Fitness Vs Fatness:
What's More Important to Your Health?



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Physical activity, obesity and health



It is time to bust the myth of physical inactivity and obesity: you cannot outrun a bad diet

A Malhotra, T Noakes and S Phinney

Br J Sports Med 2015 49: 967-968 originally published online April 22, 2015
doi: 10.1136/bjsports-2015-094911

- Written by folks trying to sell diet books about virtues of a low carb – high fat diet
- Their conclusion: "It is time to wind back the harms caused by the junk food industry's Public Relations machinery. Let us bust the myth of physical inactivity and obesity. You cannot outrun a bad diet"
- ***But can you diet away the risks of being sedentary?***

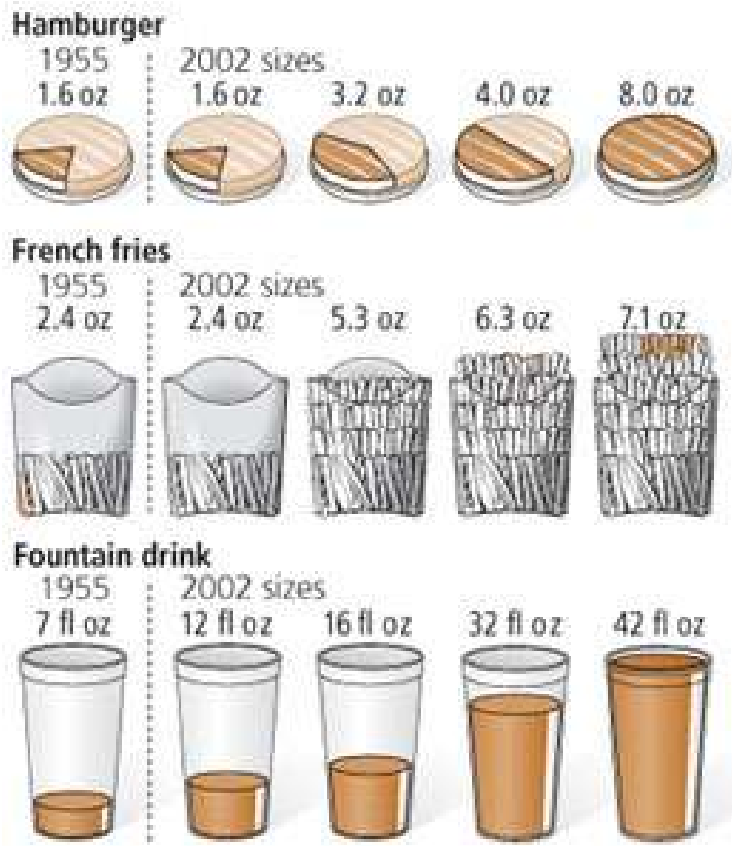
Past century has seen paradigm shift in our diet and activity level

- Over the same period of time;
  - Portion sizes have dramatically increased
  - Activity levels have dramatically decreased
- Resulting in unintended, but predictable, consequences that are gravely affecting our health and longevity



The Growth of Fast Food Portion Sizes Over 60+ yrs

- Between 1971 and 2019:
  - –Average man added 168 calories to his daily diet
  - –Average woman added 335 calories a day



Harvard Health Newsletter, 2019
Weigh Less, Live Longer: Strategies for successful weight loss

The Growth of Portion Sizes; 40 years & 210 calories later

- The Average Bagel:



3-inch diameter 140 calories



6-inch diameter 350 calories

The Growth of Portion Sizes; 40 years & 360 calories later

- The Average Large Size Theatre Popcorn:



5 cups
270 calories



11 cups
630 calories

The Growth of Portion Sizes; 40 years & 270 calories later

- The Average Hamburger:



333 calories



590 calories

Changes to the US Labor Force

- Over past century, shift from industries dominated by primary production
- 1900 Most Common Occupations:
  - Farm workers
  - Forest workers
  - Mine workers
- 2000 Most Common Occupations:
  - Professional workers
  - Technical workers
  - Service workers





Then Exercise Didn't Matter

Lumberjack;
Then



Now Exercise Matters:
Unintended Consequences of Technology

Lumberjack;
Now



Then Exercise Didn’t Matter

Farmer;
Then



Now Exercise Matters:
Unintended Consequences of Technology

Farmer;
Now



Then Exercise Didn’t Matter

Play time;
Then



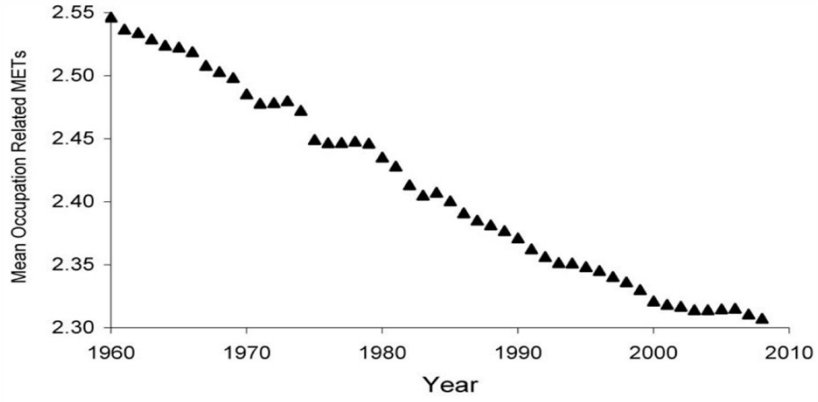
Now Exercise Matters:
Unintended Consequences of Technology

Play time;
Now

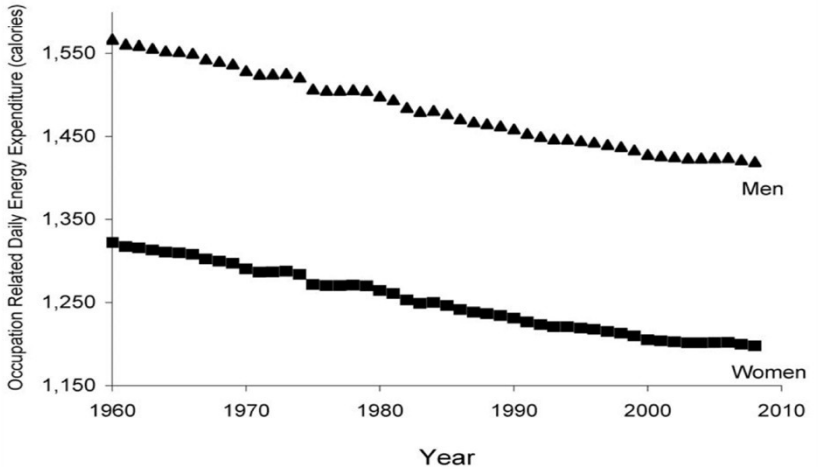


Energy Expenditure at Work Over 5 Decades

METs Expended



Calories Burned

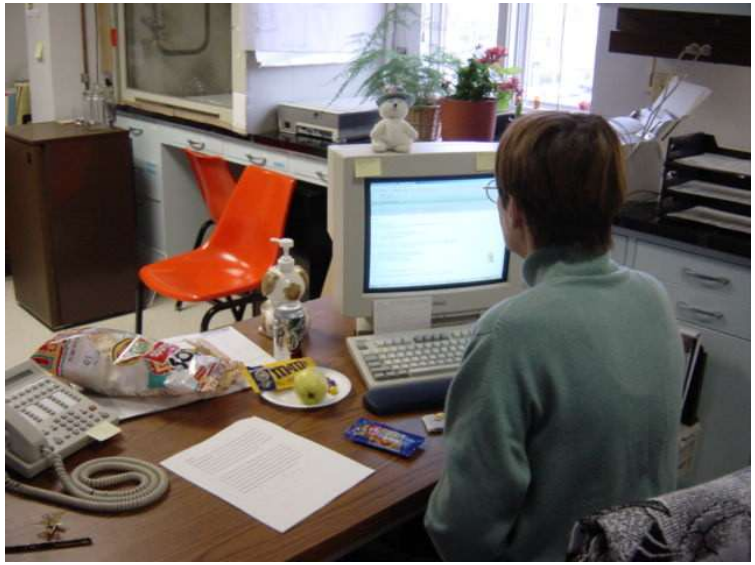


Church TS et al. PLOS ONE 2011;6(5): e19657

Now, Everywhere We Look
At home and at work

Exercise Matters!



