

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™

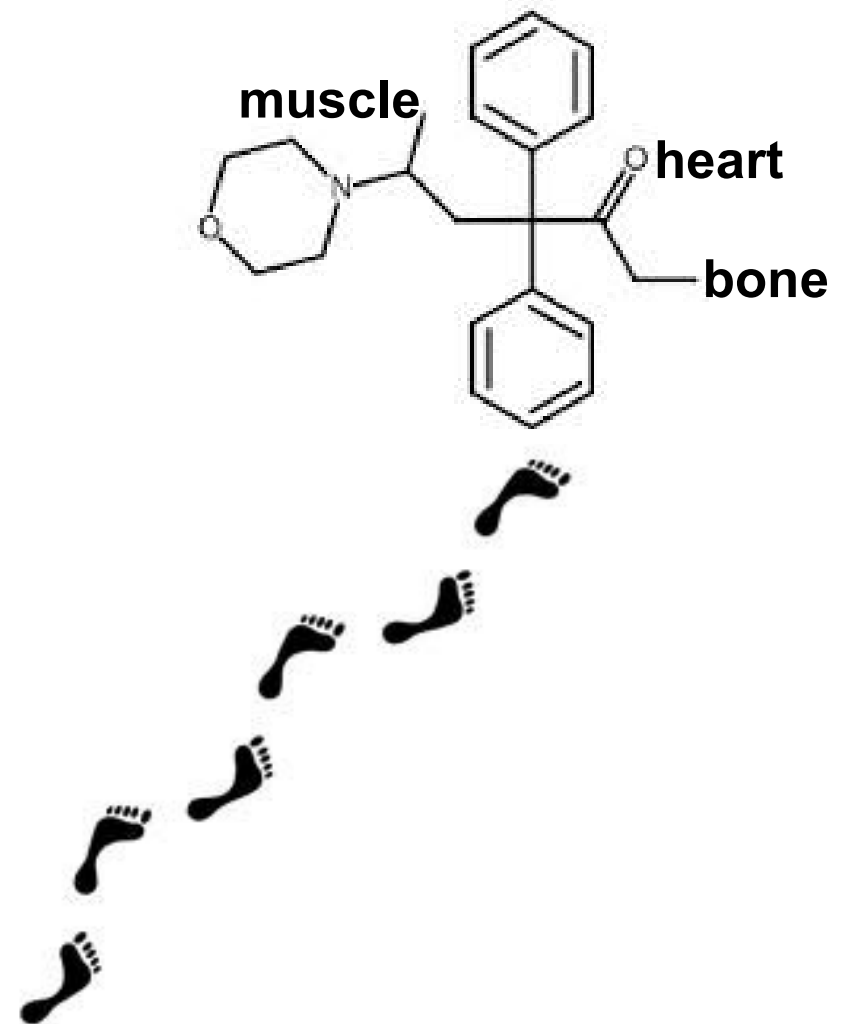
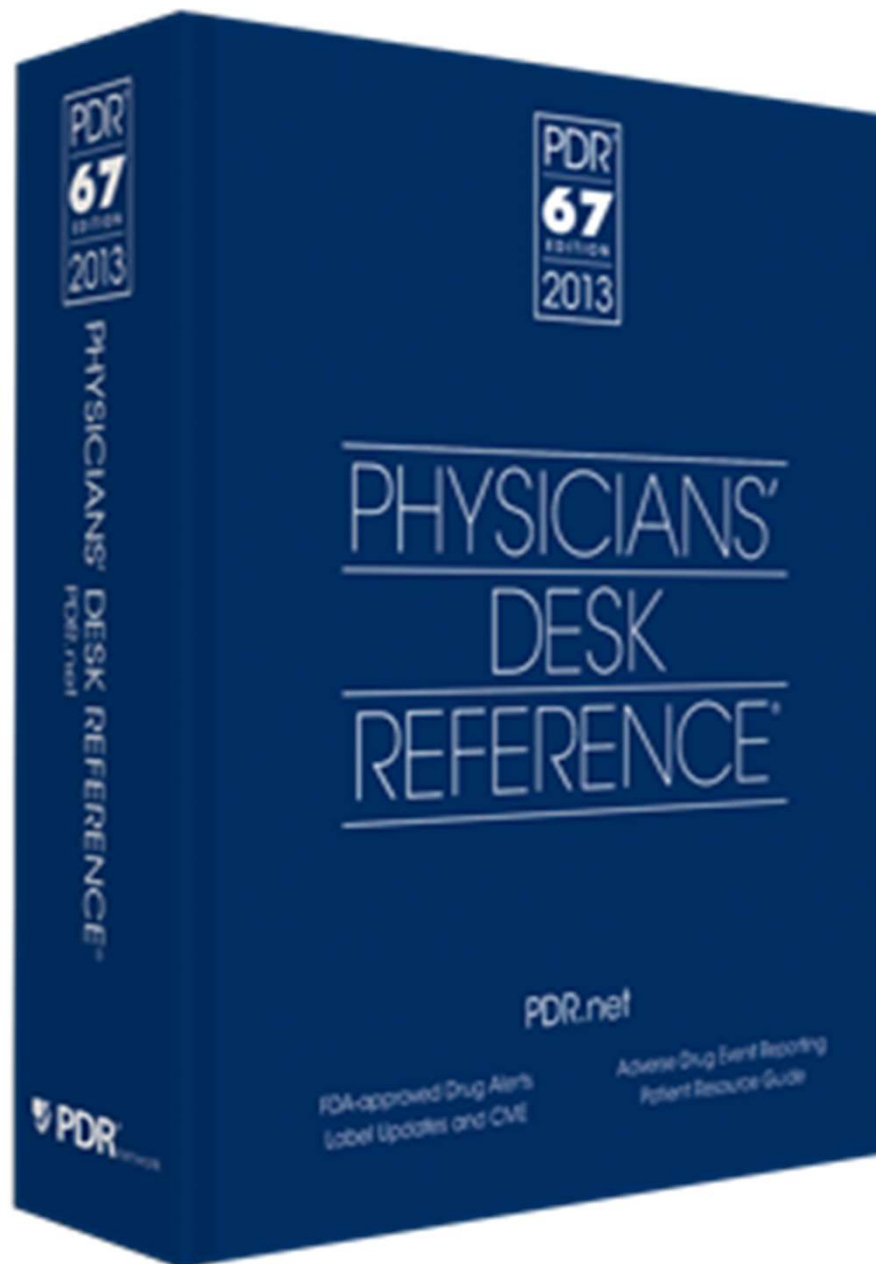
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Conflict of Interest Disclosure

Robert Sallis

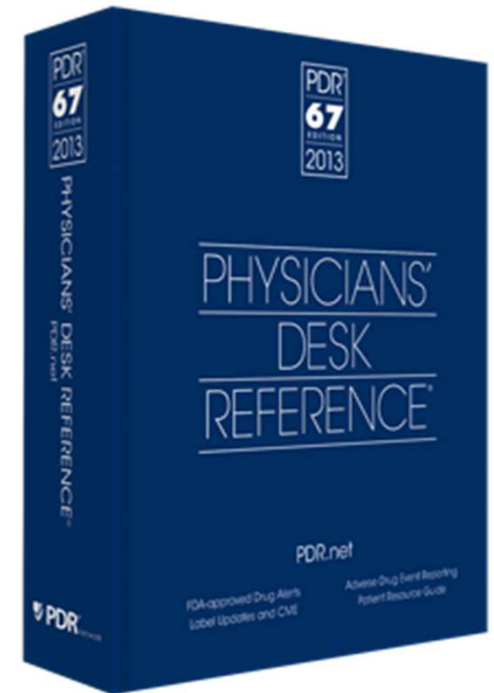
- Has no actual or potential conflict of interest in relation to this presentation
- Will be discussing the use an off-label and unapproved drug called Exercise in this presentation

A Drug Called Exercise



A Drug Called Exercise

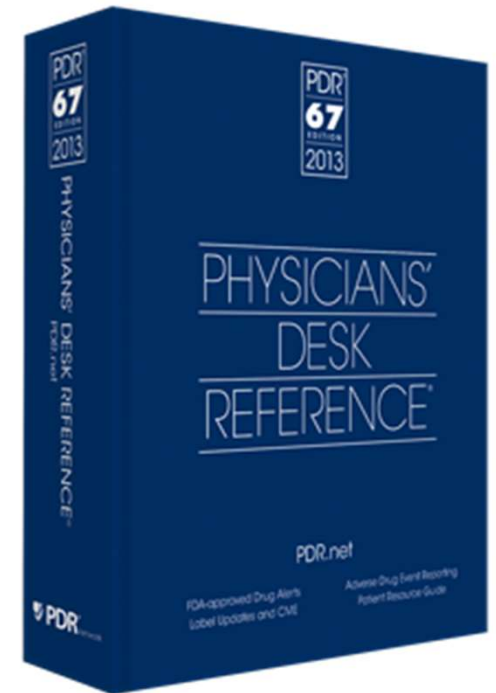
- **Generic name:** physical activity
- **Other Brand names:** jogging, hiking, rolling, swimming, aerobics, biking, tennis, basketball, soccer, dancing, gardening, etc.
- **Dosage:** optimum 150 minutes per week in adults; 60 min per day in children has proven efficacy. Even low doses have been shown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



A Drug Called Exercise

■ Indications and Usage:

