JEAN MAYER USDA HUMAN NUTRITION RESEARCH CENTER ON AGING

HNRCA

Changing Nutritional Needs in Older Adults

Susan B. Roberts, PhD

Team Leader, Energy Metabolism Laboratory
Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University

Professor of Nutrition, Tufts University

Professor of Psychiatry & Scientific Staff Member in Pediatrics, Tufts Medical School

Co-Director Tufts Institute for Global Obesity Research

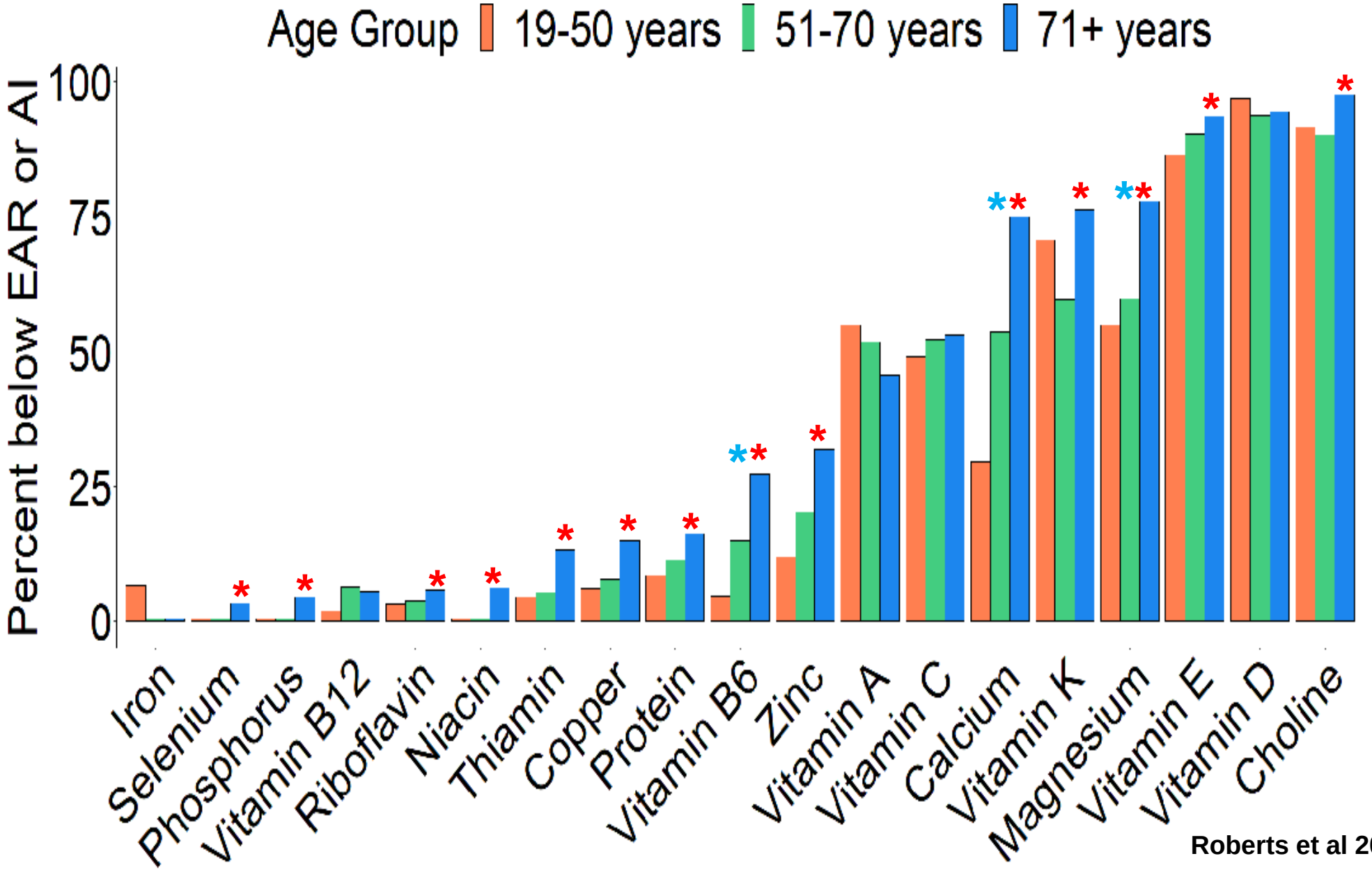
Tufts UNIVERSITY