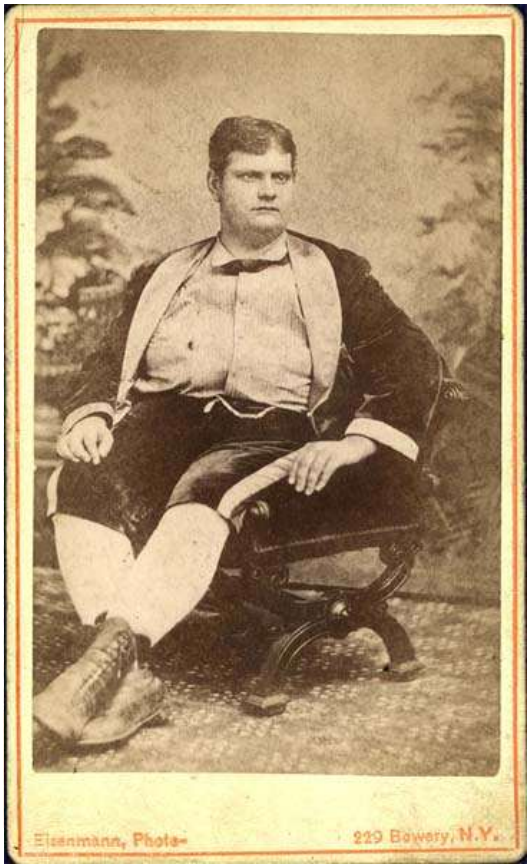


Bottom Line – We have systematically engineered PA out of our daily routine



The results have been catastrophic

- Can you guess the occupation of these people from the early 1900's?
  - They are circus performers
  - Often called "fat folks", who were so unusually large that people actually paid to see them!



Are you kidding?
Compare with today's standards







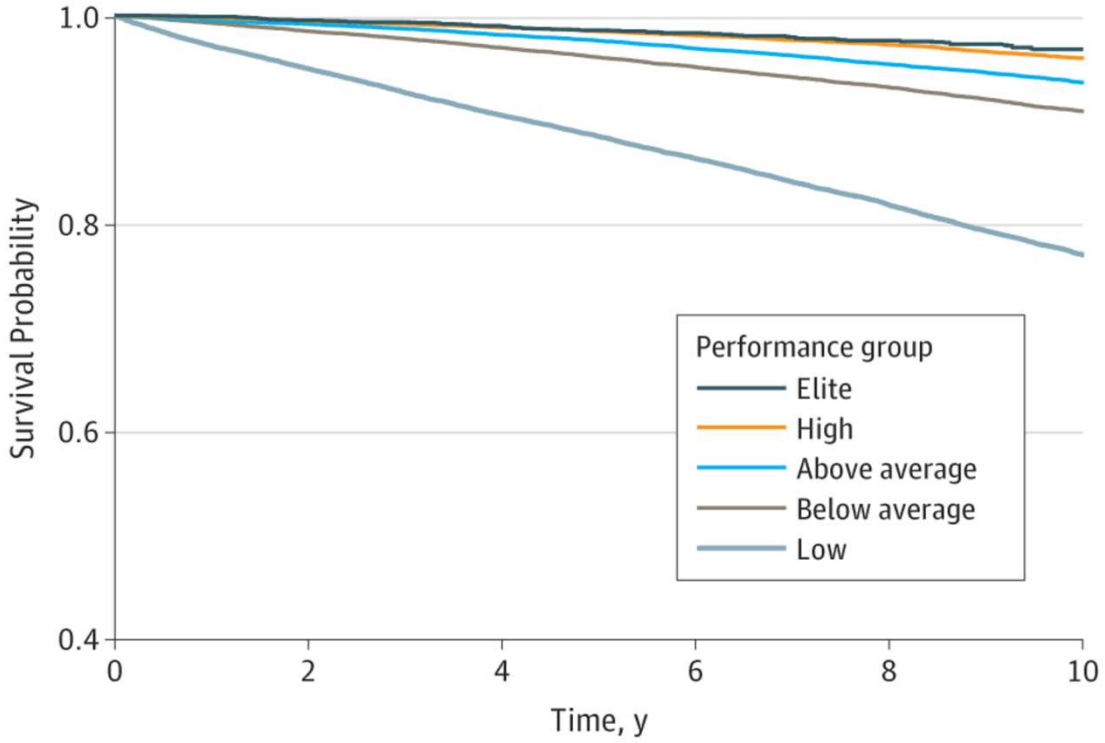
Look at Old Pictures; What has Changed?



Exercise is Medicine

The case for physical activity to improve health and reduce mortality

Association of Fitness With Mortality in Adults Undergoing Ex Treadmill Testing



-122,007 adults with ETT at Cleveland Clinic

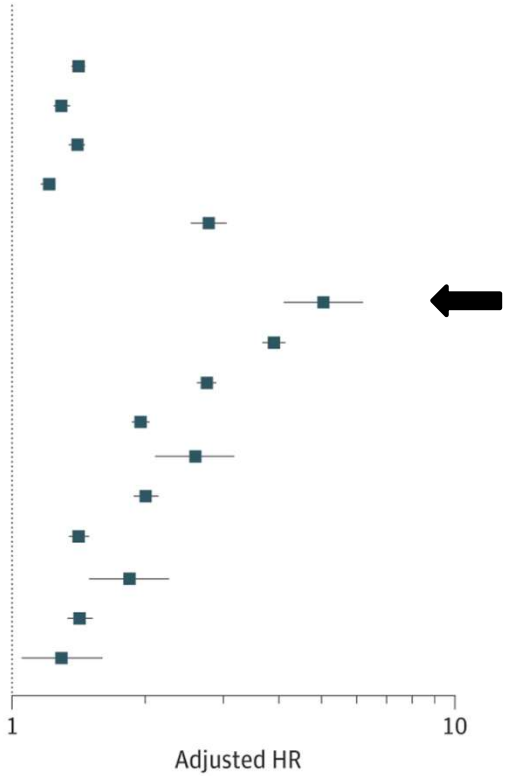
-1991-2014 (23 yrs)

-Fitness inversely a/w all-cause mortality in 5 quintiles of fitness

Mandsager, *JAMA,* 2018

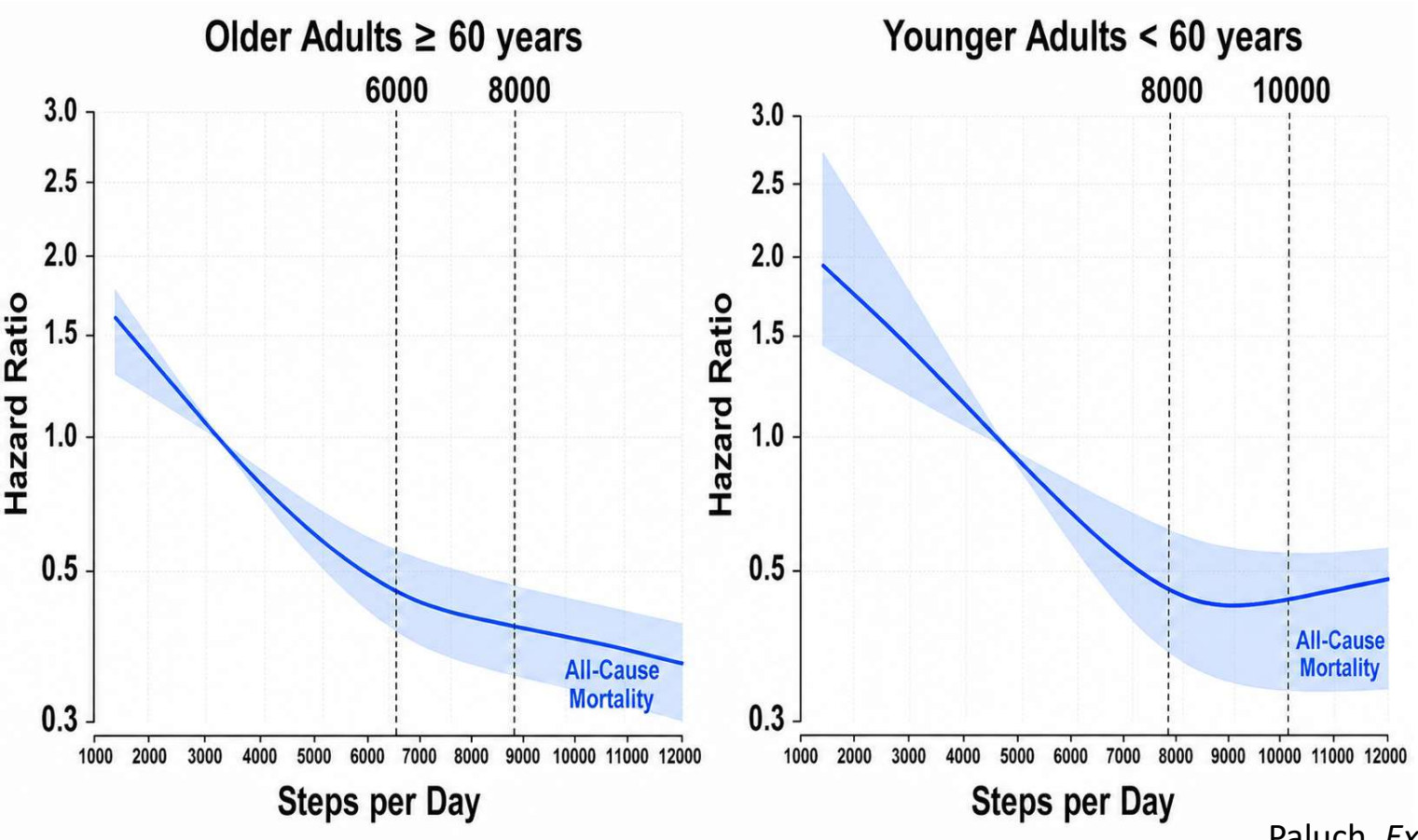
Low Fitness is a Bigger Mortality Risk than Hypertension, Diabetes, CAD or *Smoking*

