



Meeting 3

Exposure

Chair: Bill Kraus

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

Experts and Consultants



- Invited experts: None
- Consultants: William L. Haskell, PhD,
FACSM
Stanford University

Subcommittee Questions



1. What is the relationship between physical activity and all-cause mortality?
2. What is the relationship between physical activity and cardiovascular disease mortality?
3. What is the relationship between physical activity and cardiovascular disease incidence?
4. 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)?
5. What is the relationship between bout duration of continuous aerobic physical activity and cardiorespiratory fitness and health outcomes?

Subcommittee Questions



6. What is the relationship between high intensity interval training and reduction in cardiometabolic risk?
7. How does the declining basal level of activity influence the volume of physical activity required to maintain a similar level of energy expenditure per day?

Question 1-2

1. What is the relationship between physical activity and all-cause mortality?
2. What is the relationship between physical activity and cardiovascular disease mortality?
 - a) Is there a dose-response relationship? If yes, what is the shape of the relationship?
 - b) Does the relationship vary by age, sex, race/ethnicity, or socio-economic status?
- Source of evidence to answer question:
 - Systematic Reviews, Meta-Analyses, Pooled Analyses

Analytical Framework

Systematic Review Questions

What is the relationship between physical activity and all-cause mortality?

What is the relationship between physical activity and cardiovascular disease mortality?

Target Population

Adults, 18 years and older

Comparison

Adults who participate in various levels of physical activity

Exposure

All types and intensities of physical activity, including lifestyle activities/leisure activities

Endpoint Health Outcomes

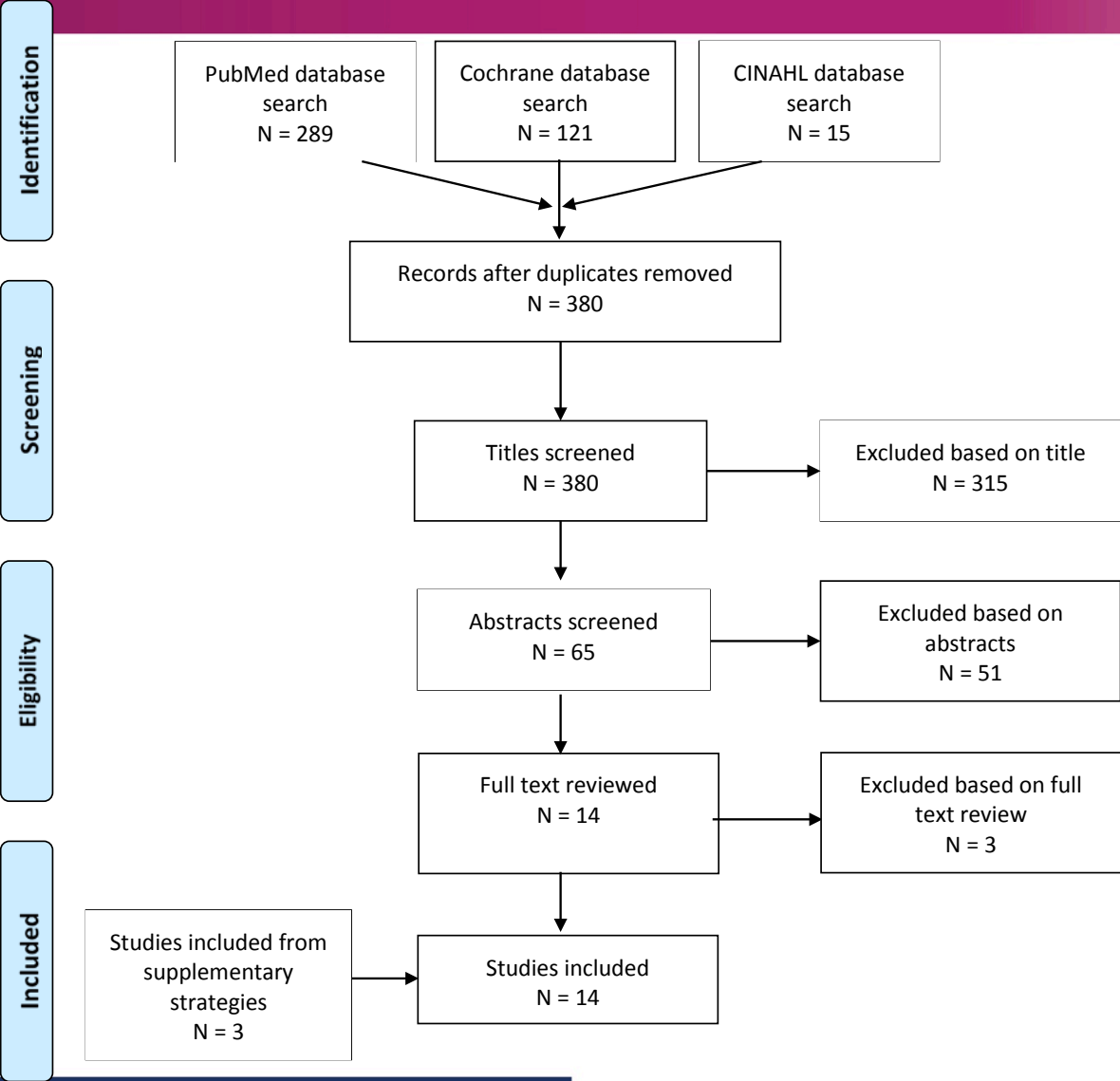
Incidence of:

