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Abstract

A Comparison of Different Methods for Meal Pattern Analysis †

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Abstract: Research on meal patterns, including both combinations of foods and meals, has increased in recent years. Advanced statistical techniques are required to identify these patterns. Despite this, no study has assessed whether applying different statistical approaches to the same data gives rise to different outcomes. The objective was to identify meal patterns using different methods and compare the resulting meal patterns that were identified. This study is a secondary analysis of data from NHANES 2017-2018. A small number of generic meals were identified that were representative of the larger number of actual meals consumed with regard to their food group and nutrient content, using a previously established method. Combinations of these generic meals consumed (meal patterns) were identified using three different statistical approaches: partitioning around the medoids clustering, principal component analysis (PCA), and latent class analysis (LCA). For clustering and PCA the input data were the % total energy intake from each of the generic meals and five binary variables indicating consumption or non-consumption of five meal types (breakfast, lunch, dinner, snacks, and beverages). For LCA the input data were five categorical variables for each of the five meal types giving the specific generic meal consumed at each meal type and five binary variables that were the same as those used in clustering and PCA. The number of meal patterns identified were 26 by clustering, 18 by PCA, and 17 by LCA. Meal patterns in which individuals skipped certain meal types were only observed using clustering and LCA, but not PCA. There was only one meal pattern that was identical between when comparing clustering patterns with LCA patterns, i.e., the generic meals consumed at all five meal types were the same. No other identical patterns were identified. For all comparisons (clustering v. PCA, clustering v. LCA, and PCA v. LCA), there were two meal patterns in each in which identical generic meals were consumed in four of the five meal types. Different approaches to meal pattern analysis gave rise to the differing number of meal patterns; similar identification of meal skipping between clustering and LCA, but not PCA; and differences in the content of the meal patterns. Caution is required when comparing meal patterns identified using differing statistical approaches.

Keywords: meal patterns; eating behaviours; eating occasions; clustering; latent class analysis; principal component analysis

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