Aging, Diet, Mental Health & Maintaining Independence

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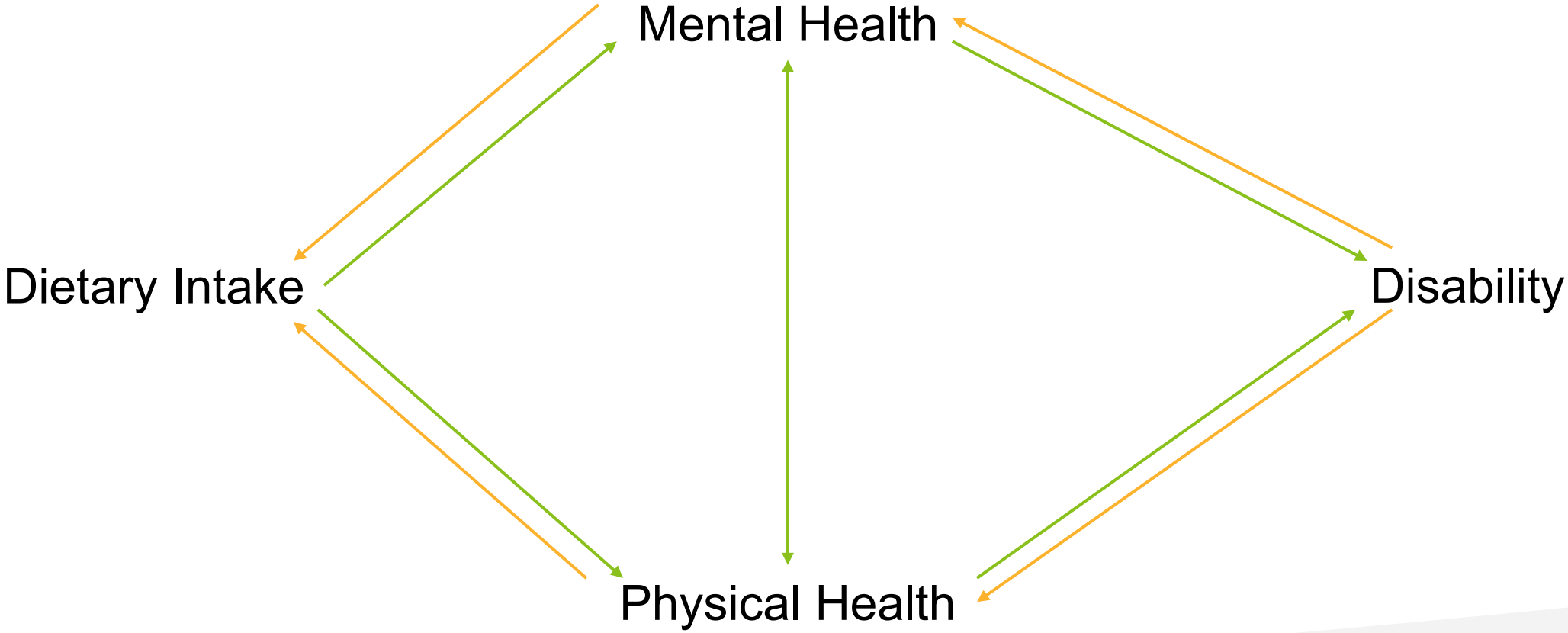
Purpose & Objectives

The purpose of this presentation is to provide information with the goal of maintaining independence for community dwelling older adults.

1. Describe the importance of neuromuscular system for maintaining independence.
2. Explain the effects of aging on dietary intake and the need for more nutrient dense foods.
3. Learn dietary protein intake supports physical and mental health, helping to maintain independence.
4. Discuss ways to improve dietary intake in older adults.

The Diamond of Dietary Intake & Disability



The Importance of Muscle & Strength

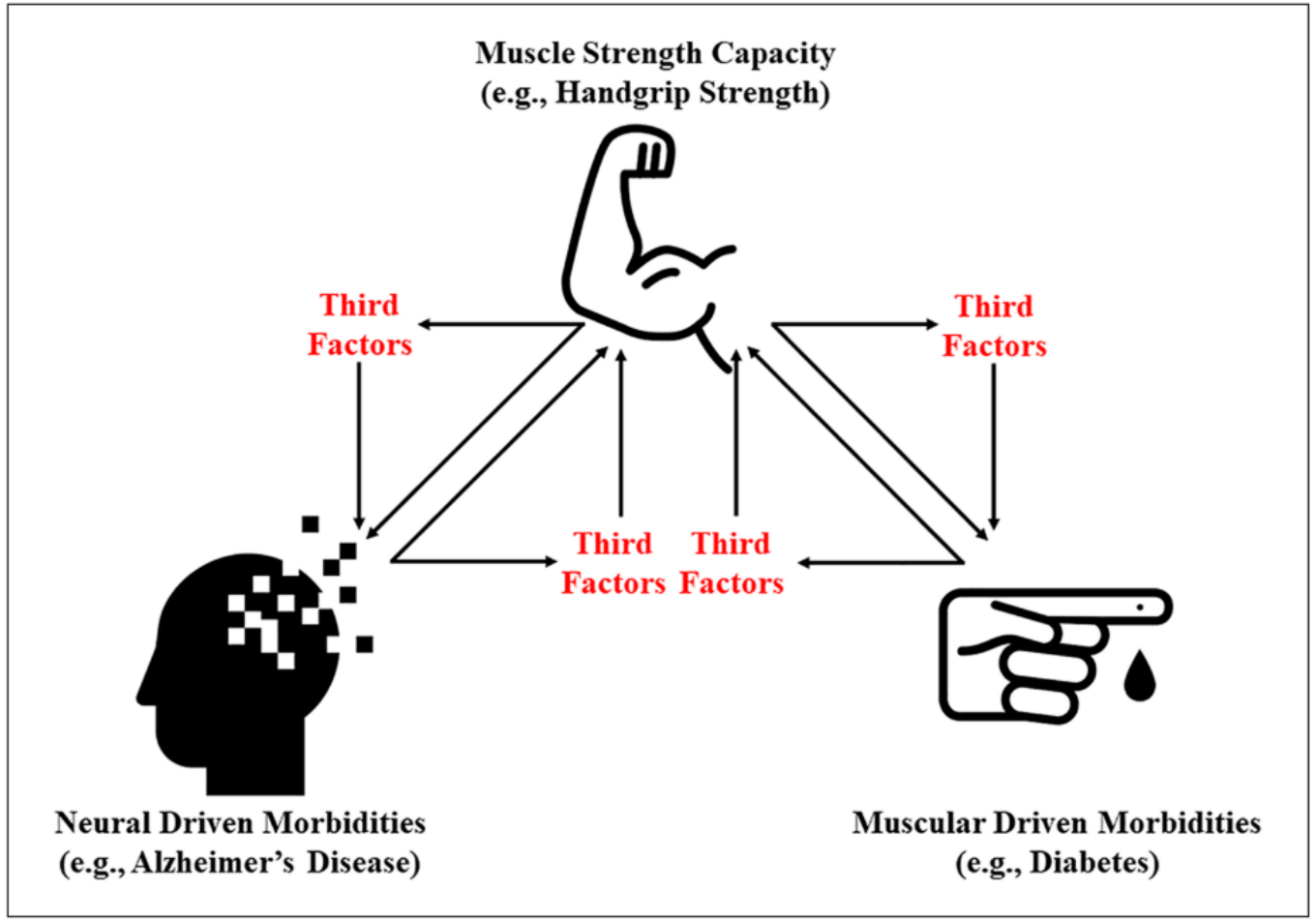
- Skeletal muscle ≈ 40-50% of bodyweight (Lee, 2000)
  - ≈ 45% of total body proteins (Institute of Medicine, 1999)
- Skeletal muscle is an amino acid reservoir(Carbone, 2019; Timmerman, 2008)
  - **Muscle** is catabolized during/after **trauma** (Reeds, 1994) and **negative energy balance** (Layman, 2003)
- **Sarcopenia** (Beudart, 2017)
  - **Mortality** Odds Ratio**: 3.60 [2.96, 4.37]**
  - **Disability** Odds Ratio**: 3.03 [1.80, 5.12]**