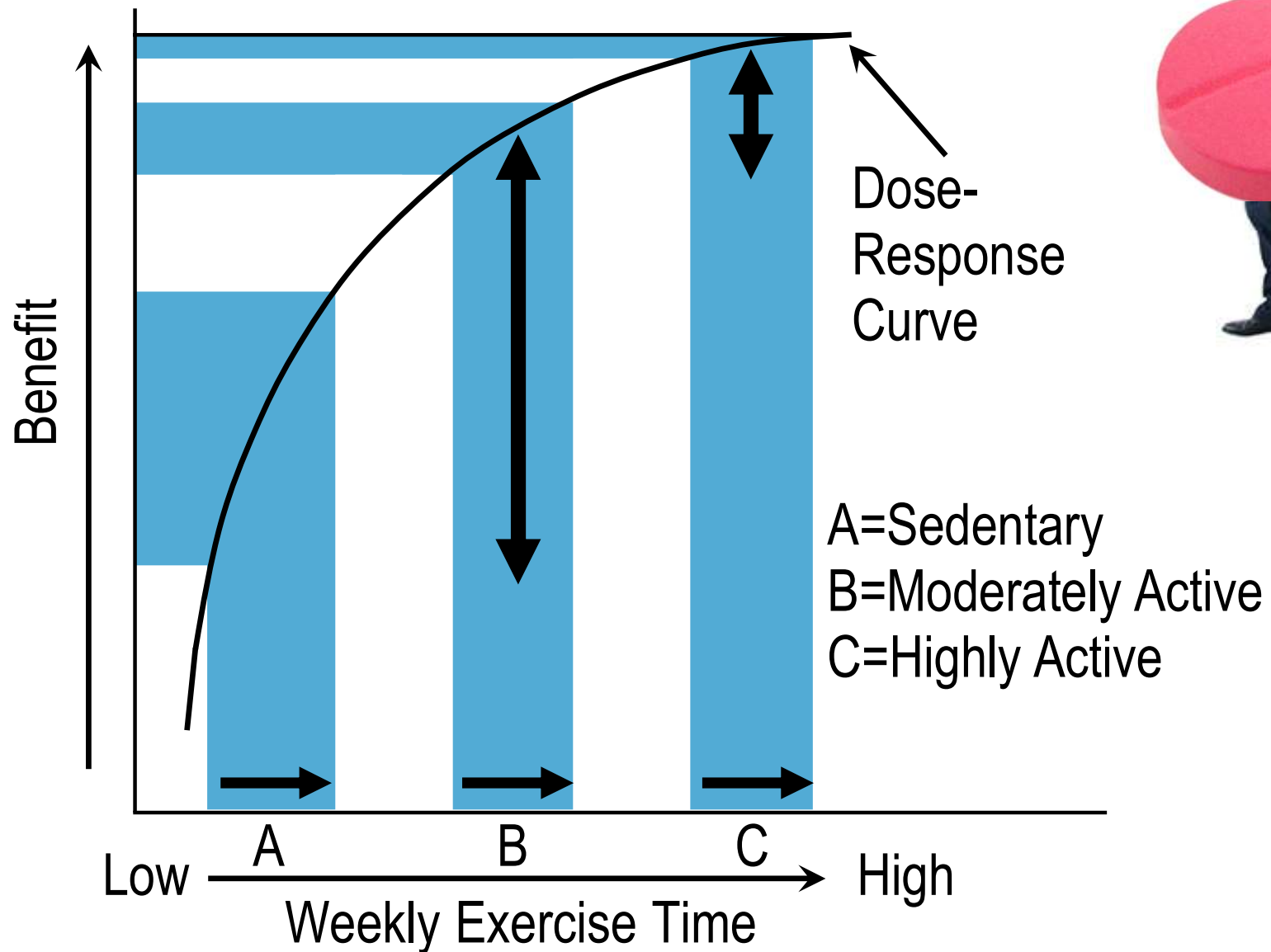
- Prevent obesity and mitigate its risks
- Reduce development and improve management of diabetes
- Prevent and treat heart disease
- Lower risk of cancer (breast and colon)
- Treatment of hypertension
- Prevent osteoporosis and fractures
- Manage depression and anxiety
- Reduce risk of dementia
- Recreational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



****Decrease risk of dying from COVID-19**

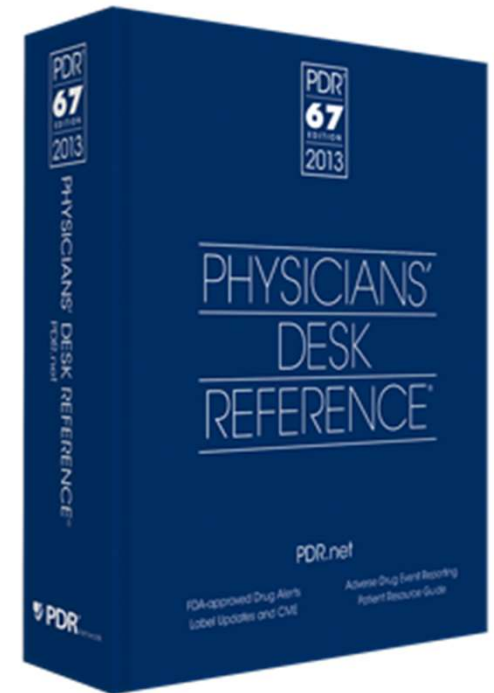
A Drug Called Exercise

Dose-Response Curve



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.



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.



Components of an Exercise Program

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



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).



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

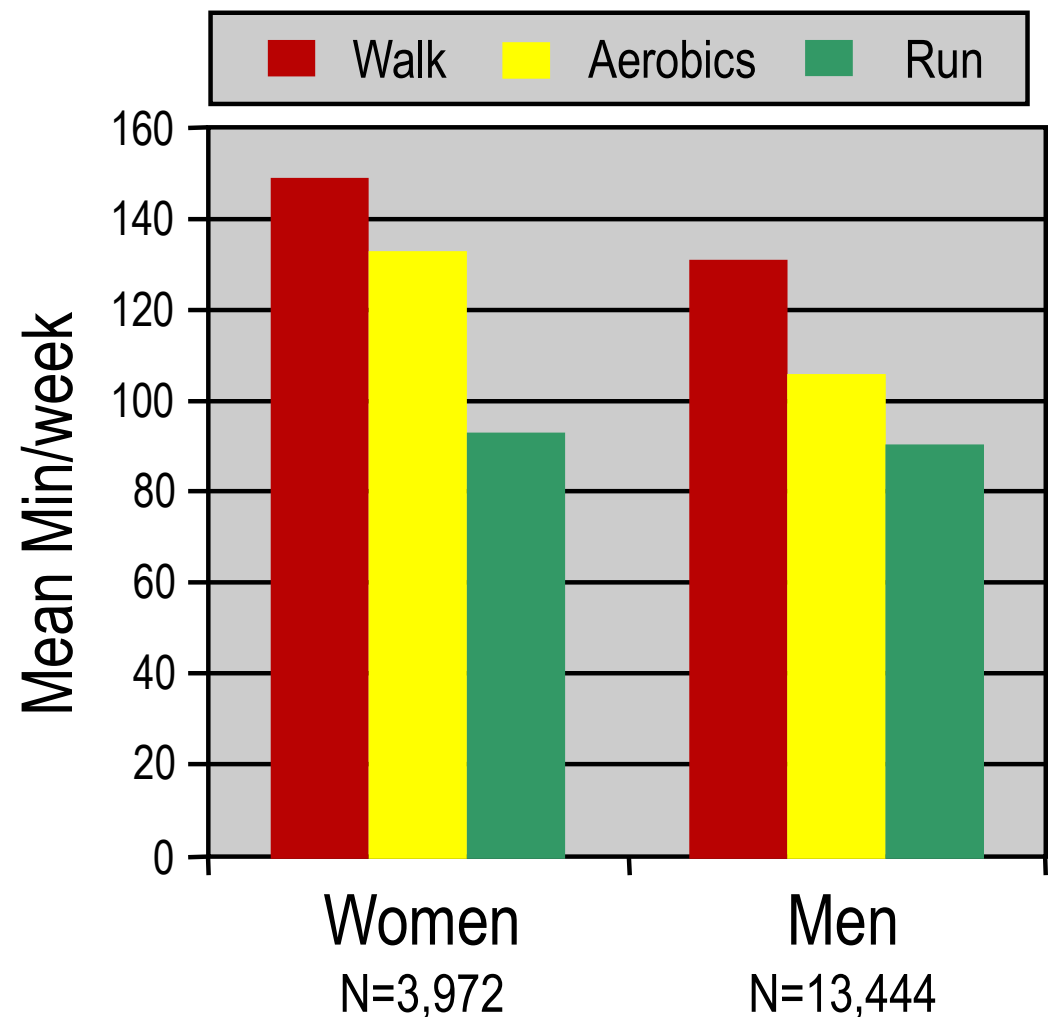
Use large muscle groups; something enjoyable.

T = Time

30 minutes.