Variable	HR (95% CI)	*P* Value
Comorbidity		
Smoking	1.41 (1.36-1.46)	<.001
CAD	1.29 (1.24-1.35)	<.001
Diabetes	1.40 (1.34-1.46)	<.001
Hypertension	1.21 (1.16-1.25)	<.001
ESRD	2.78 (2.53-3.05)	<.001
Group comparison		
Low vs Elite	5.04 (4.10-6.20)	<.001
Low vs High	3.90 (3.67-4.14)	<.001
Low vs Above Average	2.75 (2.61-2.89)	<.001
Low vs Below Average	1.95 (1.86-2.04)	<.001
Below Average vs Elite	2.59 (2.10-3.19)	<.001
Below Average vs High	2.00 (1.88-2.14)	<.001
Below Average vs Above Average	1.41 (1.34-1.49)	<.001
Above Average vs Elite	1.84 (1.49-2.26)	<.001
Above Average vs High	1.42 (1.33-1.52)	<.001
High vs Elite	1.29 (1.05-1.60)	.02



Mandsager, *JAMA,* 2018

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

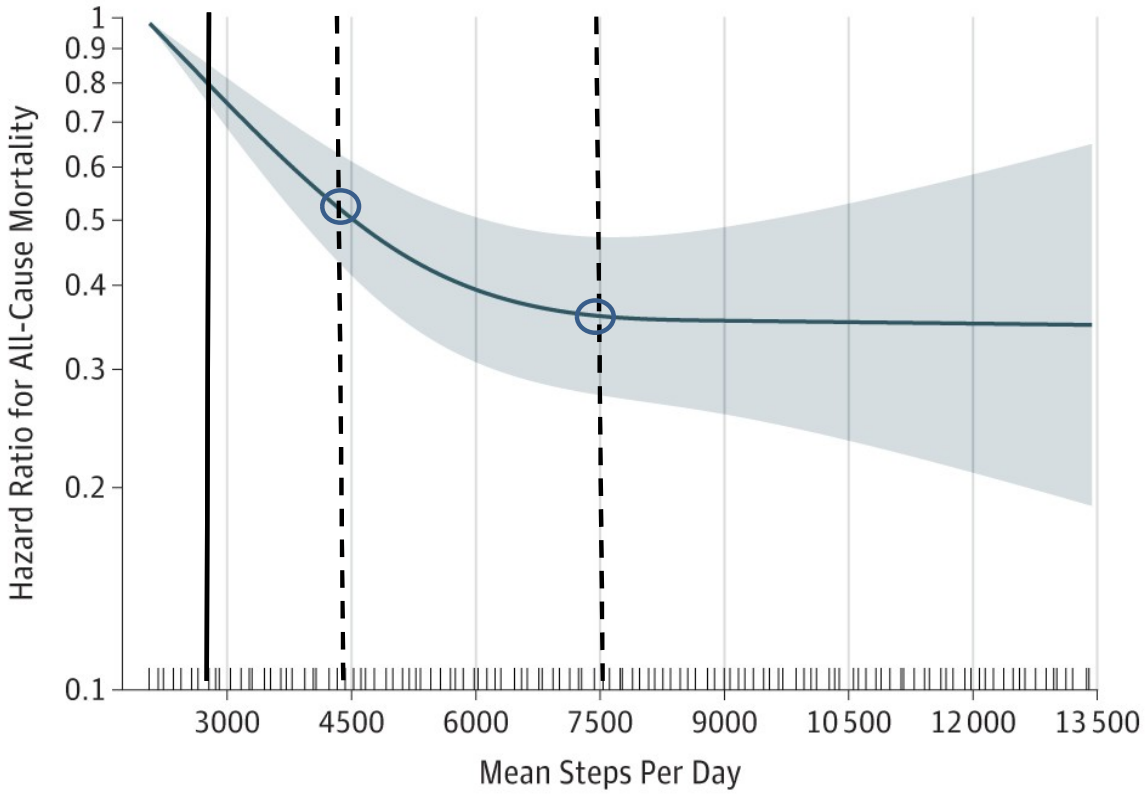
-Dose-response curve starts to level at 6-8K steps in ≥60 & 8-10K steps in <60

-No clear association btw intensity & mortality

Paluch, *Exerc Sport Sci Rev,* 2026

Daily Steps and All Cause Mortality

Women's Health Study

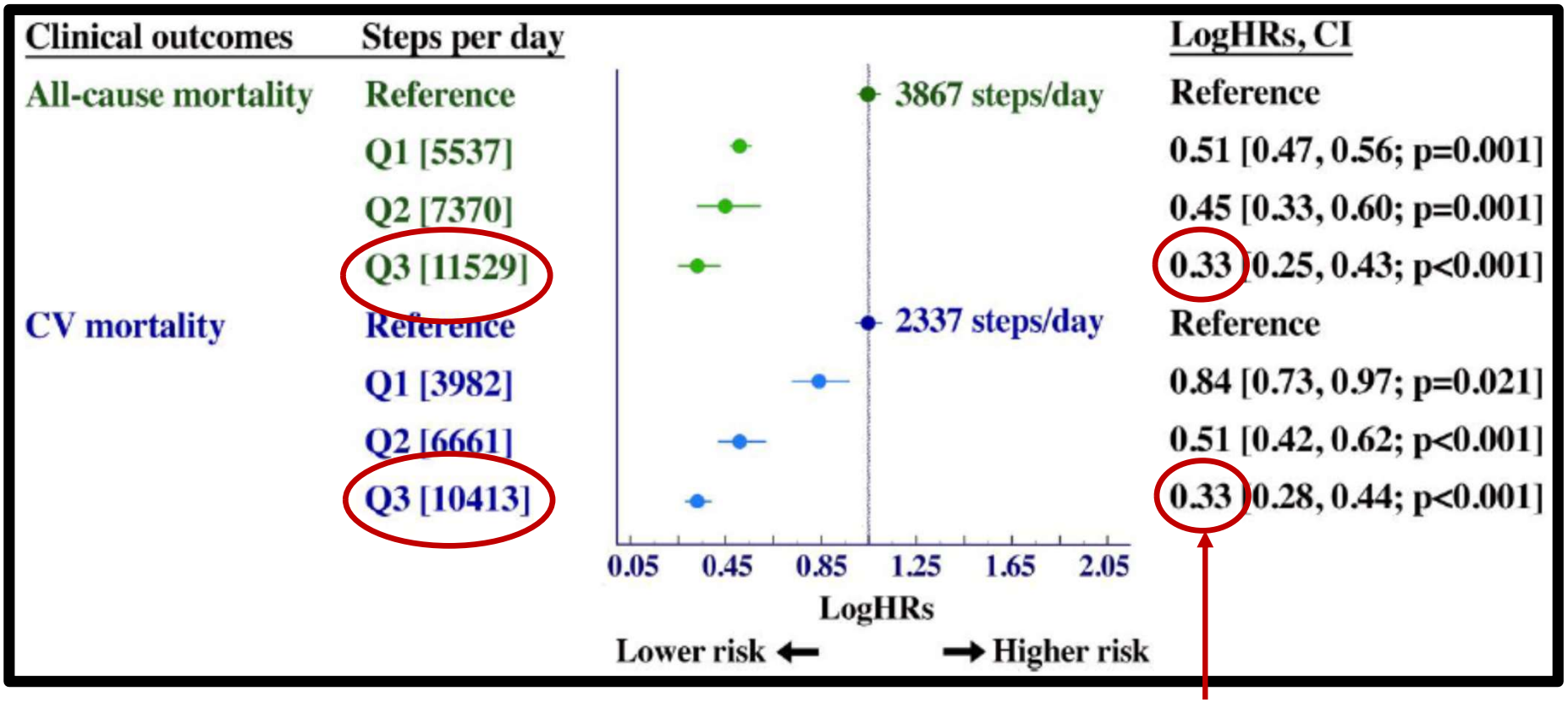


- 16,741 women; Mean age of 72 yrs; followed 4.3 yrs.
- Those averaging ***~4400 steps/d*** had significantly lower mortality compared to ***~2700 steps/d***
- Mortality rates progressively decreased before leveling at approx ***7500 steps/d.***
- Step Intensity not related to mortality
- Adjusted for diet
- -HR ~0.35-0.40 for ~6000 steps

Lee, JAMA Intern Med, 2019

Steps Per Day (quartiles) and All-Cause Mortality

Meta-analysis of 17 cohort studies



~11,000 steps/day associated with ~67% lower risk of ACM and CVD mortality

Banach et al, *Eur J Prev Cardiol* 2023;00:1-11

Food is Medicine

The case for diet and weight loss to improve health and reduce mortality

Association between Fruit & Vegetable and Mortality
Meta-analysis on 24 published studies