Muscle Strength Is More than it Appears

Decreased strength is related to:

- Diabetes
- Cardiovascular disease
- **Impaired Cognition**
- **Alzheimer's Disease**
- Disability
- Death

It is neuromuscular system



McGrath, R., **Johnson, N.,** Klawitter, L., Mahoney, S., Trautman, K., Carlson, C., Rockstad, E., & Hackney, K. J. (2020). What are the association patterns between handgrip strength and adverse health conditions? A topical review. *SAGE Open Medicine*, *8*, 1–12. https://doi.org/10.1177/2050312120910358. Reused under the terms of the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/).

Aging & Muscle Protein Synthesis (1)

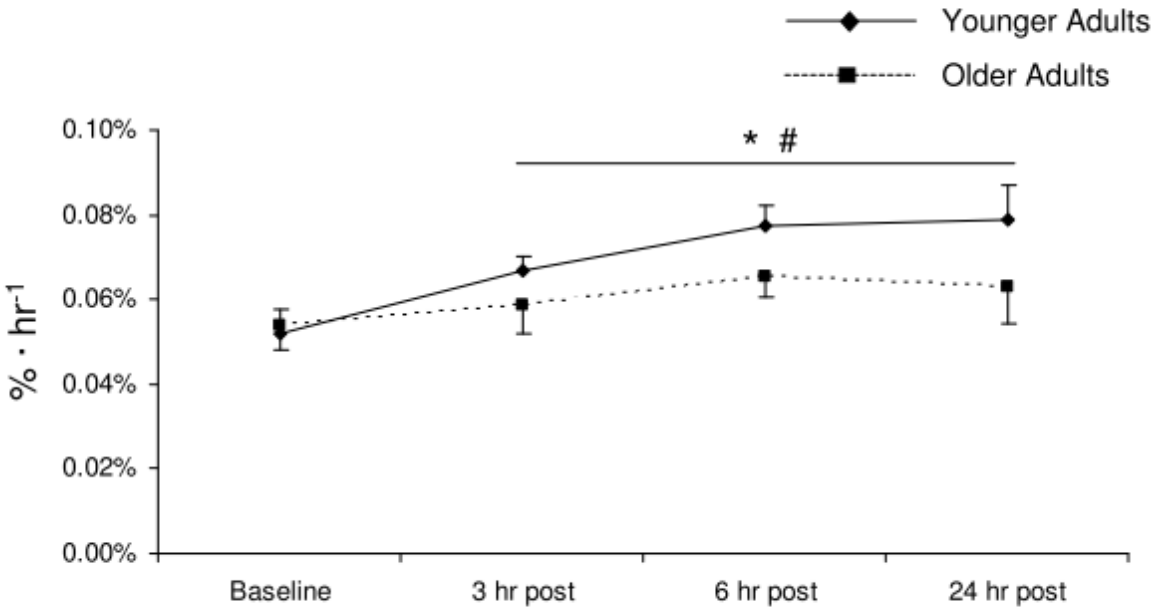


Figure 5 Mixed muscle protein fractional synthetic rate (FSR). Muscle protein synthesis as expressed by the mixed muscle FSR (%/hour) in younger and older subjects at rest and at 3, 6 and 24 hours after exercise. *Main effect for time (P <0.05); #significantly different from older subjects (P <0.05).

- **The anabolic response to exercise is blunted with age**
  - Muscle protein synthesis is decreased in response to the same exercise with aging
  - Aging means less muscle is produced in response to the same exercise

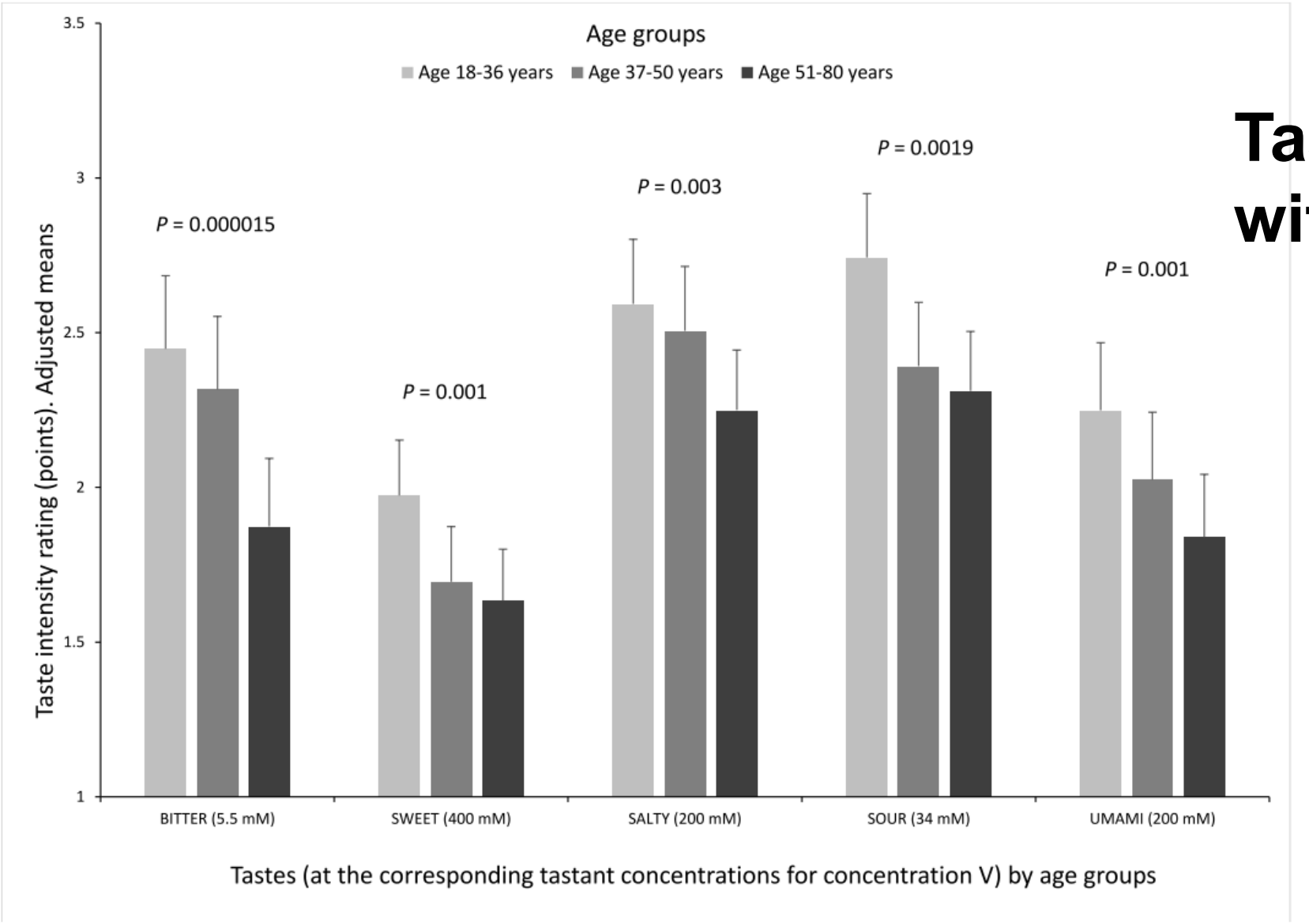
Fry, C. S., Drummond, M. J., Glynn, E. L., Dickinson, J. M., Gundermann, D. M., Timmerman, K. L., Walker, D. K., Dhanani, S., Volpi, E., & Rasmussen, B. B. (2011). Aging impairs contraction-induced human skeletal muscle mTORC1 signaling and protein synthesis. *Skeletal Muscle*, *1*(1), 11. https://doi.org/10.1186/2044-5040-1-11 .

