



Meeting 5

Exposure

Chair: Bill Kraus

Members: Wayne Campbell, John Jakicic, Kathy Janz, Ken Powell

Question # 4 Steps

- What is the relationship between step count per day and (1) mortality (i.e., all-cause or cause-specific) and (2) disease incidence (e.g., coronary heart disease, type 2 diabetes)?
- Source of evidence to answer question:
 - De novo systematic review of original articles

Draft Conclusion Statements

- **Conclusion Statements:**
 - Insufficient evidence is available to determine the relationship between step counts per day and mortality (i.e., all-cause and CVD). No studies were identified that addressed this relationship
 - Limited evidence suggests that step count per day is associated with incidence of cardiovascular disease and risk of type 2 diabetes
- **Grade:**
 - Grade: Not Assignable for mortality.
 - Grade: Limited for cardiovascular disease and risk of type 2 diabetes

Draft Conclusion Statement

- **Dose-response**

Limited evidence suggest there is a dose-response relationship between the measure of step per day and cardiovascular disease events and diabetes risk.

Grade: Limited

- **Age, gender, race/ethnicity, socioeconomic status, weight status**

Insufficient evidence is available to determine whether the relationship between the measure of steps per day and cardiovascular disease events and diabetes risk is influenced by age, sex, race/ethnicity, socio-economic status, or weight status.

Grade: Grade Not Assignable

Question # 5 Bouts

5. What is the relationship between bout duration of physical activity and health outcomes?

Description of the Evidence

| Health Outcomes | | Cross-Sectional Studies | Prospective Studies | Randomized Studies* |
|--|-----------------------------|-------------------------|---------------------|---------------------|
| Weight or Body Composition | Incidence of Obesity | | 1 | |
| | Body Mass Index | 6 | | 5 |
| | Body Fatness | 7 | | 7 |
| Blood Pressure | | 2 | 1 | 5 |
| Lipids | Total Cholesterol | | | 1 |
| | LDL Cholesterol | 1 | | 3 |
| | HDL Cholesterol | 4 | 1 | 4 |
| | Triglycerides | 3 | | 3 |
| Glycemic Control | Fasting Blood Glucose | 3 | | 2 |
| | Fasting Insulin | 2 | | 2 |
| | Oral Glucose Tolerance Test | | | 1 |
| | HbA1c | 1 | | |
| Metabolic Syndrome | | 2 | | |
| c-Reactive Protein | | 2 | | |
| Framingham Cardiovascular Disease Risk Score | | 1 | | |

*indicates that Randomized Studies on examined bouts ≥ 10 minutes in duration.

Draft Key Findings

| Health Outcomes | Number of Studies where bouts ≥ 10 minutes in duration was superior to bouts < 10 minutes in duration | | | Number of Studies where bouts < 10 minutes in duration was superior to bouts ≥ 10 minutes in duration | | | Number of Studies where there was no difference between bouts ≥ 10 minutes in duration and bouts < 10 minutes in duration | | |
|--|--|---------------------|--------------------|--|---------------------|--------------------|--|---------------------|--------------------|
| | Cross-Sectional Studies | Prospective Studies | Randomized Studies | Cross-Sectional Studies | Prospective Studies | Randomized Studies | Cross-Sectional Studies | Prospective Studies | Randomized Studies |
| Incidence of Obesity | | 1 | | | | | | | |
| Body Mass Index | 2 | | | 1 | | | 3 | | |
| Body Fatness | 1 | | | 1 | | | 5 | | |
| Blood Pressure | | | | 1 | | | 1 | 1 | |
| Total Cholesterol | | | | | | | 1 | | |
| LDL Cholesterol | | | | | | | | 1 | |
| HDL Cholesterol | | 1 | | 1 | | | 2 | | |
| Triglycerides | | | | 1 | | | 2 | | |
| Fasting Blood Glucose | | | | 1 | | | 1 | | |
| Insulin | | | | 1 | | | 1 | | |
| HbA1c | | | | 1 | | | | | |
| Metabolic Syndrome | | | | | | | 1 | | |
| c-Reactive Protein | | | | 1 | | | 1 | | |
| Framingham Cardiovascular Disease Risk Score | | | | | | | 1 | | |