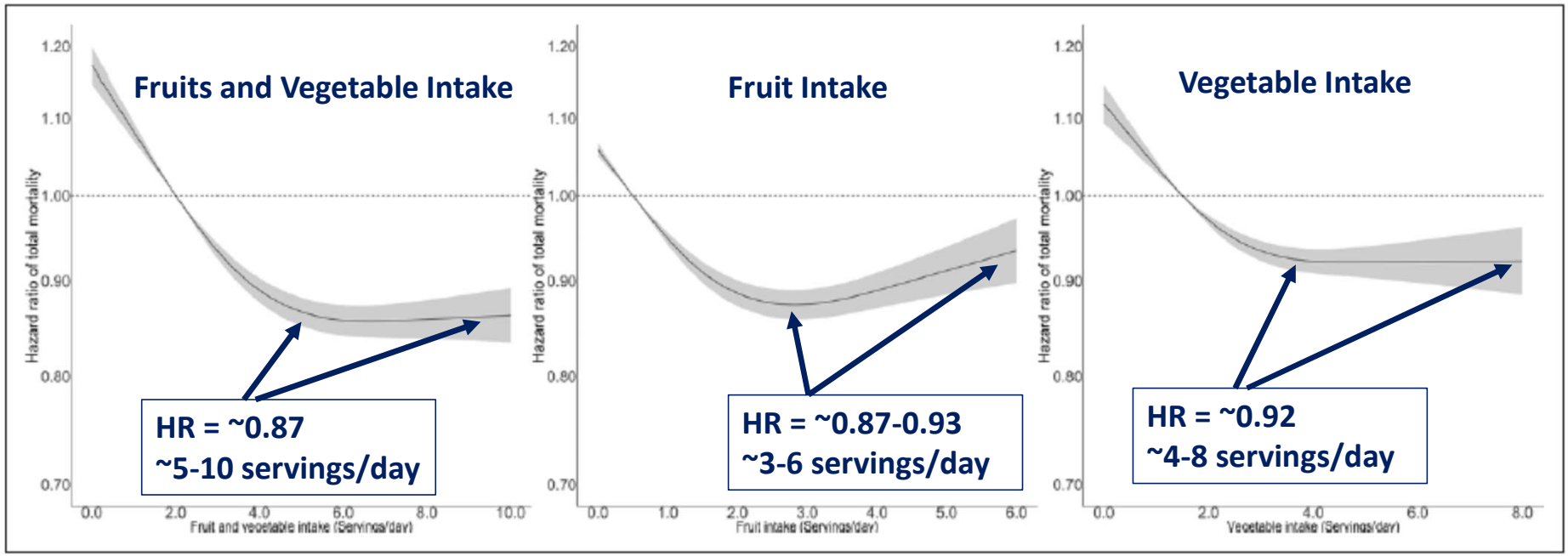


Figure 2. Association between fruit and vegetable intake and total mortality in the dose-response meta-analysis based on 24 published studies, the Nurses' Health Study, and the Health Professionals' Follow-Up Study.

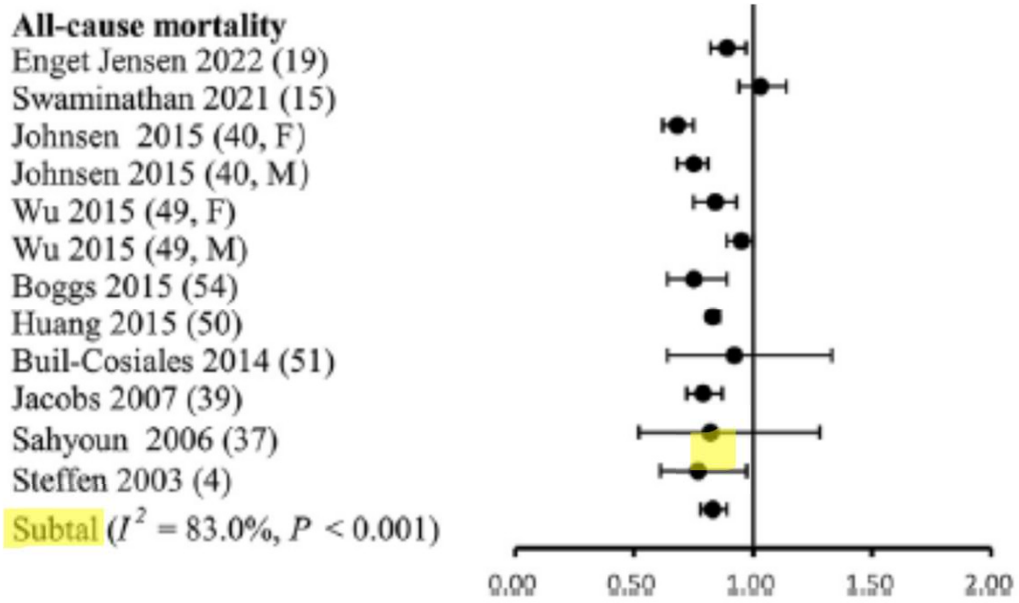
~7% - 13% lower risk with highest intakes

Wang et al, *Circulation* 2021;143:1642-1654

Whole Grain Intake and All-cause Mortality:

A Meta-Analysis of Prospective Cohort Studies

Highest vs. Lowest Intakes



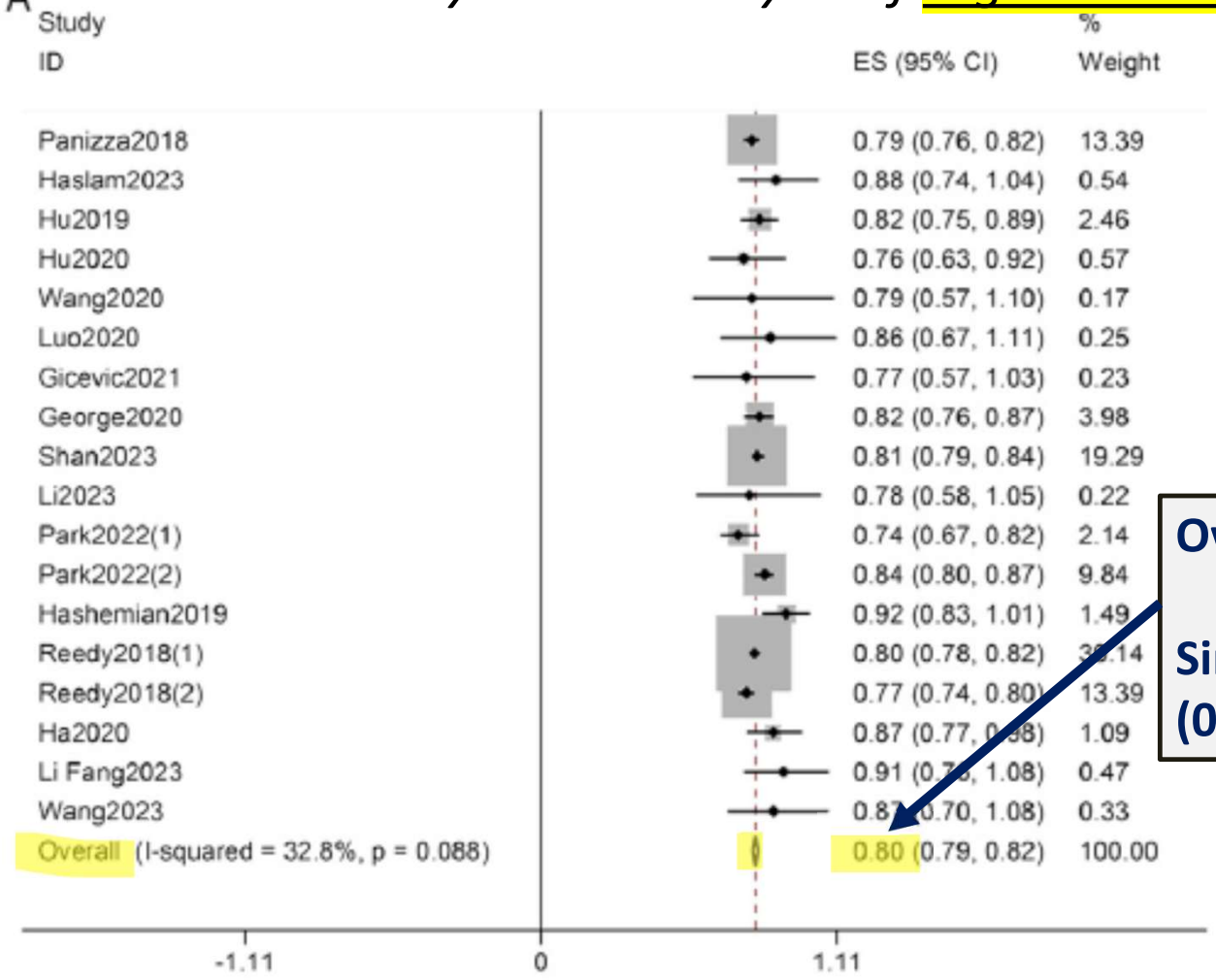
8,507	83,669	0.89 (0.82, 0.97)	10.43
7,821	137,130	1.03 (0.94, 1.14)	9.69
3,658	80,101	0.68 (0.62, 0.75)	9.97
4,181	39,417	0.75 (0.68, 0.81)	10.29
15,106	74,341	0.84 (0.75, 0.93)	9.44
11,814	43,744	0.95 (0.89, 1.00)	11.41
428	37,001	0.75 (0.64, 0.89)	7.10
46,067	367,442	0.83 (0.81, 0.86)	12.19
425	7,216	0.92 (0.64, 1.33)	2.63
5,552	27,312	0.79 (0.72, 0.87)	9.99
185	535	0.82 (0.52, 1.28)	1.87
867	11,940	0.77 (0.61, 0.97)	4.99
		0.83 (0.78, 0.89)	100.00