Aging & Muscle Protein Synthesis (2)

- **The anabolic response to exercise is blunted with age**
  - Muscle protein synthesis is decreased in response to the same exercise with aging
  - **Aging means less muscle is produced in response to the same exercise**
- **The amount of protein needed during one meal to maximally stimulate muscle protein synthesis increases with aging**
  - **0.24 g/kg/meal for young men**
  - **0.40 g/kg/meal for older men**

Moore DR, Churchward-Venne TA, Witard O, et al. Protein ingestion to stimulate myofibrillar protein synthesis requires greater relative protein intakes in healthy older versus younger men. Journals of Gerontology - Series A Biological Sciences and Medical Sciences. 2015;70(1):57-62. doi:10.1093/gerona/glu103

Taste Decreases with Aging



Barragán, R., Coltell, O., Portolés, O., Asensio, E. M., Sorlí, J. V., Ortega-Azorín, C., González, J. I., Sáiz, C., Fernández-Carrión, R., Ordovas, J. M., & Corella, D. (2018). Bitter, sweet, salty, sour and umami taste perception decreases with age: Sex-specific analysis, modulation by genetic variants and taste-preference associations in 18 to 80 year-old subjects. *Nutrients*, *10*(10). https://doi.org/10.3390/nu10101539. Reused under the terms of the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/).

Energy Expenditure Decreases with Aging

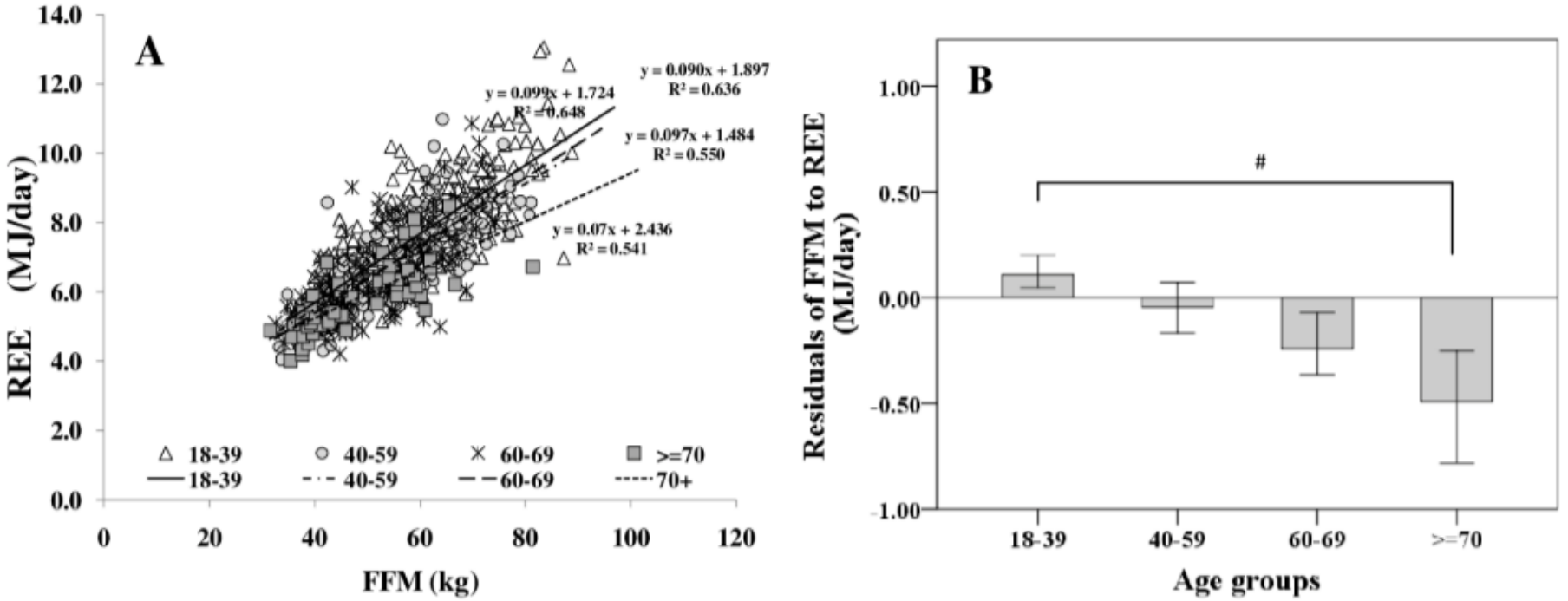


Figure 1. Age-dependent decrease in fat free mass (FFM)-resting energy expenditure (REE) relationship (**A**) and their residuals in different age groups (median; 95% CI) (**B**). Significant differences between age-groups are indicated by # as tested by Kruskal-Wallis-test (n = 714). FFM was assessed by Air Displacement Plethysmography (ADP) (for details, see Methods).

Geisler, C., Braun, W., Pourhassan, M., Schweitzer, L., Glüer, C. C., Bosy-Westphal, A., & Müller, M. J. (2016). Age-dependent changes in resting energy expenditure (REE): insights from detailed body composition analysis in normal and overweight healthy caucasians. *Nutrients*, *8*(322), 1–11. https://doi.org/10.3390/nu8060322.

Dietary Intake & Aging

- As we get older:
  - Taste decreases (Barragán, 2018)
  - Energy expenditure decreases (Geisler, 2016)
  - Oral health worsens (Hatta, 2021)
  - Our ability to chew decreases (Fledman, 1980)
- **Dietary intake decreases by 25% from 40 to 70** (Nieuwenhuizen, 2010)
- **But, older adults have increased nutrient needs**
  - **Predisposing people to nutrient deficiencies**

Older Adults & Nutrient Density (1)

- Older adults **need less energy intake** than younger adults, even if as **physically active** with the same **muscle mass,** but need **greater intakes of:**
  - **Protein**
    - Due to anabolic resistance
  - **Calcium**
    - Due to decreased absorption
  - **Vitamin D**
    - Due to decreased synthesis of vitamin D in skin
    - Due to decreased rate of the conversion of vitamin D into calcitriol
  - **Vitamin B12**
    - Due to decreased stomach acid production

