



June 2024

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Dietary Patterns

The Quality of Lunches Brought from Home to School: A Systematic Review and Meta-Analysis

Siwan Song, Elizabeth Tabares, Ariun Ishdorj, Molly Crews, Jayna Dave. *Adv Nutr.* 2024 Jun 12:100255. doi: 10.1016/j.advnut.2024.100255. [Article link](#)

This systematic review and meta-analysis, spanning studies published between 1995 and 2021, investigates various aspects of lunches brought from home (LBFH) to school by children. These meals, in contrast to those provided by the National School Lunch Program (NSLP), lack strict nutritional standards. Despite the availability of NSLP lunches, ~40% of US children opt for LBFH. This review aims to assess the food content and nutritional quality of LBFH, their adherence to NSLP standards in terms of nutrition and cost, effectiveness of intervention programs designed to enhance their nutritional quality and parental and student perceptions of LBFH. The comprehensive literature search yielded 28 eligible papers, with 16 included in meta-analysis. LBFH commonly include fruits (50%), yet vegetables (17%) and dairy (25%) are less prevalent. They frequently contain snacks (50%), sweets (48%), and sugar-sweetened beverages (31%). Compared with school lunches, LBFH exhibit lower levels of calcium, protein, iron, fiber, and vitamin A, and higher levels of carbohydrates and saturated fat. Intervention programs had no effect on quality of LBFH. On average, LBFH (\$1.81) cost slightly less than lunches served at school (\$1.98), without accounting for free/reduced-price meals in the calculation. The cost of school lunch for pre-k and kindergarten children became \$11.32, nearly 4 times higher than that of LBFH (\$2.92), after replicating the meal at home and accounting for meal preparation time. Parents preferred LBFH over school lunches because of concerns related to the quality of school meals served. This study concludes that LBFH are generally less nutritious compared with lunches provided by NSLP. Future research needs to further explore ways to improve parent perception of NSLP. Especially with many states making free meals available to all children, identifying effective ways in promoting and increasing NSLP participation can ensure more children have access to nutritionally balanced and affordable lunches

Factors Associated with Daily Fruit and Vegetable Intakes among Children Aged 1-5 Years in the United States

Adi Noiman, Seung Hee Lee, Kristin J Marks, Mary Ellen Grap, Carrie Dooyema, Heather C Hamner. *Nutrients* 2024 3:6;16(5):751. DOI: 10.3390/nu16050751. [Article link](#)

To describe child, caregiver, and household characteristics associated with fruit and vegetable intakes among US children aged 1-5 years, we examined fruit and vegetable intakes (less than daily vs. daily) using data from the 2021 National Survey of Children's Health among children aged 1-5 years. Multiple logistic regression provided adjusted odds ratios for factors associated with (1) daily fruit and (2) daily vegetable intakes. Among children aged 1-5 years, 68% (n = 11,124) consumed fruit daily, and 51% (n = 8292) consumed vegetables daily. Both daily fruit and daily vegetable intake were associated with child age, child race and ethnicity, and frequency of family meals. For example, children who ate a family meal 4-6 days/week (aOR 0.69; 95% CI 0.57, 0.83) or 0-3 days/week (aOR 0.57; 95% CI 0.46, 0.72) were less likely to consume fruit daily compared to children who had a family meal every day. Participation in food assistance programs, food insufficiency, and household income were not significantly associated with odds of daily fruit or daily vegetable intake in the adjusted models. Several factors were associated with daily fruit and vegetable intake among children aged 1-5. Strategies aimed at increasing fruit and vegetable consumption in early childhood may consider these child, caregiver, and household characteristics. Pediatric healthcare providers, early childhood education centers, and families of young children may be important partners in this work.