Q5 – Description of the Evidence

| Citation | Comment | Study Type | Sample Size | Weight | BMI | %fat, body comp | Visceral Adiposity | Blood Pressure | Total Cholesterol | HDL Cholesterol | LDL Cholesterol | Triglycerides | Fasting Glucose | Fasting Insulin | 2-hour insulin during a glucose tolerance test | HbA1c | Metabolic Syndrome | CRP | Framingham CVD Risk Score |
|-------------------|----------|-------------|-------------|-----------------|-----|-----------------|--------------------|----------------|-------------------|-----------------|-----------------|---------------|-----------------|-----------------|--|-------|--------------------|-----|---------------------------|
| White 2015 | CARDIA | Prospective | 2076 | | ≥10 | | | ND* | | | | | | | | | | | |
| Di Blasio 2014 | | Prospective | 67 | | | | | | | ≥10 | | | | | | | | | |
| Loprinzi 2013 | NHANES | X-Sectional | 6321 | | ND* | ND* | | ND* | ND* | ND* | ND* | ND* | ND* | | | | | ND* | |
| Wolff-Hughes 2015 | NHANES | X-Sectional | 5668 | | ≥10 | <10 | | <10 | | <10 | | <10 | <10 | <10 | | | | <10 | |
| Gay 2016 | | X-Sectional | 5302 | | | | | | | | | | | | | <10 | | | |
| Fan 2013 | PA = VPA | X-Sectional | 4511 | | ND* | | | | | | | | | | | | | | |
| Strath 2008 | NHANES | X-Sectional | 3250 | Bout > Non-Bout | | Bout > Non-Bout | | | | | | | | | | | | | |
| Glazer 2013 | | X-Sectional | 2109 | | ND* | ND* | | | | ND* | | ND* | | | | | | | |
| Vasankari 2017 | | X-Sectional | 1398 | | | | | | | | | | | | | | | | ≥1 |
| Clarke 2014 | | X-Sectional | 1119 | | | | | | | | | | | | | | 1-9, 4-9, 7-9 min | | |
| Jefferis 2016 | | X-Sectional | 1009 | | ND* | ND* | | | | | | | | ND* | | | ND* | | |
| Camero 2017 | | X-Sectional | 298 | | <10 | ND* | ND* | | | | | | | | | | | | |
| Ayabe 2013 | | X-Sectional | 42 | | | | >3 min | | | | | | | | | | | | |
| Ayabe 2012 | | X-Sectional | 42 | | | | | | | ≥32 sec | | | | ≥3 min | | | | | |

*ND: Both bouts of ≥10 minutes vs. <10 minutes in duration showed an association.

Draft Conclusion Statement

- Conclusion Statement:
 - Moderate evidence indicates that bouts of any length of MVPA contribute to the health benefits associated with accumulated volume of physical activity.
- PAGAC Grade: Moderate



Meeting 5

Individuals with Chronic Conditions

Chair: David Buchner

Members: Bill Kraus, Rich Macko, Anne McTiernan, Linda Pescatello, Ken Powell

Question 1

1. Among cancer survivors, what is the relationship between physical activity and (1) all-cause mortality, (2) cancer-specific mortality, or (3) risk of cancer recurrence or second primary cancer?
 - Is there a dose-response relationship? If yes, what is the shape of the relationship?
 - Does the relationship vary by age, sex, race/ethnicity, socio-economic status, or weight status?
 - Does the relationship vary based on: frequency, duration, intensity, type (mode), or how physical activity is measured?
- Source of evidence to answer question
 - Systematic Review, Meta-Analyses, and Existing Report

Updated Cancer Survivor Grades

| Prostate | Main | Dose | Demographics | Frequency, Duration, Intensity, Type |
|---------------------------------------|----------------|----------------|--|---|
| All-Cause Mortality | Limited | Limited | Not assignable | Limited |
| Cancer-Specific Mortality | Moderate | Limited | Not assignable | Limited |
| Risk of Recurrence/ Second Primary | Not assignable | Not assignable | Not assignable | Not assignable |
| Colorectal | Main | Dose | Demographics | Frequency, Duration, Intensity, Type |
| All-Cause Mortality | Moderate | Moderate | Moderate (age, gender); not assignable (SES, race, <i>weight</i>) | Not assignable |

Orange: grades not presented previously.