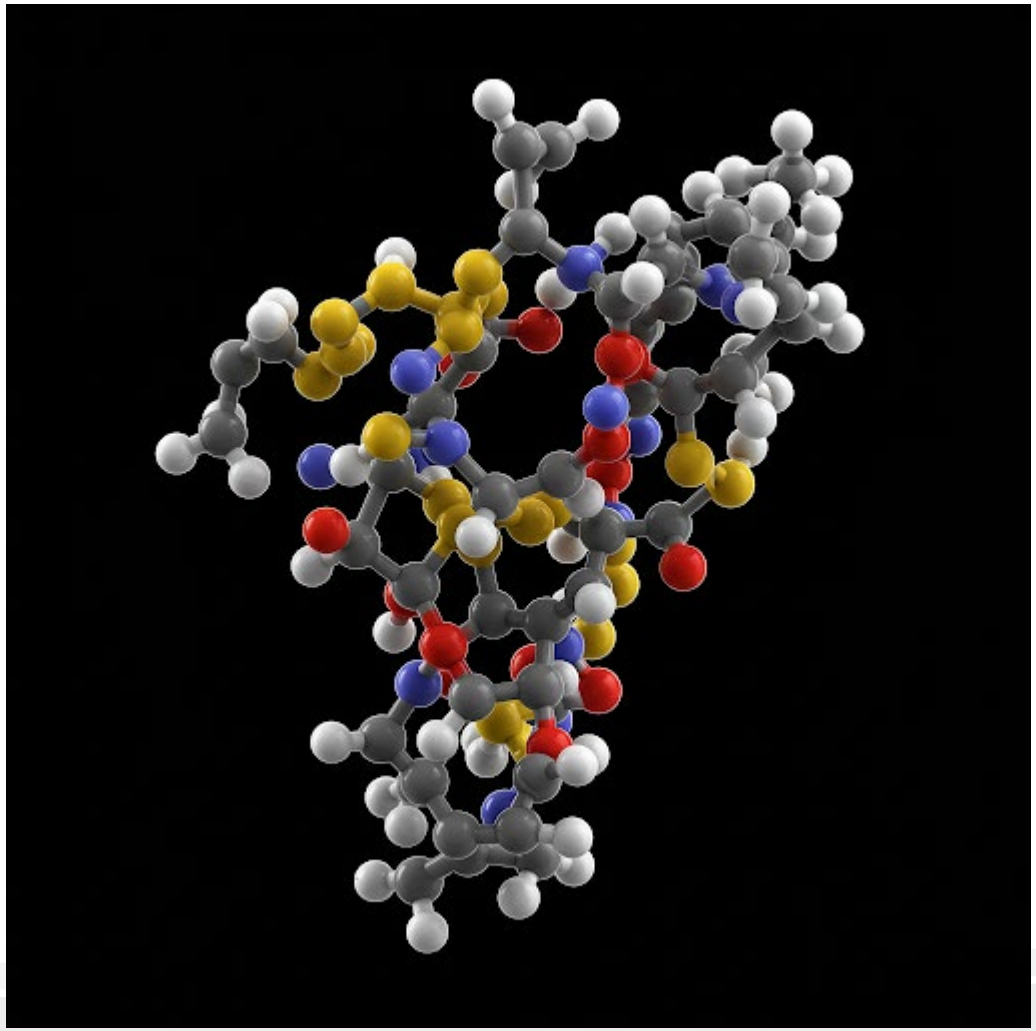
Older Adults & Nutrient Density (2)

- Nutrient density = nutrient / Calories
- "Empty Calories" have nutrient densities close to or equal to 0.00
  - Nutrient density of added sugar = 0.00
- "Empty Calories" are a major concern for older adults
  - Choosing nutrient dense food is a priority as more nutrients are needed but less total energy

Nutrients & Mental Health (1)

- Those in **highest** tertile of **branched chain amino acid** intake (Koochakpoor, 2021):
  - Had **24% reduced odds** of **depression**
  - Had **34% reduced odds** of **anxiety**

Dietary Protein & Muscle



- **Dietary protein** can directly stimulate **muscle protein synthesis** (Kim, 2018; Dickinson, 2011; Bauer, 2013; Paddon-Jones, 2009, Bar-Peled, 2014, Gingras, 2001)
- By activating the mammalian target of rapamycin complex 1 - **mTORC1** (Dickinson, 2011; Bar-Peled, 2014)
  - mTORC1 controls translation (Gingras, 2001)
- Older adults have increased protein needs

3 Keys to Protein Success:

1. Quantity

2. Distribution

3. Quality

Protein Quantity & Muscle Health

- **NIH recommends = 0.8 g/kg/day**
- **Experts in aging and muscle health recommend greater intakes due to anabolic resistance**
  - **1.0 to 1.2 g/kg/day** (Bauer, 2013; Deutz, 2014; Morley, 2010)
  - Or 25 to 30 g per meal (Paddon-Jones, 2009; Morley, 2010)
- **If performing resistance exercise, then 1.62 g/kg/day** is the amount needed to **maximize gains in lean body mass** (Morton, 2018)
  - Older adults should be performing resistance exercise!

3 Keys to Protein Success:

1. Quantity

2. Distribution

3. Quality

Dietary Protein Distribution (1)

- The same studies (Rand, 2003) that informed the NIH's **0.8 g/kg/day** recommendation only included works where participants **ate three or more iso-nutrient meals**
  - **Thus, protein intake was exactly evenly distributed**
- **Breakpoint** analysis of muscle protein synthesis indicates only so much protein is needed in a meal to stimulate muscle protein synthesis (Moore, 2015) :
  - **0.24** g/kg/meal for younger adults
  - **0.40 g/kg/meal for older adults**
  - Maximally stimulates muscle protein synthesis
- In other words, **protein should be eaten at each meal**

Dietary Protein Distribution (2)

VARIABLES	PERIOD			
	BREAKFAST MEAN ± SEM [95% CI]	LUNCH MEAN ± SEM [95% CI]	DINNER MEAN ± SEM [95% CI]	TOTAL MEAN ± SEM [95% CI]
Total protein (g)	17.4 ± 0.8 [15.9, 18.9]	28.1 ± 0.9 [26.3, 29.8]	39.8 ± 1.1 [37.7, 42.0]	85.3 ± 1.8 [81.6, 88.9]
Relative protein (g/kg)	0.255 ± 0.012 [0.232, 0.278]	0.418 ± 0.015 [0.388, 0.448]	0.588 ± 0.018 [0.553, 0.623]	1.262 ± 0.033 [1.197, 1.326]
Percent of energy (%)	3.5 ± 0.2 [3.2, 3.8]	5.7 ± 0.2 [5.4, 6.0]	8.0 ± 0.2 [7.7, 8.4]	17.3 ± 0.3 [16.6, 17.9]
Percent of total protein (%)	20.0 ± 0.7 [18.6, 21.4]	33.2 ± 0.8 [31.6, 34.7]	46.8 ± 0.8 [45.2, 48.4]	100*

Abbreviations: 95% CI, 95% confidence interval; SEM, standard error of the mean.
*Standard error and 95% confidence interval could not be calculated as all values were 100.

Johnson, N. R., Kotarsky, C. J., Mahoney, S. J., Sawyer, B. C., Stone, K. A., Byun, W., Hackney, K. J., Mitchell, S., & Stastny, S. N. (2022). Evenness of dietary protein intake is positively associated with lean mass and strength in healthy women. *Nutrition and Metabolic Insights*, *15*, 1–9. https://doi.org/10.1177/11786388221101829.

Dietary Protein Distribution (3)

Table 4. Model summaries of separate multiple linear regression models and coefficients evaluating 2 different methods of defining protein intake distribution when controlling for age, BMI, MVPA, relative energy intake, and percent of energy from protein.