- All-cause mortality
- Cardiovascular disease mortality

Key Definitions

- Dose-response: The relation between the dose of physical activity and the health or fitness outcome of interest.
- Dose: The amount of physical activity performed by the subject or participants. The dose can be measured in terms of a single component of activity (e.g., frequency, duration, intensity) or as the total amount.
- Intensity: Refers to the work-rate being performed or the magnitude of the effort required to perform an activity or exercise. Intensity can be expressed either in *absolute* or *relative* terms (relative to body mass).

Search Results: High-Quality Reviews¹



¹ Reviews include systematic reviews, meta-analyses, and pooled analyses

Approach to Q1&2

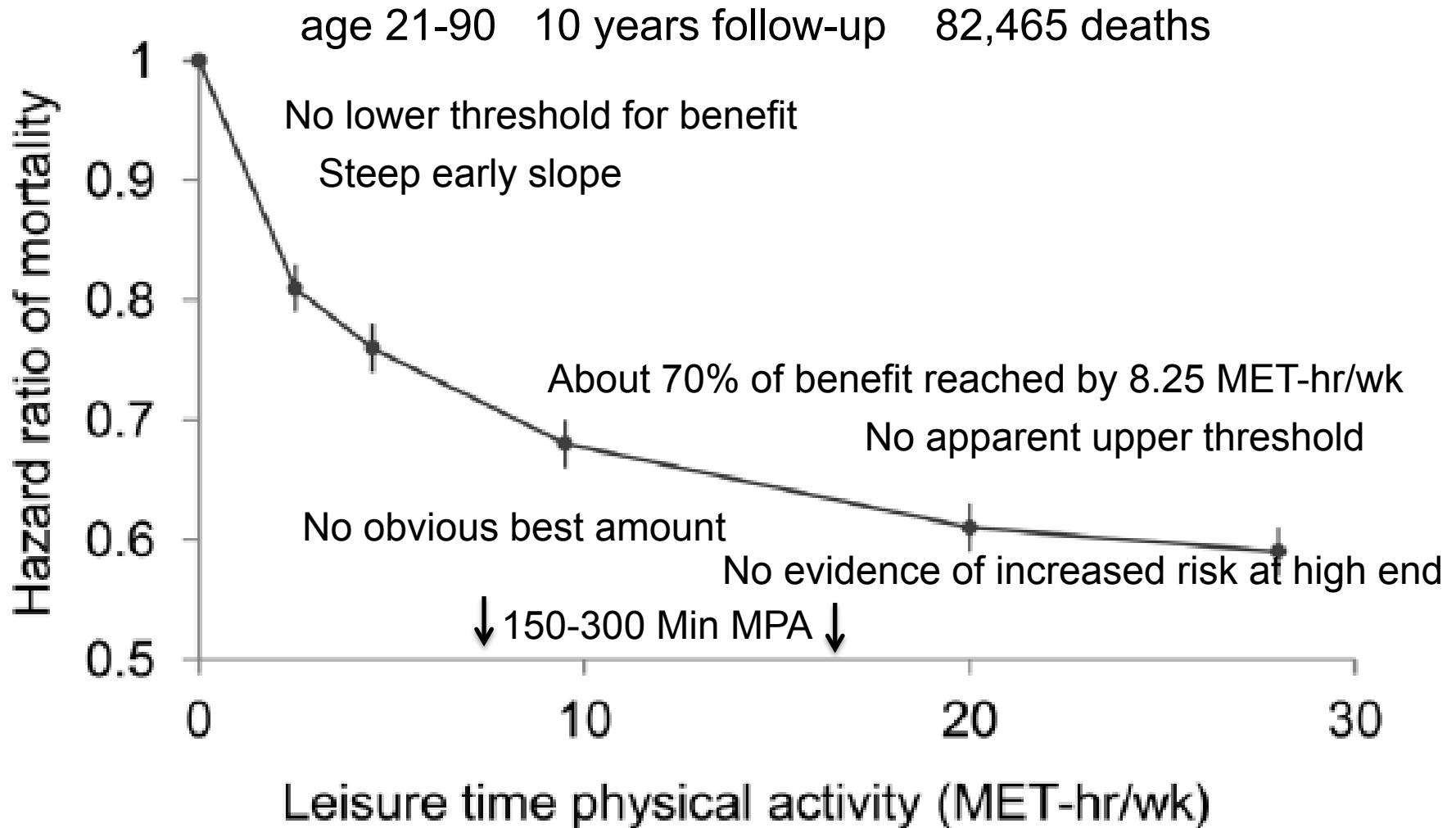
- Review of titles and abstracts ... ICF followed by two subcommittee members
- Extraction of key elements of the articles by ICF
- Review of extractions and extracted articles by one subcommittee member with summary on evidence table and key figures
- Formal close of search with date assignment
- Review of reviews by entire subcommittee