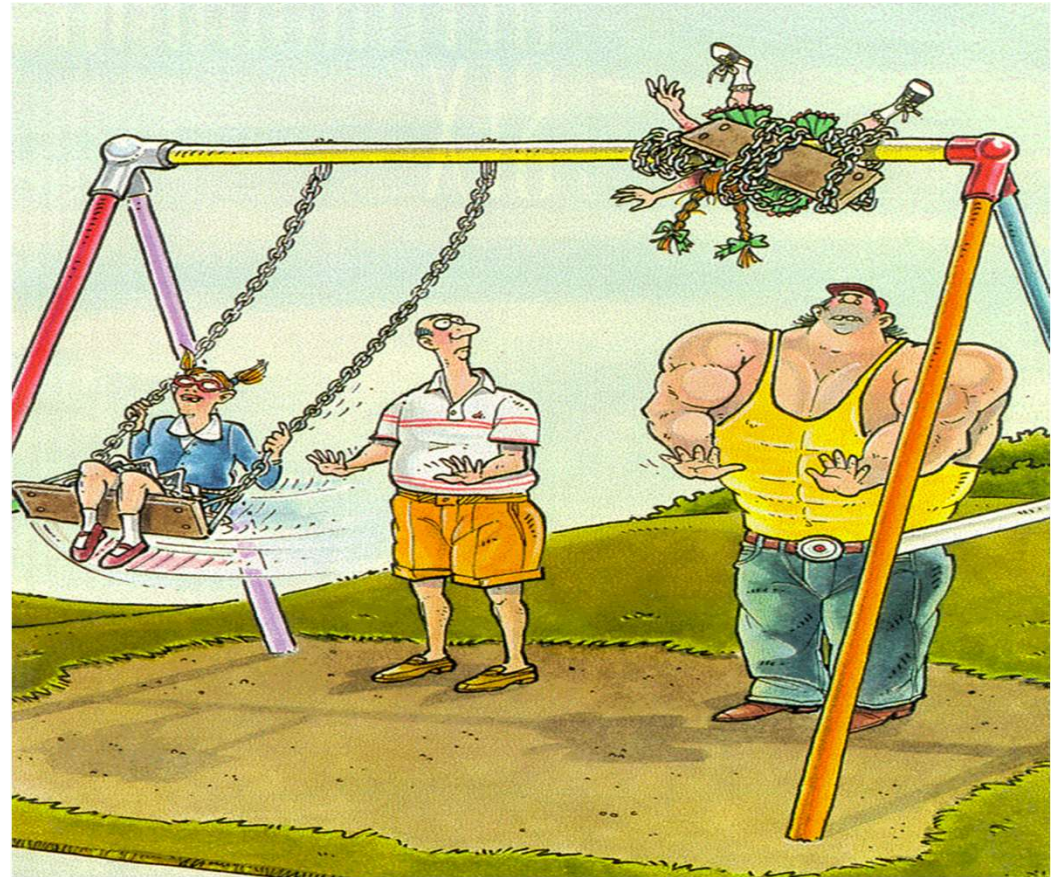
How Much Exercise do You Need to be Moderately Fit?

- 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.



The Strength Exercise Prescription

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

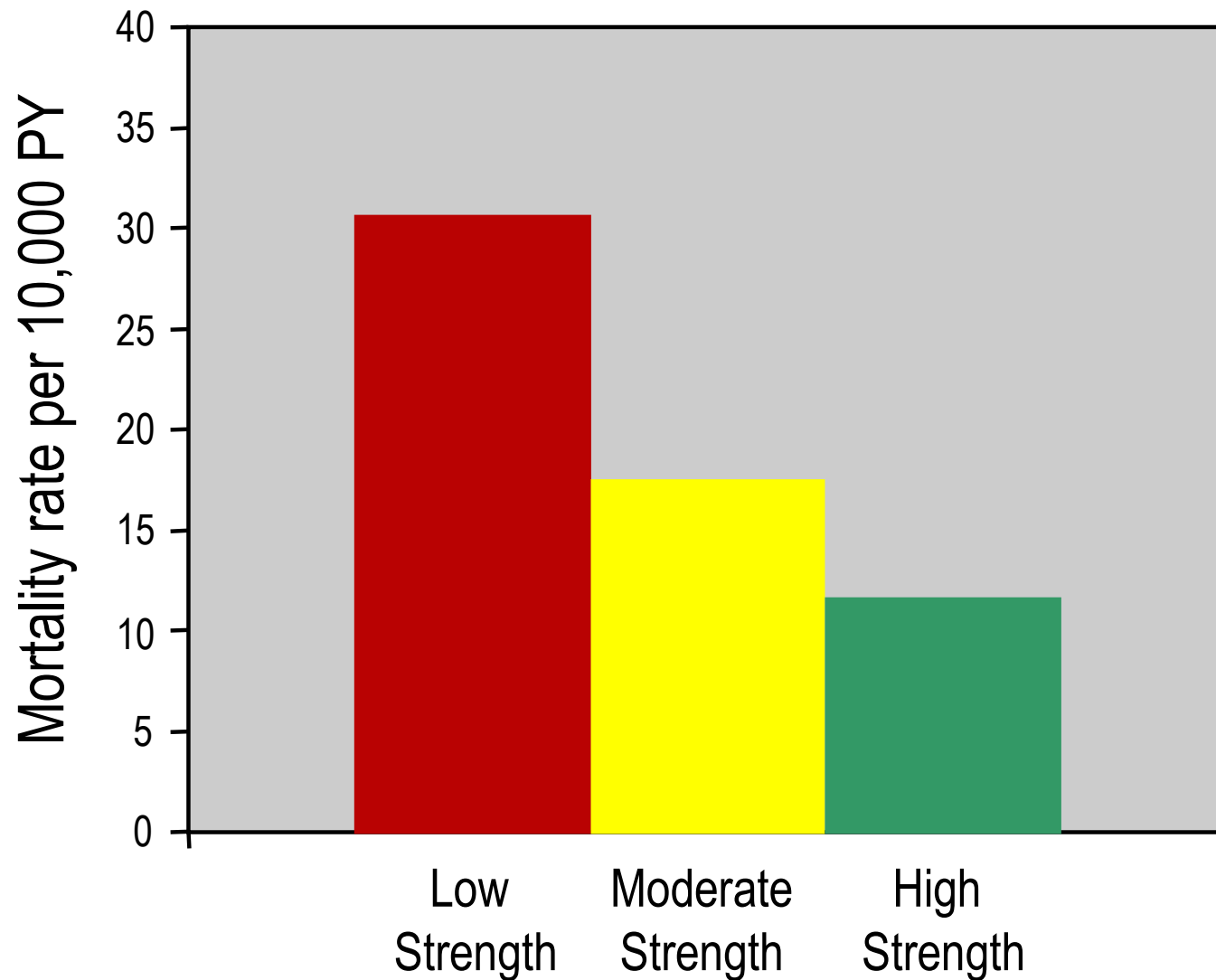


Muscle Loss With Age

- 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.



Mortality Rates by Musculoskeletal Fitness Category



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.