© Tufts University, Jean Mayer United States Department of Agriculture Human Nutrition Research Center on Aging

Agenda

- Changes in nutritional adequacy across the adult lifespan and role in healthy aging
- Energy requirements and aging
- Summary and research recommendations

NHANES: Many Essential Nutrients Consumed in Inadequate Amounts

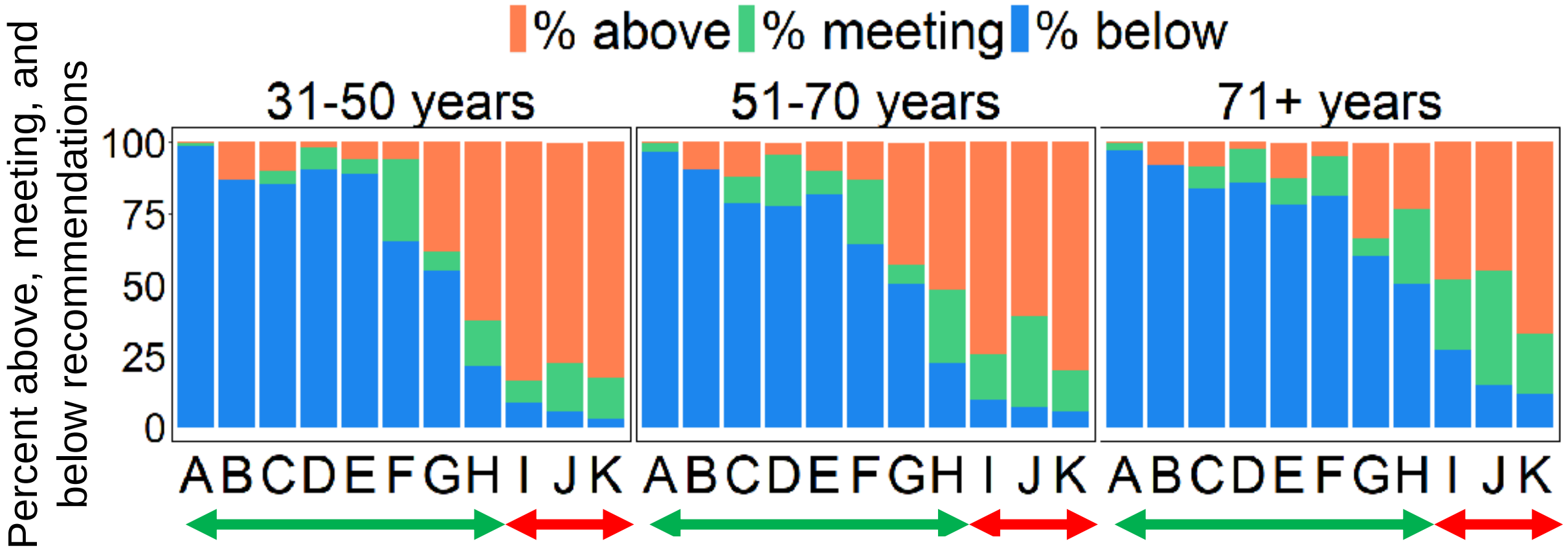


* ↑ shortfall increases with advancing age

* ↑ DRI with advancing age

Roberts et al 2021 Adv Nutr;12:1438

Dietary Guidelines for Americans: Most Recommended Food Groups Consumed in Inadequate Amounts