Description of the Evidence



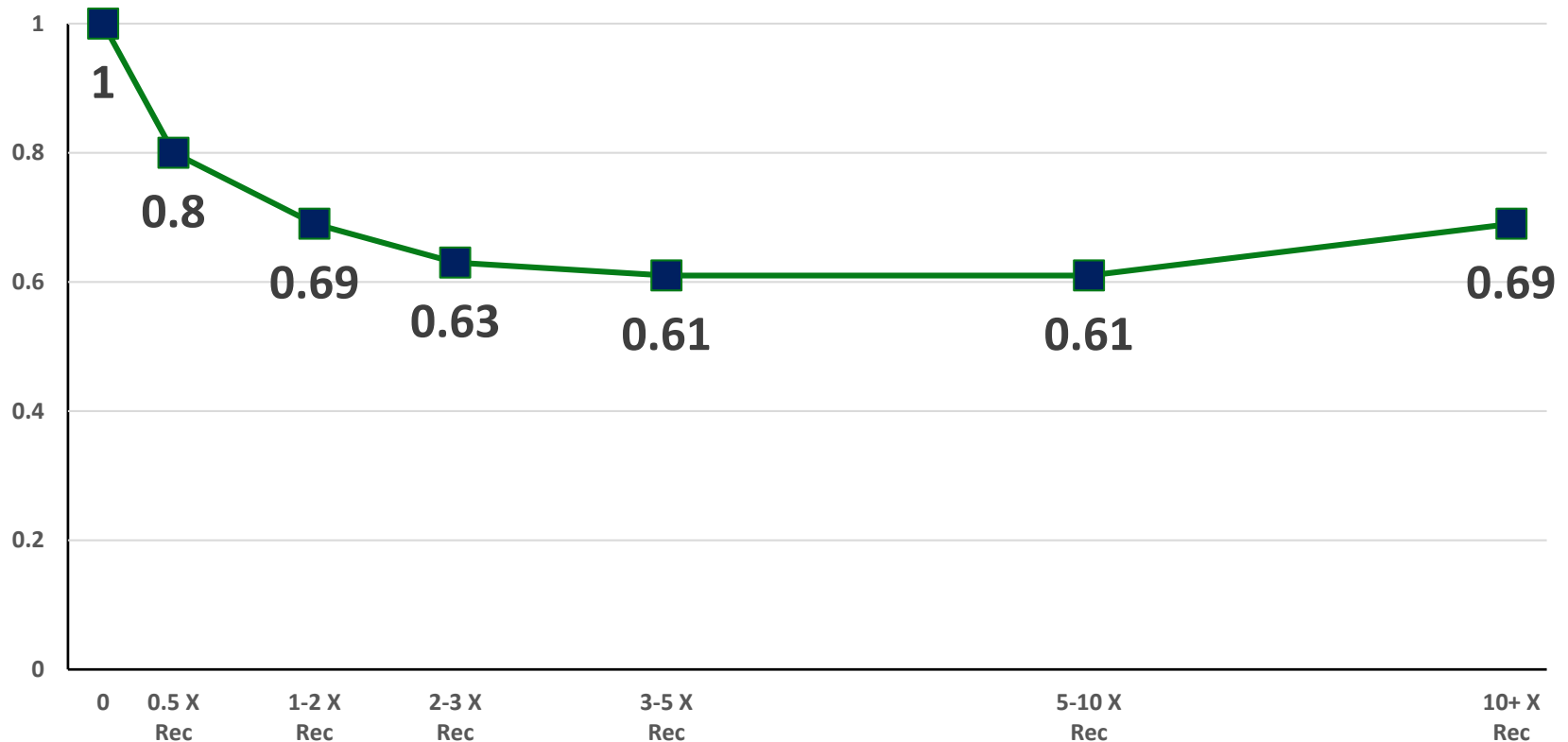
- All cause mortality—studies focus on MVPA
 - 8 systematic reviews with meta-analyses
 - 4 pooled analyses; one focused on older adults
 - 2 systematic reviews only
 - 9 of the 14 studies also study CV mortality
 - Studies published 2006-2016
 - N=6 to 36 studies per review or meta-analysis (CA review more)
 - Follow-up from 3.8 to >20 years; up to 3.4M subjects
 - 7 examined PA dose-response on amount (energy); 1 compared intensity not controlling for amount; one on non-vigorous PA; one walking only; one study of concentrating exposure in two days.
 - 2 compared aerobic mode (walking versus cycling; dance vs walking)
 - Some studies examined sub-group effects; one focused on older adults (>60); one reported more pronounced mortality benefits in women