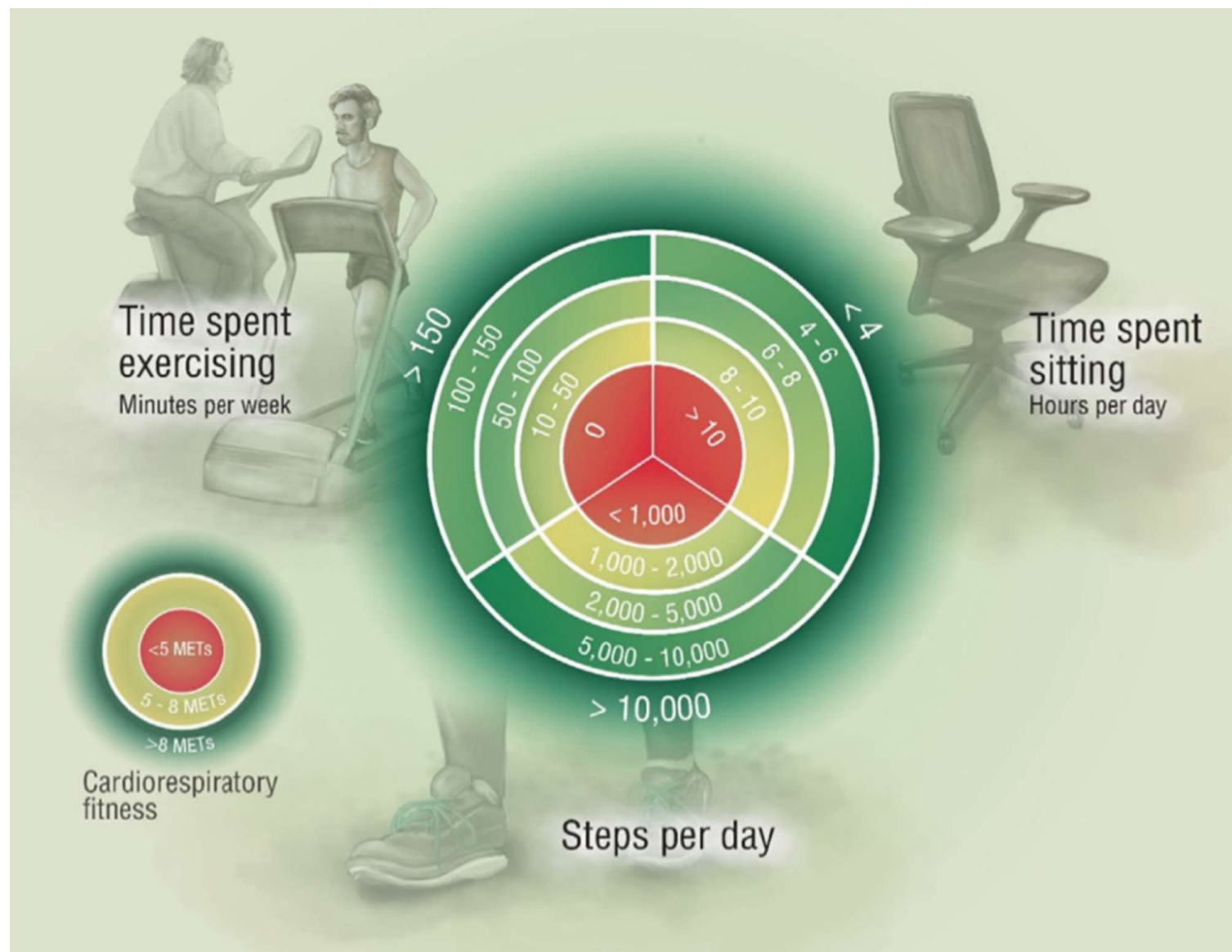


Warm Up and Cool Down

- 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



Goals for Physical Activity



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

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



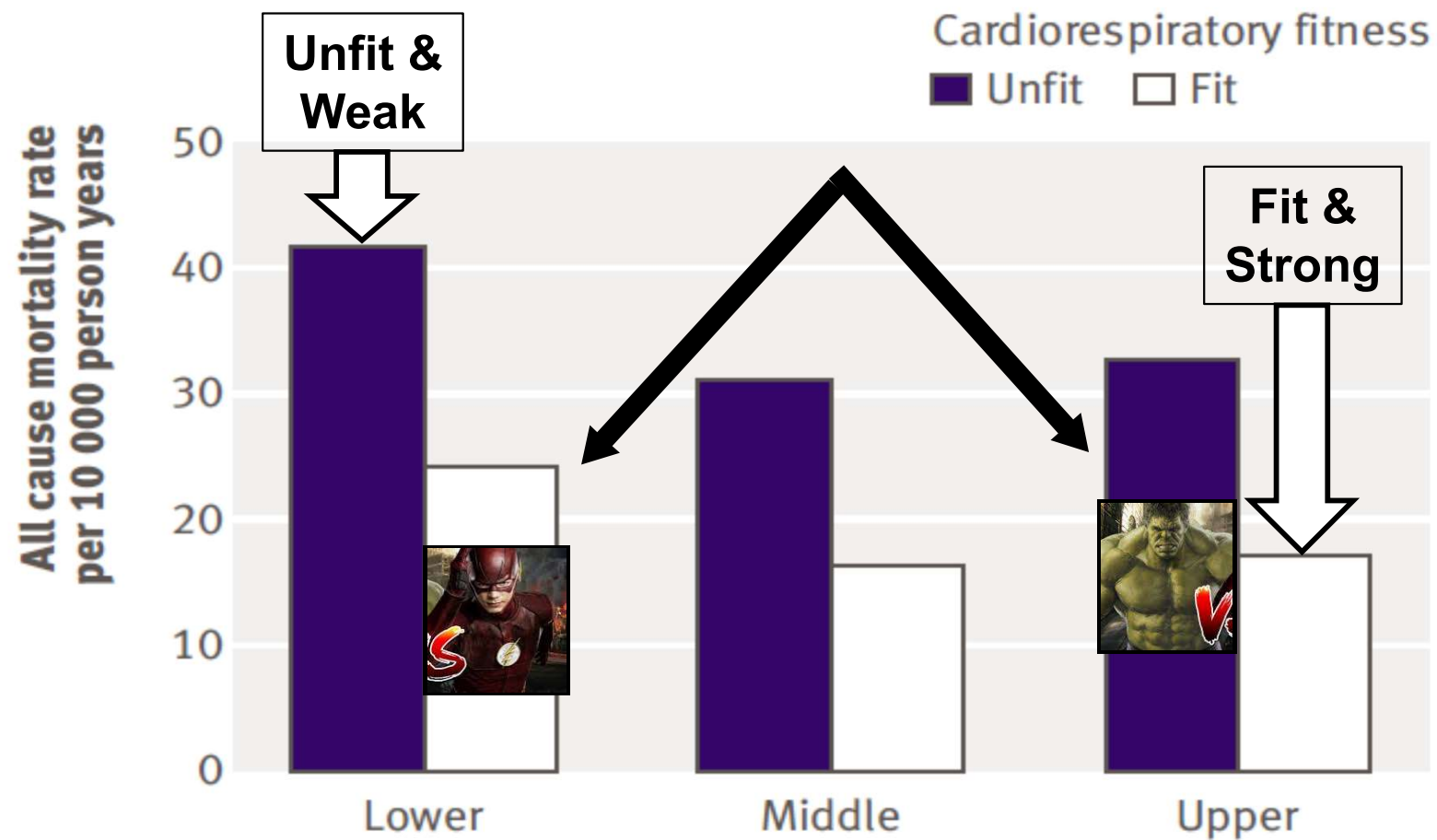
Association between muscular strength and mortality in men: prospective cohort study

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)

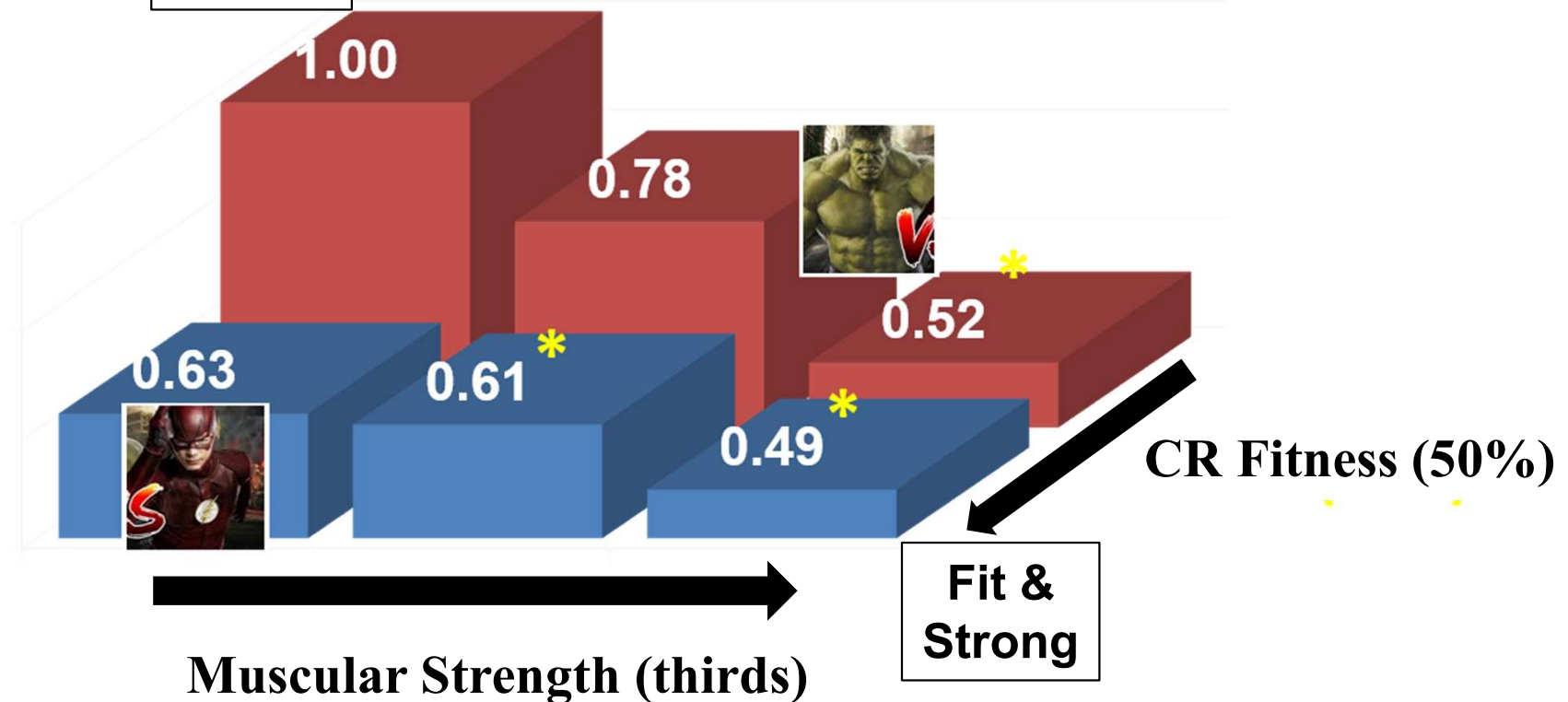
A Prospective Study of Muscular Strength and All-Cause Mortality in Men With Hypertension