Green: changed grade (previously presented as Limited evidence of no association, and has been corrected to Not Assignable).



Meeting 5

Key Topic Discussion
2018 PAGAC Co-Chairs
Ken Powell & Abby King

Topics to Come to Consensus On



- **Adults**
- **Youth**
- **Older adults**
- **Special populations**
- **Sedentary behavior**
- **Resistance training**
- **Safety**

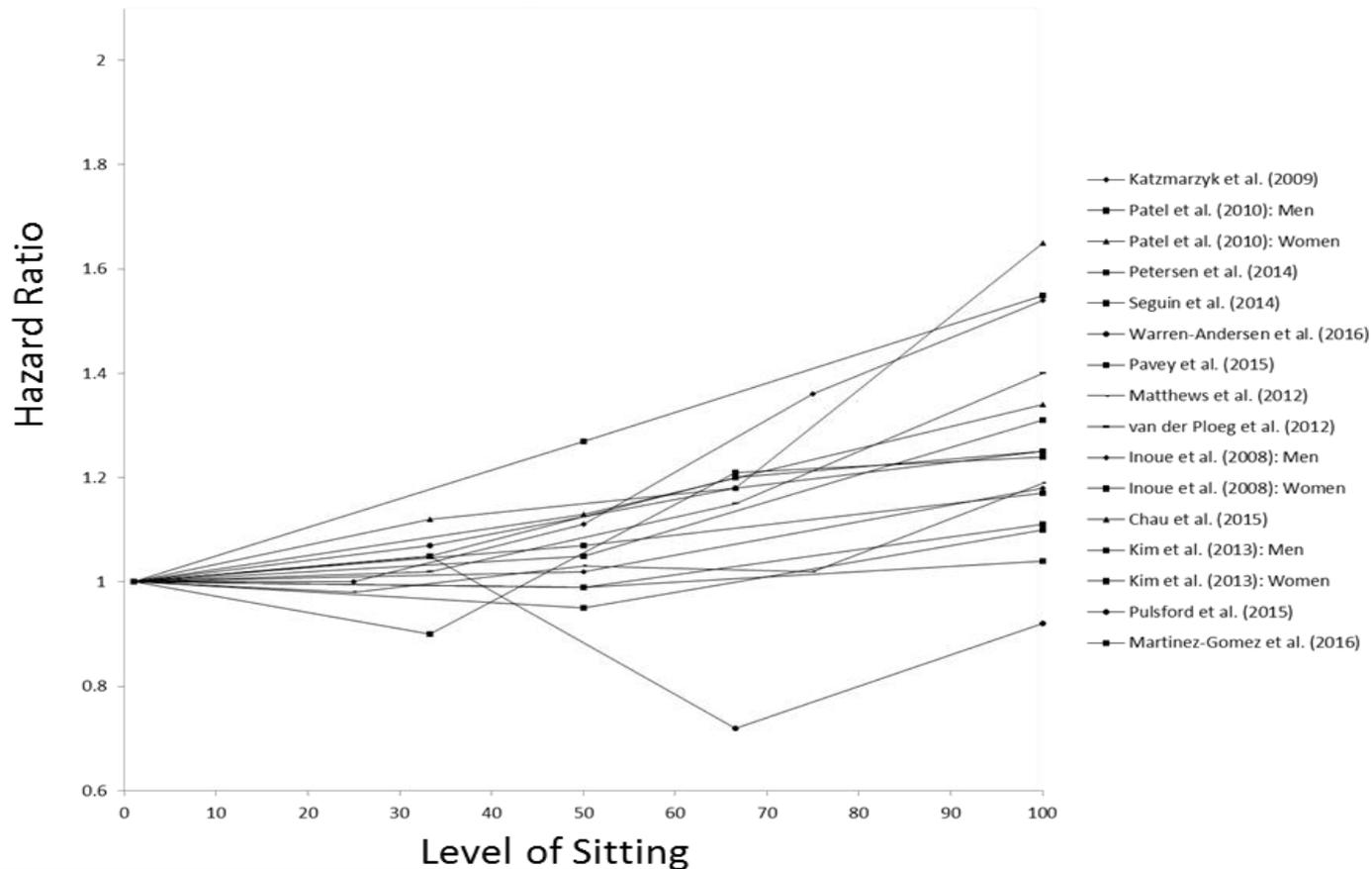
Adults

- Target range from 2008
 - 500-1000 MET-minutes per week
 - 8 – 17 MET-hours per week
 - 150 – 300 Minutes per week (MPA)