Food Group Key

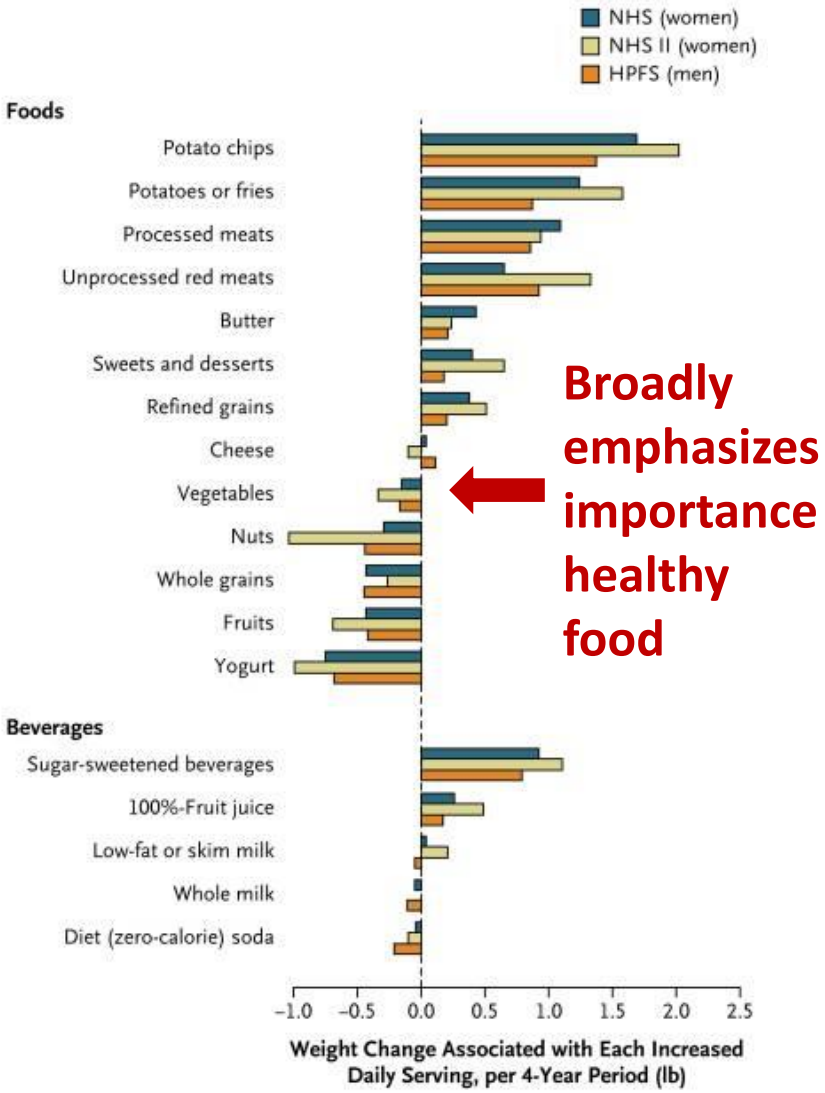
A: Whole grains * B: Dairy * C: Seafood * D: Vegetables * E: Fruit
F: Oils * G: Nuts, seeds, soy * H: Protein * I: Meat, poultry, eggs
J: Refined grains
K: SoFAS (solid fat, added sugar)

Roberts et al 2021 Adv Nutr;12:1438

Summary of consistent evidence for nutrition parameters with prevention and treatment of common aging-associated diseases and functional losses *From Roberts et al 2021 Adv. Nutr. 1:1-11*

