.81; 95% CI: 0.75, 0.87), whereas replacing 0.3% of energy from SFA with marine n-3 PUFA was associated with 11% lower all-cause mortality (HR: 0.89; 95% CI: 0.84, 0.93). Isocaloric substitution of SFA by PUFA, particularly marine n-3 PUFA, was associated with lower mortality due to cardiovascular, neurodegenerative, and respiratory diseases. **Conclusions:** These findings support replacing SFA with unsaturated fatty acids (especially from plant sources) and eliminating dietary TFA to reduce premature death.

Sodium

Potassium-Based Sodium Substitutes Impact the Sodium and Potassium Content of Foods

Kelly Picard, Diana R. Mager, Peter A. Senior, Caroline Richard. *Jrn of Renal Nutrition*. Vol. 35, Issue 1, Jan. 2025. doi.org/10.1053/j.jrn.2024.05.010. [Article link](#)

Objective: Potassium-based sodium substitutes (PBSS) can be used to replace sodium during food processing. How potassium and sodium content is associated with PBSS is not known. The objectives of the study were to describe the prevalence of PBSS by sodium content claim category and describe how PBSS are associated with sodium and potassium concentrations by sodium level. **Design and Methods:** This cross-sectional analysis used the July 2018 version of the United States Department of Agriculture's Branded Food Products Database. Products were divided into sodium content claim category and were analyzed for the presence of PBSS. Products with non-missing values for sodium and potassium were grouped by sodium level and analyzed for the prevalence of PBSS to explore potassium and sodium concentration. Column proportion z-test with the Bonferroni correction was used to explore the occurrence of PBSS by sodium content claim category. Mann-Whitney U-test was used to assess differences in potassium and sodium concentrations across sodium levels and within levels by the presence/absence of PBSS. **Results:** The prevalence of PBSS in the categories "without a sodium content claim" (2.4%), "lightly salted" (0.5%), and "unsalted" claims (0.6%) were statistically significantly lower than prevalence of PBSS in the "sodium free" (9.5%), "low sodium" (10.3%), and "reduced sodium" claim categories (23.3%; all $P < .01$). Among the group of products with serving sizes more than 30 g containing PBSS, there was a 357 mg per serving higher median sodium concentration and a 160 mg per serving higher median potassium concentration compared to the group without PBSS (both $P < .01$). **Conclusion:** In the "reduced sodium" claim category, a higher prevalence of PBSS was found compared to other sodium claim categories. The presence of PBSS was associated with higher potassium and sodium concentrations in foods.

Gut Health

Cardiometabolic Benefits of a Non-Industrialized-Type Diet are Linked to Gut Microbiome Modulation

Fuyong Li, Anissa M. Armet, Katri Korpela, Junhong Liu, Rodrigo Margain Quevedo, Francesco Asnicar, Benjamin Seethaler. *Cell*. Jan. 23, 2025, DOI: 10.1016/j.cell.2024.12.034. [Article link](#)

Industrialization adversely affects the gut microbiome and predisposes individuals to chronic non-communicable diseases. We tested a microbiome restoration strategy comprising a diet that recapitulated key characteristics of non-industrialized dietary patterns (restore diet) and a bacterium rarely found in industrialized microbiomes (*Limosilactobacillus reuteri*) in a randomized controlled feeding trial in healthy Canadian adults. The restore diet, despite reducing gut microbiome diversity, enhanced the persistence of *L. reuteri* strain from rural Papua New Guinea (PB-W1) and redressed several microbiome features altered by industrialization. The diet also beneficially altered microbiota-derived plasma metabolites implicated in the etiology of chronic non-communicable diseases. Considerable cardiometabolic benefits were observed independently of *L. reuteri* administration, several of which could be accurately predicted by baseline and diet-responsive microbiome features. The findings suggest that a dietary intervention targeted toward restoring the gut microbiome can improve host-microbiome interactions that likely underpin chronic pathologies, which can guide dietary recommendations and the development of therapeutic and nutritional strategies.

Emerging Science Areas

Emerging Areas : GLP-1-Based Treatment

Mapping the Effectiveness and Risks of GLP-1 Receptor Agonists

Yan Xie, Taeyoung Choi, Ziyad Al-Aly. *Nature Medicine*, 20 Jan. 2025. doi.org/10.1038/s41591-024-03412-w. [Article link](#)

Glucagon-like peptide 1 receptor agonists (GLP-1RAs) are increasingly being used to treat diabetes and obesity. However, their effectiveness and risks have not yet been systematically evaluated in a comprehensive set of possible health outcomes. Here, we used the US Department of Veterans Affairs databases to build a cohort of people with diabetes who initiated GLP-1RA (n = 215,970) and compared them to those who initiated sulfonylureas (n = 159,465), dipeptidyl peptidase 4 (DPP4) inhibitors (n = 117,989) or sodium–glucose cotransporter-2 (SGLT2) inhibitors (n = 258,614), a control group composed of an equal proportion of individuals initiating sulfonylureas, DPP4 inhibitors and SGLT2 inhibitors (n = 536,068), and a control group of 1,203,097 individuals who continued use of non-GLP-1RA antihyperglycemics (usual care). We used a discovery approach to systematically map an atlas of the associations of GLP-1RA use versus each comparator with 175 health outcomes. Compared to usual care, GLP-1RA use was associated with a reduced risk of substance use and psychotic disorders, seizures, neurocognitive disorders (including dementia), coagulation disorders, cardiometabolic disorders, infectious illnesses and several respiratory conditions. There was an increased risk of GI disorders, hypotension, syncope, arthritis, nephrolithiasis, interstitial nephritis and drug-induced pancreatitis associated with GLP-1RA use. The results provide insights into the benefits and risks of GLP-1RAs and may be useful for informing clinical care and guiding research agendas.

Engage with IAFNS

Emerging Leaders Award

We are establishing an IAFNS Emerging Leaders Award to promote excellence in the food safety and nutritional sciences as evidenced by research, leadership, initiative, collaboration, and communication. There are two awards, one for food safety and one for nutritional science.

- Applications are due February 14, 2025
- <https://iafns.org/iafns-emerging-leaders-award/>

Workshop on Science-Based Principles for Food Classification Focused on Processing and Formulation to Support Public Health

The IAFNS Working Group on Food Classification has initiated a project focused on the development of Science-Based Principles for Classifying Foods Based on Processing and Formulation – to Support Public Health. The goal of this effort is to deliver statements (Principles) which researchers can agree are representative of the evidence required to classify foods based on processing and formulation.

- We are pleased to offer an opportunity for an expanded audience to participate in the Workshop by supporting remote attendee/online attendee options.
- <https://iafns.org/event/workshop-on-science-based-principles-for-food-classification/>



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