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),
Framingham Heart Study

Unfit &
Weak

All Cause Mortality



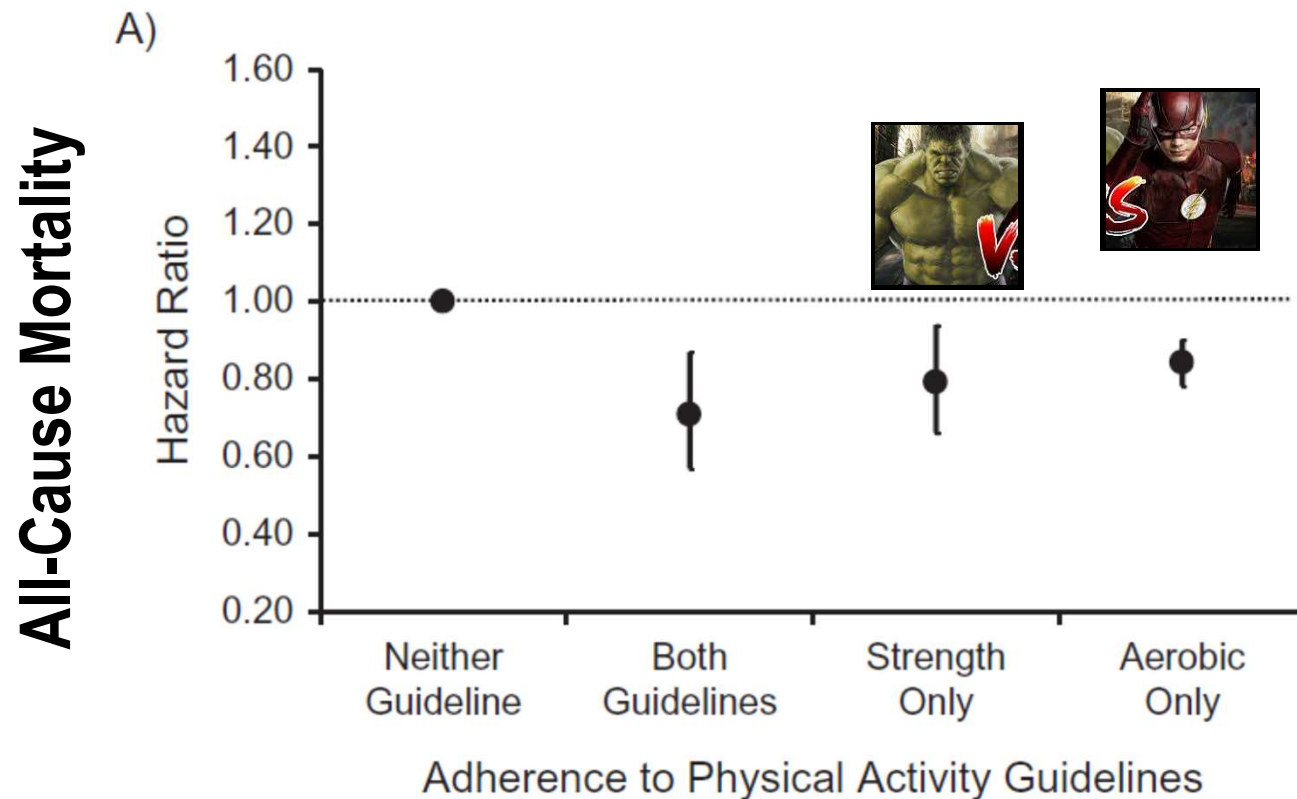
Adjusted for age, physical activity, smoking, alcohol, BMI, blood pressure, total cholesterol, diabetes, abnormal ECG, and parental CVD. * $P < 0.05$.

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



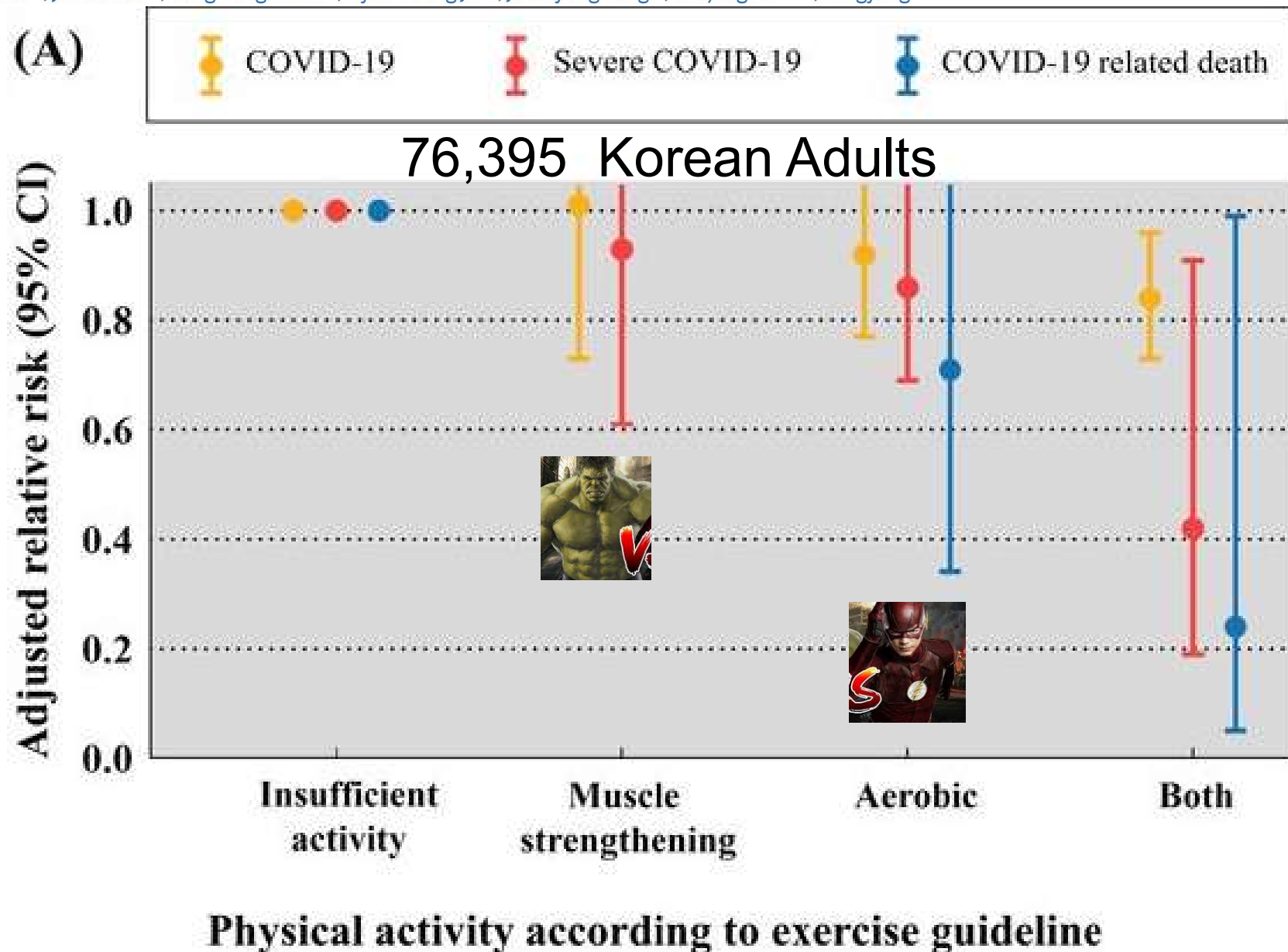
- **Aerobic guideline** as ≥ 150 min/week of moderate-intensity or ≥ 75 min/week of vigorous-intensity activity or equivalent combinations of both.
- **Strength guideline** as reporting participation in ≥ 2 sessions/week.

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

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

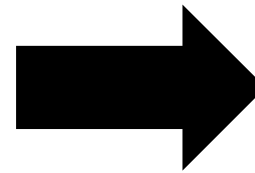
Seung Won Lee¹, Jinhee Lee², Sung Yong Moon¹, Hyun Young Jin¹, Jee Myung Yang³, Shuji Ogino^{4, 5}, Mingyang



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



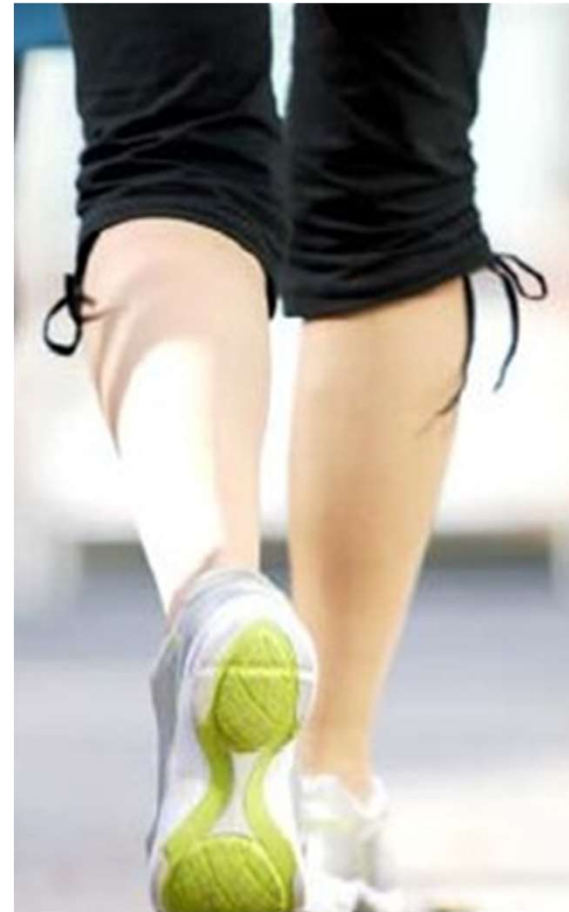
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The one who is both ***strong*** and ***fast*** (fit)!