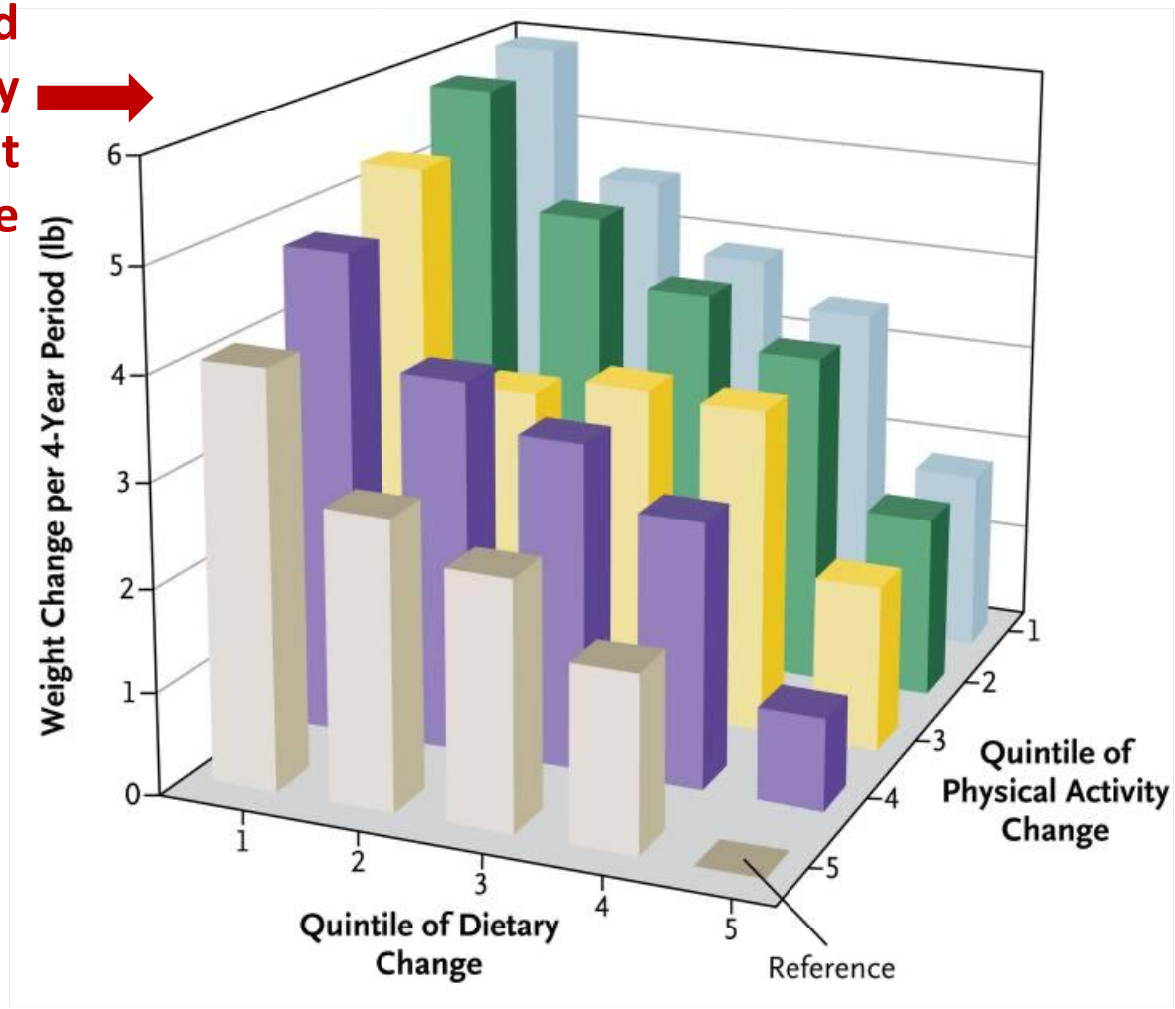
	Prevention		Treatment for reduced disease progression or remission	
	General healthy diet*	Healthy BMI 18.5-25 kg/m^2	Disease-specific nutrition	Reduced obesity, OW
Musculoskeletal				
Frailty, sarcopenia, risk of falls	✓	✓	✓	✓
Osteoarthritis		✓		✓
Osteoporosis	✓		✓	
Cognition				
Cognitive decline	✓	✓		✓
Dementia/ Alzheimer's	✓	✓		
Sense-organ diseases				
Age-related macular degeneration	✓	✓	✓	
Cataracts	✓	✓		
Hearing loss	✓	✓	✓	
Non-communicable diseases				
Type 2 diabetes, cardiovascular disease	✓	✓	✓	✓
Cancers	✓	✓		
Sleep				
Obstructive sleep apnea		✓		✓
Gastrointestinal				
Chronic constipation	✓		✓	
Urinary incontinence		✓		✓