OUTCOME	PROTEIN INTAKE VARIABLE*	MODEL			COEFFICIENT	
		R	$R^2_{ADJ.}$	P	B ± SE	P
Lean mass (kg)	⩾25 g/period	.710	.489	<.001	1.067 ± 0.273	<.001
	0.24/0.4 g/kg/period†	.700	.474	<.001	0.754 ± 0.244	.002
Percent body fat (%)	⩾25 g/period	.835	.687	<.001	−0.715 ± 0.563	.205
	0.24/0.4 g/kg/period	.833	.684	<.001	−0.033 ± 0.497	.948
Maximal handgrip strength (kg)	⩾25 g/period	.517	.243	<.001	3.274 ± 0.737	<.001
	0.24/0.4 g/kg/period	.495	.221	<.001	2.451 ± 0.658	<.001
Thirty second chair stand test (repetitions)	⩾25 g/period	.306	.064	.006	0.348 ± 0.588	.555
	0.24/0.4 g/kg/period	.303	.062	.006	0.07 ± 0.519	.893
Mean 6 m gait speed (s)	⩾25 g/period	.359	.100	<.001	0.007 ± 0.073	.927
	0.24/0.4 g/kg/period	.380	.117	<.001	−0.119 ± 0.064	.063
Summed lower-body peak torque (Nm)	⩾25 g/period	.583	.319	<.001	22.858 ± 7.918	.004
	0.24/0.4 g/kg/period	.561	.293	<.001	8.019 ± 7.099	.260
Summed lower-body muscular endurance (J)	⩾25 g/period	.544	.273	<.001	170.522 ± 88.159	.055
	0.24/0.4 g/kg/period	.551	.303	<.001	184.852 ± 77.185	.018

Abbreviations: BMI, body mass index; MVPA, moderate-to-vigorous physical activity; SE, standard error.
*Mean protein intakes during 3 periods from 3-day food diaries, waking to 11:30 (breakfast), afternoon (lunch) 11:31 to 16:30, and evening after 16:30 (dinner), equal to or greater than the listed cut-offs were coded as "1s" and were then summed to create ordinal levels with 4 levels, meeting the cut-off at 0, 1, 2, or 3 periods.
†For those 60 and under 0.24 g/kg/period; for those 60 and over 0.4 g/kg/period.

Johnson, N. R., Kotarsky, C. J., Mahoney, S. J., Sawyer, B. C., Stone, K. A., Byun, W., Hackney, K. J., Mitchell, S., & Stastny, S. N. (2022). Evenness of dietary protein intake is positively associated with lean mass and strength in healthy women. *Nutrition and Metabolic Insights*, *15*, 1–9. https://doi.org/10.1177/11786388221101829.

3 Keys to Protein Success:

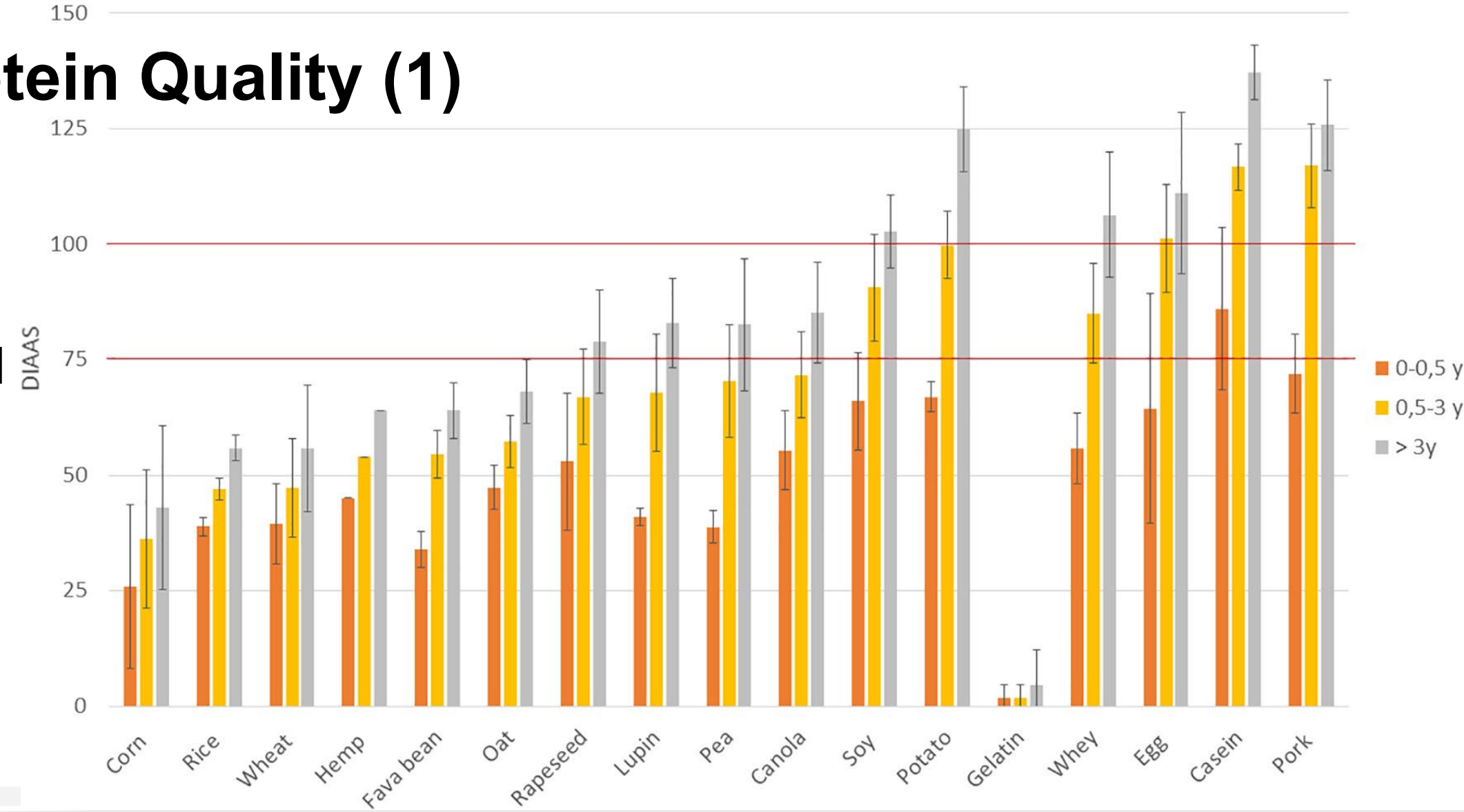
1. Quantity

2. Distribution

3. Quality

Protein Quality (1)

- 100≥ complete protein
- 99-75 good quality protein
- ≤75 poor quality protein



Protein Quality (2)

- **Most animal proteins are complete proteins**
  - Pork, egg, casein, and whey would all = 100 in table to the right
  - **Soy and potato are complete plant proteins**
    - **Potato is not high in protein**
- **Protein quality** can be improved by combining **complementary proteins** that provide **all essential amino acids**

TABLE 3 Improved DIAAS as a result of optimal plant protein combination

Plant protein mixture	Max. DIAAS[a] (≤100)	Ratio
Oat/lupin	76	7/93
Oat/lupin/soy	91	10/10/80
Oat/lupin/potato	100	10/20/60
Fava bean/corn	64	75/25
Fava bean/corn/soy	85	10/20/70
Fava bean/corn/potato	100	15/20/65
Fava bean/rapeseed	82	55/45
Pea/wheat	85	60/40
Pea/wheat/soy	90	25/20/55
Pea/wheat/potato	100	25/25/50
Canola/pea	84	35/65
Canola/pea/soy	92	25/15/60
Canola/pea/potato	100	35/35/30
Soy/canola	92	85/15
Soy/wheat	90	90/10
Soy/wheat/potato	100	25/20/55
Soy/oat	92	90/10
Corn/potato	100	25/75
Corn/soy	88	15/85
Wheat/potato	100	30/70
Lupin/potato	100	30/70

[a]DIAAS value derived from average IAA content and average SID per protein sources and calculated according to Equations (6), (8), and (9). Based on 0.5- to 3-year-old reference pattern score.

