Food Patterns Measured by Factor Analysis and Anthropometric Changes in Adults

OBJECTIVE
To examine whether food patterns derived from exploratory factor analysis, specifically, components analysis, are related to changes in body mass index (BMI) and waist circumference.

STUDY DETAILS
– Subjects were 449 healthy men and women participating in the Baltimore Longitudinal Study of Aging
– Participants return about every 24 months for repeated measurements of height, weight, body composition, diet and a variety of physiological, psychological and behavioural measures
– Physical activity was measured by an adapted version of the Harvard Alumni questionnaire, which asked participants about all daily activities at home, work and during recreation or sports
– 40 food groups were formed, mainly according to macronutrient content, from 7-day dietary records and entered into a factor analysis. The food-group variables were considered in terms of the percentage of energy each one contributed
– 6 food patterns (factors) were derived:

| Factor 1 | Reduced-fat dairy products, fruit and fiber |
| Factor 2 | Protein and alcohol |
| Factor 3 | Sweets |
| Factor 4 | Vegetable fats and vegetables |
| Factor 5 | Fatty meats |
| Factor 6 | Eggs, bread and soup |
– Factors were divided into quintiles
– Interpretation of factors is similar to correlation coefficients where the most positive values contribute most to the factor score, and the most negative values contribute least to the factor score
– Separate regression analyses were performed for each factor to test whether food patterns predicted changes in BMI and waist circumference
– Models were adjusted for baseline BMI, waist circumference, age, sex and sociodemographic covariates
– Total energy intake was also added to the multivariate model
– Exclusions from the study included those entering the study before 1980; age < 30 or > 80 years; persons who had not completed at least 4 days of dietary records; subjects whose food group intake appeared implausible (> 6 SD from the mean for each food group); those who had no information on waist circumference or did not have at least 2 measures of height or weight and all subjects who were diagnosed with cancer, diabetes, stroke or heart disease either before or at baseline

KEY FINDING
A food pattern that is high in reduced-fat dairy products, fruit and fiber (factor 1) is associated with smaller increases in BMI in women and smaller gains in waist circumference in both men and women.

People who consumed the least amount of reduced-fat dairy products, fruit and fiber were more likely to experience the greatest increases in BMI and waist circumference.

RESULTS
– Women tend to have healthier diets than men as demonstrated in this study by the high percentage (60%) of women in the top quintile of factor 1 (the healthy pattern)
– Subjects in the 5th quintile of factor 1 had the lowest BMI and the smallest waist circumference. They also consumed more reduced-fat dairy products, fruits and fiber
Weighing The Evidence: What Is The Role of Milk Products in Healthy Weights?


![Daily food group intakes of factor 1 at baseline](image)

Newby et al. 2004

- For women, the 5th quintile of factor 1 (reduced-fat dairy, fruit and fiber) was inversely associated with annual change in BMI, \( p<0.05 \) compared to the 1st quintile, and the test for trend was significant \( p<0.01 \) in the multivariate-adjusted and energy model. In men, the inverse association was not significant.

- For both men and women, factor 1 was inversely associated with annual change in waist circumference when comparing the highest with the lowest quintile \( p<0.05 \) and the test for trend was significant \( p=0.03 \) in the multivariate-adjusted and energy model.

- Factor 2 (protein and alcohol) was directly associated with annual BMI changes—as intake increased, BMI increased.

- The highest mean score for factor 1 (strongest correlation with lower BMI and waist circumference) was seen for those subjects in the healthy cluster \( 0.98 \pm 0.08 \).

- The lowest mean score for factor 1 was seen for those people in the meat-and-potatoes cluster \( -0.48 \pm 0.09 \), indicating this group was more likely to experience greater increases in BMI and waist circumference.