Predictors of 4-year weight change in USA Nurses Health Study (Mozaffarian et al NEJM 2011)

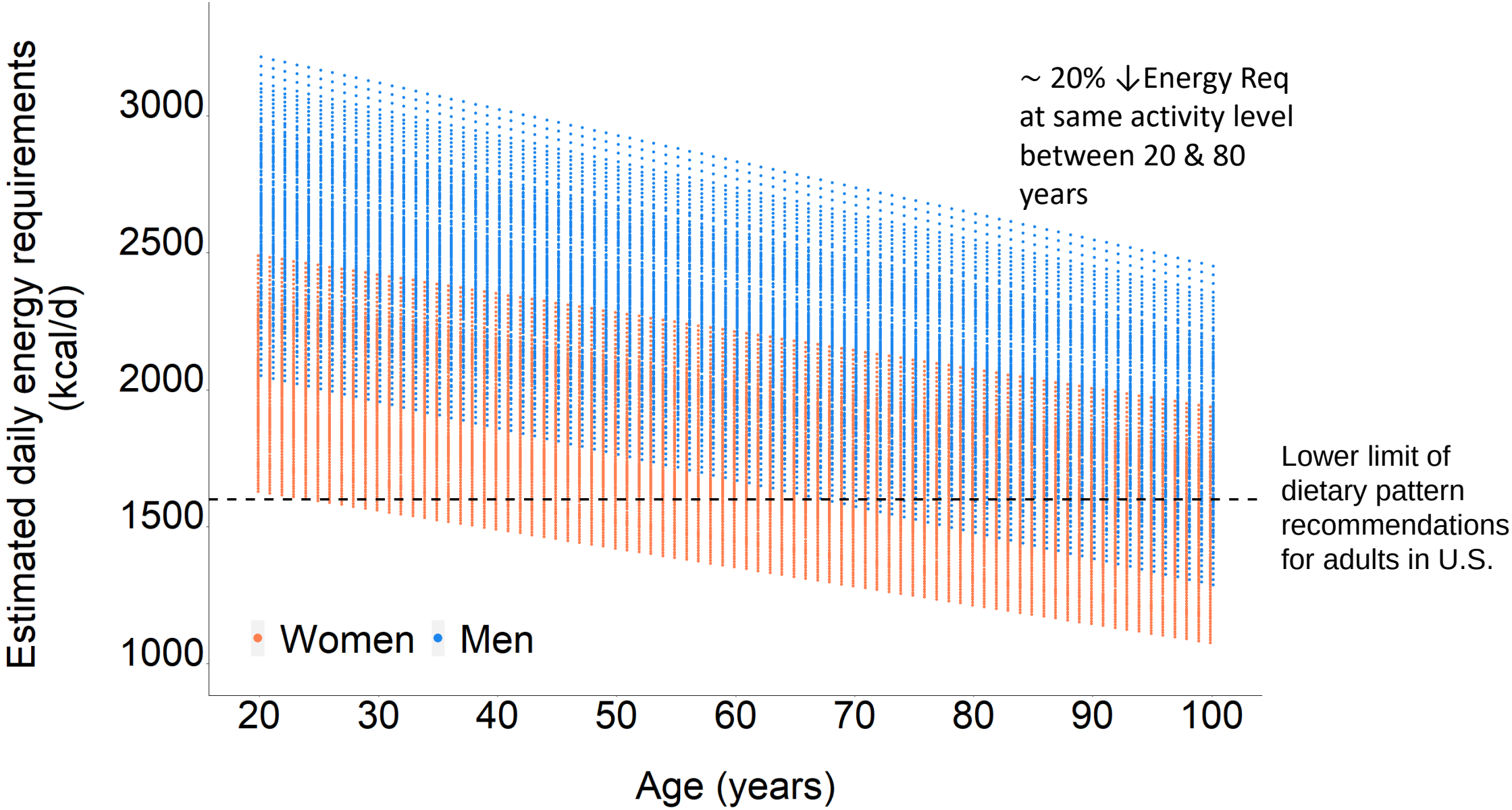