Herreman, L., Nommensen, P., Pennings, B., & Laus, M. C. (2020). Comprehensive overview of the quality of plant- And animal-sourced proteins based on the digestible indispensable amino acid score. *Food Science and Nutrition*, *8*(10), 5379–5391. https://doi.org/10.1002/fsn3.1809. Reused under the terms of the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/).

Healthy Eating Research Guidelines for Protein

Table 1: Nutrition Guidelines for Ranking Charitable Food

Food Category*	Example Products	Choose Often			Choose Sometimes			Choose Rarely		
		Saturated Fat	Sodium	Added Sugar**	Saturated Fat	Sodium	Added Sugar**	Saturated Fat	Sodium	Added Sugar**
Fruits and Vegetables	Fresh, canned, frozen, and dried fruits and vegetables, frozen broccoli with cheese sauce, apple sauce, tomato sauce, 100% juice, 100% fruit popsicle	≤ 2 g	≤230 mg	0 g	All 100% juice and plain dried fruit			≥2.5 g***	≥480 mg	≥12 g
					≥2.5 g***	231-479 mg	1-11 g			
Grains	Bread, rice, pasta, grains with seasoning mixes	First ingredient must be whole grain AND meet following thresholds:			≥2.5 g***	231-479 mg	7-11 g	≥2.5 g***	≥480 mg	≥12 g
		≤ 2 g	≤ 230 mg	≤ 6 g						
Protein	Animal (beef, pork, poultry, sausage, deli meats, hot dogs, eggs) and plant proteins (nuts, seeds, veggie burgers, soy, beans, peanut butter)	≤ 2 g	≤ 230 mg	≤ 6 g	2.5-4.5 g	231-479 mg	7-11 g	≥5 g	≥480 mg	≥12 g

Schwartz, M., Levi, R., Lott, M., Arm, K., & Seligman, H. (2020). *Healthy Eating Research Nutrition Guidelines for the Charitable Food System Healthy Eating Research*. https://healthyeatingresearch.org/wp-content/uploads/2020/02/her-food-bank_FINAL.pdf

Nutrients & Mental Health (1)

- Those in **highest** tertile of **branched chain amino acid** intake (Koochakpoor, 2021):
  - Had **24% reduced odds** of **depression**
  - Had **34% reduced odds** of **anxiety**
- A **1-gram increase** in **dietary fiber** is related to a **1% decrease** in **depression** risk (Saghafian, 2023)
- Those in the **highest quartile** of 12:0 **saturated fat** intake were **40% more likely** to have **depression** (Qi, 2024)
- Those with **depression** and/or **anxiety** prefer **saltier foods** (Ferraris, 2023)

Nutrients & Mental Health (2)

- **Dietary Intake and Depression in adults 50 years and older:**

Table 5. The Association Between Dietary Intake and Self-Reported Days with Depressive Symptoms.

Dietary Intake Variable	Univariate (n = 637)		Partially Adjusted Model Including Demographic Covariates (n = 589) [a]		Fully Adjusted Model Including Dietary Covariates (n = 589) [b]	
	β ± S.E. [c]	p	β ± S.E.	p	β ± S.E.	p
Lean protein intake	−0.189 ± 0.036	<0.001	−0.146 ± 0.037	<0.001	−0.117 ± 0.040	0.004
Processed meat intake	0.043 ± 0.028	0.133	−0.010 ± 0.030	0.741	0.016 ± 0.032	0.614
Fruit intake	−0.139 ± 0.030	<0.001	−0.093 ± 0.032	0.004	−0.096 ± 0.038	0.011
Vegetable intake	−0.120 ± 0.036	<0.001	−0.055 ± 0.035	0.115	−0.027 ± 0.044	0.536
Leafy green intake	0.021 ± 0.031	=0.512	0.039 ± 0.033	0.232	0.078 ± 0.041	0.059
Nut and seed intake	−0.021 ± 0.029	=0.512	−0.022 ± 0.030	0.461	−0.003 ± 0.035	0.925
Bean intake	0.058 ± 0.029	<0.001	0.003 ± 0.031	0.920	0.014 ± 0.037	0.712

[a] The partially adjusted model included age, sex, race and ethnicity, cohabitation status, education level, and household income as covariates. [b] The fully adjusted model included all covariates from the partially adjusted model and all dietary intake variables. [c] S.E. = Standard error.

Johnson, N. R., Stastny, S. N., & Garden-Robinson, J. (2024). Intakes of Lean Proteins and Processed Meats and Differences in Mental Health between Rural and Metro Adults 50 Years and Older. *Nutrients*, *16*(18), 3056. https://doi.org/10.3390/nu16183056. This table is reused under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

Nutrients & Mental Health (3)

- **Dietary Intake and Anxiety in adults 50 years and older:**

Table 6. The Association Between Dietary Intake and Self-Reported Days with Anxiety Symptoms.

Dietary Intake Variable	Univariate (n = 637)		Partially Adjusted Model Including Demographic Covariates (n = 589) [a]		Fully Adjusted Model Including Dietary Covariates (n = 589) [b]	
	β ± S.E. [c]	p	β ± S.E.	p	β ± S.E.	p
Lean protein intake	−0.145 ± 0.037	<0.001	−0.108 ± 0.037	0.004	−0.086 ± 0.040	0.031
Processed meat intake	0.086 ± 0.029	0.003	0.044 ± 0.30	0.146	0.089 ± 0.040	0.005
Fruit intake	−0.157 ± 0.031	<0.001	−0.105 ± 0.032	0.001	−0.095 ± 0.038	0.012
Vegetable intake	−0.138 ± 0.034	<0.001	−0.089 ± 0.035	0.011	−0.051 ± 0.044	0.242
Leafy green intake	−0.012 ± 0.032	0.712	−0.006 ± 0.033	0.853	0.068 ± 0.041	0.103
Nut and seed intake	−0.028 ± 0.30	0.356	−0.022 ± 0.30	0.452	0.032 ± 0.035	0.929
Bean intake	−0.003 ± 0.030	0.916	−0.070 ± 0.031	0.025	−0.092 ± 0.037	0.013

[a] The partially adjusted model included age, sex, race and ethnicity, cohabitation status, education level, and household income as covariates. [b] The fully adjusted model included all covariates from the partially adjusted model and all dietary intake variables. [c] S.E. = Standard error.

Johnson, N. R., Stastny, S. N., & Garden-Robinson, J. (2024). Intakes of Lean Proteins and Processed Meats and Differences in Mental Health between Rural and Metro Adults 50 Years and Older. *Nutrients*, *16*(18), 3056. https://doi.org/10.3390/nu16183056. This table is reused under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

Food Choices & Mental Health

Choose

- **Lean Proteins –** Branched Chain Amino Acids
  - Skim and reduced fat dairy
  - Lean meats
  - Fish
  - Soy
- *Whole* **Vegetables –** Fiber and antioxidants
- *Whole* **Fruits –** Fiber and antioxidants
- **Beans –** Fiber and probiotics

Limit

- **Processed Meats**
  - Deli Meats
- **Deep-Fried Foods**
- **Desserts and Pastries**
- **Salty Foods**
- **Other Processed Foods**
  - Instant Noodles
  - Pre-packaged deserts
  - Snack Foods

Model	β	SE	p
Constant	0.846	0.097	<0.001
Age	0.036	0.011	0.001
Sex (Male =1)	0.015	0.025	0.559
Race/Ethnicity (Non-Hispanic White = 1)	-0.090	0.026	0.001
Education	-0.012	0.009	0.176
Income	-0.044	0.010	<0.001
Lean Meat	-0.041	0.011	<0.001
Processed Meat	0.041	0.010	<0.001
Fruit	-0.001	0.012	0.964
Vegetables	-0.038	0.013	0.002
Leafy Greens	0.017	0.011	0.133
Nuts & Seeds	-0.001	0.011	0.907
Legumes	0.013	0.010	0.195

Dietary Intake and Disability

Johnson, N., Garden-Robinson J., & Stastny, S. (2024). How Does Living Alone & Inability to Drive Affect Dietary Intake & Physical Limitations? Nutrition & Health Outreach Implications for Extension Education. *Journal of the National Extension Association of Family and Consumer Sciences*, 19, 27-34.