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

Running vs Walking



Let's Start With Running

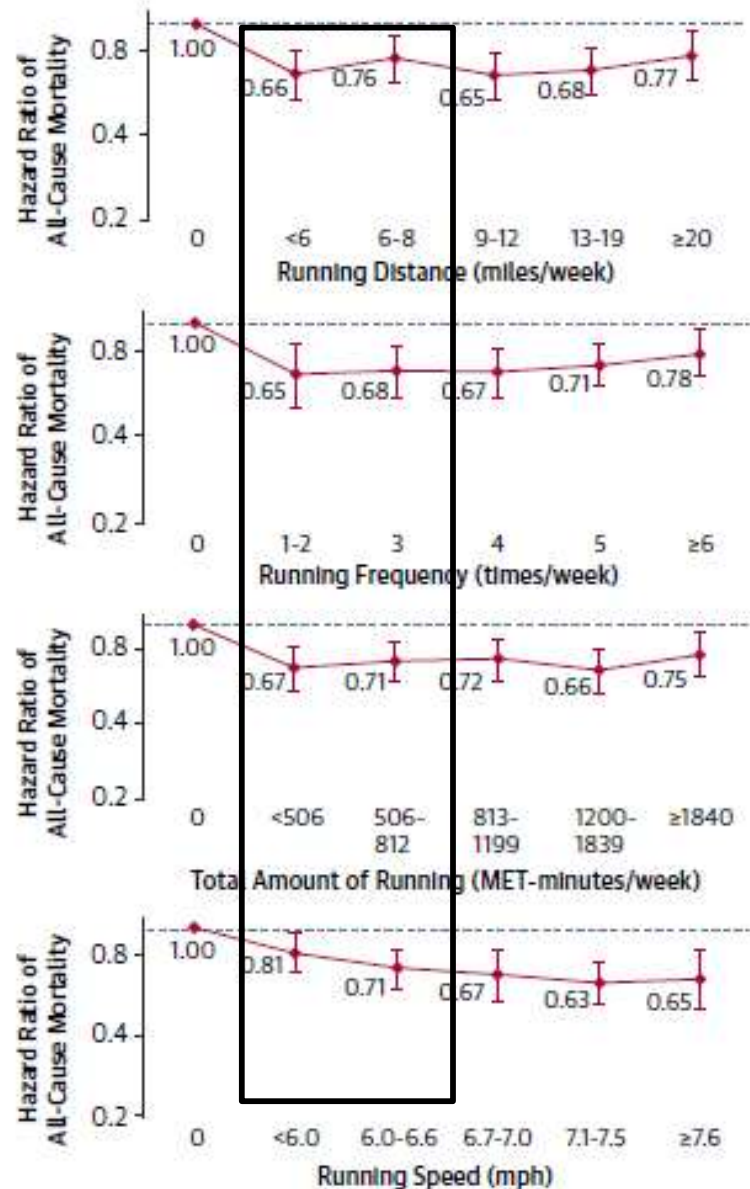


Affect of Leisure-time Running on All-cause and Cardiovascular Mortality Risk

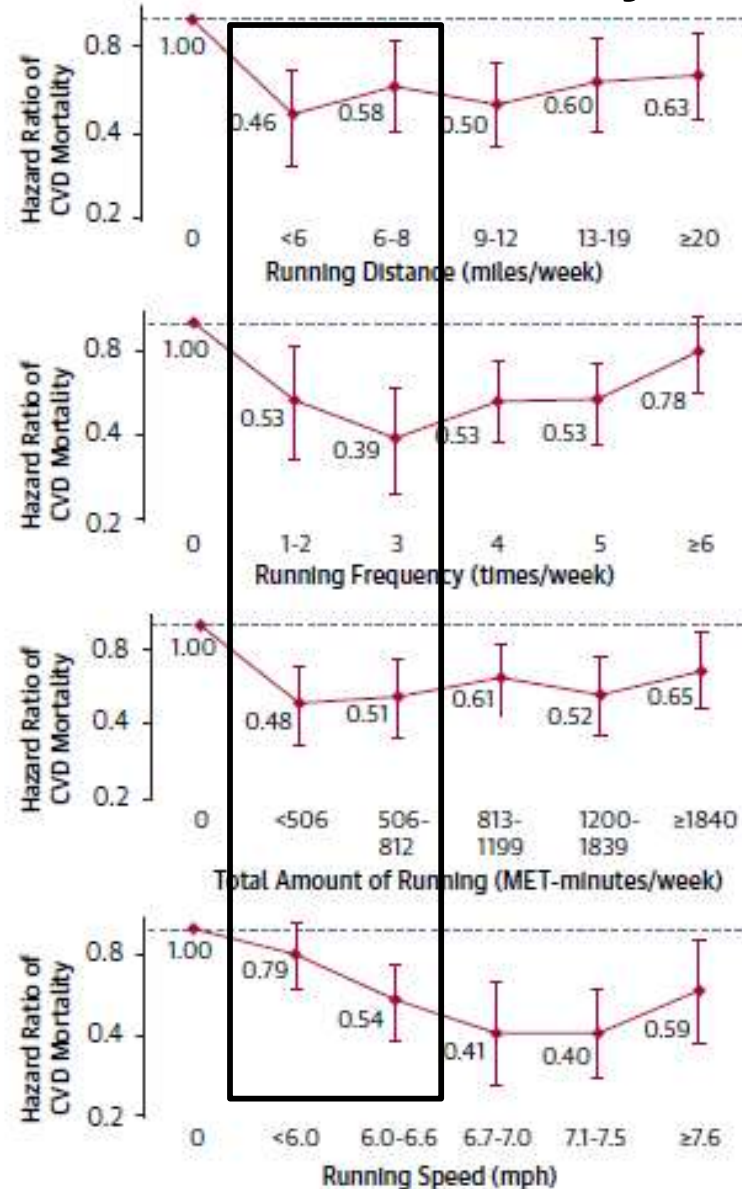
- Most data on PA and mortality has focused on moderate intensity exercise (walking).
- Examined association of running with all-cause and CV mortality risks in 55,137 adults, 18 to 100 yrs. (mean 44 yrs., 26% female); ACLS data.
 - Compared non-runners to runners in 5 quintiles of **distance** (miles/wk), **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.