Broadly emphasizes importance healthy food

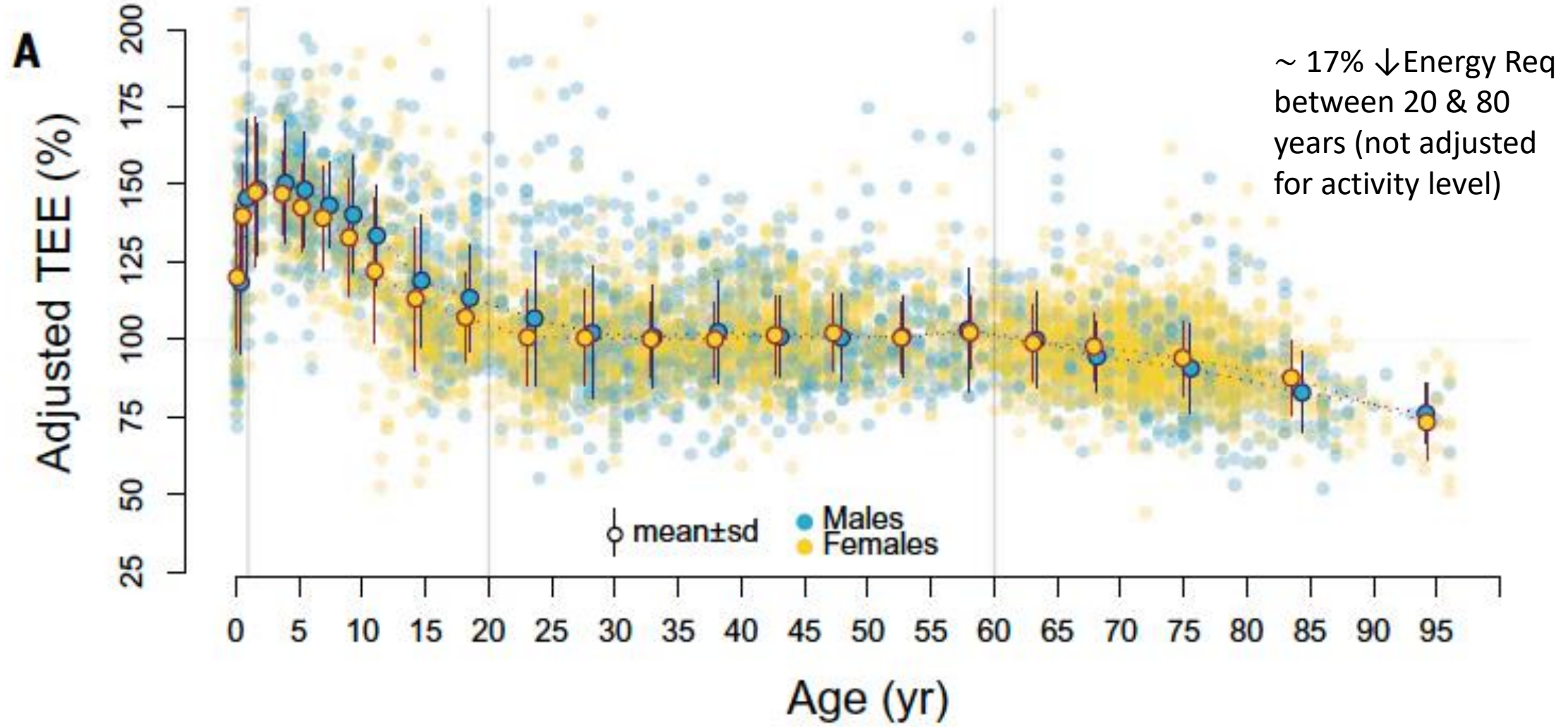
Food quantitatively more important than exercise



