



Not All Ultra-Processed Foods Are Created Equal: A Case for Advancing Research and Policy That Balances Health and Nutrition Security

Maya K. Vadiveloo¹ and
Christopher D. Gardner²

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The multifaceted connection between diet quality and chronic disease etiology and mortality continues to challenge simple, consumer-friendly dietary guidance to promote healthier dietary patterns. Dietary pattern guidance has largely converged on encouraging diets rich in vegetables, fruits, legumes, whole grains, and nuts, but an area of emerging importance—the degree of food processing—has introduced another dimension to dietary quality guidance that demands further attention. Concern over food processing separate from a food's nutritional composition is growing and centered around more extensive industrial food manufacturing techniques comprising multi-ingredient formulations that change the nature of how foods are consumed, their palatability, and their sensorial qualities (1,2).

While no aspect of dietary guidance can escape scientific skepticism, it is difficult to refute the strong, consistent evidence from prospective cohort studies and randomized controlled trials linking ultra-processed food (UPF) consumption with higher risk of obesity, cardiovascular disease, cancer, and type 2 diabetes (T2D) through mechanisms independent of overall diet quality (3–6). The analysis in the study by Chen et al. (7) in the current

issue of *Diabetes Care* of three large prospective cohorts and high-quality meta-evidence, along with robust previous research, suggests that it is time to prioritize policy guidance around intake of UPF, even as the scientific understanding of the mechanistic underpinnings evolves.

To date, the most widely used tool for evaluating the degree of food processing is the NOVA framework, a system that classifies foods into four mutually exclusive groups. Appealing in its simplicity, the NOVA framework has been extensively applied in research and has challenged prior paradigms of how factors beyond a food's nutritional composition affect health. Going forward, the present study provides an important framework for evolving the NOVA classification by allowing for nuance in guidance around UPF consumption. The reported reduced risk of T2D and presumably other diet-related chronic diseases with intake of certain UPF food groups (i.e., whole grains and low-fat dairy) underscores the importance of adeptly addressing such complexity when formulating recommendations. Such distinction not only facilitates evidence-based dietary guidance but also supports multifaceted goals of nutrition policy, including nutrition security, reducing food waste, and enhancing

adoption of healthy dietary patterns. This novel study provides an opportunity to 1) provide clear recommendations to limit unhealthy UPF and 2) critically develop more precise guidance surrounding consumption of other UPF. Lessons learned from the move from overreaching low-fat dietary guidance (8) to nuanced guidance (9) could help avoid the perils of oversimplification and unintended consequences that have previously plagued consumer-facing dietary guidance (10).

SUMMARY, STRENGTHS, AND LIMITATIONS OF THE RESEARCH

This analysis of the Health Professionals Follow-up Study (HPFS), Nurses' Health Study (NHS), and Nurses' Health Study II (NHSII) found that higher intake of UPF was associated with higher T2D risk, and the meta-analysis (per the NutriGrade scoring system) similarly concluded that total UPF was associated with higher T2D risk (7). This finding was consistent for five of the nine subgroups of UPF in the set of three cohort studies. However, four of the UPF subgroups were associated with lower T2D risk. Adding complexity to the heterogeneity among UPF subgroups, discordance was found in the direction of the association with T2D

¹Department of Nutrition and Food Sciences, University of Rhode Island, Kingston, RI

²Stanford Prevention Research Center, School of Medicine, Stanford University, Palo Alto, CA