RR = 0.83; 17% lower risk

Hu et al, *Am J Clin Nutr* 2023;117:149-159

The Healthy Eating Index and All-Cause/Cause-Specific

Mortality: Meta-Analysis of Highest vs. Lowest Diet Quality



Overall HR = 0.80 (20% lower risk)

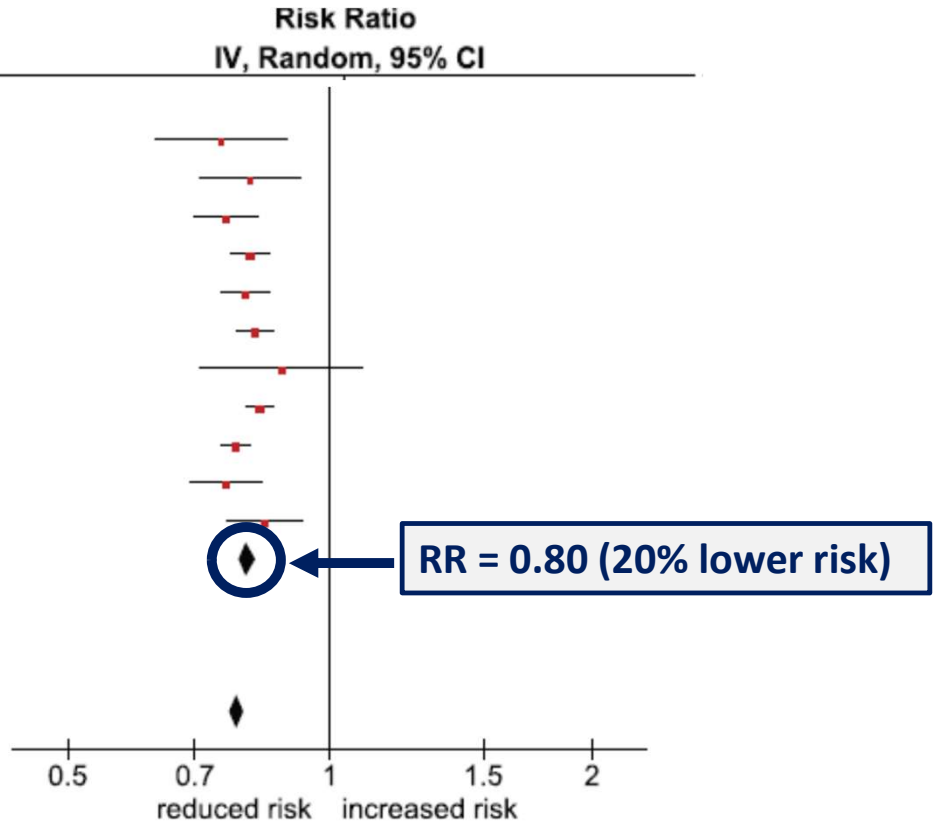
Similar HRs for cancer mortality (0.81) and CVD mortality (0.81)

Hao and Li, *Adv Nutr* 2024;15 (100166)

DASH Diet Score and All-Cause Mortality:

Meta-Analysis of Highest vs. Lowest Diet Quality

Study or Subgroup	Weight	Risk Ratio IV, Random, 95% CI
DASH score[e]		
Boggs and colleagues 2015[68]	0.9%	0.75 [0.63, 0.89]
Djousse and colleagues 2014[46]	1.5%	0.81 [0.71, 0.92]
George and colleagues 2014 b[28]	2.8%	0.76 [0.70, 0.83]
Harmon and colleagues 2015 M[31]	4.6%	0.81 [0.77, 0.85]
Harmon and colleagues 2015 W[31]	3.7%	0.80 [0.75, 0.85]
Lassale and colleagues 2016[34]	4.6%	0.82 [0.78, 0.86]
Park and colleagues 2016[9]	0.6%	0.88 [0.71, 1.09]
Reedy and colleagues 2014 M[25]	5.5%	0.83 [0.80, 0.86]
Reedy and colleagues 2014 W[25]	5.3%	0.78 [0.75, 0.81]
Yu and colleagues 2014 M[59]	2.3%	0.76 [0.69, 0.84]
Yu and colleagues 2014 W[59]	2.2%	0.84 [0.76, 0.93]
Subtotal (95% CI)	**34.0%**	**0.80 [0.79, 0.82]**
Heterogeneity: Tau² = 0.00; Chi² = 10.99, df = 10 (P = 0.36); I² = 9%		
Test for overall effect: Z = 21.01 (P < 0.00001)		
Total (95% CI)	**100.0%**	**0.78 [0.77, 0.80]**
Heterogeneity: Tau² = 0.00; Chi² = 72.83, df = 30 (P < 0.0001); I²[f] = 59%		
Test for overall effect: Z = 27.14 (P < 0.00001)		



Schwingshackl et al, *J Acad Nutr Diet* 2018

Healthy Plant-based Diet and All-Cause Mortality:
Meta-Analysis of Highest vs. Lowest adherence

	No. of studies	HR (95% CI)
Healthy plant-based diet indexes		
All-cause mortality	21	0.86 (0.82–0.90)
Cardiovascular disease mortality	13	0.89 (0.82–0.96)
Chronic heart disease mortality	5	0.87 (0.82–0.92)
Stroke mortality	5	0.97 (0.91–1.05)
Cancer mortality	10	0.90 (0.85–0.95)
Breast cancer mortality	3	1.03 (0.91–1.17)
Lung cancer mortality	4	0.94 (0.79–1.11)
Colorectal cancer mortality	5	0.93 (0.81–1.07)
Prostate cancer mortality	5	0.92 (0.85–0.99)

HRs ~0.86-1.03; 14% lower risk ACM

Etesami et al, *Food Function* 2025;16:2194

Ultra-processed food consumption and all-cause mortality

Meta-analyses of prospective cohort studies

Highest vs. Lowest Intakes

Publication	No. of studies	Risk Ratio
Pagliai (2021)	5	1.25
Suksatan (2021)	6	1.21
Taneri (2022)	5	1.29
Yuan (2023)	7	1.21
Lane (2024)	7	1.21
Liang (2025)	15	1.15

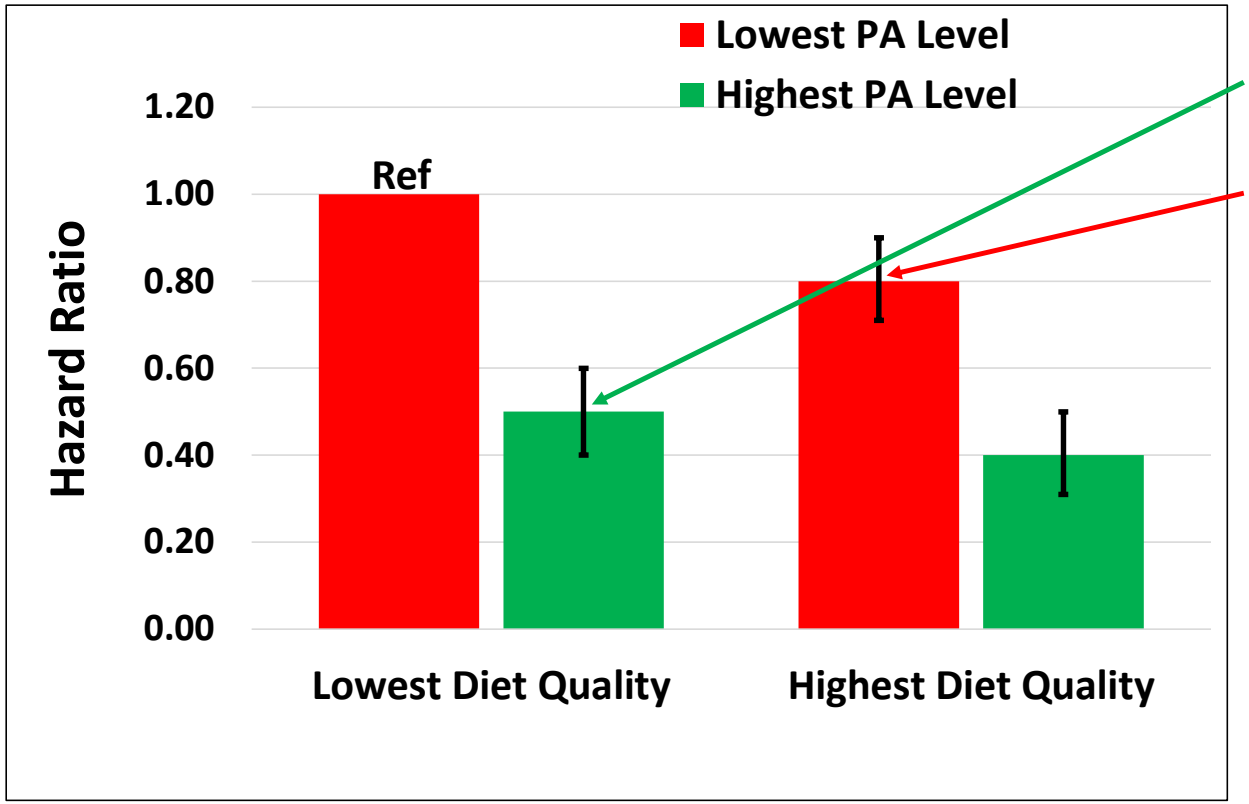
~15% to 29% higher risk

Exercise is Medicine

Food is Medicine

Which is the stronger medicine?