Food Agency

- **Food agency** is the ability to produce ***healthy*** **meals**
  - **Nutrition knowledge** – needed to make healthy food choices
    - Improved by nutrition classes or lessons
  - **Culinary skills** – needed to prepare food
    - Affected by physical health and environment/equipment
    - Improved by cooking classes or lessons
  - **Environment/Equipment** – needed to prepare food
    - A reason why lack of housing contributes to poor intake
    - Living alone is another environmental factor affecting intake
  - **Food Security** – access to and ability to afford healthy food

Trubek, A. B., Carabello, M., Morgan, C., & Lahne, J. (2017). Empowered to cook: The crucial role of 'food agency' in making meals. *Appetite*, *116*, 297–305. https://doi.org/10.1016/j.appet.2017.05.017

Barriers to producing healthy meals in older adults

- **Lack of Nutrition knowledge** – needed to make healthy food choices
  - May have little nutrition knowledge
- **Lack of Culinary skills** – needed to prepare food
  - Older adults may not have the physical and/or mental functionality to cook on their own and may lack support in environmental factors that would allow them to make their own meals
- **Unfavorable Environment/lack of Equipment** – needed to prepare food
  - Social isolation decreases dietary intake, an overlooked factor
- **Food Insecurity** – access to and ability to afford healthy food
  - Fixed income and limited transportation puts older adults at risk for food insecurity

Food Security Vs. Food Insecurity

- **Food security** is one's ability to ***access*** and ***afford*** ***healthy*** food

- **Food insecurity** (FI) is limited or uncertain ability to access or afford ***healthy*** food

Food Security & Mental Health

- Global data from **372,143 people** across **19 studies** and **10 countries**:
- People who are food insecure are **44% more likely** to have **depression**
- People who are food insecure are **34% more likely** to report **stress**
- **Food insecurity was not associated with anxiety**

Pourmotabbed, A., Moradi, S., Babaei, A., Ghavami, A., Mohammadi, H., Jalili, C., … Miraghajani, M. (2020). Food insecurity and mental health: a systematic review and meta-analysis. *Public Health Nutrition*, *23*(10), 1778–1790. doi:10.1017/S136898001900435X

Food Insecurity & Mental Health: Older Adults (1)

- **Food insecurity** is related to **malnutrition** in older adults (Pereira, 2022)
- Older adults with **depression** are **112%** more likely to be **food insecure** (Brostow, 2019)
- Food insecure older adults report lower quality of life (Russel, 2016):
  - Physical functioning – ▼6.4
  - Role Limit—Physical – ▼11.8
  - Bodily Pain –▼7.8
  - General Health – ▼4.0
  - Vitality – ▼5.5
  - Social functioning – ▼6.3
  - Role Limit—Emotional – ▼18.0
  - Mental Health – ▼5.1

Food Insecurity & Mental Health: Older Adults (2)

- **Food insecurity** is related to **malnutrition** in older adults (Pereira, 2022)
- Older adults with **depression** are **112%** more likely to be **food insecure** (Brostow, 2019)
- Food insecure older adults report lower quality of life (Russel, 2016):
  - Physical functioning – ▼0.36 SD
  - Role Limit—Physical – ▼0.34 SD
  - Bodily Pain –▼0.36 SD
  - General Health – ▼0.24 SD
  - Vitality – ▼0.31 SD
  - Social functioning – ▼0.30 SD
  - Role Limit—Emotional – ▼0.57 SD
  - Mental Health – ▼0.32 SD

Addressing Food Security

1. Screen and assess all patients for food insecurity
2. Determine if eligible for WIC or SNAP benefits
3. Offer Cooking Classes
4. Partner with non-profits and charitable organizations
5. Create health system food banks that provide opportunity for food at medical appointments
6. Produce food at health system facilities
   - There are psychological benefits to gardening, as well

Assessing Food Security

- **Food insecurity is limited or uncertain access to healthy food**
- Often this is assessed using the U.S. Adult Food Security Survey Module (USDA, 2012)
  - Screener
    - Values >1 indicate possible food insecurity
  - 10-item version
  - 6 item version

Optional USDA Food Sufficiency Question/Screener: Question HH1 (This question is optional. It is not used to calculate the Adult Food Security Scale. It may be used in conjunction with income as a preliminary screener to reduce respondent burden for high income households).

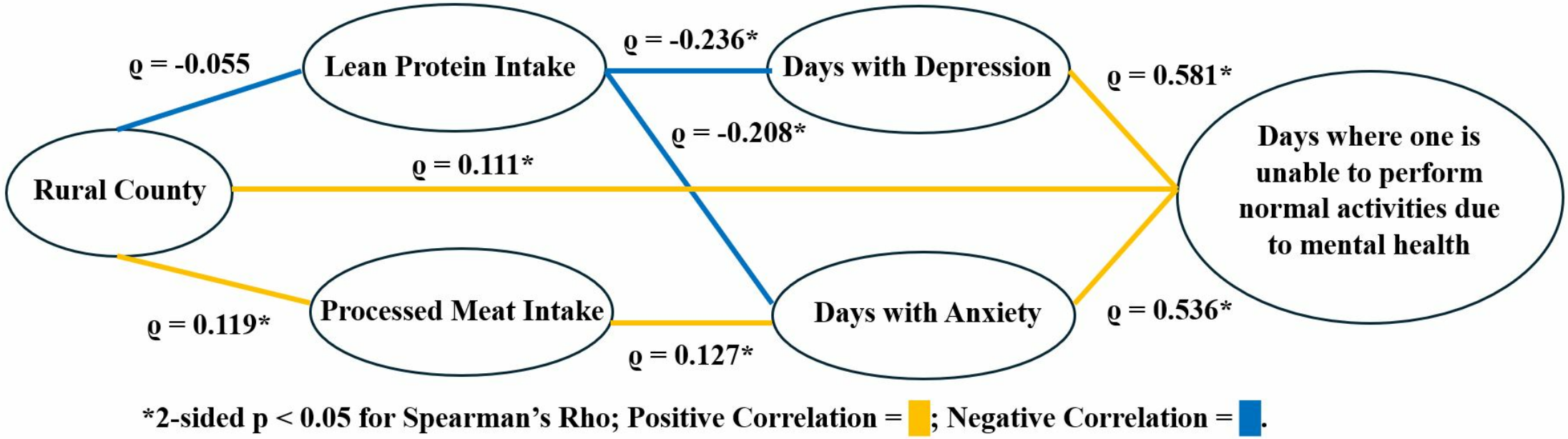
HH1. [IF ONE PERSON IN HOUSEHOLD, USE "I" IN PARENTHETICALS, OTHERWISE, USE "WE."]