Carbohydrates

National Policies to Limit Food Marketing and Competitive Food Sales in Schools: A Global Scoping Review

Michelle Perry, Kayla Mardin, Grace Chamberlin, Emily A Busey, Lindsey Smith Taillie, Francesca R Dillman Carpentier, Barry M Popkin. *Adv Nutr.* 2024 Jun 12:100254. doi: 10.1016/j.advnut.2024.100254. [Article link](#)

School food environments contribute to children's nutritional intake and overall health. As such, the World Health Organization and other public health organizations encourage policies that restrict children's access and exposure to foods and beverages that do not build health in and around schools. This global scoping review explores the presence and characteristics of policies that restrict competitive food sales and marketing for unhealthy foods across 193 countries using evidence from policy databases, gray literature, peer-reviewed literature, and primary policy documents. Policies were included if they were nationally mandated and regulated marketing and/or competitive foods in the school environments. Worldwide, only 28% of countries were found to have any national-level policy restricting food marketing or competitive food sales in schools: 16% of countries restrict marketing, 25% restrict competitive foods, and 12% restrict both. Over half of policies were found in high-income countries. No low-income countries had either policy type. Eight marketing policies (27%) and 14 competitive foods policies (29%) lacked explicit guidelines for either policy monitoring or enforcement. Future research is needed to assess the prevalence of policies aimed at improving other key aspects of the school food environment, such as dietary quality of school meals or food procurement, as well as assess the implementation and efficacy of existing policies.

Impact of Fibre Supplementation on Microbiome and Resilience in Healthy Participants: A Randomized, Placebo-Controlled Clinical Trial

Boukje C Eveleens Maarse, Hannah M Eggink, Ines Warnke, Sabina Bijlsma, Tim J van den Broek, Johanneke E Oosterman, Martien P M Caspers, et. al. *Nutr Metab Cardiovasc Dis.* 2024 Jun;34(6):1416-1426. doi: 10.1016/j.numecd.2024.01.028. [Article link](#)

Background and Aims: The gut microbiome exerts important roles in health, e.g., functions in metabolism and immunology. These functions are often exerted via short-chain fatty acid (SCFA) production by gut bacteria. Studies demonstrating causal relationships between interventions targeting the microbiome and clinical outcomes are limited. This study aimed to show a causal relationship between microbiome modulation through fibre intervention and health. **Methods and Results:** This randomized, double-blind, cross-over study included 65 healthy subjects, aged 45-70 years, with increased metabolic risk (i.e., body mass index [BMI] 25-30 kg/m², low to moderate daily dietary fibre intake, <30g/day). Subjects took daily a fibre mixture of Acacia gum and carrot powder or placebo for 12 weeks, with an 8-week wash-out period. Faecal samples for measurement of SCFAs and microbiome analysis were collected every 4 weeks. Before and after each intervention period subjects underwent the mixed-meal PhenFlex challenge Test (PFT). Health effects were expressed as resilience to the stressors of the PFT and as fasting metabolic and inflammatory state. The fibre mixture exerted microbiome modulation, with an increase in β -diversity ($p < 0.001$). α -diversity was lower during fibre mixture intake compared to placebo after 4, 8 and 12 weeks ($p = 0.002$; $p = 0.012$; $p = 0.031$). There was no effect observed on faecal SCFA concentrations, nor on any of the primary clinical outcomes (Inflammatory resilience: $p = 0.605$, Metabolic resilience: $p = 0.485$). **Conclusion:** Although the intervention exerted effects on gut microbiome composition, no effects on SCFA production, on resilience or fasting metabolic and inflammatory state were observed in this cohort.

Protein

Food-Derived Peptides Unleashed: Emerging Roles as Food Additives Beyond Bioactivities

Yanli Yang, Lunjie Huang, Zhangjun Huang, Yao Ren, Yanfei Xiong, Zhenghong Xu, Yuanlong Chi. *Crit Rev Food Sci Nutr.* 2024 Jun 18:1-22. doi: 10.1080/10408398.2024.2360074. [Article link](#)

Innovating food additives stands as a cornerstone for the sustainable evolution of future food systems. Peptides derived from food proteins exhibit a rich array of physicochemical and biological attributes crucial for preserving the appearance, flavor, texture, and nutritional integrity of foods. Leveraging these peptides as raw materials holds great promise for the development of novel food additives. While numerous studies underscore the potential of peptides as food additives, existing reviews

predominantly focus on their biotic applications, leaving a notable gap in the discourse around their abiotic functionalities, such as their physicochemical properties. Addressing this gap, this review offers a comprehensive survey of peptide-derived food additives in food systems, accentuating the application of peptides' abiotic properties. It furnishes a thorough exploration of the underlying mechanisms and diverse applications of peptide-derived food additives, while also delineating the challenges encountered and prospects for future applications. This well-time review will set the stage for a deeper understanding of peptide-derived food additives.