Diet quality, Physical Activity and Mortality
85,545; Age 45+ Australians; 10.7-yr follow-up



HR for Highest PA-Lowest DQ (0.05) is lower than the HR for Highest DQ-Lowest PA (0.80)

PA level and Diet Quality were self reported

Ding et al, *J Sport Health Sci* 2024

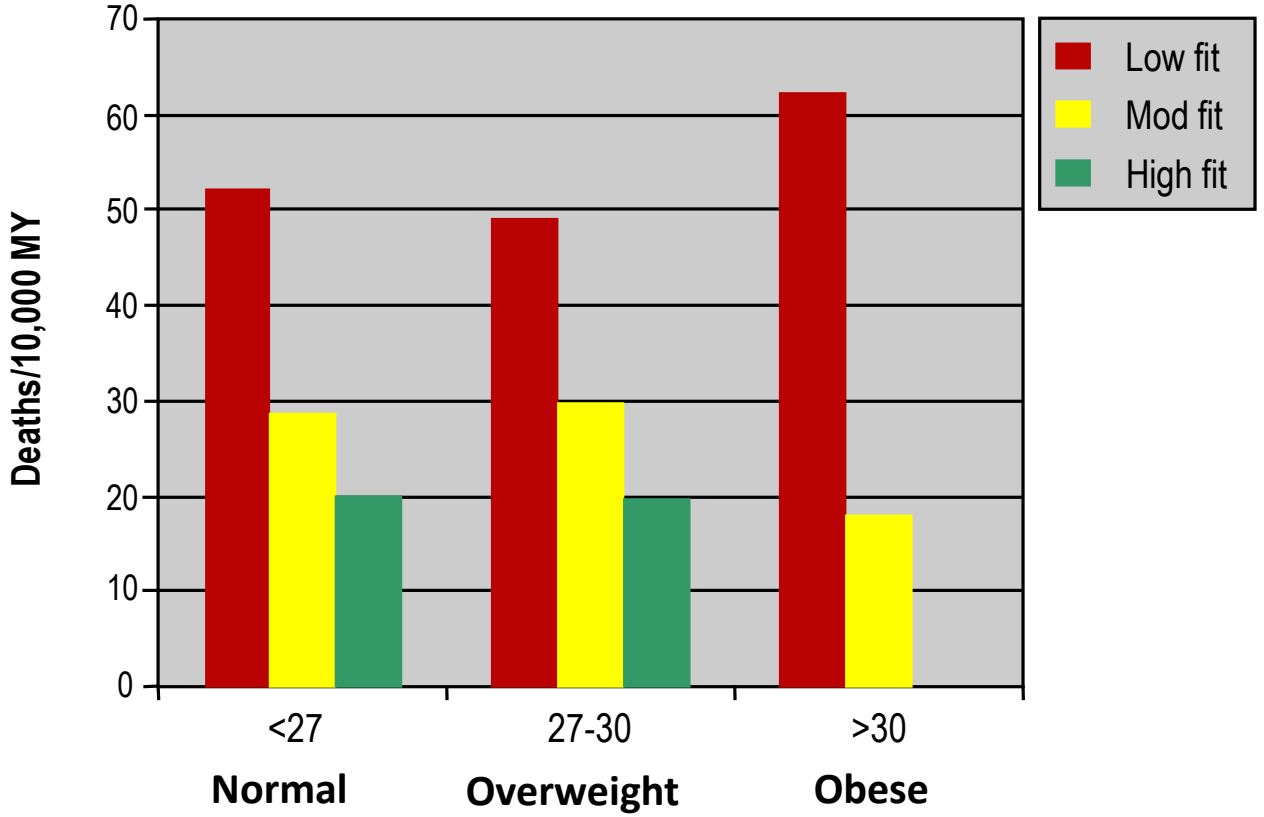
Aerobics Center Longitudinal Study (ACLS)

- Prospective cohort study at the at the Cooper Institute in Dallas, Texas
- Involving over 80,000 adults followed for over 50 years
- Objective cardiorespiratory fitness (CRF) via treadmill testing and diet assessment using validated indices
- Steve Blair was the key scientific architect and driving force behind its most influential findings





Death Rates by Fitness & BMI Categories



Barlow, *Int J Obes, 1995*

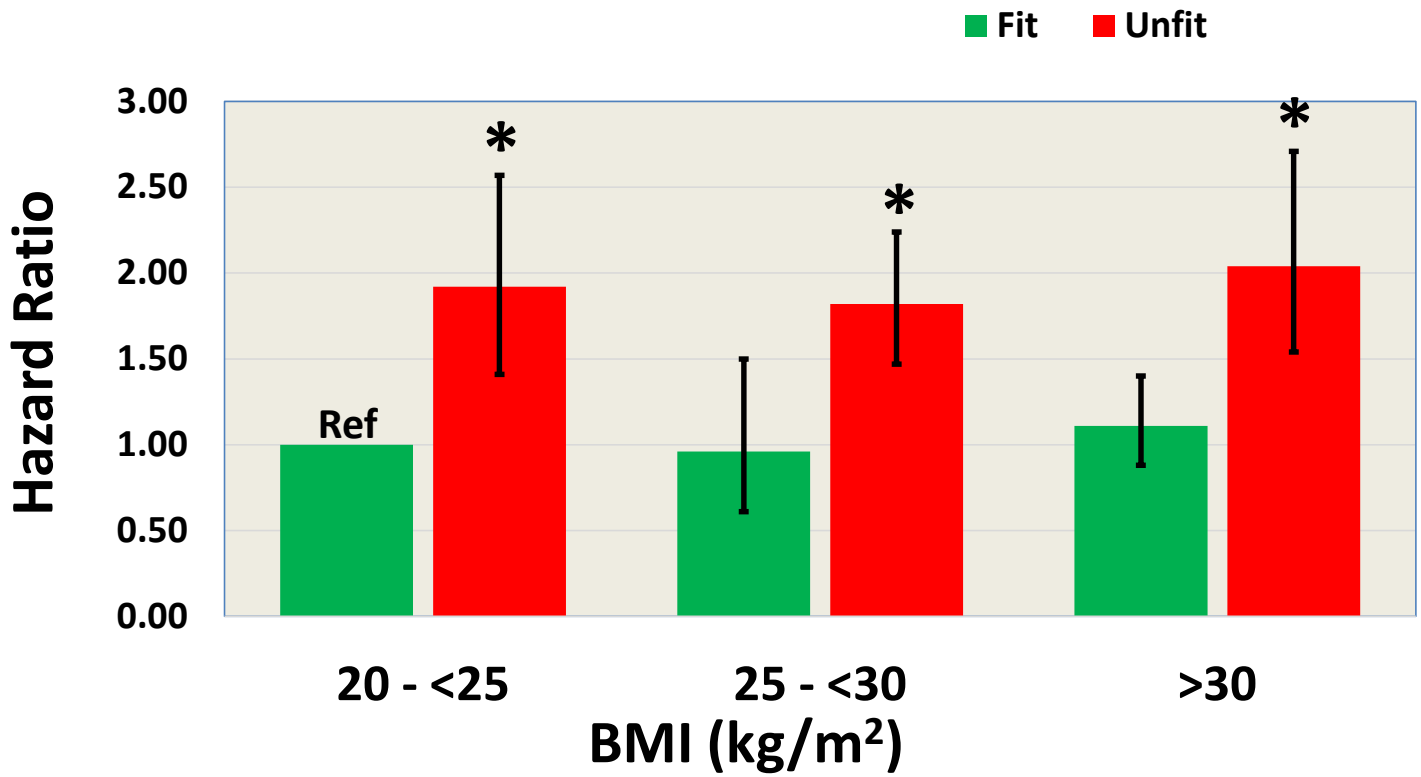
Dietary indices, CV risk factors and mortality:
Findings from the Aerobics Center Longitudinal Study

- Three dietary indices (3-day records)
  - Ideal Diet Index (adapted from DASH)
  - Diet Quality Index
  - Mediterranean Diet Score
- Dietary indices were associated with lower BMI, cholesterol, glucose, diastolic BP, and higher CRF…**but were not significantly related to all-cause, CVD, or cancer mortality**
- No associations were observed in fully-adjusted models, which controlled for CRF
- Unlikely that "fit-fat" findings of earlier ACLS study (Barlow et al) were significantly confounded by diet