MVPA & All-Cause Mortality in 654, 827 Men & Women



Moore, et al. PLOS Medicine, November 2012

MVPA & All-Cause Mortality in 661,137 Men & Women

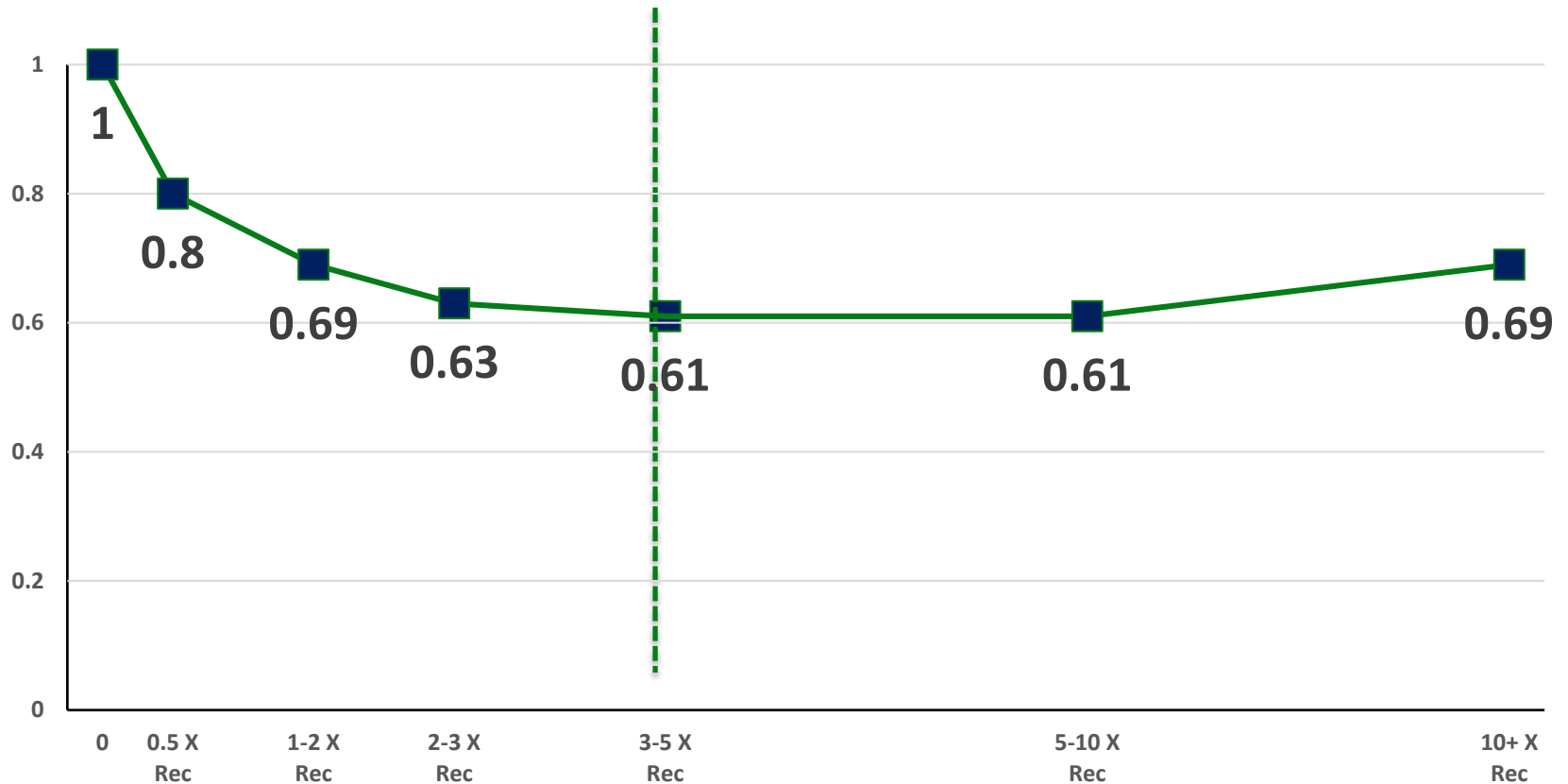


Arem, H, Moore, SC, Patel, A, et al. (2015). Leisure time physical activity and mortality: a detailed pooled analysis of the dose-response relationship. *JAMA internal medicine* 175: 959-967.

MVPA & All-Cause Mortality in 661,137 Men & Women



Highest level on Moore Study



Arem, H, Moore, SC, Patel, A, et al. (2015). Leisure time physical activity and mortality: a detailed pooled analysis of the dose-response relationship. JAMA internal medicine 175: 959-967.

Draft Conclusion Statement

- Conclusion Statement: There is a strong dose-response inverse relation between amount of MVPA and both all-cause and cardiovascular mortality.
- Shape of the curve is nonlinear with the greatest benefit seen early in the dose-response relation.
- There is no lower limit for the relation of MPVA and risk reduction. Risk appears to continue to decrease with increased exposure up to 3-5 times the current recommended levels of MVPA.
- New data are consistent with those used to develop the 2008 guidelines.
- The effects appear to apply to all races and ethnicities, both men and women, and throughout adult life.
- Grade: Strong evidence based upon interim evidence in at least a dozen strong meta-analyses and systematic reviews since 2006.

Draft Implications

- Increasing MVPA levels by relatively small amounts in the inactive US population has the potential to have important and substantial impact on all-cause and CV mortality in the adult population.

Draft Research Recommendations



More research required on:

- The joint effects of sedentary behavior and physical activity in mortality outcomes.
- The role of light intensity physical activities in risk reduction.
- The possibility of increased risk at very high amounts.
- Whether total volume is the operative exposure, irrespective of intensity, frequency and mode

Committee Discussion



1. What is the relationship between physical activity and all-cause mortality?
2. What is the relationship between physical activity and cardiovascular disease mortality?