Corresponding author: Maya K. Vadiveloo, maya_vadiveloo@uri.edu

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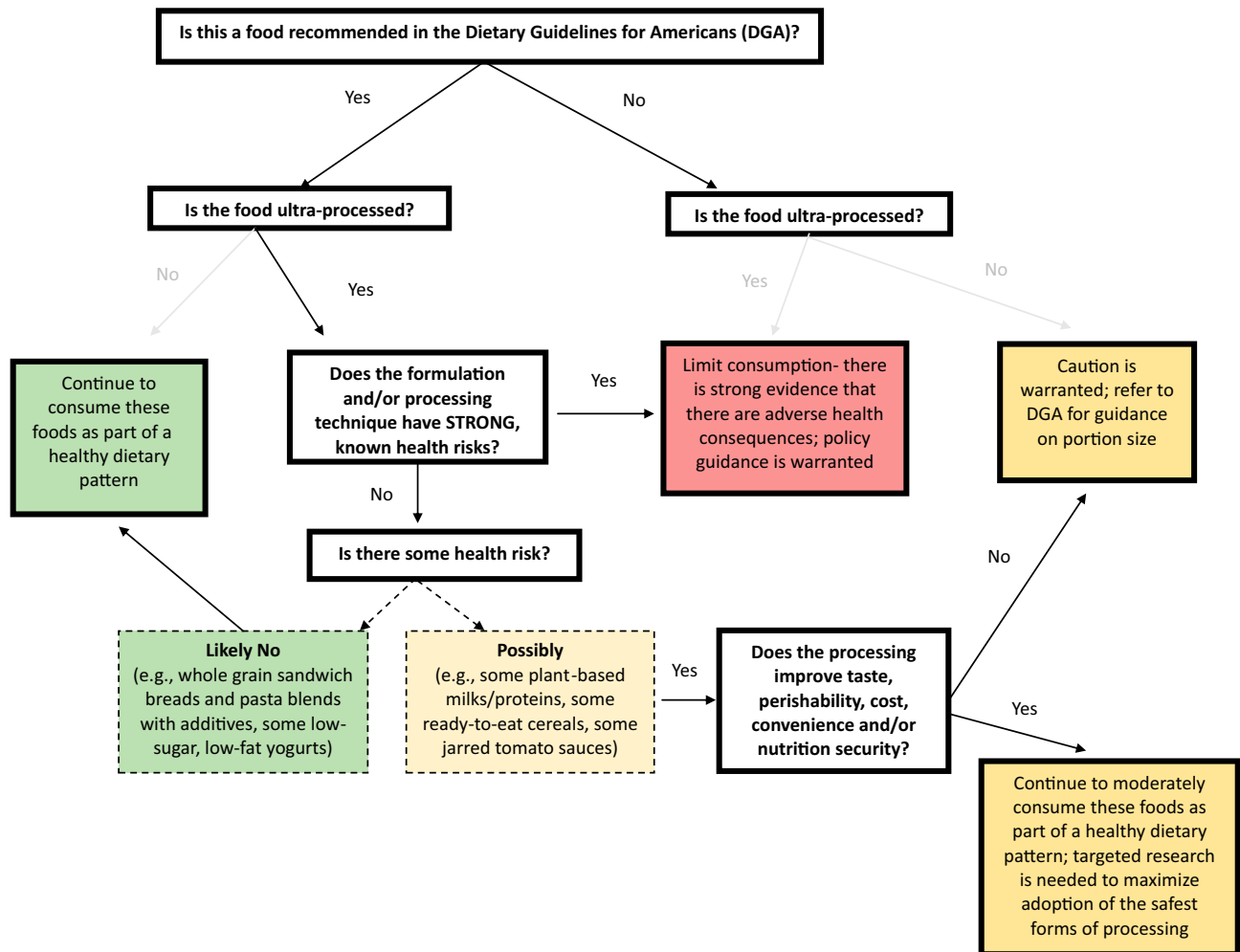


Figure 1—Decision tree based on existing evidence for guidance around consumption of UPF. The stoplight color coding system denotes foods where existing evidence supports 1) regular consumption of these foods as part of a healthy dietary pattern (green), 2) moderate consumption of these foods as part of a healthy dietary pattern, noting that more research could modify understanding further (yellow), and 3) limited consumption of these foods to align with healthy dietary patterns (red). Dotted lines around text boxes and for arrows indicate decision points where some subjectivity is currently required, and it is difficult to definitively answer “yes” or “no.” Gray arrows denote pathways that are generally agreed upon in the scientific community and do not require further deliberation.

among further differentiated categories within two of the subgroups (e.g., ultra-processed whole-grain breads were associated with protection, whereas ultra-processed refined grains were associated with higher T2D risk). Given that within any grouping of foods it is possible to differentiate the most healthy from the least healthy item, it is likely that further complexity and heterogeneity can be identified for specific foods within any of these groupings, i.e., foods within subcategories within subgroups that compose the UPF classification. Parsing this heterogeneity versus maximally reducing intake of UPF may enable consumers to adopt a healthy dietary pattern more easily.