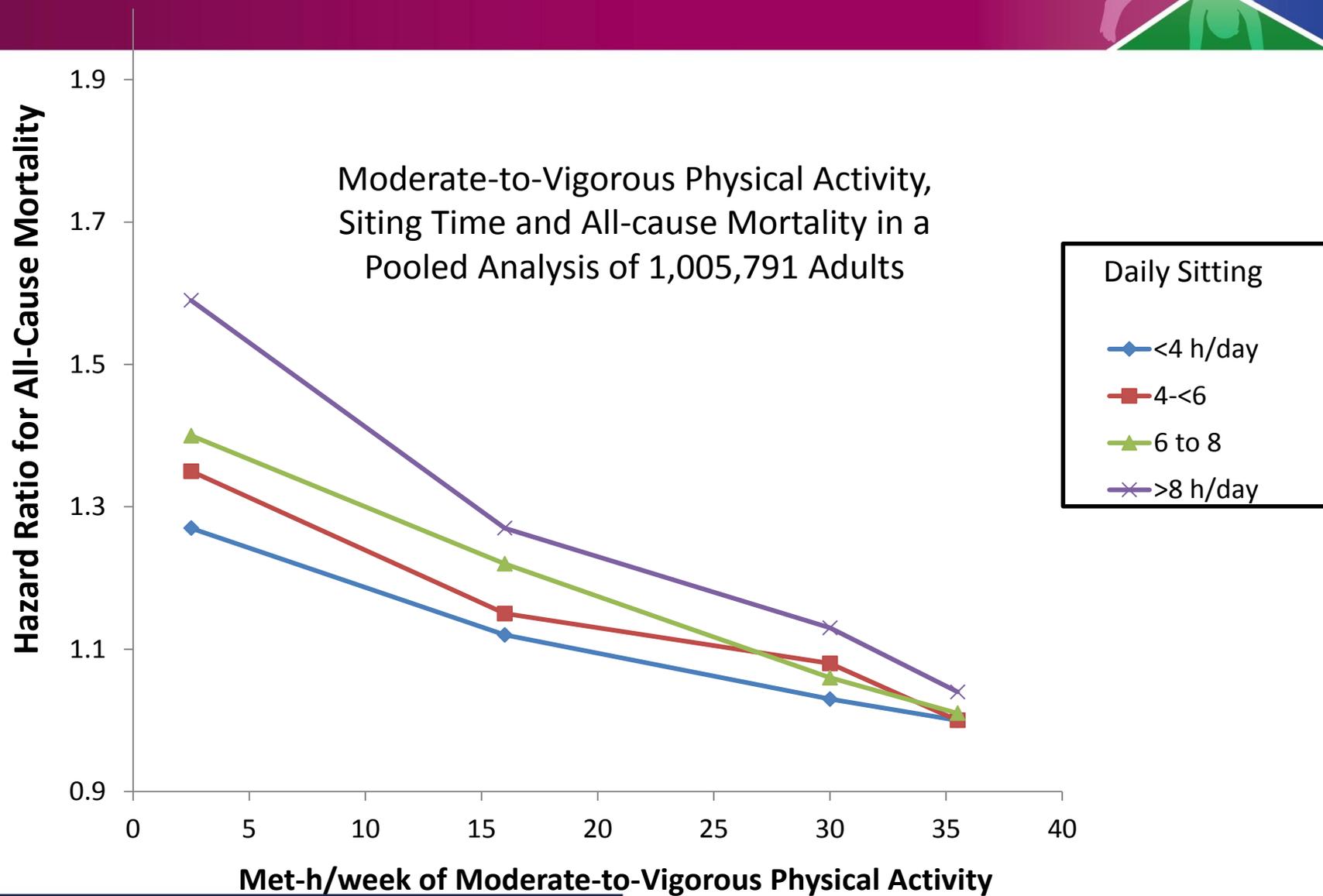
Sedentary Behavior

Figure 1. Dose-response associations between sedentary behavior and all-cause mortality.

