Designing an Exercise Program to Maximize Health and Well-Being

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Every Body WALK!
The Campaign to Get America Walking

ExeRcise is Medicine™

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Conflict of Interest Disclosure

Robert Sallis

- Has no actual or potential conflict of interest in relation to this presentation
- Will be discussing the use an off-label and unapproved drug called Exercise in this presentation

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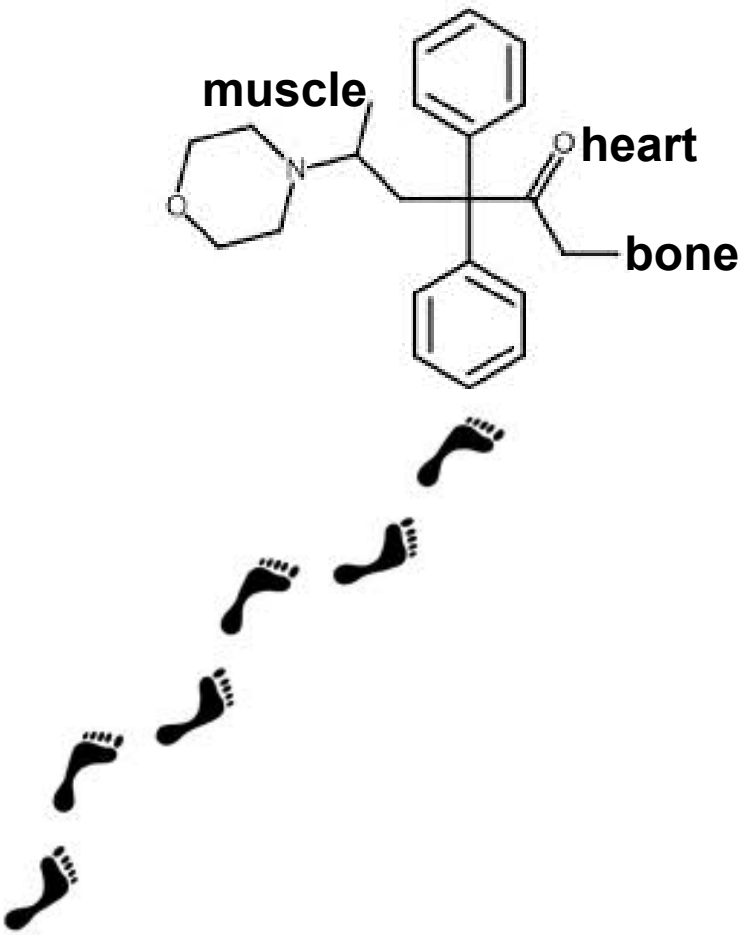
A Drug Called Exercise



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A Drug Called Exercise

- **Generic name:** physical activity
- **Other Brand names:** jogging, hiking, rolling, swimming, aerobics, biking, tennis, basketball, soccer, dancing, gardening, etc
- **Dosage:** optimum 150 minutes per week in adults; 60 min per day in children has proven efficacy. Even low doses have been shown to have benefit. Advise to start with low dose and advance as tolerated
- **Pregnancy and Lactation**: completely safe. Good for mother and baby

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A Drug Called Exercise

- **Indications and Usage:**
  - Prevent obesity and mitigate its risks
  - Reduce development and improve management of diabetes
  - Prevent and treat heart disease
  - Lower risk of cancer (breast and colon)
  - Treatment of hypertension
  - Prevent osteoporosis and fractures
  - Manage depression and anxiety
  - Reduce risk of dementia
  - Recreational uses
  - Decrease risk of premature death

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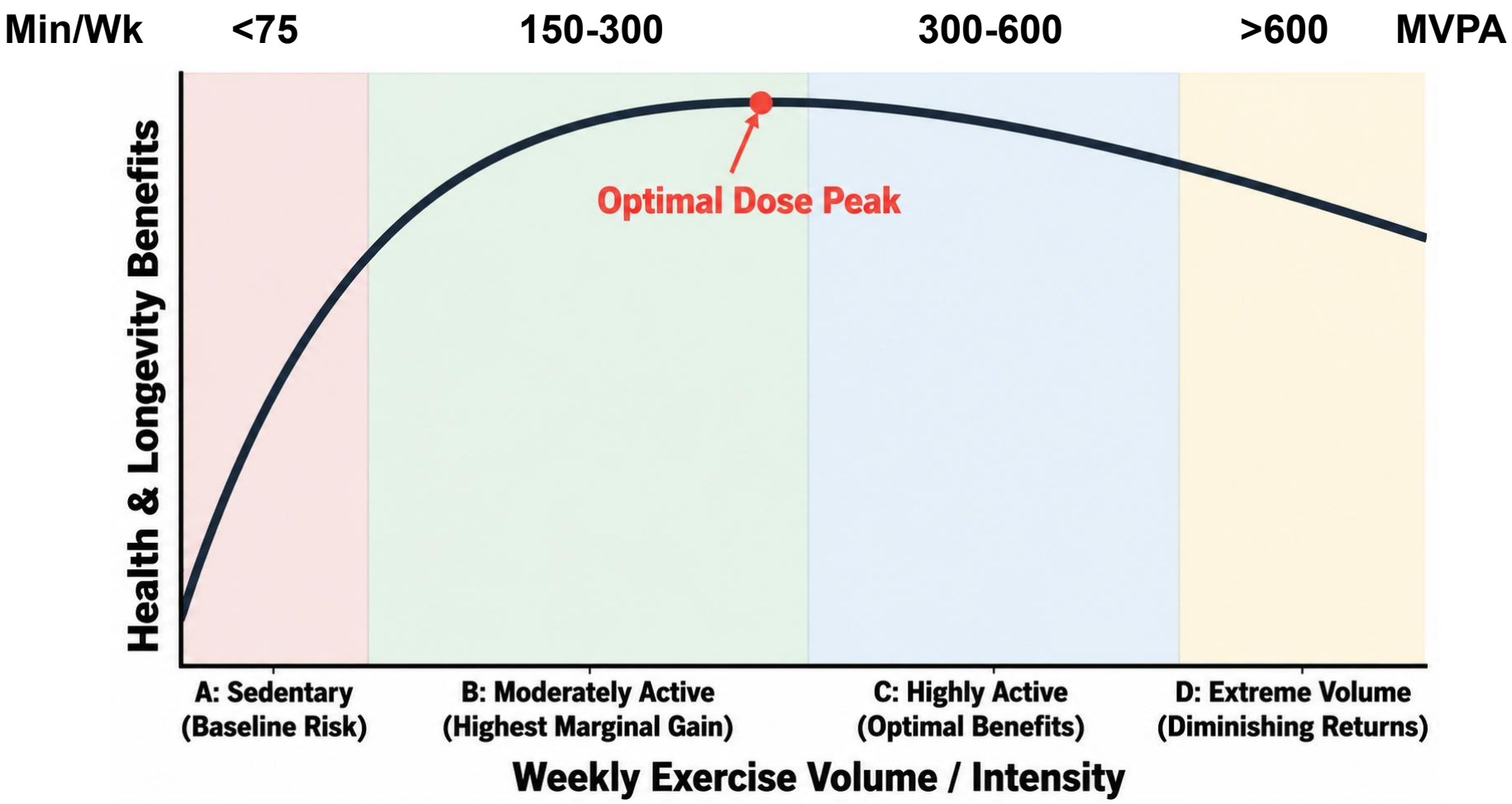
A Drug Called Exercise
Dose-Response Curve: The Inverted U



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A Drug Called Exercise

- **Side effects:** decreased BP, pulse and blood sugar; stronger muscles & bones, weight loss; improved mood, confidence, self esteem and concentration; Bowel & sleep habits improved; Look & feel better
- **Adverse Reactions:** sweating, injury (overdose), sudden death (extremely rare)
- **Administration:** self administer or with others. Start off slowly, add minutes and intensity PRN. Change formulations to decrease boredom & improve compliance. Take outdoors or indoors any time of day

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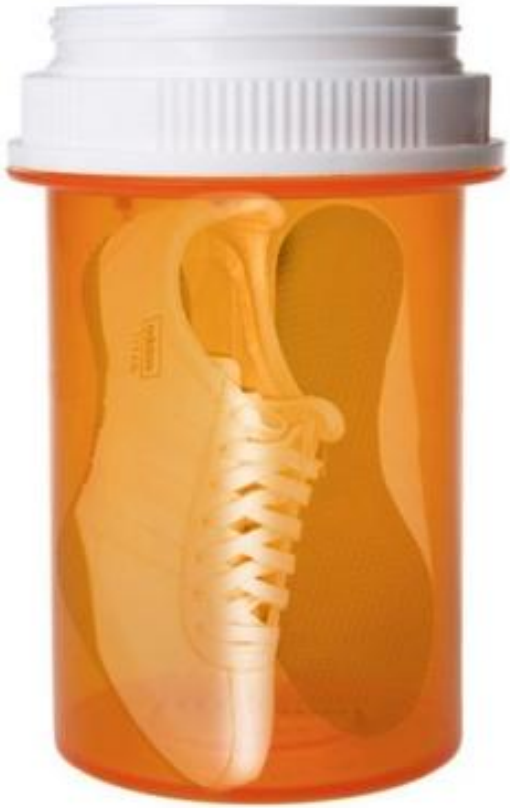
Exercise is a wonder Drug
We all need to take it and prescribe to our Patients!