Cuenca-Garcia, *Ann Epi,* 2014

Most Recent “Fit-fat” Meta-analysis - All Cause Mortality Risk

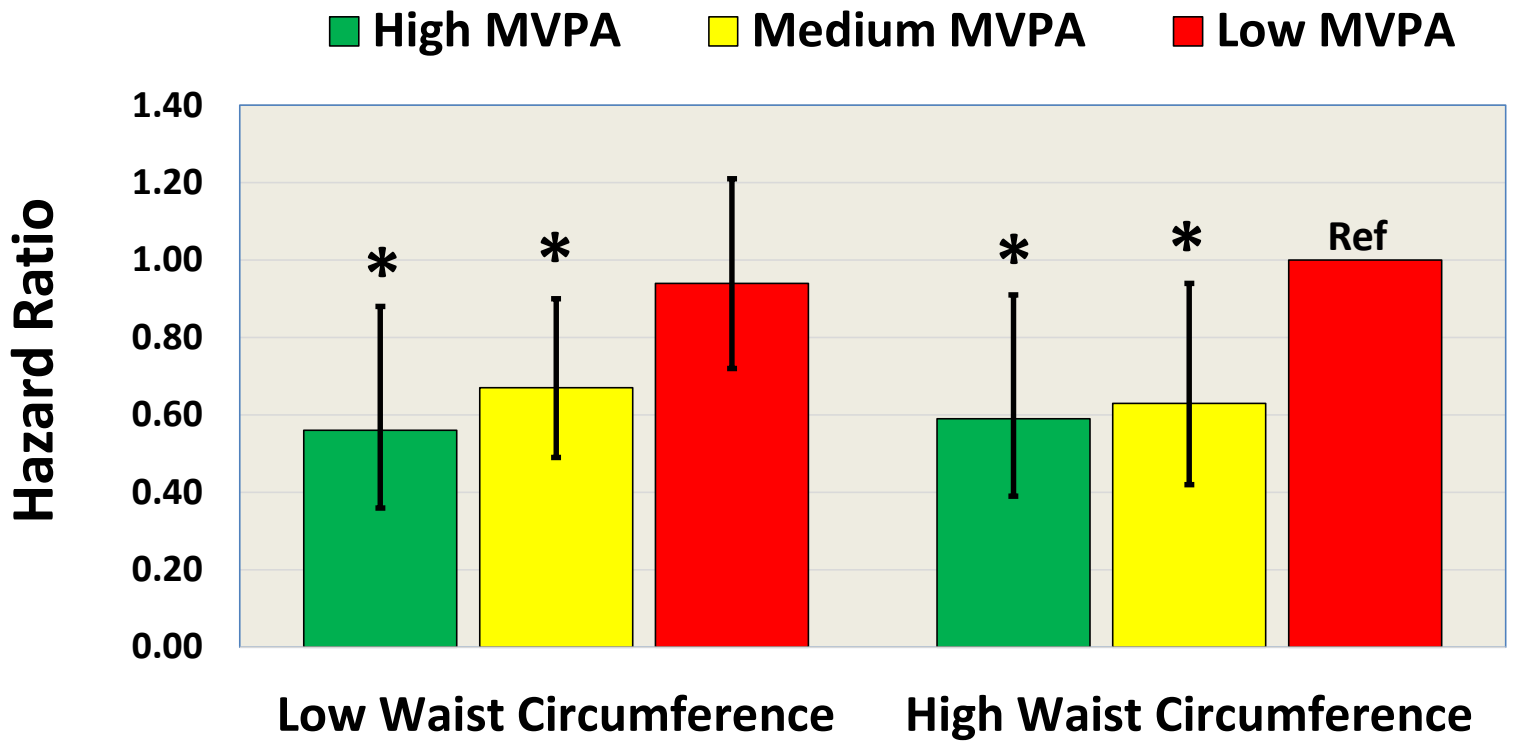
(20 studies; 398,716 participants)



Weeldreyer, *Brit J Sports Med,* 2024

MVPA and Waist Circumference - All Cause Mortality Risk

(meta-analysis of 5 studies; 9,136 never smokers)



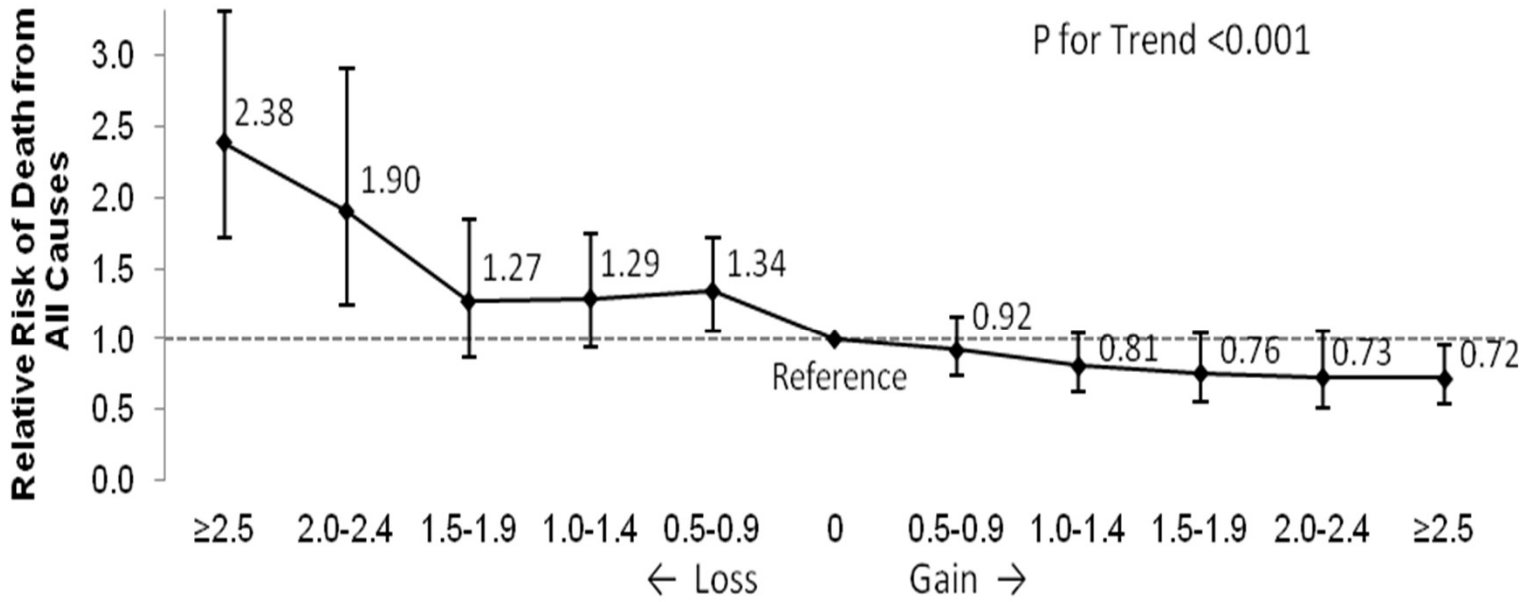
Tarp, *Br J Sports Med* 2022

Is Mortality Risk Reduced More by Decreasing Body Fat or Increasing Fitness?

- 14,345 mostly middle-aged men; All had 2 or more exams at the Cooper Clinic
- Over 11.4 years of follow-up (165,186 person-years) 914 all cause deaths
- Excluded those with chronic disease, <1 year of follow-up, or BMI <18.5 BMI
- Evaluated changes in fitness and body fat in relation to all-cause mortality