Low- and No-Calorie Sweeteners

Could Insulin Be a Better Regulator of Appetite/Satiety Balance and Body Weight Maintenance in Response to Glucose Exposure Compared to Sucrose Substitutes? Unraveling Current Knowledge and Searching for More Appropriate Choices

Georgios Antasouras, Antonios Dakanalis, Maria Chrysafi, Sousana K Papadopoulou, Ioulia Trifonidi, Maria Spanoudaki, Olga Alexatou, et. al. *Med Sci (Basel)*. 2024 Jun 6;12(2):29. doi: 10.3390/medsci12020029. [Article link](#)

Background: Insulin exerts a crucial impact on glucose control, cellular growing, function, and metabolism. It is partially modulated by nutrients, especially as a response to the intake of foods, including carbohydrates. Moreover, insulin can exert an anorexigenic effect when inserted into the hypothalamus of the brain, in which a complex network of an appetite/hunger control system occurs. The current literature review aims at thoroughly summarizing and scrutinizing whether insulin release in response to glucose exposure may be a better choice to control body weight gain and related diseases compared to the use of sucrose substitutes (SSs) in combination with a long-term, well-balanced diet. **Methods:** This is a comprehensive literature review, which was performed through searching in-depth for the most accurate scientific databases and applying effective and relevant keywords. **Results:** The insulin action can be inserted into the hypothalamic orexigenic/anorexigenic complex system, activating several anorexigenic peptides, increasing the hedonic aspect of food intake, and effectively controlling the human body weight. In contrast, SSs appear not to affect the orexigenic/anorexigenic complex system, resulting in more cases of uncontrolled body weight maintenance while also increasing the risk of developing related diseases. **Conclusions:** Most evidence, mainly derived from *in vitro* and *in vivo* animal studies, has reinforced the insulin anorexigenic action in the hypothalamus of the brain. Simultaneously, most available clinical studies showed that SSs during a well-balanced diet either maintain or even increase body weight, which may indirectly be ascribed to the fact that they cannot cover the hedonic aspect of food intake. However, there is a strong demand for long-term longitudinal surveys to effectively specify the impact of SSs on human metabolic health.

Lipids

Whole Milk Dairy Foods and Cardiometabolic Health: Dairy Fat and Beyond

Avinash Pokala, Jana Kraft, Victoria M Taormina, Marie-Caroline Michalski, Cécile Vors, Moises Torres-Gonzalez, Richard S Bruno. *Nutr Res*. 2024 Jun;126:99-122. doi: 10.1016/j.nutres.2024.03.010. [Article link](#)

Bovine dairy milk is a nutrient-rich matrix, but consumption of full-fat dairy food varieties has been claimed historically to be associated with poorer cardiometabolic health, a notion often attributed to the saturated fat content. However, continued investigation that includes observational studies and randomized controlled trials (RCTs) provide evidence that favorably supports full-fat dairy foods and their bioactive components on cardiometabolic health. This review addresses this controversy by examining the evidence surrounding full-fat dairy foods and their implications for human health. Dairy foods are heterogeneous, not just in their fat content but also in other compositional aspects within and between fermented (e.g., yogurt, cheese) and nonfermented products (e.g., milk) that could differentially influence cardiometabolic health. Drawing from complementary lines of evidence from epidemiological studies and RCTs, this review describes the health effects of dairy foods regarding their fat content, as well as their polar lipids that are concentrated in the milk fat globule fraction. Observational studies have limitedly supported the consumption of full-fat dairy to protect against cardiometabolic disorders. However, this framework has been disputed by RCTs indicating that dairy foods, regardless of their fat content or fermentation, are not detrimental to cardiometabolic health and may instead alleviate certain cardiometabolic risk factors. As dietary recommendations evolve, which currently indicate to avoid full-fat dairy foods, it is essential to consider the totality of evidence, especially from RCTs, while also recognizing that investigation is needed to evaluate the complexity of dairy foods within diverse dietary patterns and their impacts on cardiometabolic health.