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

All Cause Mortality



CVD Mortality



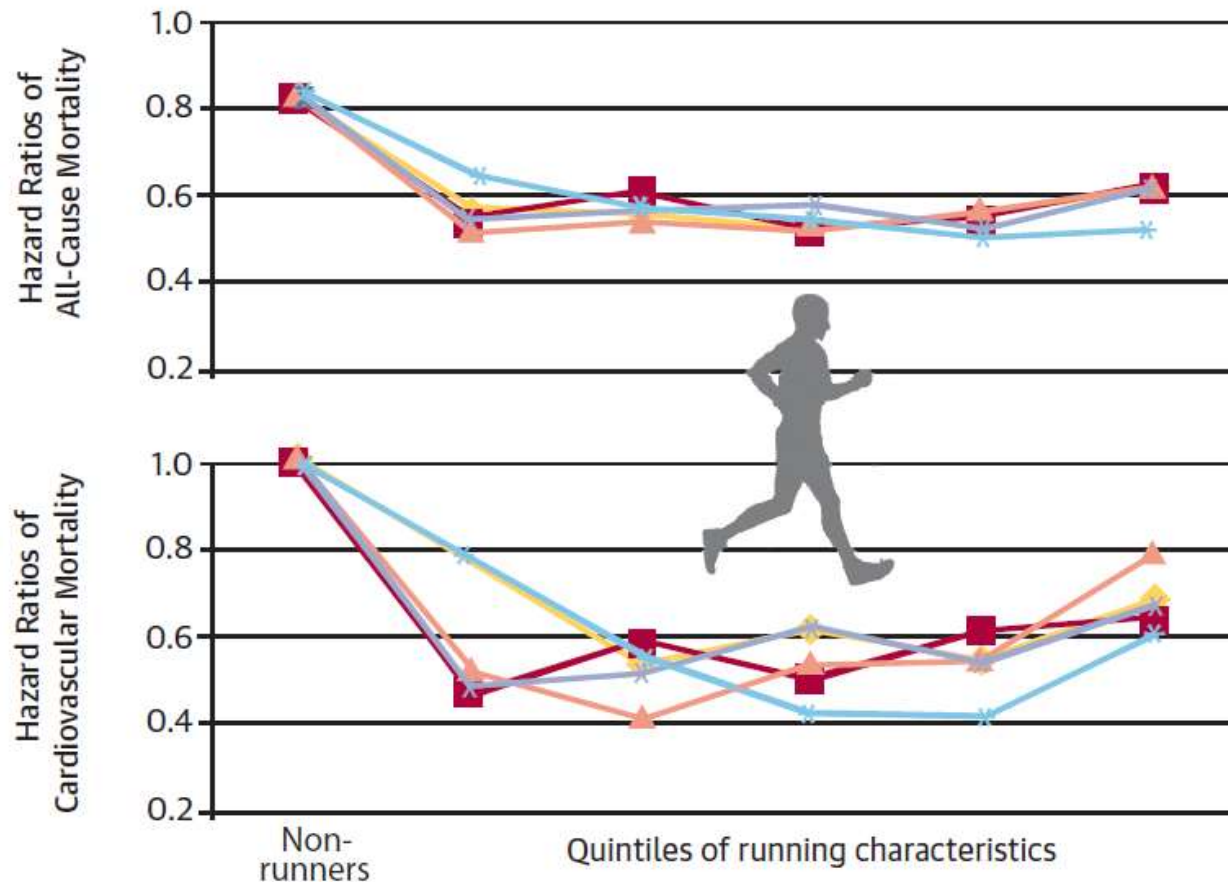
Distance

Frequency

Amount

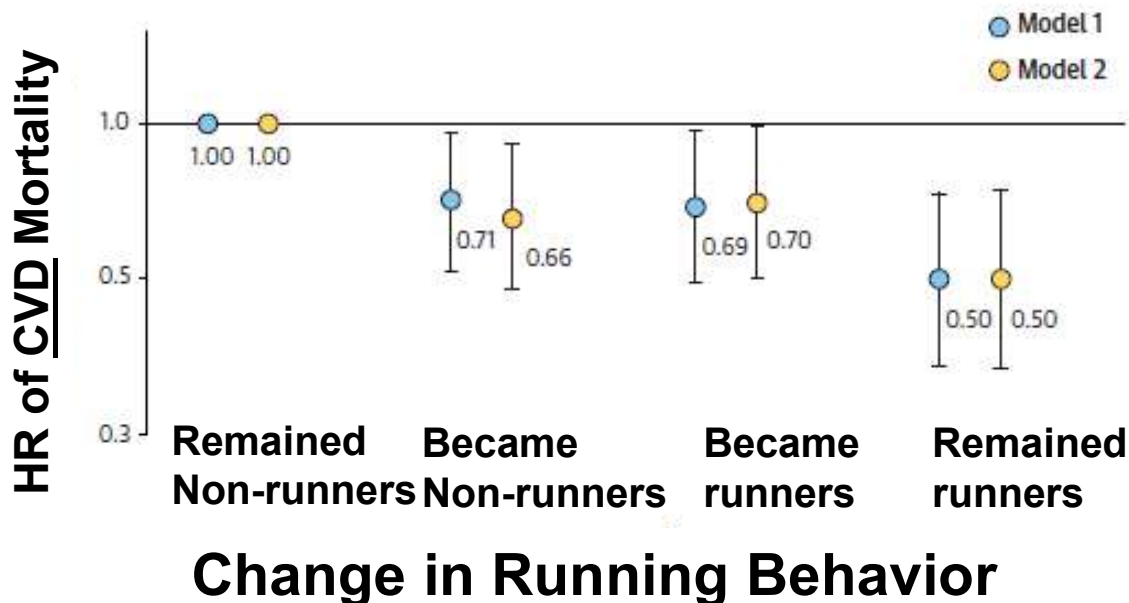
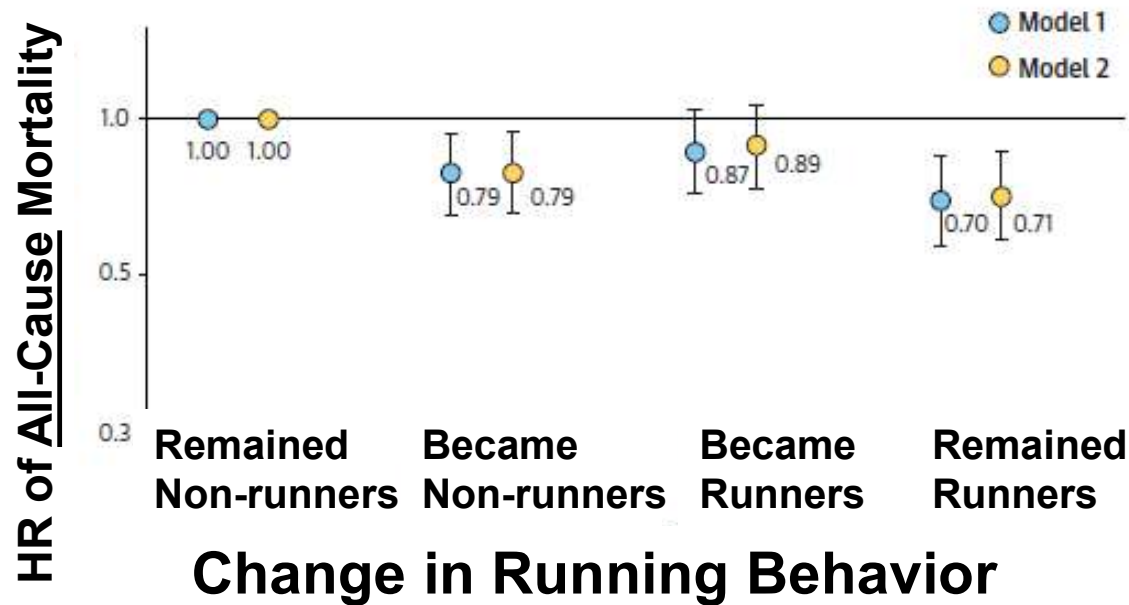
Speed

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

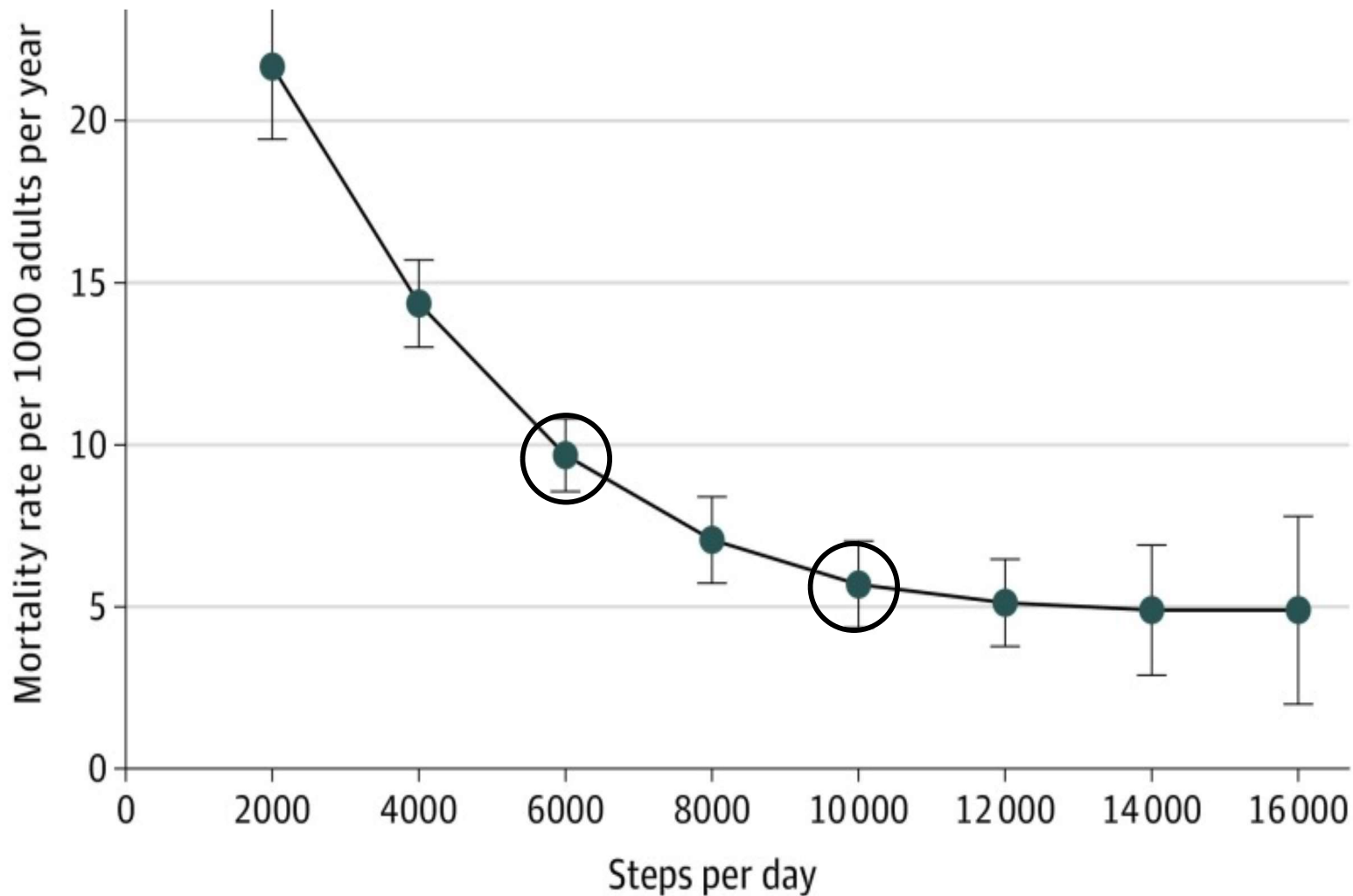
Running Study Conclusions

- 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.

How about walking?