- ***Exercise is Medicine*** that can prevent & treat chronic disease and those who take it **LIVE LONGER**
- If we had a pill that conferred the proven health benefits of exercise, physicians would prescribe it to every patient and healthcare systems would find a way to make sure every patient had access to this wonder drug



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Components of an Exercise Program

- Aerobic Exercise
- Strength Exercises
- Flexibility Exercises
- Warm up/Cool down

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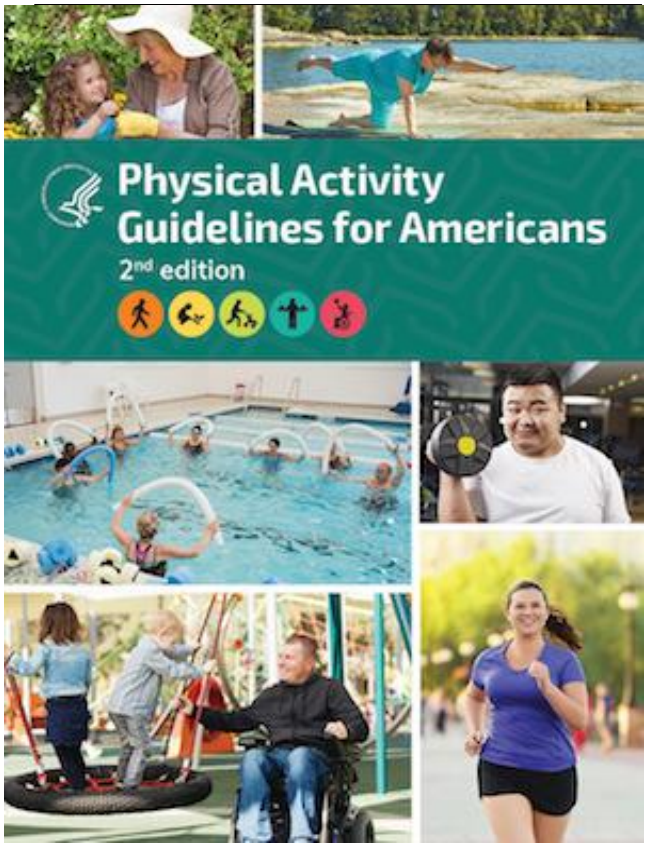
What is the Optimal Dose of Exercise? 2018 US Physical Activity Guidelines

- 150 minutes per week of moderate to vigorous PA (like a brisk walk) in adults
  - 30 minutes walking on 5 days per week
  - Activity bouts of any duration count!
- 75 minutes per week of vigorous exercise (like running)
- 60 minutes per day in kids (half at vigorous intensity)



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The Aerobic Exercise Prescription
"Think FITT"

F = Frequency

Most days of the week; 5 or more

I = Intensity

Moderate; 50-70% of max HR or use "sing-talk" test

T = Type

Use large muscle groups; something enjoyable

T = Time

30 minutes

How Much Exercise do You Need to be Moderately Fit?

- Detailed physical activity assessments in women and men who then completed a maximal exercise test
- Average min/week for the moderately fit who only reported each specific activity

Stofan JR et al. *AJPH* 1998; 88:1807

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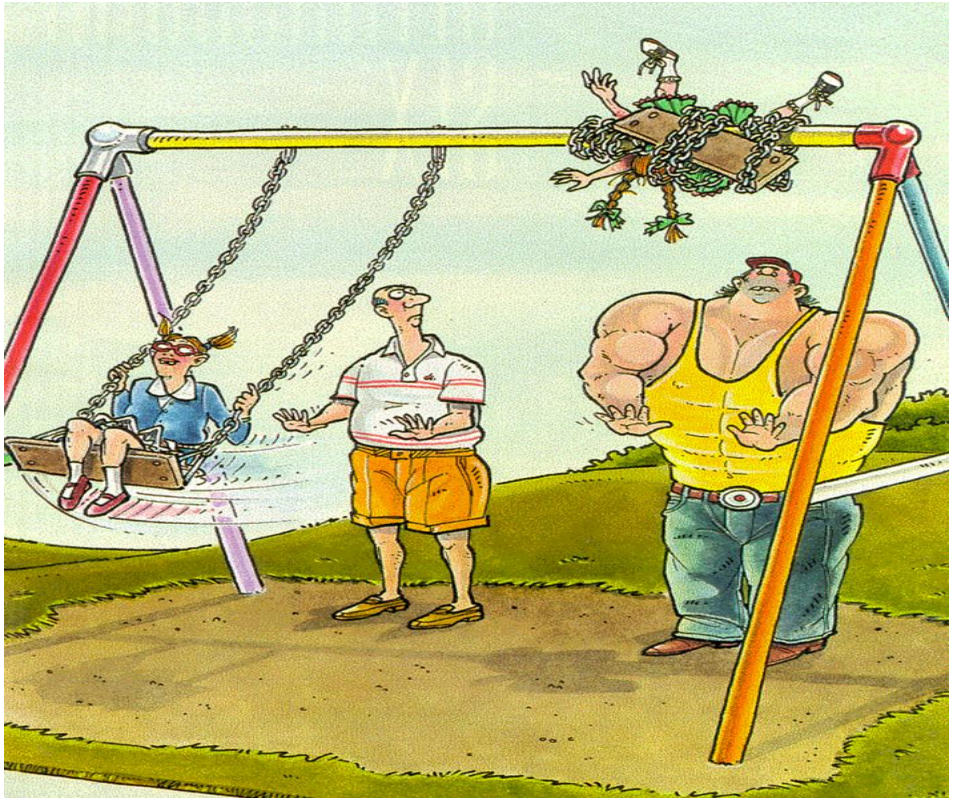
The Strength Exercise Prescription

- 2-3 nonconsecutive days per week of resistance training
- Select 8-10 exercises that incorporate major muscle groups
- 1-3 sets of 8-12 reps for each exercise at 40-80% of a 1-rep max



ACSM Guidelines for Exercise Testing and Prescription; 2025

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Muscle Loss With Age

- Sarcopenia is a major concern with aging, especially in women:
  - 15% per decade after age 50
  - 30% per decade after age 70
- Results in loss of strength:
  - Age 65; 45% of women can't lift 10 lbs
  - Age 75; 65% of women can't lift 10 lbs
- A resistance training program can counteract age-related changes in skeletal muscle

Fragala; J Strength Cond Res: August 2019

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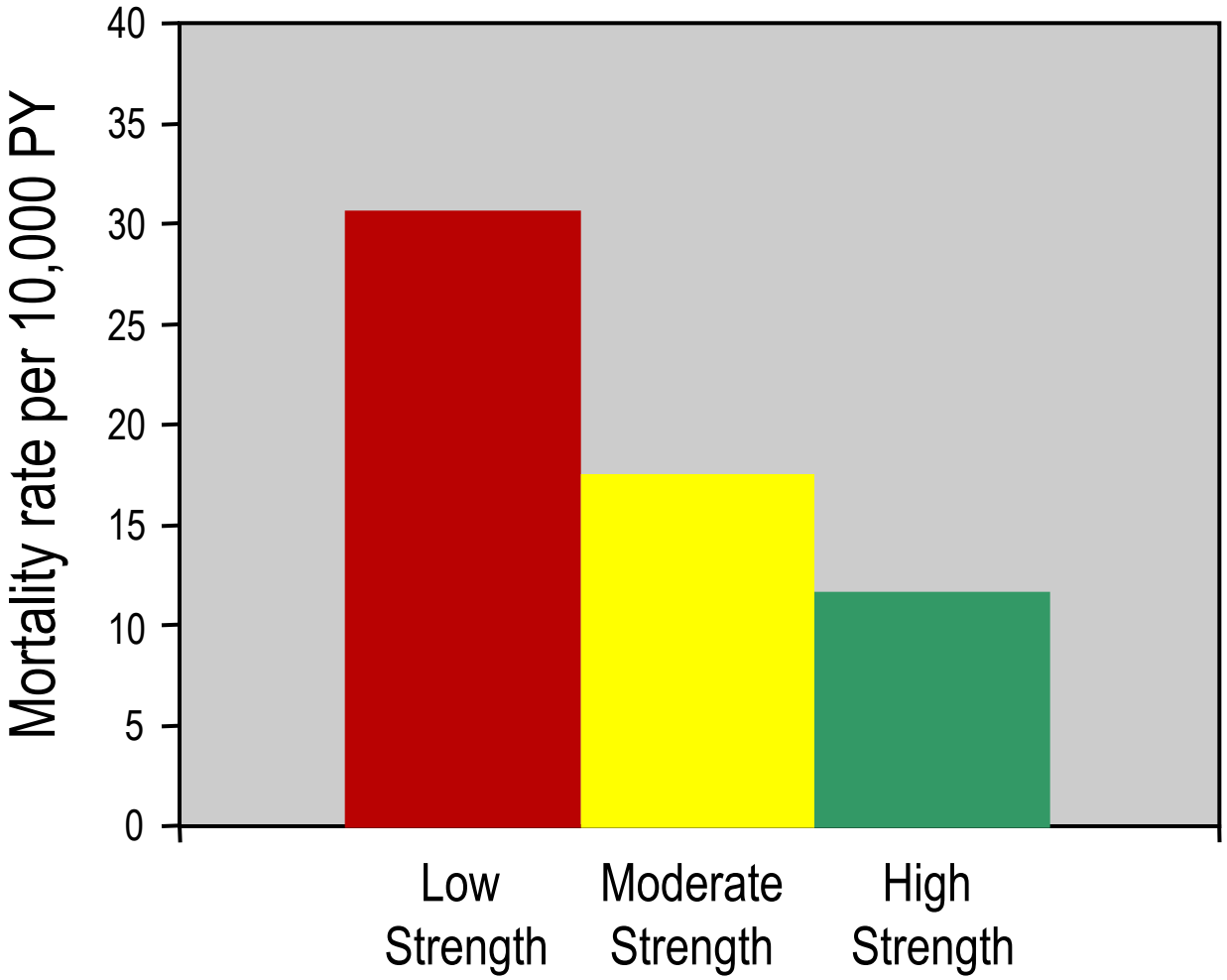
Mortality Rates by Musculoskeletal Fitness Category



FitzGerald S et al. *J Phys Act Health* 2004

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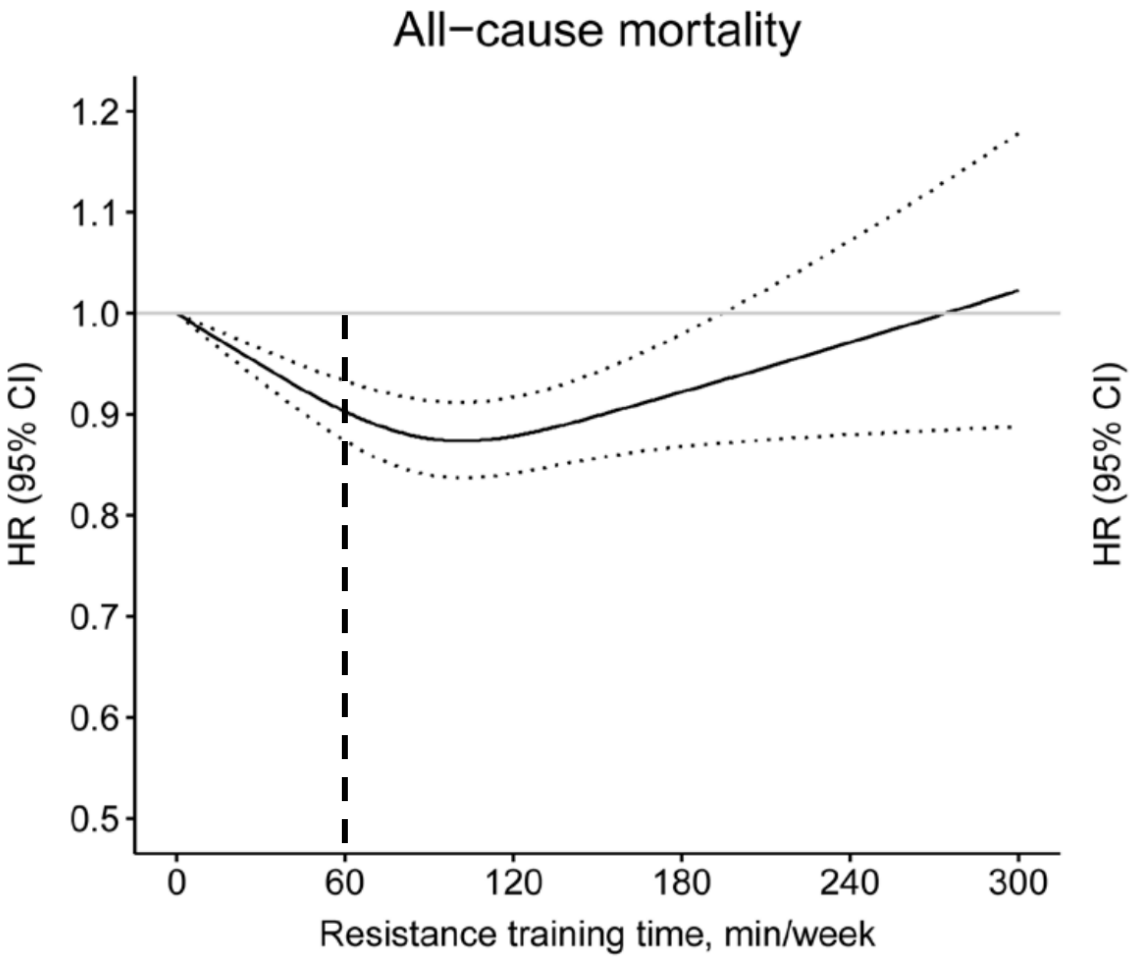
Resistance Training and *Mortality*