A) Sitting and All-Cause Mortality



Sedentary Behavior



Youth

- 0 – 18 years of age
 - More information supporting benefits
- 3 – 6 years of age
 - Strong evidence demonstrates that higher amounts of physical activity are associated with more favorable indicators of bone health and with reduced risk for excessive increases in body weight and adiposity in children 3-6 years of age. **PAGAC Grade: Strong**

Older Adults

- Adult target OK if able
- Multimodal training
- Muscle strengthening

Draft Key Findings: Muscle strengthening activity and physical function

- Two publications from a MA of N=121 RCT's of PRT in older adults.
 - In a Cochrane 2009 review [1]
 - Frequency = 2 or 3 days of PRT “in almost all trials.”
 - No trials compared 2 vs 3 (or more) days of PRT with outcome of physical function.
 - One trial compared 3 sets versus 1 set in N=28 participants, with significant difference in favor of 3 sets on only 1 of 4 physical function tests.
 - In a f/u summary in 2011 [2]
 - To obtain benefits of PRT, “the exercise frequency should be two to three times a week...”
- In a meta-regression, “number of repetitions of resistance exercises was associated with intervention effectiveness ($p<.01$), whereas number of sets was not ($p=.09$)” p.154 [3]

1. (Liu,2009) pp 7 &13; 2. Liu, 2011 p.94; 3. Chase, 2017 p. 154

Special Populations



- Pregnancy
 - Benefits of PA
- Selected disabilities
 - Adult target OK if able
 - Muscle strengthening