Cognitive Health

Alignment of Consumers' Expected Brain Benefits from Food and Supplements with Measurable Cognitive Performance Tests

Hayley A. Young, Alecia L. Cousins, Carol Byrd-Bredbenner, David Benton, Richard C. Gershon, Alyssa Ghirardelli, Marie E. Latulippe, Andrew Scholey, Laura Wagstaff. *Nutrients* 2024, 16(12), 1950; June 19. <https://doi.org/10.3390/nu16121950>.

[Article link](#)



This research was supported by IAFNS [Cognitive Health Committee](#)

Consumers often cite cognitive improvements as reasons for making dietary changes or using dietary supplements, a motivation that if leveraged could greatly enhance public health. However, rarely is it considered whether standardized cognitive tests that are used in nutrition research are aligned to outcomes of interest to the consumer. This knowledge gap presents a challenge to the scientific substantiation of nutrition-based cognitive health benefits. Here we combined focus group transcript review using reflexive thematic analysis and a multidisciplinary expert panel exercise to evaluate the applicability of cognitive performance tools/tasks for substantiating the specific cognitive benefits articulated by consumers with the objectives to (1) understand how consumers comprehend the potential benefits of nutrition for brain health, and (2) determine the alignment between consumers desired brain benefits and validated tests and tools. We derived a 'Consumer Taxonomy of Cognitive and Affective Health in Nutrition Research' which describes the cognitive and affective structure from the consumers perspective. Experts agreed that validated tests exist for some consumer benefits including focused attention, sustained attention, episodic memory, energy levels, and anxiety. Prospective memory, flow, and presence represented novel benefits that require the development and validation of new tests and tools. Closing the gap between science and consumers and fostering co-creative approaches to nutrition research are critical to the development of products and dietary recommendations that support realizable cognitive benefits that benefit public health.

Acute and Repeated Ashwagandha Supplementation Improves Markers of Cognitive Function and Mood

Megan Leonard, Broderick Dickerson, Landry Estes, Drew E Gonzalez, Victoria Jenkins, Sarah Johnson, Dante Xing. *Nutrients*. 2024 Jun 8;16(12):1813. doi: 10.3390/nu16121813. [Article link](#)

Background: Ashwagandha has been reported to reduce stress and attenuate cognitive decline associated with inflammation and neurodegeneration in clinical populations. However, the effects as a potential nootropic nutrient in younger populations are unclear. This study examined the effects of liposomal ashwagandha supplementation on cognitive function, mood, and markers of health and safety in healthy young men and women. **Methods:** 59 men and women (22.7 ± 7 yrs., 74.9 ± 16 kg, 26.2 ± 5 BMI) fasted for 12 h, donated a fasting blood sample, and were administered the COMPASS cognitive function test battery (Word Recall, Word recognition, Choice Reaction Time Task, Picture Recognition, Digit Vigilance Task, Corsi Block test, Stroop test) and profile of mood states (POMS). In a randomized and double-blind manner, participants were administered 225 mg of a placebo (Gum Arabic) or ashwagandha (*Withania somnifera*) root and leaf extract coated with a liposomal covering. After 60-min, participants repeated cognitive assessments. Participants continued supplementation (225 mg/d) for 30 days and then returned to the lab to repeat the experiment. Data were analyzed using a general linear model (GLM) univariate analysis with repeated measures and pairwise comparisons of mean changes from baseline with 95% confidence intervals (CI). **Results:** Ashwagandha supplementation improved acute and/or 30-day measures of Word Recall (correct and recalled attempts), Choice Reaction Time (targets identified), Picture Recognition ("yes" correct responses, correct and overall reaction time), Digit Vigilance (correct reaction time), Stroop Color-Word (congruent words identified, reaction time), and POMS (tension and fatigue) from baseline more consistently with several differences observed between groups. **Conclusion:** Results support contentions that ashwagandha supplementation (225 mg) may improve some measures of memory, attention, vigilance, attention, and executive function while decreasing perceptions of tension and fatigue in younger healthy individuals.