Zhang, Br J Sports Med 2025

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The Flexibility Exercise Prescription

- Especially important as we age.
- Emphasis should be on developing and maintaining full range of motion.
- Stretch major muscle groups at least 2-3 days per week.
- It has weakest evidence for improving health and longevity.

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Warm Up and Cool Down

- Exercise is best preceded by a warm-up and followed by a cool down
  - Warm-up usually involves doing the planned exercise at a lower intensity
  - Cool Down usually involves slowly tapering down intensity to aid recovery.
- Both warm-up and cool down often involve stretching

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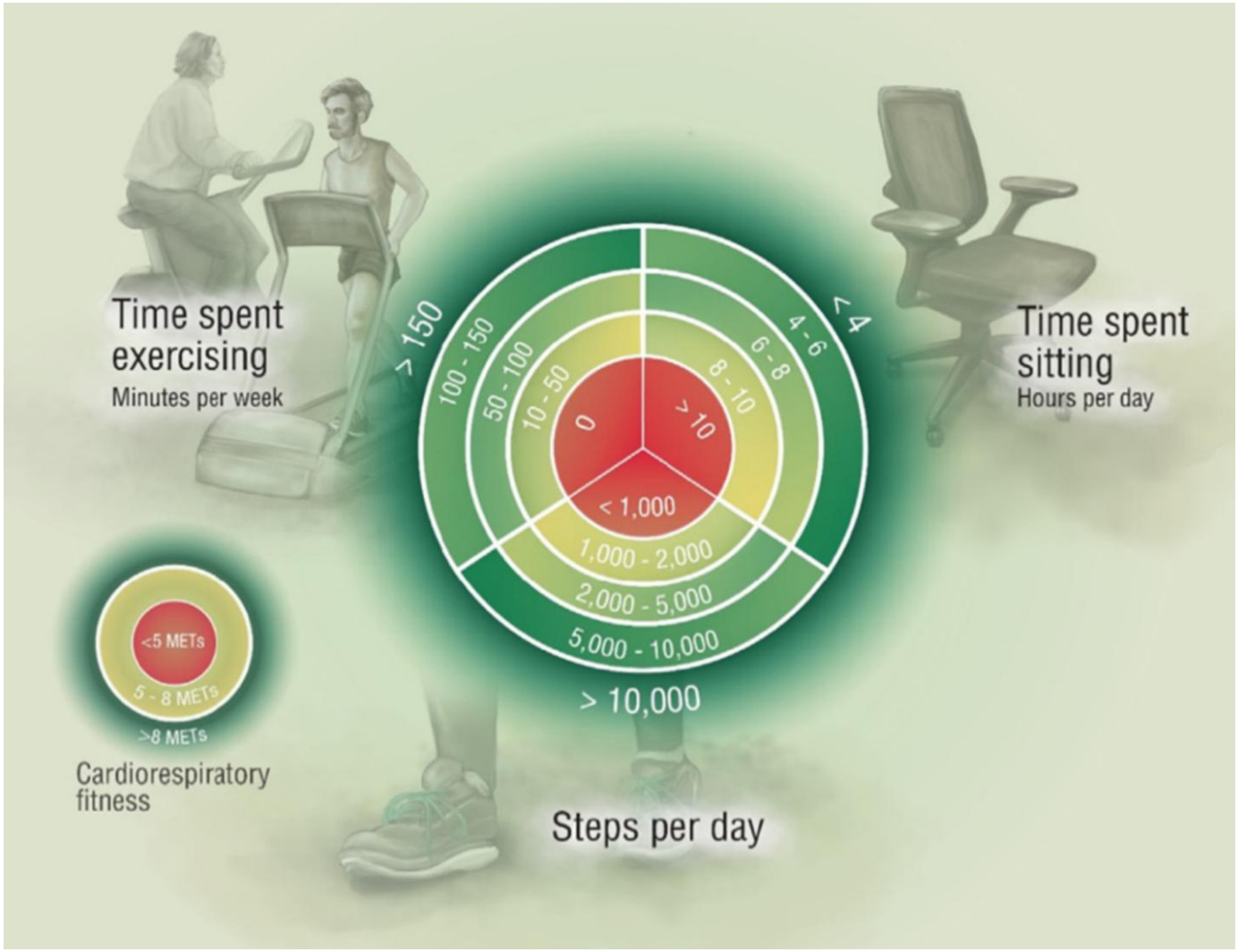
Goals for Physical Activity



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What is the best exercise program?

- The most effective exercise program is the one you'll do!
- I-Min Lee's top 5 exercises
  - 1. Walking
  - 2. Strength training
  - 3. Yoga
  - 4. Swimming
  - 5. Biking

I-Min Lee, PhD
Professor of Medicine
Harvard Medical School

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Which exercise is better for you? Aerobic or Resistance Exercise

- Who is healthier and lives longer?
  - Hulk – he does only resistance training and has superior muscular strength
  - Flash – he does only aerobic exercise and has superior cardiorespiratory fitness

Courtesy of Duck-Chul Lee, PhD; Iowa State University

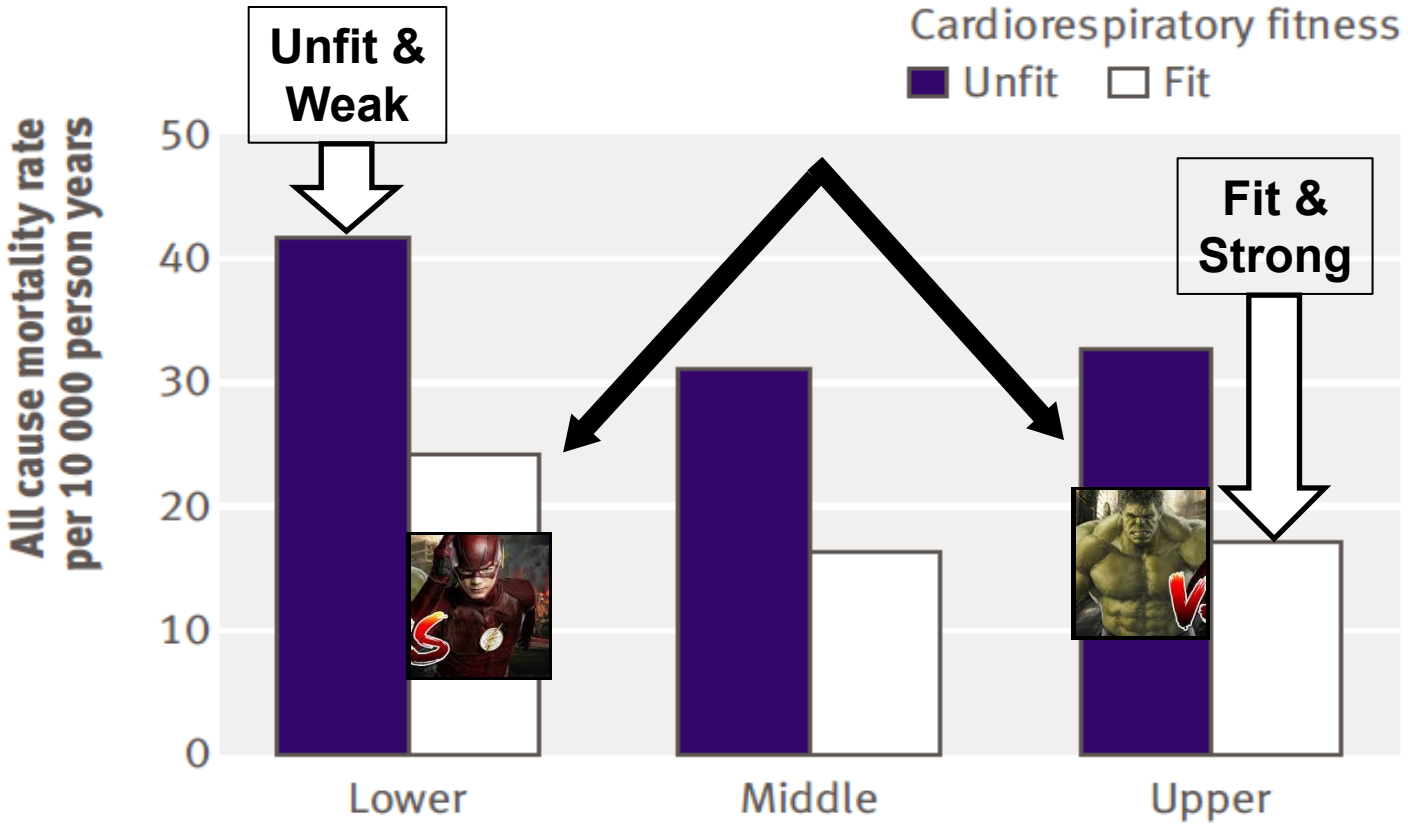
Association between muscular strength and mortality in men: prospective cohort study

BMJ | 12 JULY 2008 | VOLUME 337

BMJ

Jonatan R Ruiz, research associate,[1,2] Xuemei Sui, research associate,[3] Felipe Lobelo, research associate,[3] James R Morrow Jr, professor,[4] Allen W Jackson, professor,[4] Michael Sjöström, associate professor,[1] Steven N Blair, professor[3,4]