Resistance Training

- Evidence regarding frequency

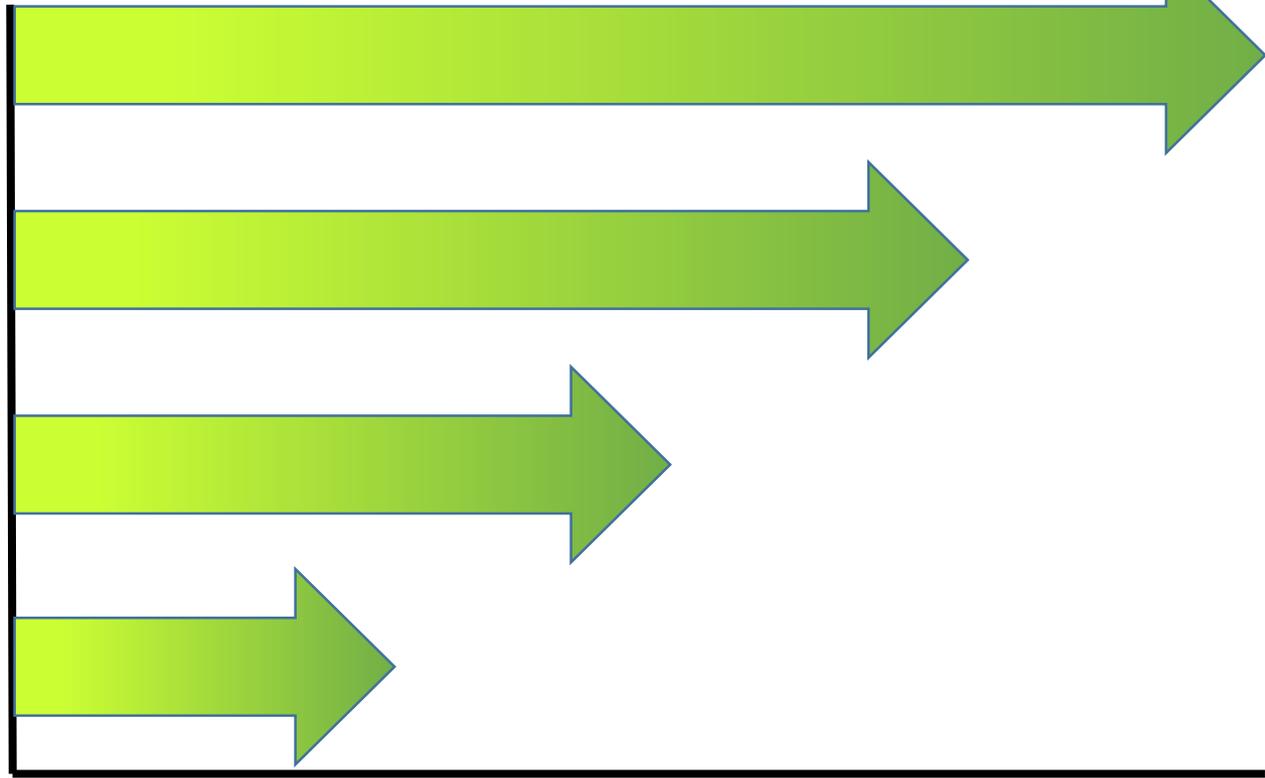
Safety

- All subcommittees alert to issue
- No information uncovered

Other

- “Aerobic”

Accruing Health Benefits by Dose of Moderate-to-Vigorous Physical Activity



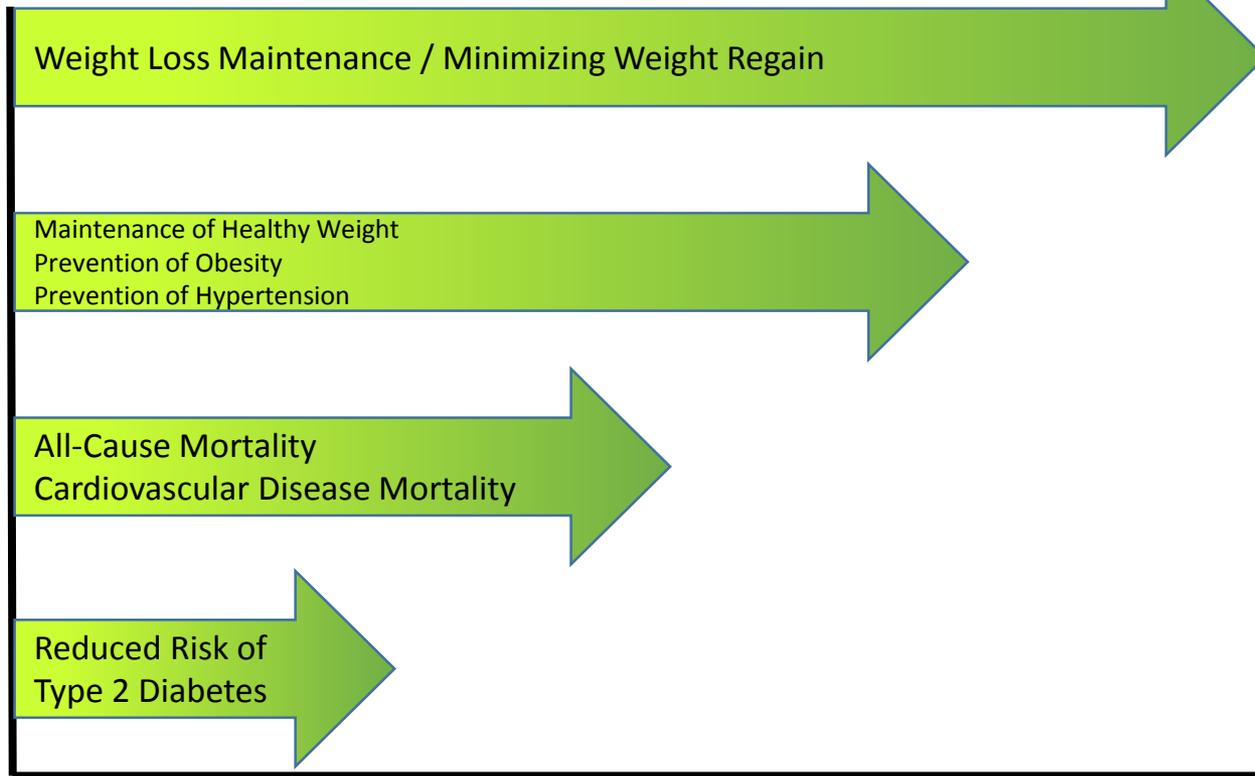
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Minutes per Week of MVPA

