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Response to Invited Commentary

Gorst-Rasmussen et al. Respond to ''Dietary Pattern Analysis''

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We thank Imamura and Jacques (1) for their insightful commentary on our article (2), in which they go beyond the treelet transform (TT) to critically discuss the relevance of sparsity in dietary pattern analysis. We limit this response to challenging a fundamental premise in their discussion, which is that sparsity is not a natural property of a dietary pattern because a dietary pattern should reflect the cumulative effect of all foods. We acknowledge the intuitive appeal of directly connecting the concept of a diet with dietary patterns, but diets remain individual-specific constructs, whereas dietary patterns are population-based and usually observational. Attempts to provide a universal, isolated understanding of the concept of a dietary pattern will lead to subjective and ambiguous definitions at best. It would be akin to Wittgenstein's famous beetle-in-a-box analogy (3): Suppose that everyone has a beetle in a box and that no one can see anyone else's beetle. The actual content of our private boxes would thus be completely irrelevant for our public discussion of beetles. How, then, can we ever hope to discuss beetles scientifically? To avoid such issues, we consider an ostensive definition of dietary patterns more appropriate: A dietary pattern is a pattern produced by a dietary pattern analysis. More operationally, it is a means of data reduction (4). Principal component analysis produces patterns that are eigenvectors of a correlation matrix of foods; cluster analysis produces patterns that show food averages within clusters; and TT produces patterns by aggregating foods according to correlation. Different methods might or might not (5, 6) reflect similar aspects of data; some may even produce patterns that can somehow be translated to an actual diet. However, no one method can claim more validity per se than any other, be it sparse or not. This does not make dietary pattern analysis a vacuous exercise, but simply implies that it must be judged strictly externally, in terms of its usefulness: for predicting disease, for generating hypotheses, and for communicating public health messages. Within this view, we agree with Imamura and Jacques that there are situations in which sparsity is less useful. Confounding by dietary patterns (7) is one such example. Conversely, sparsity appears useful in confirmative factor analytic studies, as observed by Imamura and Jacques. In addition, as we argued in our original article, sparsity certainly seems useful in the majority of factor-analytic dietary pattern analyses, in which pattern sparsity is currently approximated by intricate exercises of factor rotation and loading truncation (6).

TT seems a promising technique for dietary pattern analysis because it could offer directly what researchers seek from a dietary pattern: a simplified interpretation without sacrifice of predictive properties (2). However, TT is no silver bullet. As with any statistical method, its usefulness must stand the test of time and be subjected to the usual vigilance regarding underlying assumptions when applied in practice. TT will sometimes fail, but so will any method of dietary pattern analysis. Imamura and Jacques (1) mention a scenario in which the sum of systolic and diastolic blood pressure appears as a factor, although the difference is more relevant for disease prediction (8). Any method of pattern analysis that disregards the outcome would fail in this example, which only serves to emphasize the relevance of supervision in pattern analyses.

Do we consider sparsity essential to dietary pattern analysis? No. Sparsity simply represents one promising way of enriching methodology for pattern analysis with additional structure so that it may support the scientific process rather than developing into a series of mysteries to be untangled ad hoc and case by case. The endeavor to ensure methodological transparency is essential, both in nutritional epidemiology and elsewhere.

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