8,762 Men (20-80 years, mean age 42); *Aerobics Center Longitudinal Study*



**Adjusted for age*

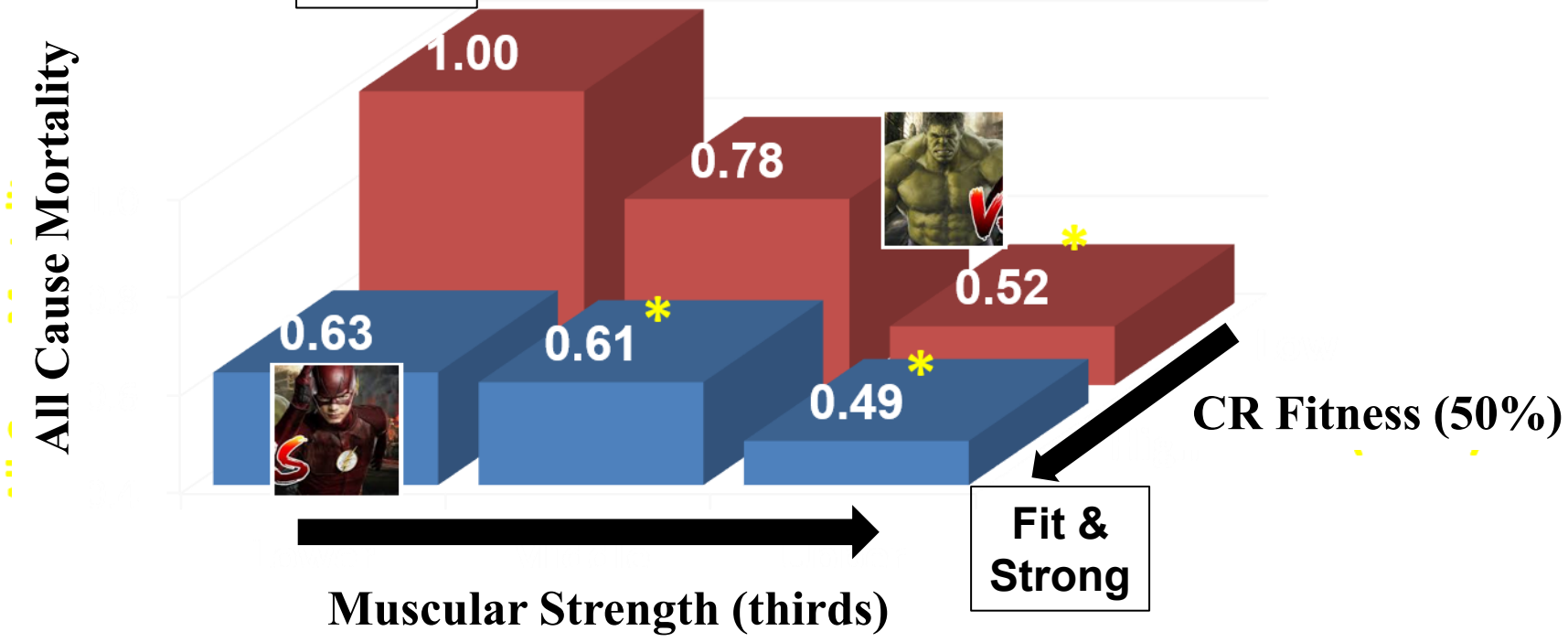
Muscular Strength (thirds)

JACC Journal of the American College of Cardiology Vol. 57, No. 18, 2011

A Prospective Study of Muscular Strength and All-Cause Mortality in Men With Hypertension

Enrique G. Artero, PhD,*† Duck-chul Lee, PhD,† Jonatan R. Ruiz, PhD,§‖ Xuemei Sui, MD,†
Francisco B. Ortega, PhD,*§ Timothy S. Church, MD, PhD,¶ Carl J. Lavie, MD,#
Manuel J. Castillo, MD, PhD,* Steven N. Blair, PED†‡

1,506 hypertension men (mean age 50 years),
bics Center Longitudinal Study



*Adjusted for age, physical activity, smoking, alcohol, BMI, blood pressure, total cholesterol, diabetes, abnormal ECG, and parental CVD. *$P<0.05$.

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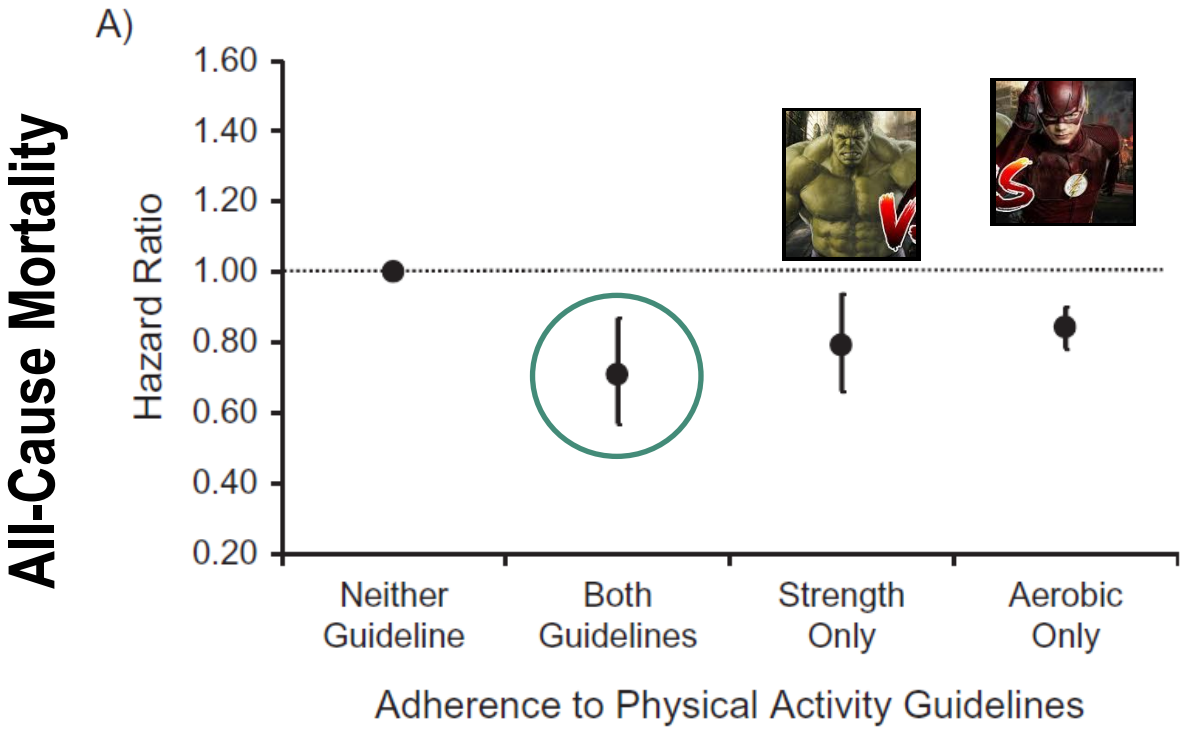
Does Strength-Promoting Exercise Confer Unique Health Benefits? A Pooled Analysis of Data on 11 Population Cohorts With All-Cause, Cancer, and Cardiovascular Mortality Endpoints

Emmanuel Stamatakis*, I.-Min Lee, Jason Bennie, Jonathan Freeston, Mark Hamer, Gary O'Donovan, Ding Ding, Adrian Bauman, and Yorgi Mavros

Am J Epidemiol. 2018;187(5):1102–1112

80,306 adults (≥30 years) from 11 studies



- **Aerobic guideline** as ≥150 min/week of moderate-intensity or ≥75 min/week of vigorous-intensity activity or equivalent combinations of both.
- **Strength guideline** as reporting participation in ≥2 sessions/week.

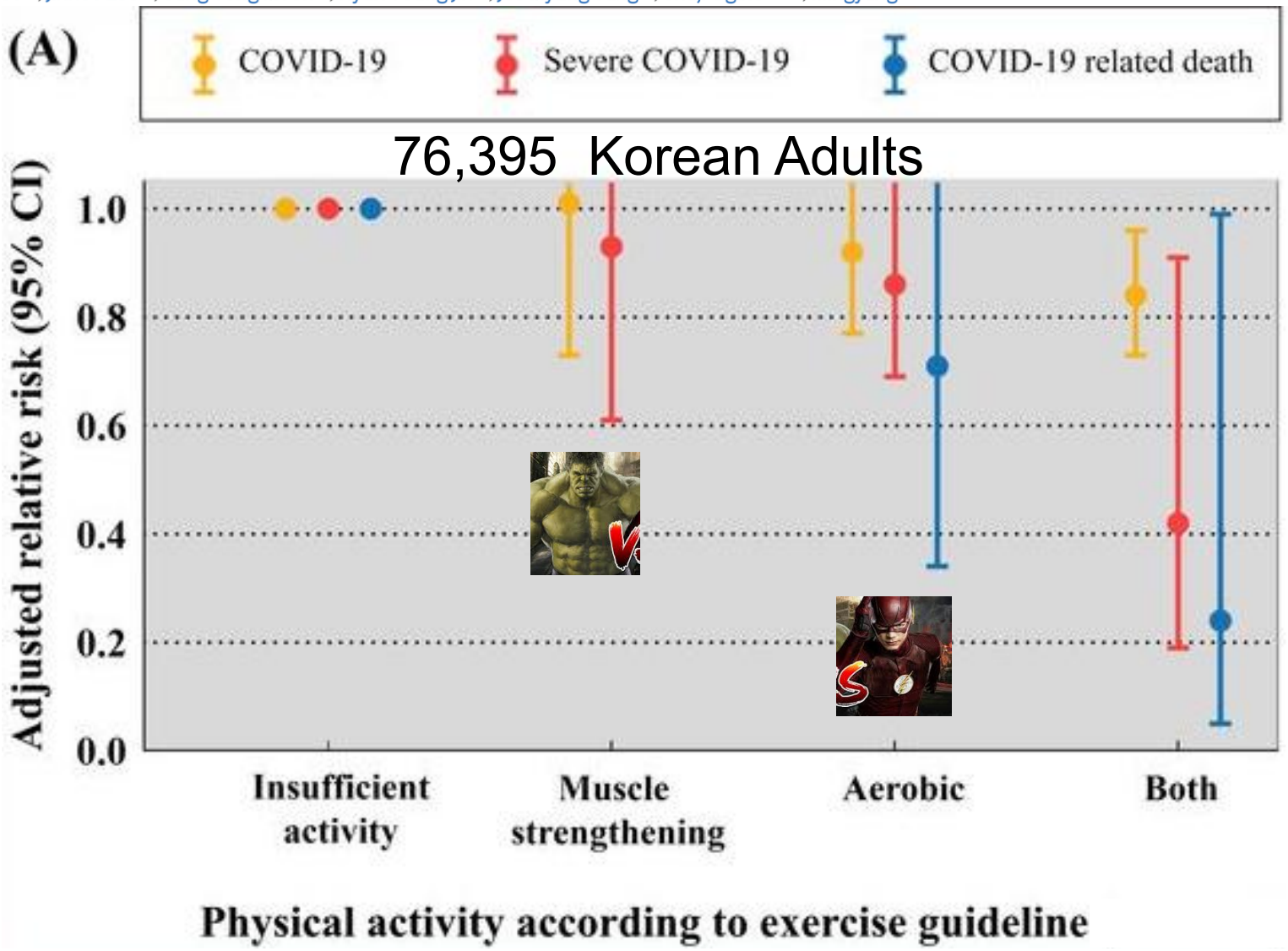
*Adjusted for age, body mass index, education, illness, alcohol intake, smoking habits, psychological distress/depression, total volume of physical activity.