LEGEND

Some Benefit More Benefit

Accruing Health Benefits by Dose of Moderate-to-Vigorous Physical Activity

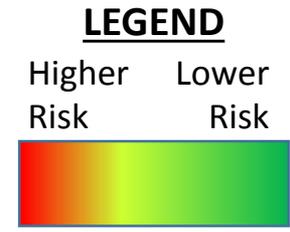
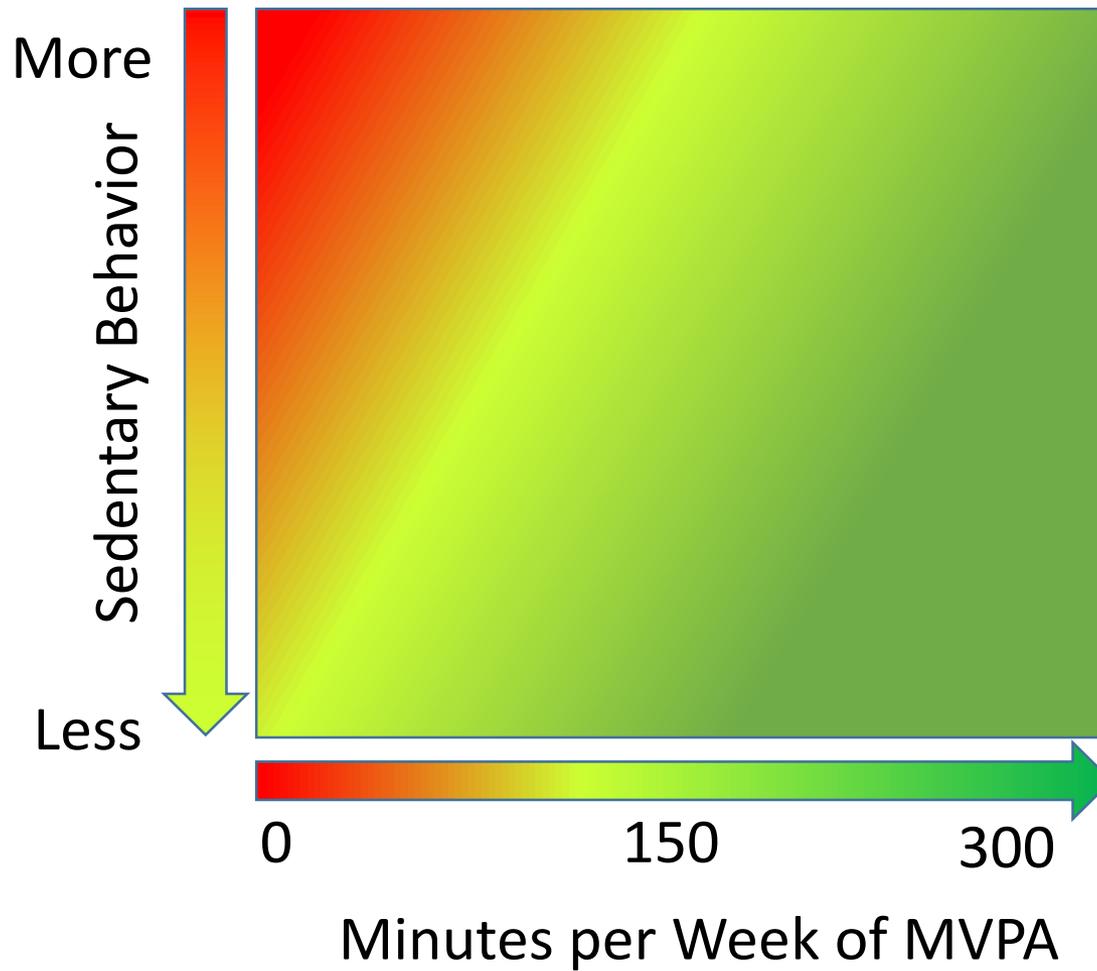


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Minutes per Week of MVPA

LEGEND

Some Benefit More Benefit





Meeting 5

Remarks from the Acting Assistant Secretary for Health



Meeting 5

ADJOURN