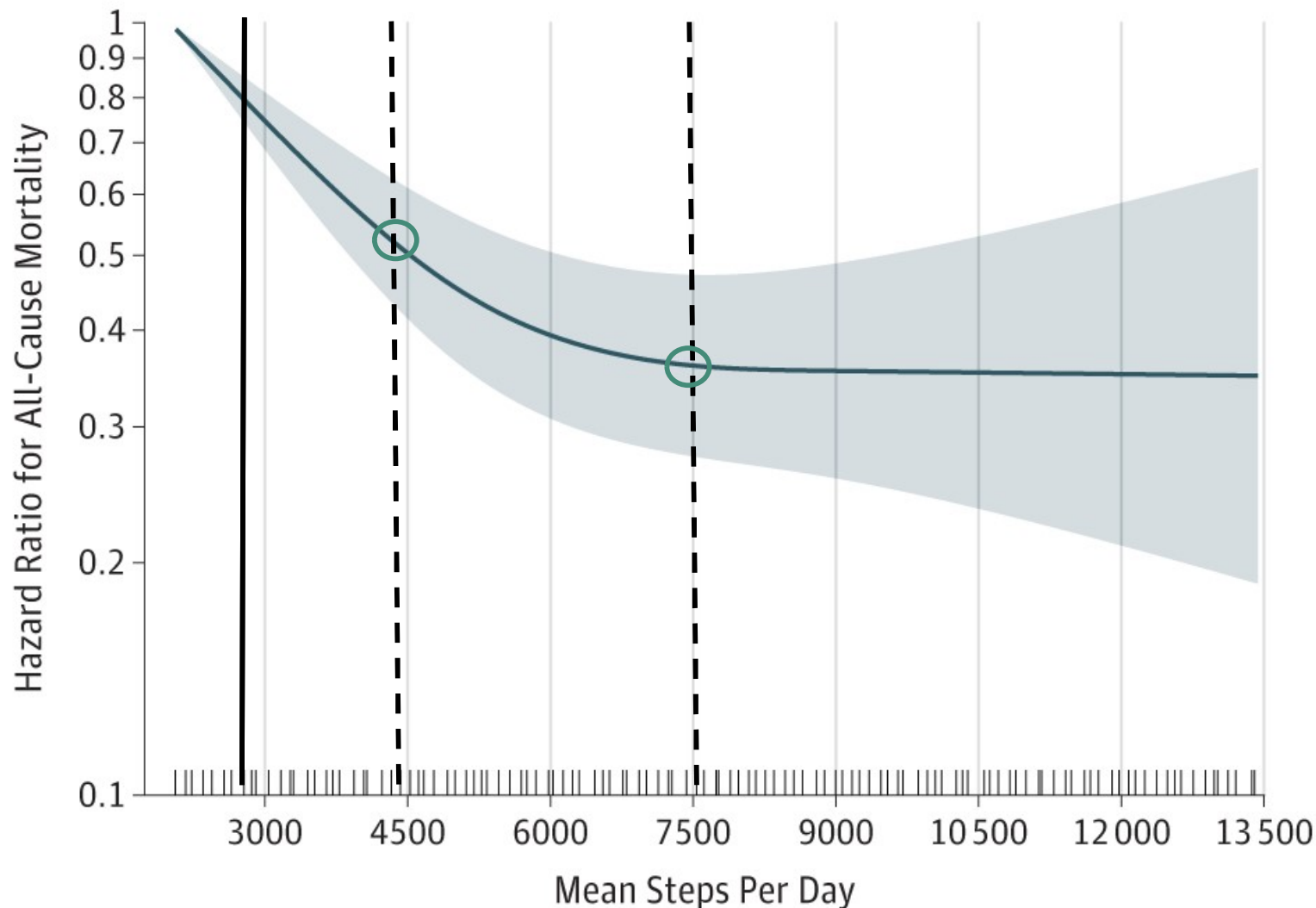


Association of Daily Step Counts and Mortality




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

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

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.

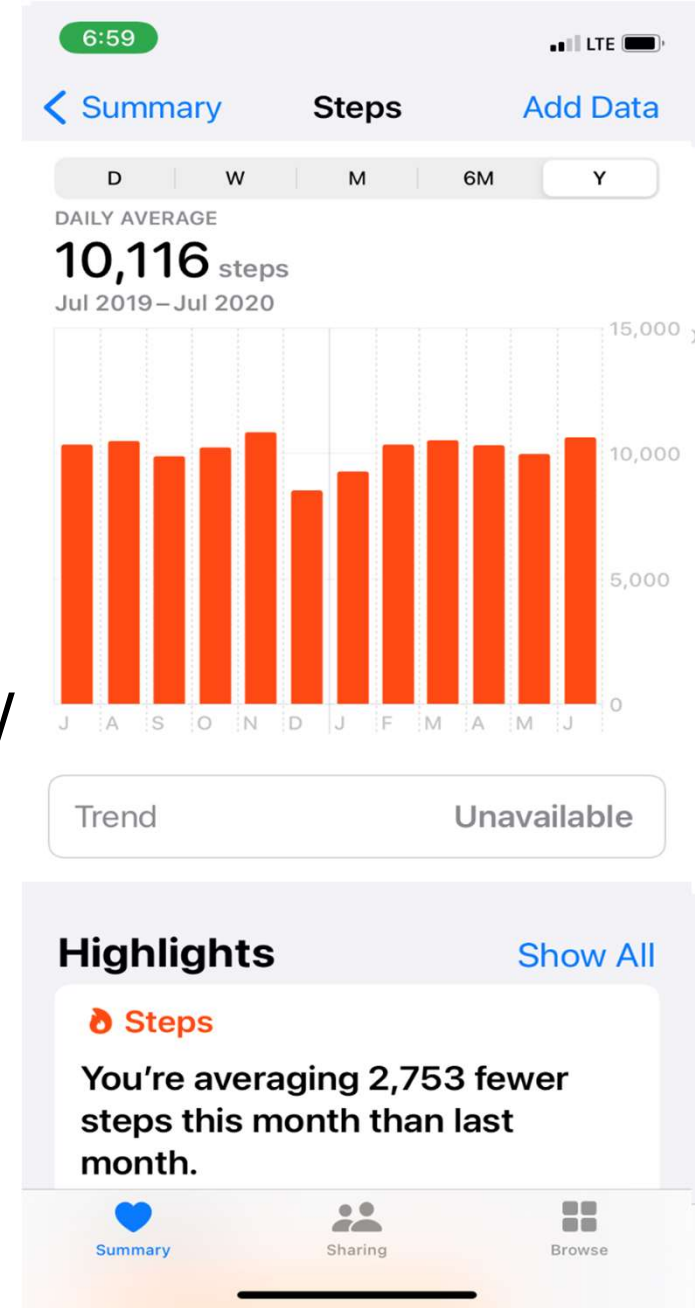
Signature: Robert Sallis, MD


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 *measurable*
 - 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!

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 ($\dot{V}O_2$ 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



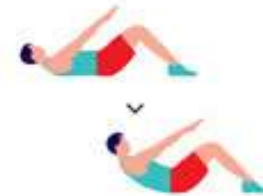
1. Jumping jacks



2. Wall sit



3. Push-up



4. Abdominal crunch



5. Step-up onto chair



6. Squat



7. Triceps dip on chair



8. Plank



9. High knees running in place



10. Lunge



11. Push-up and rotation



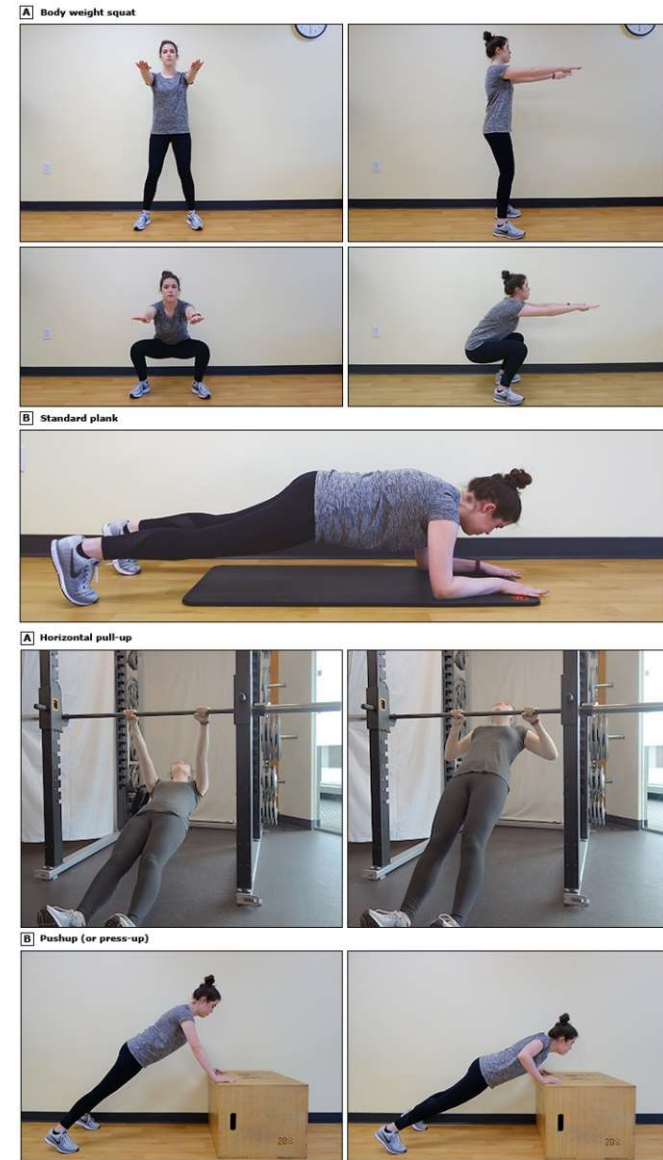
12. Side plank

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
- 3x per week; Can substitute biking or swimming

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



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.



It's time to get off the couch...