Original research

Physical activity and the risk of SARS-CoV-2 infection, severe COVID-19 illness and COVID-19 related mortality in South Korea: a nationwide cohort study

British Journal of Sports Medicine

Seung Won Lee [1], Jinhee Lee [2], Sung Yong Moon [1], Hyun Young Jin [1], Jee Myung Yang [3], Shuji Ogino [4, 5], Mingyang



Lee et al, BJSM, 2021

Hulk vs. Flash:
Who is healthier and lives longer?

The one who is both ***strong*** and ***fast*** (fit)!

Courtesy of Duck-Chul Lee, PhD; Iowa State University

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What is the Minimal Amount of Exercise I can Do and be Healthy?

Running vs Walking

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Let’s Start With Running

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Affect of Leisure-time Running on All-cause and Cardiovascular Mortality Risk

- Most data on PA and mortality has focused on moderate intensity exercise (walking)
- Examined association of running with all-cause and CV mortality risks in 55,137 adults, 18 to 100 yrs. (mean 44 yrs., 26% female); ACLS data
  - Compared non-runners to runners in 5 quintiles of **distance** (miles/wk), **frequency** (times/wk), **amount** (MET-min/wk) and **speed** of running (mph)
  - Also looked at effects of a change in running habits over time in sub-group (20,647) who had ≥2 exams

Lee, *J Am Coll Cardiol,* 2014

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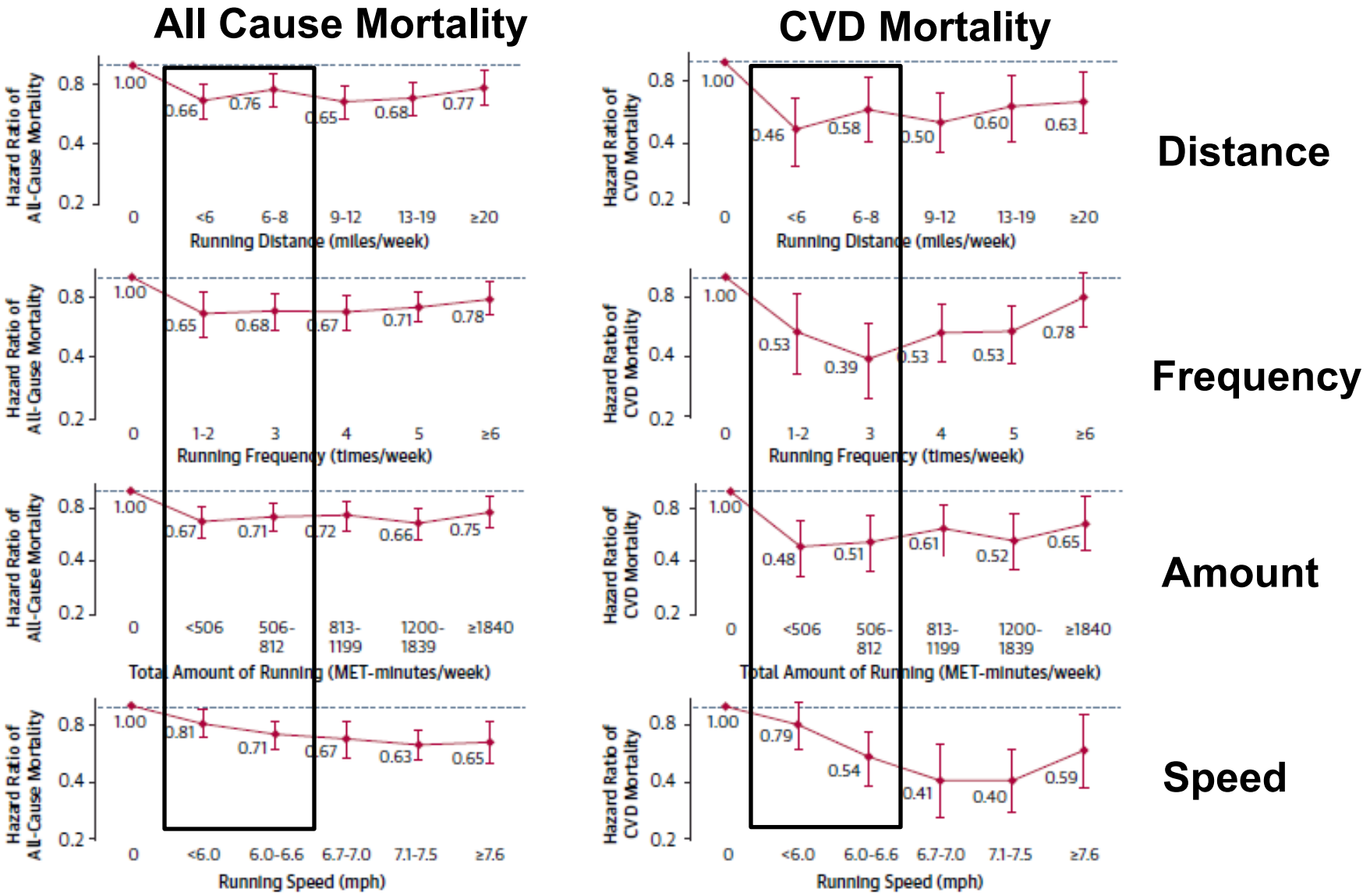
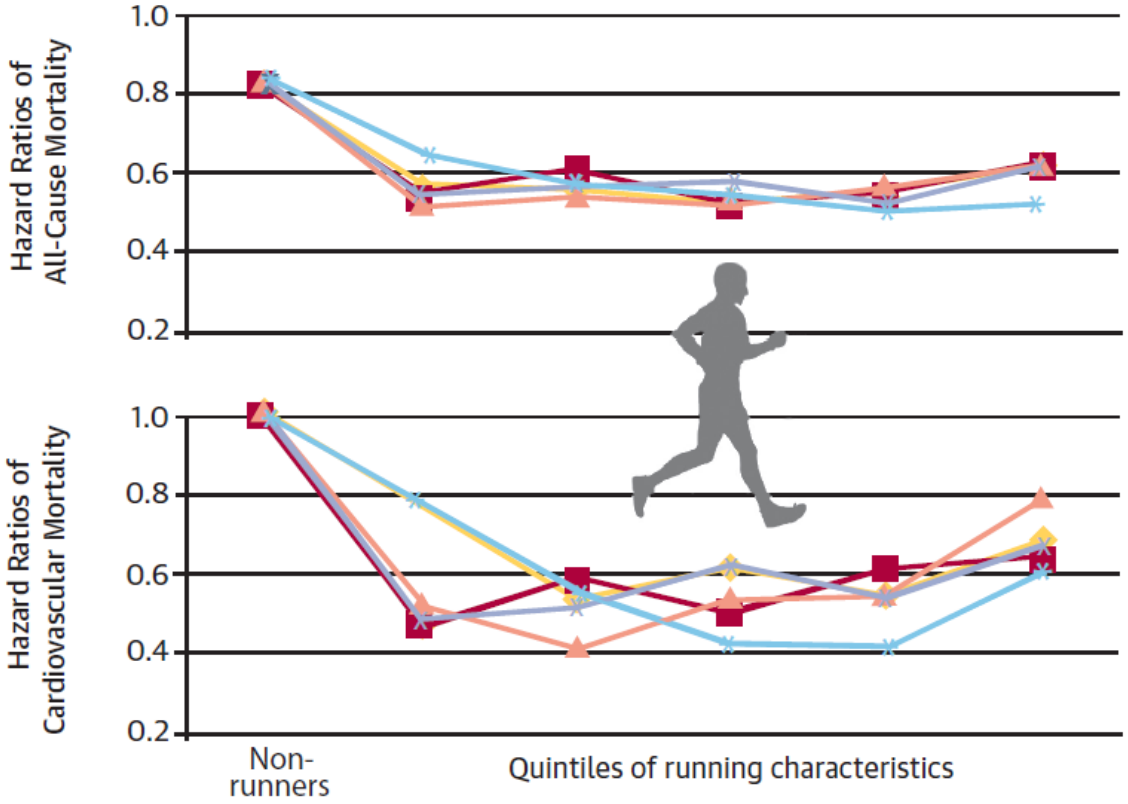
All-Cause and CV Mortality by Running *Distance, Frequency, Total Amount, and Speed*