Sodium

Impact of Nutrient Warning Labels on Colombian Consumers' Selection and Identification of Food and Drinks High in Sugar, Sodium and Saturated Fat: A Randomized Controlled Trial

Mercedes Mora-Plazas, Isabella Carolyn Aida Higgins, Luis Fernando Gomez, Marissa G Hall, Maria Fernanda Parra, Maxime Bercholz, Nandita Murukutla, et. al. *PLoS One*. 2024 Jun 10;19(6):e0303514. doi: 10.1371/journal.pone.0303514.

[Article link](#)

Objective: This study assessed the impact of nutrient warnings on product selection and ability to identify food products high in nutrients of concern in Colombia. **Methods:** In an online experiment (May-June 2023), Colombian adults were randomized to a nutrient warning, guideline daily amounts (GDA), Nutri-Score, or no-label condition (n = 8,004). Participants completed selection tasks between two fruit drinks labeled according to their condition, one high in sugar and one not. Next, participants answered questions about products high in sugar, sodium, and/or saturated fat ("high-in" product). Finally, they selected which label would most discourage them from consuming a high-in product. **Results:** Fewer participants (17%) exposed to the nutrient warning indicated they would purchase the high-sugar fruit drink compared to Nutri-Score (27%, Holm-adjusted (adj) $p < 0.001$) and no label conditions (31%, adj $p < 0.001$); there were no differences between the nutrient warning and GDA label (14%, adj $p = 0.087$). Compared to the nutrient warning, the GDA label was slightly more effective at helping consumers identify which drink was high in sugar (89% versus 92%, adj $p < 0.001$), while the Nutri-Score and no-label conditions were less effective. Compared to all other conditions, nutrient warnings were more effective at helping participants identify that products were high in nutrients of concern, were more effective at decreasing intentions to purchase these high-in products and were perceived as more effective. Nutrient warnings were most often selected as the label that most discouraged consumption. **Conclusions:** Nutrient warnings are a promising policy to help consumers identify and discourage consumption of products high in nutrients of concern.

Emerging Science

Emerging Topic: Vitamin B6 and Insulin Release for Glucose Response Using Optogenetic B Cells Approach

Optogenetic β Cell Interrogation *in vivo* Reveals a Functional Hierarchy Directing the Ca^{2+} Response to Glucose Supported by Vitamin B6

Luis Fernando Delgadillo-Silva, Emirhan Taso, Sumeet Pal Singh, Prateek Chawla, Eleni Georgiadou, Anne Gomph, Guy A. Rutter, et. al. *Science Advances*. 26 Jun 2024. Vol 10, Issue 26. DOI: 10.1126/sciadv.ado4513. [Article link](#)

Coordination of cellular activity through Ca^{2+} enables β cells to secrete precise quantities of insulin. To explore how the Ca^{2+} response is orchestrated in space and time, we implement optogenetic systems to probe the role of individual β cells in the glucose response. By targeted β cell activation/inactivation in zebrafish, we reveal a hierarchy of cells, each with a different level of influence over islet-wide Ca^{2+} dynamics. First-responder β cells lie at the top of the hierarchy, essential for initiating the first-phase Ca^{2+} response. Silencing first responders impairs the Ca^{2+} response to glucose. Conversely, selective activation of first responders demonstrates their increased capability to raise pan-islet Ca^{2+} levels compared to followers. By photolabeling and transcriptionally profiling β cells that differ in their thresholds to a glucose-stimulated Ca^{2+} response, we highlight vitamin B6 production as a signature pathway of first responders. We further define an evolutionarily conserved requirement for vitamin B6 in enabling the Ca^{2+} response to glucose in mammalian systems.

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