This well-designed prospective study provides strong impetus to examine hetero-

geneity more deeply within UPF. Notable strengths include the large sample size and number of cases, the long follow-up period, robust sensitivity analyses, and the use of cumulative averages of repeatedly measured dietary data. While assessing UPF through food frequency questionnaires is especially challenging, the authors used a systematic, iterative strategy to identify UPF, including consultation with experts, review of cohort-specific documents, and online grocery store scans (11). However, it is unlikely that all UPF were captured, and misclassification of processing level is possible, especially because the utilized food frequency questionnaires were not developed for, and have not been validated for, assessing UPF intake. Given the growing

scholarly interest in UPF, it is crucial to design and validate dietary assessment methods that accurately capture UPF exposure. Finally, given that the three U.S. cohorts were primarily Caucasian health professionals and UPF consumption differs according to race/ethnicity and education level (12), the current findings may not be generalizable to other U.S. populations.

Priorities for Ongoing Research

The present analysis adds to growing evidence that demonstrates greater health risk associated with higher UPF consumption, independent of diet quality and a food’s nutritional composition (5). The subgroup and mediation analyses are important methodologic contributions, as they enable greater tailoring and prioritization

of policy guidance around UPF consumption (1). Such prioritization is essential, as nutrition policy is multifunctional and must balance the need to improve food and nutrition security, ensure nutrient adequacy, promote healthy dietary patterns, and reduce diet-related health disparities.

Recognizing food processing as an emerging and independent dimension of diet quality while also acknowledging the differential health impacts of food processing by food group provides an opportunity for more precise recommendations around processing in lieu of blanket guidance. In that vein, to reduce unintended consequences of unnecessarily maligning certain processing techniques or formulations without strong evidence of adverse health effects, including increasing barriers to consuming a healthful diet among socioeconomically disadvantaged communities, we propose some criteria to consider (Fig. 1). First and foremost is whether, apart from the degree of food processing, the food is in alignment with national dietary guidance (13).

1. If no, then reducing intake of these UPF groups is not controversial and clear policy guidance is warranted (e.g., sugar-sweetened beverages). Similarly, limiting intake of non-UPF that are out of alignment with national guidance (e.g., high-fat red meat) is advisable.
2. If yes, consider more comprehensively evaluating whether the health benefits of this UPF food outweigh the potential harms of UPF processing techniques or formulations by asking the following questions:
 - a. Could this UPF displace less healthy foods in the diet (e.g., whole-wheat tortillas with additives vs. white-flour tortillas) or enhance the ability for consumers of all socioeconomic

strata to choose foods aligned with national guidance?

- b. Could explicit guidance to limit only UPF with known adverse consequences increase adoption of healthy dietary patterns by reducing consumer confusion, skepticism, and potentially nutrition misinformation around which foods to include in a healthful dietary pattern?
- c. Does this UPF address other nutrition policy priorities, including improving the availability (cost and convenience), perishability, nutrient composition (e.g., sodium substitutes), and taste of healthy foods?

Ultimately, dietary guidance involves tradeoffs, and it is essential for policymakers to help consumers prioritize which dietary advice is most critical to follow to promote health. Such advice is ideally simple yet feasible to implement given the many competing goals people have when choosing food. As such, while it is important to advance policy to reduce consumption of unhealthy UPF, it may be prudent to continue promoting intake of otherwise recommended food groups, regardless of processing, until more research is done. The current study should encourage the research community to investigate how different types of processing affect health and, if needed, whether risk mitigation is possible through changes to ingredients, processing, or packaging. The overarching goal of dietary guidance is to promote public health, which may be achieved most effectively when we endorse the most sensible guidance attainable for the largest proportion of the population.

Duality of Interest. No potential conflicts of interest relevant to this article were reported.

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