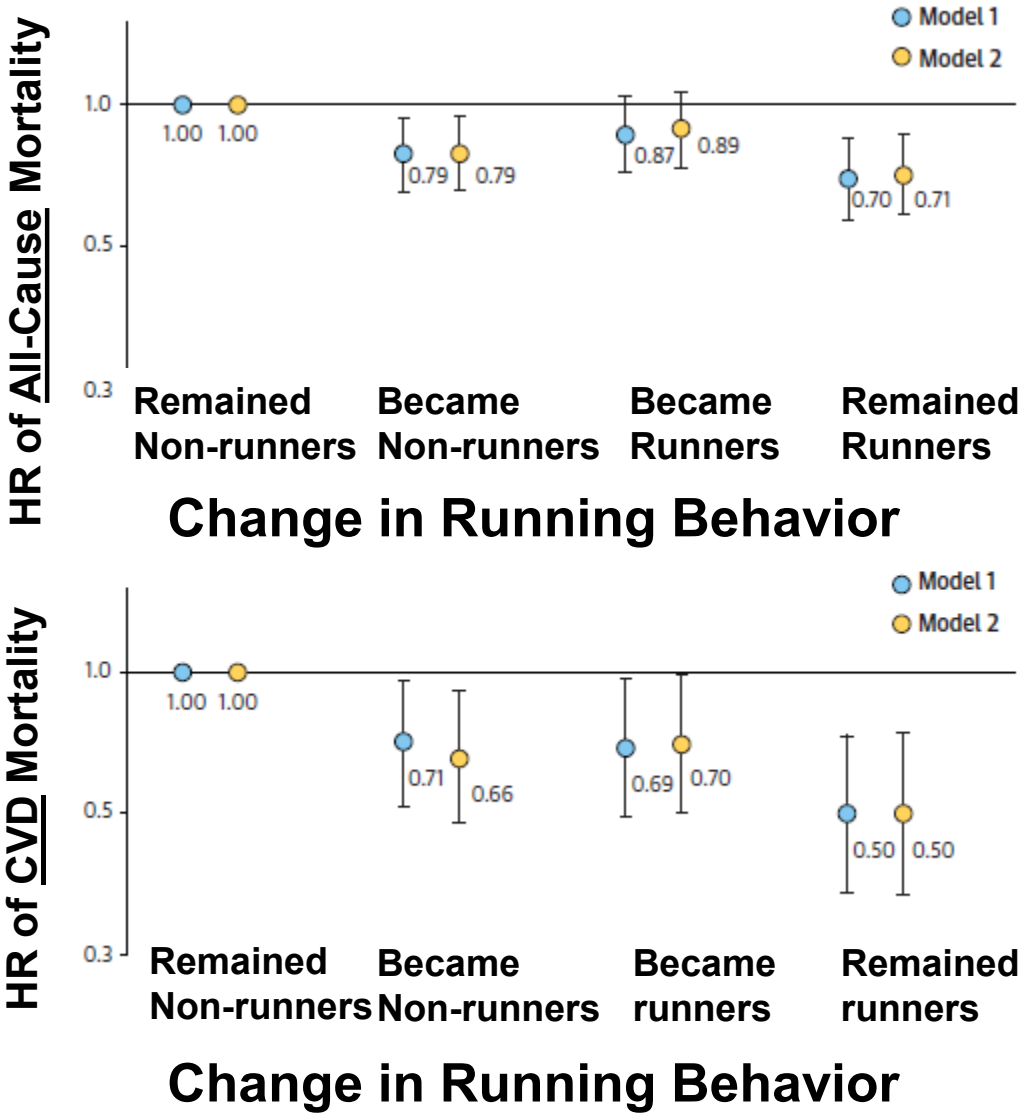


Running Reduced All-Cause and CV Mortality Risk



Time (min/wk)	0	<51	51-80	81-119	120-175	≥176
Distance (miles/wk)	0	<6	6-8	9-12	13-19	≥20
Frequency (times/wk)	0	1-2	3	4	5	≥6
Total amount (MET-min/wk)	0	<506	506-812	813-1199	1200-1839	≥1840
Speed (mph)	0	<6.0	6.0-6.6	6.7-7.0	7.1-7.5	≥7.6

All-Cause and Cardiovascular Mortality by Change in Running Behaviors



Model 1 adjusted for age, sex, exam year and interval btw exams. Model 2 added smoking, alcohol and PA other than running

Lee; *JACC;* 2014

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Running Study Conclusions

- Runners had consistently lower risk of all-cause and CVD mortality compared with non-runners.
- Running even at lower doses or slower speeds was associated with significant mortality benefits.
  - 30-59 min per week (5-10 min per day) gave significant benefit!
- Persistent running over time was more strongly associated with mortality reduction, but any history of running gave benefit.

Lee, et al, *J Am Coll Cardiol,* 2014

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How about walking?

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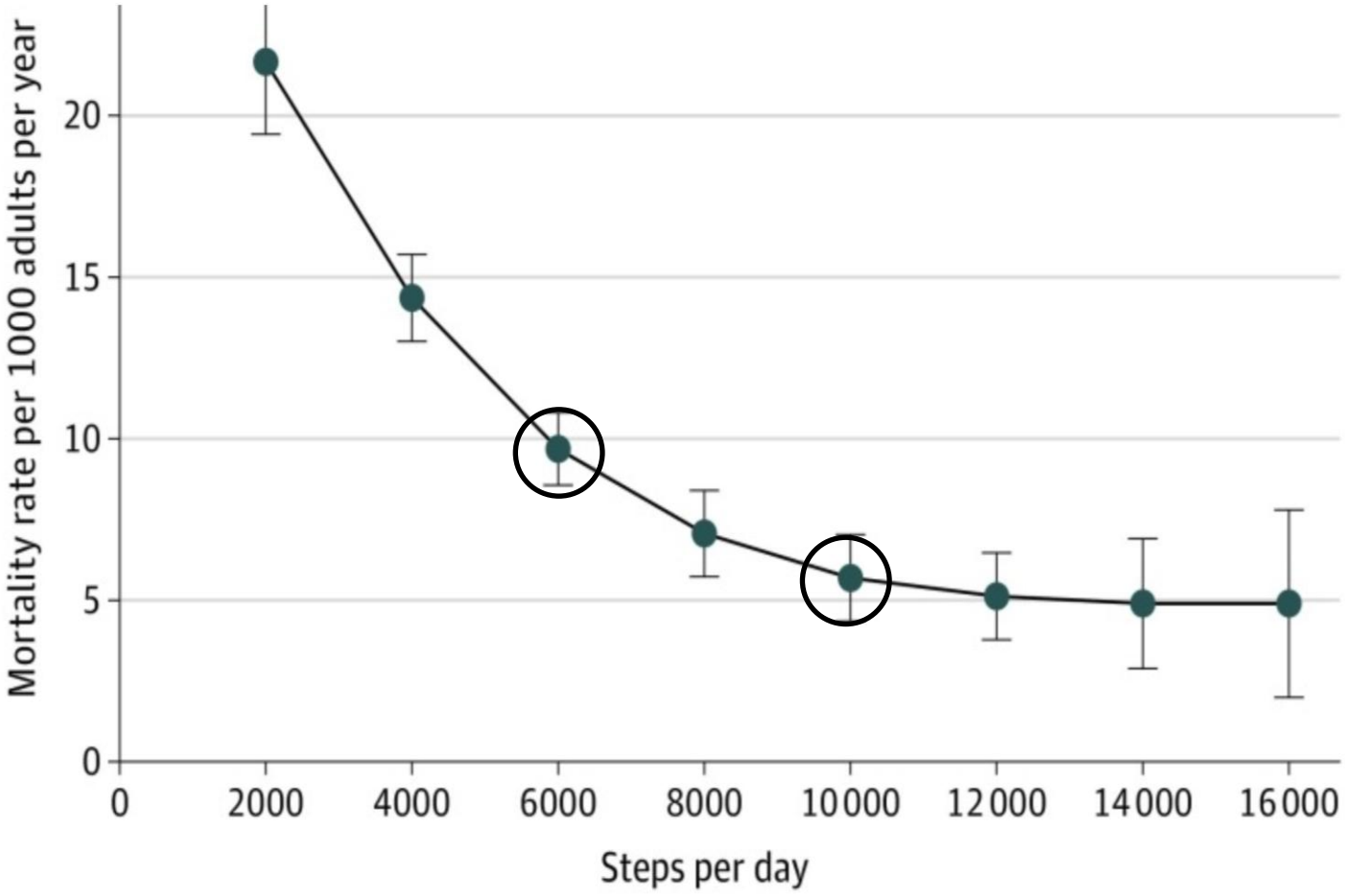
Association of Daily Step Counts and *Mortality*



- 4440 Adults
- Mean age 57y
- 10 yrs f/u
- Accelerometer x 7d to measure steps & intensity.
- No association btw intensity and mortality

Saint-Maurice JAMA. 2020 Mar

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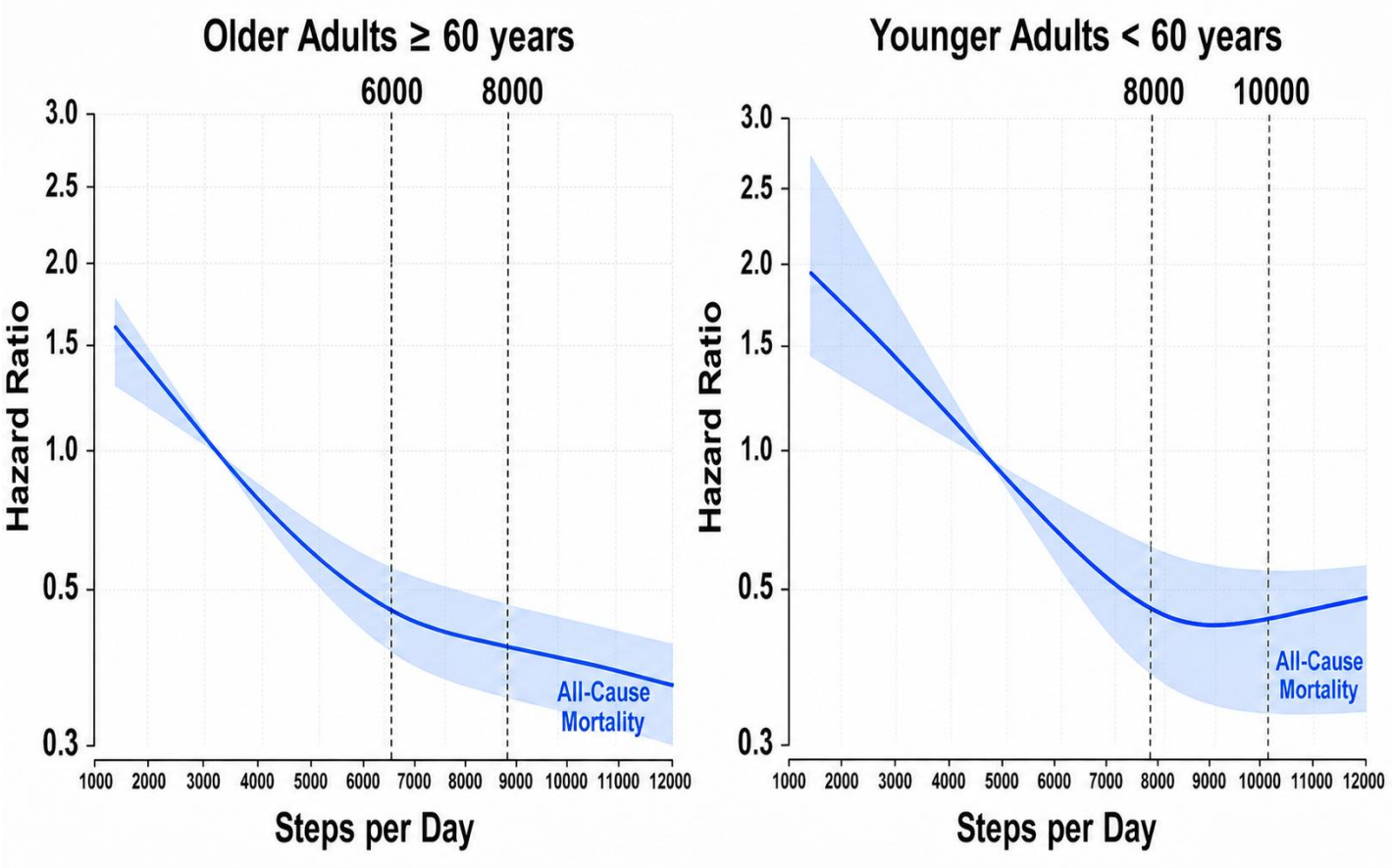
Association of Daily Step Counts and All Cause Mortality