Which of these statements best describes the food eaten in your household in the last 12 months: —enough of the kinds of food (I/we) want to eat; —enough, but not always the kinds of food (I/we) want; —sometimes not enough to eat; or, —often not enough to eat?

[1] Enough of the kinds of food we want to eat
[2] Enough but not always the kinds of food we want
[3] Sometimes not enough to eat
[4] Often not enough to eat
[ ] DK or Refused

United States Department of Agriculture - Economic Research Service. (2012). *U.S. Adult Food Security Survey Module: Three-Stage Design, With Screeners*. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/survey-tools#household

Food Access & Mental Health



*2-sided p < 0.05 for Spearman's Rho; Positive Correlation = ; Negative Correlation = .

- Data from 637 North Dakotans 50 years and older
  - 504 (79.1%) from rural counties
  - 133 (20.9%) from metro counties

Johnson, N. R., Stastny, S. N., & Garden-Robinson, J. (2024). Intakes of Lean Proteins and Processed Meats and Differences in Mental Health between Rural and Metro Adults 50 Years and Older. *Nutrients*, *16*(18), 3056. https://doi.org/10.3390/nu16183056.

Barriers to producing healthy meals in older adults

- **Lack of Nutrition knowledge** – needed to make healthy food choices
  - May have little nutrition knowledge
- **Lack of Culinary skills** – needed to prepare food
  - Older adults may not have the physical and/or mental functionality to cook on their own and may lack support in environmental factors that would allow them to make their own meals
- **Unfavorable Environment/lack of Equipment** – needed to prepare food
  - Social isolation decreases dietary intake, an overlooked factor
- **Food Insecurity** – access to and ability to afford healthy food
  - Fixed income and limited transportation puts older adults at risk for food insecurity

Cooking Classes Increase Intake

Table 2. Association between participation in a personal food skills course with a teaching kitchen and self-efficacy in cooking and consuming fruit, vegetables, and whole grains [1].

	N	Intervention		Comparison		*p* [2]
		Baseline	Endline	Baseline	Endline	
Fruit self-efficacy score	117	32.77 (1.04)	37.13 (1.04)	34.74 (0.99)	32.78 (0.99)	<0.0001
Vegetable self-efficacy score	116	33.74 (1.07)	38.34 (1.07)	36.89 (1.05)	36.06 (1.05)	0.0002
Whole grain self-efficacy score	114	35.76 (1.18)	41.26 (1.18)	38.58 (1.14)	38.25 (1.14)	<0.0001
Cooking self-efficacy score	115	11.76 (0.46)	16.24 (0.46)	13.45 (0.44)	14.69 (0.44)	<0.0001

[1] Least squares means (SE) from mixed effects model using propensity-score-weighted data are presented. [2] *p* values are for the group × time point interaction term.

Table 3. Association between participation in a personal food skills course with a teaching kitchen and usual consumption of fruit, vegetables, and whole grains and meal preparation behaviors in the past month [1].

	N	Intervention		Comparison		*p* [2]
		Baseline	Endline	Baseline	Endline	
Fruit (cups/day)	121	2.40 (0.35)	1.71 (0.26)	2.67 (0.36)	1.81 (0.26)	0.77
Vegetables (cups/day)	121	2.39 (0.35)	1.99 (0.30)	3.34 (0.44)	1.96 (0.28)	0.03
Whole grains (ounces/day)	120	4.85 (0.59)	3.80 (0.48)	5.65 (0.61)	3.77 (0.43)	0.18
Cooking (meals/week)	113	5.86 (0.76)	6.64 (0.85)	8.68 (0.98)	7.87 (0.90)	0.03
Skipping (meals/week)	102	4.65 (0.54)	3.56 (0.44)	3.02 (0.37)	3.71 (0.44)	0.003
Eating out/take-out (meals/week)	106	3.38 (0.36)	3.44 (0.37)	3.15 (0.35)	2.92 (0.33)	0.58

[1] Exponentiated least squares means (SE) from mixed effects Poisson regression using propensity-score-weighted data are presented. [2] *p* values are for the group × time point interaction term.

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Nutrition Education Improves Clinical Outcomes

Variables	Control group(n = 54)	Intervention group(n = 53)	p value[1]
	Mean ± SD	Mean ± SD	
Blood Hb level gm/dl			
Baseline	10.18±0.62	9.99±0.87	0.209
End line	10.35±0.64	10.55±0.79	0.144
Change	0.16±0.82	0.56±0.40	0.002*

[1] Independent sample t-test

*statistically significant is at $p<0.05$

https://doi.org/10.1371/journal.pone.0213982.t002

- Nutrition education is effective and can be combined with cooking lessons
- Get folks to come in for the cooking lesson and free food, and get them to stay for the nutrition education

Culinary-Nutrition Classes Increase Intake in Older Adults

- A recent scoping review highlighted the **success** of **culinary nutrition classes,** but also noted that **few classes focused on older adults**

Alghamdi, M. M., Burrows, T., Barclay, B., Baines, S., & Chojenta, C. (2023). Culinary Nutrition Education Programs in Community-Dwelling Older Adults: A Scoping Review. *Journal of Nutrition, Health and Aging*, *27*(2), 142–158. https://doi.org/10.1007/s12603-022-1876-7

- **One 4-week culinary-nutrition class for older adults:**
  - **Improved culinary and nutrition knowledge**
  - **Increased the variety of vegetables eaten**
    - A **1-gram increase** in **dietary fiber** is related to a **1% decrease** in **depression** risk (Saghafian, 2023)
  - **Decreased the amount of salt eaten**

Wallace, R., Lo, J., & Devine, A. (2016). Tailored nutrition education in the elderly can lead to sustained dietary behaviour change. *The Journal of Nutrition, Health & Aging*, *20*(1), 8–15. https://doi.org/10.1007/s12603-016-0669-2

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Isolation & Dietary Intake

- Living alone was related to decreased intake of:
  - Processed meat
  - Fruit
  - Lean Meat
  - Vegetables
  - Nuts & Seeds

		Overall Model			Lives Alone			Cannot Drive	
	R2	F	p	β	SE	p	β	SE	P
Processed Meat	0.078	11.564	<0.001	-0.216	0.085	0.011	0.293	0.092	0.001
Fruit	0.126	19.622	<0.001	-0.282	0.074	<0.001	-0.174	0.079	0.028
Lean Meat	0.078	11.476	<0.001	-0.137	0.070	0.050	0.169	0.075	0.025
Vegetables	0.132	20.702	<0.001	-0.196	0.072	0.007	-0.077	0.077	0.324
Leafy Green	0.117	18.065	<0.001	-0.117	0.078	0.135	0.036	0.084	0.667
Nuts and Seeds	0.061	8.934	<0.001	-0.194	0.083	0.019	-0.060	0.089	0.497
Legumes	0.058	8.326	<0.001	0.117	0.085	0.171	0.071	0.092	0.439

Johnson, N., Garden-Robinson J., & Stastny, S. (2024). How Does Living Alone & Inability to Drive Affect Dietary Intake & Physical Limitations? Nutrition & Health Outreach Implications for Extension Education. *Journal of the National Extension Association of Family and Consumer Sciences*, 19, 27-34.

Improving Dietary Intake in Older Adults

- Offer cooking, nutrition, and shopping lessons
  - https://www.ndsu.edu/agriculture/extension/programs/nourish/upcoming-courses
- Find ways in your community to facilitate transportation for older adults
- Host meals for older adults that offer food and chances for social interaction
- Refer patients to Meals on Wheels and other services
- Be friendly – invite people to dine with you

Thanks For Your Time!

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Thanks For Your Time!

- **How may I answer your questions?**

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