Energy requirements for individuals in the healthy weight range at different ages based on the 2002 U.S. Institute of Medicine equations for predicting energy requirements of individuals with typical heights, BMI 18.5-25 kg/m^2, and sedentary or light activity levels



Energy requirements for individuals adjusted for body composition at different ages based on IAEA compiled worldwide doubly labeled water data (Pontzer et al 2021)



~ 17% ↓Energy Req between 20 & 80 years (not adjusted for activity level)

Comparison of 2002 and 2023 DRIs for Energy

		DRI (kcal/d) for reference female (5'4") and male (5'9") at BMI 25 kg/m2			
	Gender	Age 20	Age 50	Age 80	% change 80 vs 20 yrs
2002 DRIs	Women	2080	1873	1665	-20%
2023 DRIs	Women	2306	2096	1886	-18%
2002 DRIs	Men	2772	2486	2200	-21%
2023 DRIs	Men	2585	2260	1936	-25%

- Energy requirements decrease linearly over time both 2002 and 2023 DRIs (inconsistent with the main IAEA database in 2023 edition)
- Between 2002 and 2023 women's energy DRI increased 12% and men's decreased by 9%: currently very little difference in DRIs between males and females at 80 years
- No adjustment for race, ethnicity and for non-binary individuals

Strengths and weaknesses in available energy requirement data

Strengths

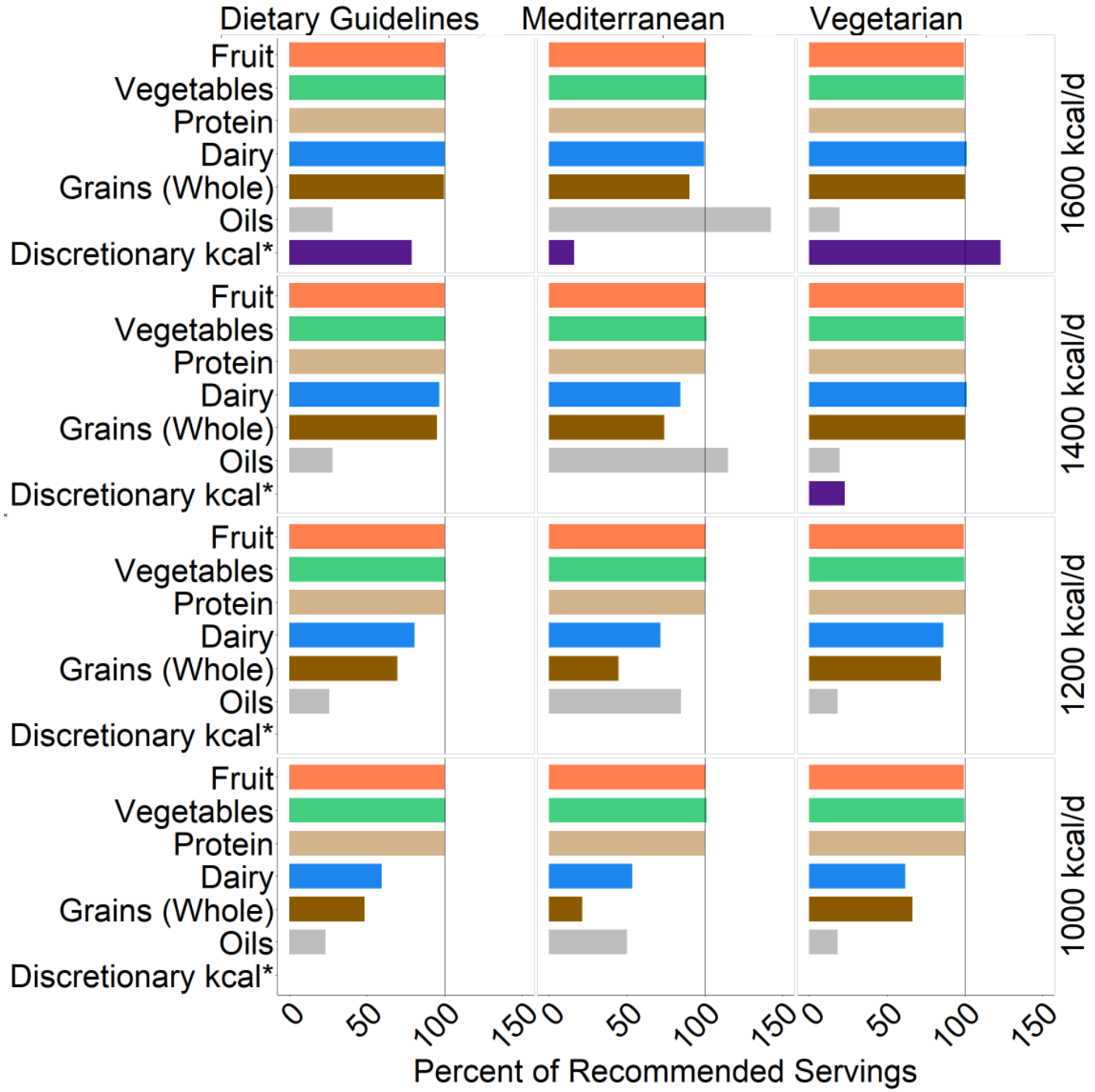
- DLW is still gold standard method for energy requirements in free living humans. 14- day measurements are obtained. Two databases available:
- Old (2002) IOM database compiled DWL data for US adults
- New (2021) IAEA database compiles DLW and other from global sources including US

Weaknesses

- Based on convenience samples, often recruited for larger studies
- Almost no adults >80
- No normative data at all