-Meta-analysis of 17 studies

-Over 127,000 Adults

-Mean age 57y

-7.4 yrs f/u

-Dose-response curve starts to level at 6-8K steps in >60 & 8-10K steps in <60

-No clear association btw intensity & mortality

Paluch, *Exerc Sport Sci Rev,* 2026

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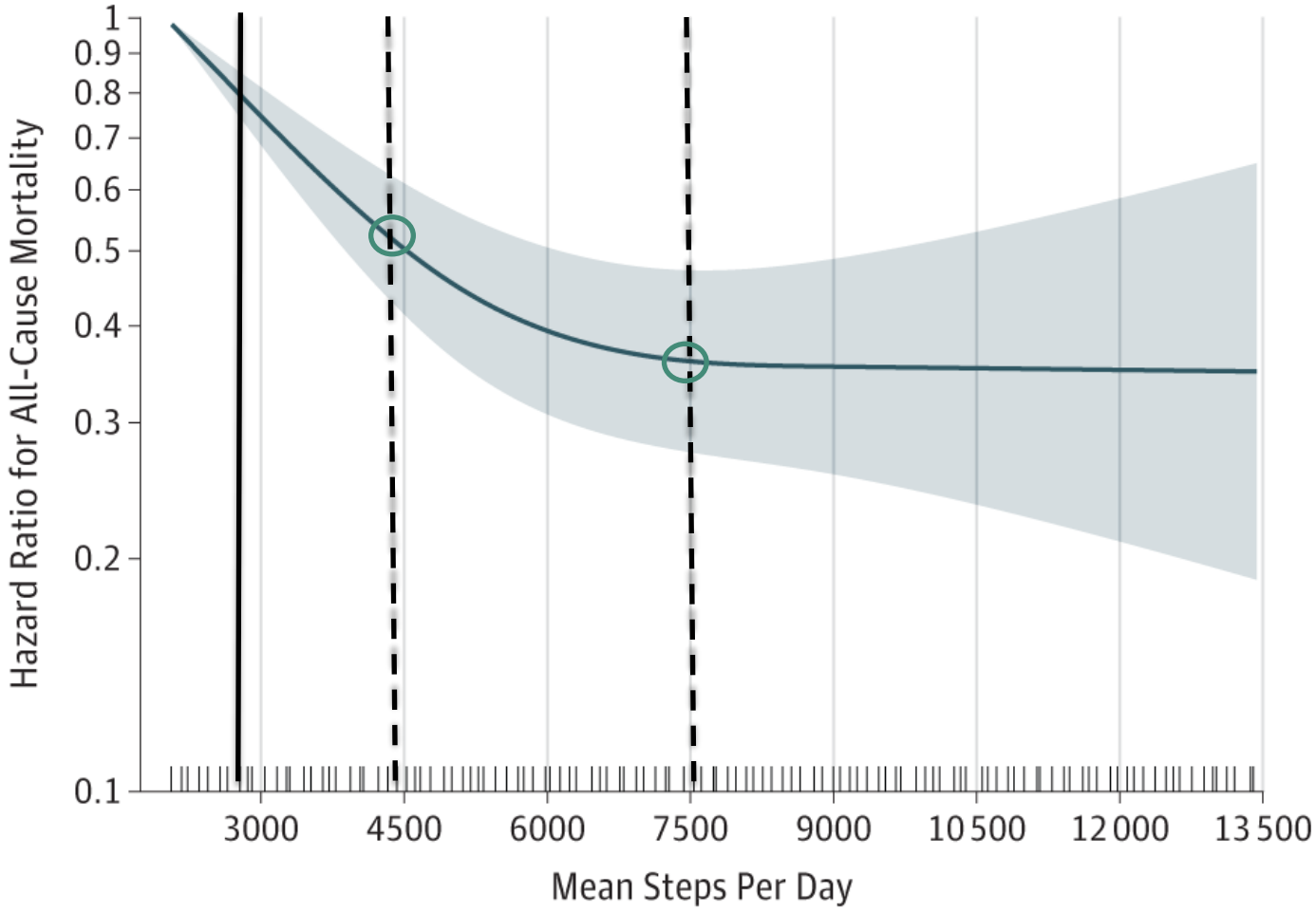
Even Fewer Steps are Needed as We Get Older!



- 16,741 women
- Mean age of 72 yrs followed 4.3 yrs.
- Those averaging ***~4400 steps/d*** had significantly lower mortality compared to ***~2700 steps/d***
- Mortality rates progressively decreased before leveling at approx ***7500 steps/d.***
- Step Intensity not related to mortality

Lee; JAMA Intern Med; 2019

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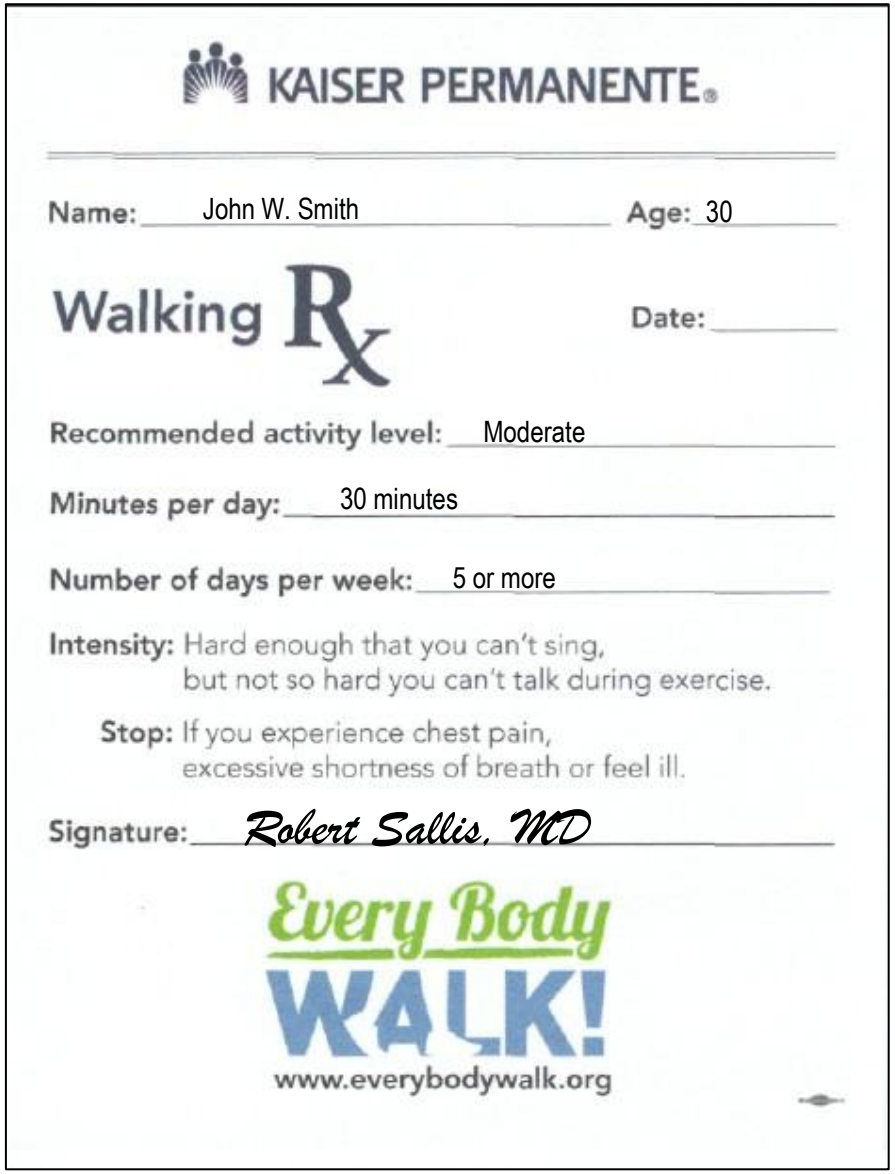
Write a walking Rx for patients!



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Name: John W. Smith Age: 30

Walking Rx Date:

Recommended activity level: Moderate

Minutes per day: 30 minutes

Number of days per week: 5 or more

Intensity: Hard enough that you can't sing, but not so hard you can't talk during exercise.

Stop: If you experience chest pain, excessive shortness of breath or feel ill.

Signature: Robert Sallis, MD

Every Body WALK!

www.everybodywalk.org

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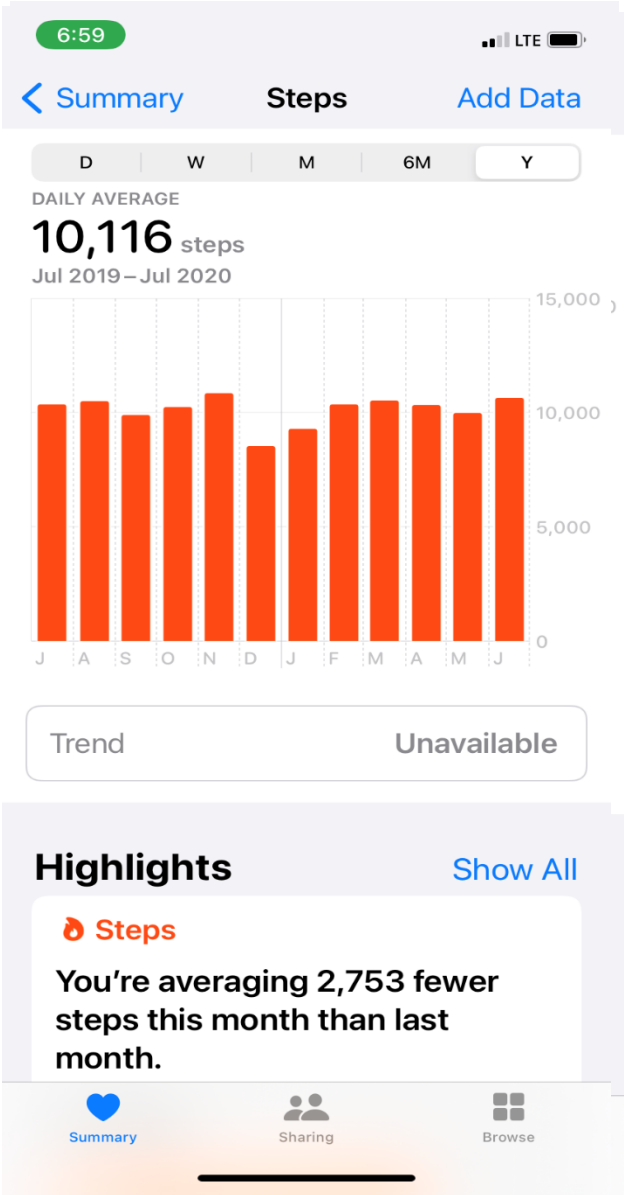
Why I Choose Walking as the Default Exercise Prescription?

- Walking is accessible
  - All ages, fitness level, ability, alone or in groups
- Walking is low cost
  - No gym, no equipment
- Walking is *measureable*
  - Pedometer, stop watch, distance
- Walking is the most common adult activity
  - Good long term adherence
- Walking is proven
  - Multiple studies prove benefit
- Walking is cost saving
  - Health costs lower, its “Green”



How fast do you need to walk; To stay ahead of the Grim Reaper?

- Several studies have shown correlation walking speed and survival.
- 1705 Australia men, age ≥70; Measured walking speed at usual pace for 6 m (~20 feet); Speed correlated with mortality rates over 5 yrs:
  - Walking speed of 0.82 m/s (2 mph or 3 kph) was most predictive of mortality (i.e. speed of Grim Reaper)
  - No men walking at speeds ≥ 1.36 m/s (3 mph or 5 kph) were caught by Grim Reaper
- Walking faster protects against mortality!

Stanaway, et al; BMJ, 2011

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Designing a Strength Training Program

- Types of strength training exercises
  - Bodyweight Exercises (push ups, pull ups, air squats, planks, sit-ups, lunges)
  - Resistance Bands (thickness/resistance varies)
  - Weight Training Machines (usually at the gym; safer)
  - Barbells (build muscle with bench press, curl, squats etc.)
- General Guidelines for Beginners
  - 2 to 3 days per week using multiple-joint exercises first
  - Large muscle groups are trained before small muscle groups.

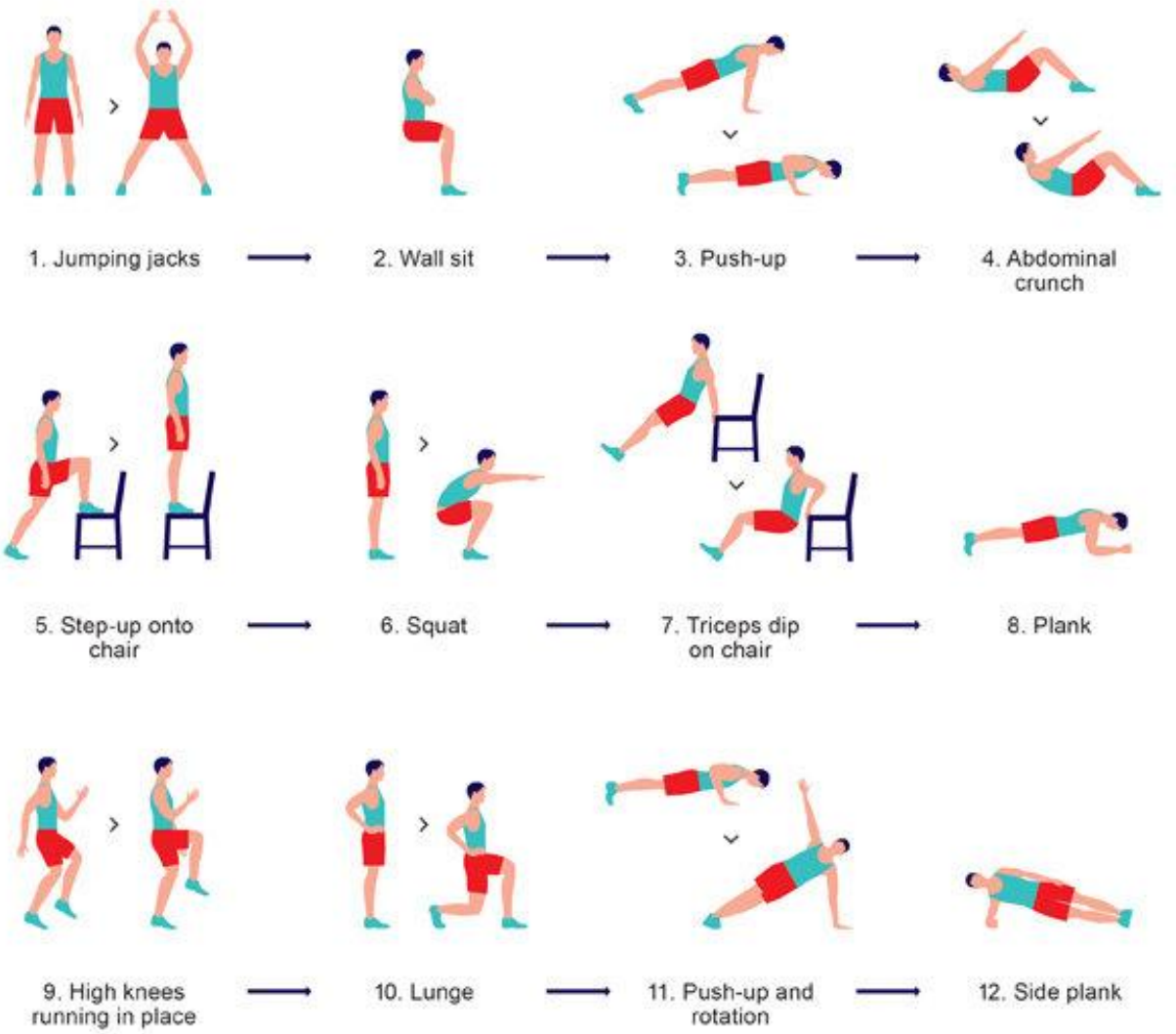
High-intensity Interval Training (HIIT)

- Broad term for workouts that involve short periods of intense exercise (80% max HR) alternated with recovery periods.
  - Very efficient lasting 10-30 min and gives most improvement in least time
  - Studies suggest greater gains in fitness (V02 max) and reduced risk of CVD
- But even alternating a “relatively” high intensity workout gives benefit.
  - Consider jogging or walking a bit faster for 1 min

Examples of HIIT Training

- 7-minute Workout
  - Made famous by NY Times health writer Gretchen Reynolds
  - 12 exercises deploying only body weight, a chair and a wall
  - One minute warm up followed by doing each exercise for 30 sec at near max intensity and then 10 sec rest; repeat 2-3 times; 3-5x per week
- “Combines a long run and a visit to the weight room into about seven minutes of steady discomfort”

7 Minute Workout
Do each exercise for 30 sec at max intensity



Other Examples of HIIT Training

- Tabata Workout (8 min)
  - 20 seconds of a very high intensity exercise (e.g., sprints, burpees, squat jumps, etc.)
  - 10 seconds of slow walk or rest
  - Repeat 8 times (2 min warm up + 2 min cool down)
- 10-by-1 (20 min)
  - 10 one-minute bursts of running each followed by one minute of recovery
- Do either workout 3x per week; Can substitute biking or swimming

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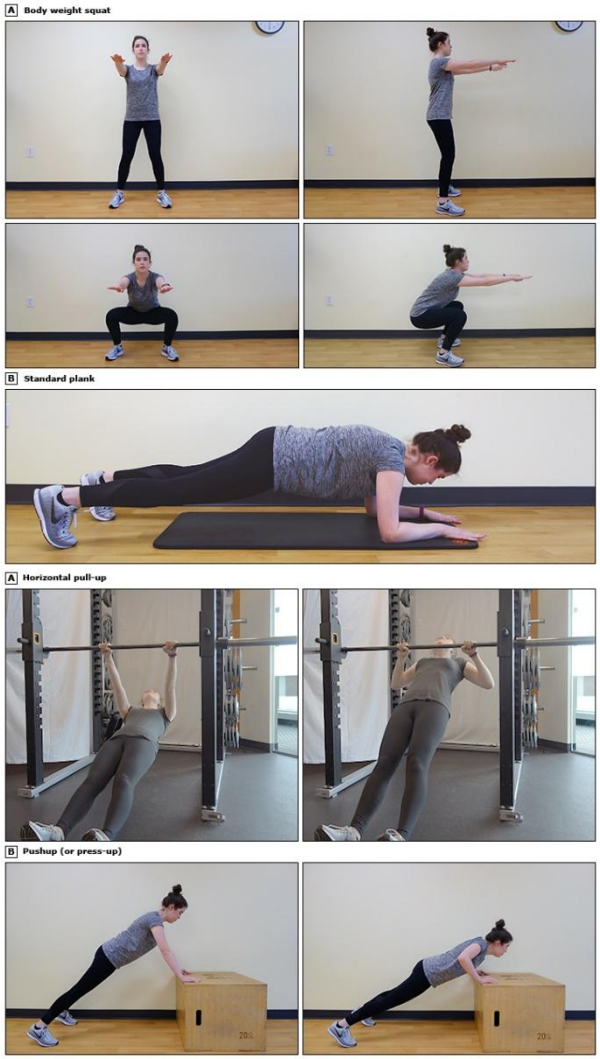
For The Beginner;
A simple exercise routine that I would suggest

- Walk for 30 min on 5 days per week; Or Jog for 25 min on 3 days per week.
- Do 2 sets each of:
  - Body weight squats x 10
  - Planks x 30 seconds
  - Horizontal pullups x 10
  - Elevated push-ups x 10



Frankin & Sallis; *UptoDate; 2025*

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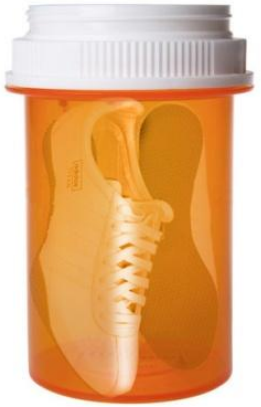
Hydration and Nutrition

- On average, endurance exercise leads to ~1L of sweat loss, ~1gm sodium loss and ~80gm carb burned per hour
- Hydration - replacing water is key!
  - For exercise bouts less than 1 hour, drink to thirst
  - If over 1 hour, drink according to your **sweat rate**!
- Nutrition (during, after and in between)
  - For exercise bout less than 1 hour, no need for carbs
  - Need protein supplement within 2 hours to aid recovery

Summary



- Benefits of exercise in treatment and prevention of chronic disease are irrefutable.
- The best exercise routine is one that you will do regularly, but ideally should contain:
  - Aerobic exercise (MVPA) for 150 min each week.
  - Strength training done 2-3 x per week.
  - Flexibility exercises done after each exercise session.
- Keep in mind that the biggest gains from exercise come by doing just a moderate amount.
- Keeping your routine fun and social can help you be more consistent.

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It’s time to get off the couch…