- Information to date may substantially underestimate the decrease in energy requirements during aging (self-selected healthy/active populations who participate in research)

Adequacy of meeting recommended portion servings of healthy food groups at low levels of energy intake (Roberts et al 2021 Adv Nutr;12:1438)

- At 1600 kcal/day, most healthy dietary patterns can allow for dietary recommendations
- Below 1600 kcal/d meeting dietary recommendations is increasingly hard
- At 1000 kcal/day it is essentially impossible to meet dietary recommendations



Summary

- **Lack of normative DLW data for US population collected specifically to assess energy requirements hampers optimizing dietary recommendations to support healthy aging**
- **Very limited information on optimal meal patterns, diurnal nutrient intakes for healthy aging**
- **Energy requirements have strong influence on ability to maintain nutritional health via quantity of food you can consume; extremely hard to consume adequate diet with recommended portions healthy foods and micronutrients without supplements at <1600 kcal/d**

Summary: research needs

- **DRIs, Dietary Guidelines:** To improve dietary recommendations for healthy aging need to much better understand changes in energy requirements and data-weak nutrients in older adults
  - Should be mentally flexible with respect to role of dietary supplements, meal patterns and timing
- **Precision Nutrition Dietary Recommendations:** To improve monitoring need practical methods for regular nutritional screening across wide range nutrients
- **Population Uptake:** To achieve healthful dietary changes to support healthy aging need research on how to support changes in eating behavior over the lifestyle