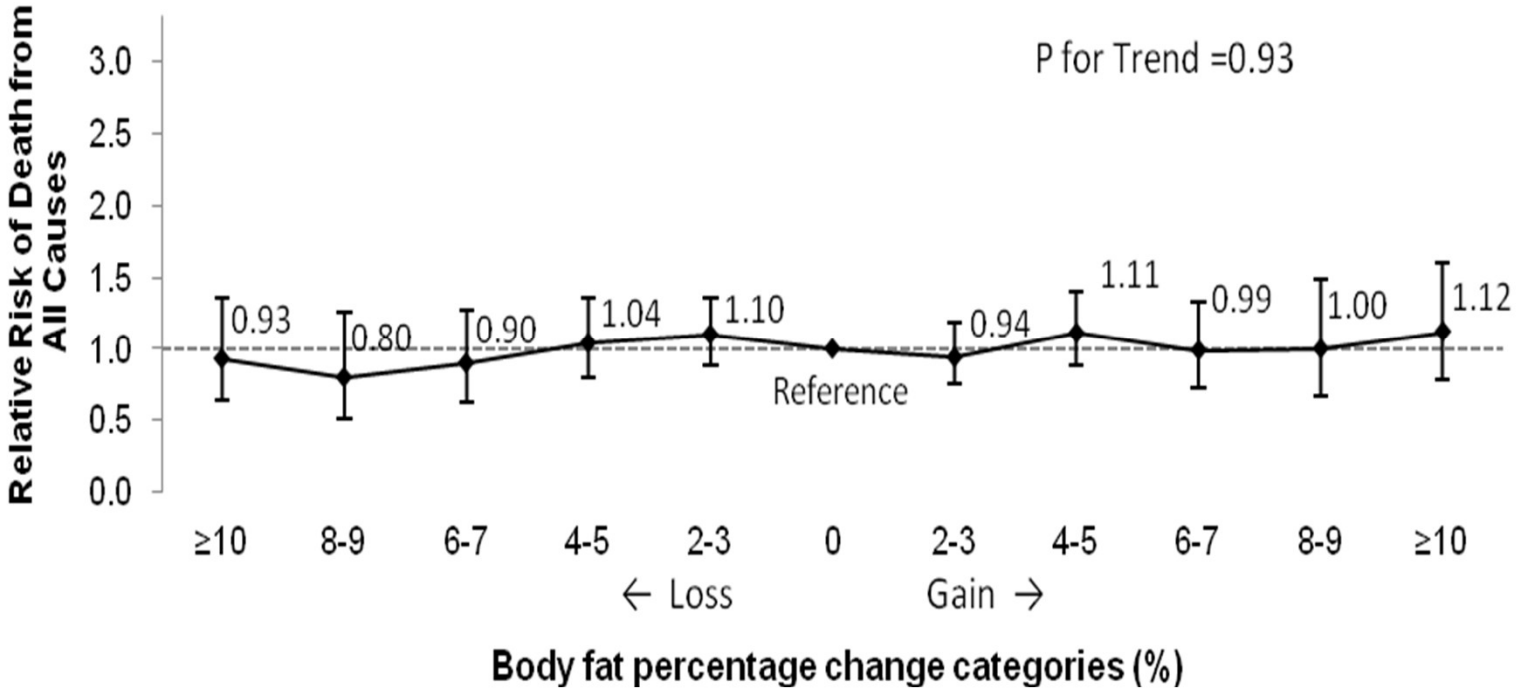
Lee DC, *Circulation, 2011*

Is Mortality Risk Reduced More by Decreasing Body Fat or Increasing Fitness?



Lee DC; *Circulation, 2011*

Is Mortality Risk Reduced More by Decreasing Body Fat or Increasing Fitness?



Lee DC; *Circulation, 2011*

Dietary Patterns, Fitness and Mortality Risk



For high-CRF individuals, diet was relatively unimportant with regard to all-cause mortality risk

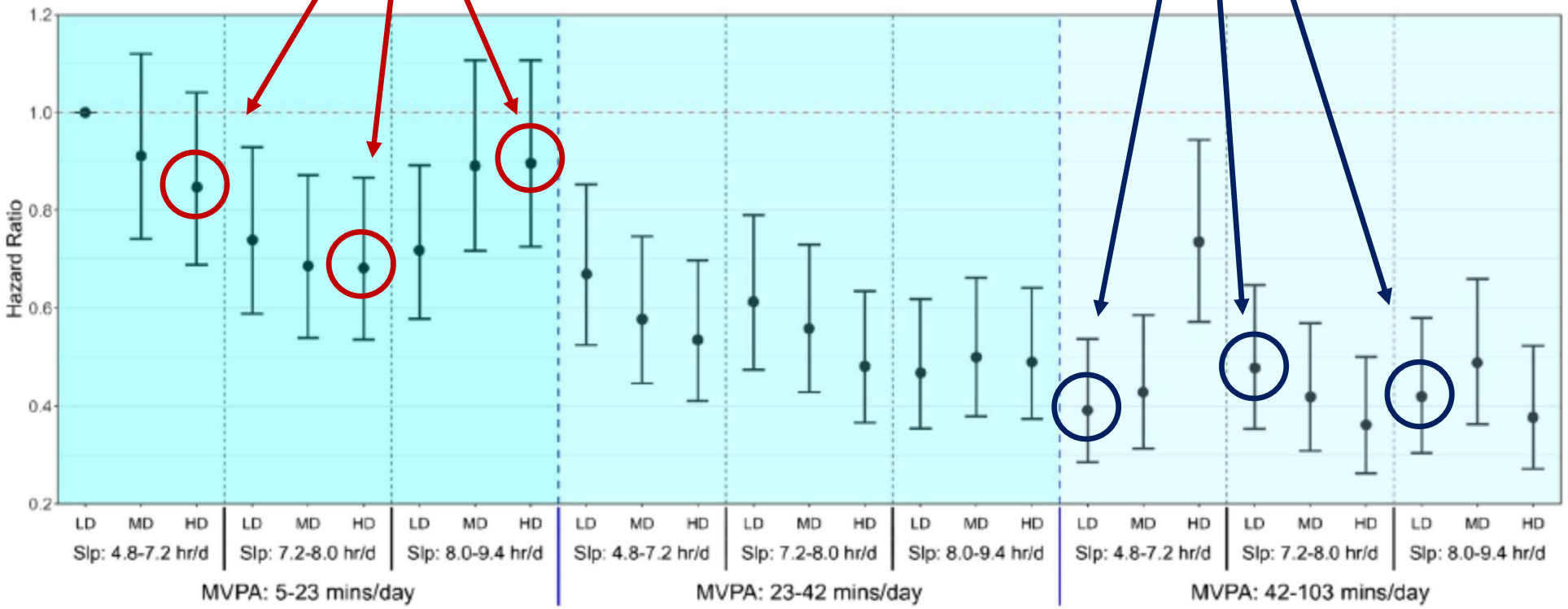
Even a low "unhealthy eating index" did not offset the high all-cause mortality hazard ratio associated with low CRF

Heroux et al, *Int J Epidemiol* 2010;39:197-209

MVPA, Diet Quality, and ACM - UK Biobank

Lowest MVPA - Highest Diet Score across 3 sleep categories
HR ~0.70 – 0.85

Highest MVPA - Lowest Diet Score across 3 sleep categories
HR ~0.40 – 0.50



Stamatakis et al, *BMC Med* 2025;23:11

Physical Inactivity and SevereCOVID-19 Risk

Original research

Physical inactivity is associated with a higher risk for severe COVID-19 outcomes: a study in 48 440 adult patients

Robert Sallis ,[1] Deborah Rohm Young,[2] Sara Y Tartof,[2] James F Sallis,[3] Jeevan Sall,[1] Qiaowu Li,[2] Gary N Smith,[4] Deborah A Cohen[2]

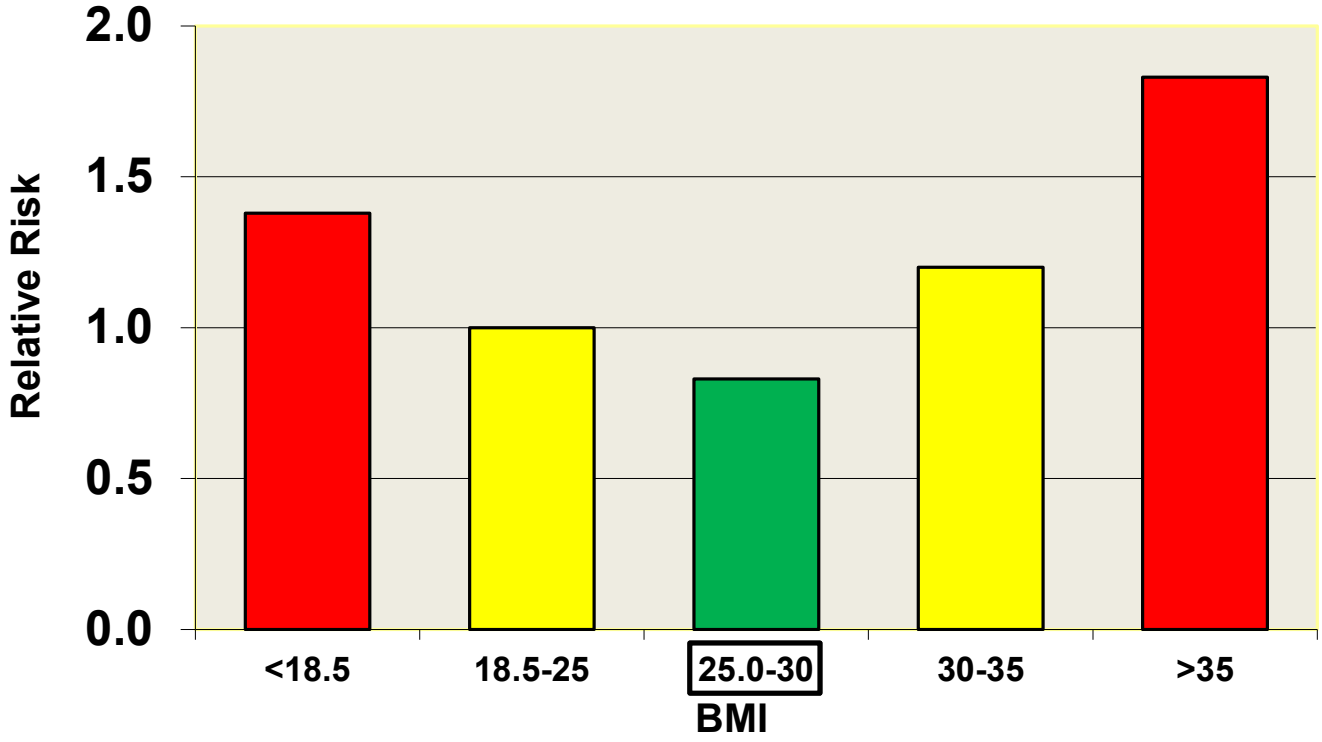
First published April 13, 2021

British Journal of
Sports Medicine

Odds Ratios for COVID 19 *Deaths*
Obese were patients less likely to die!

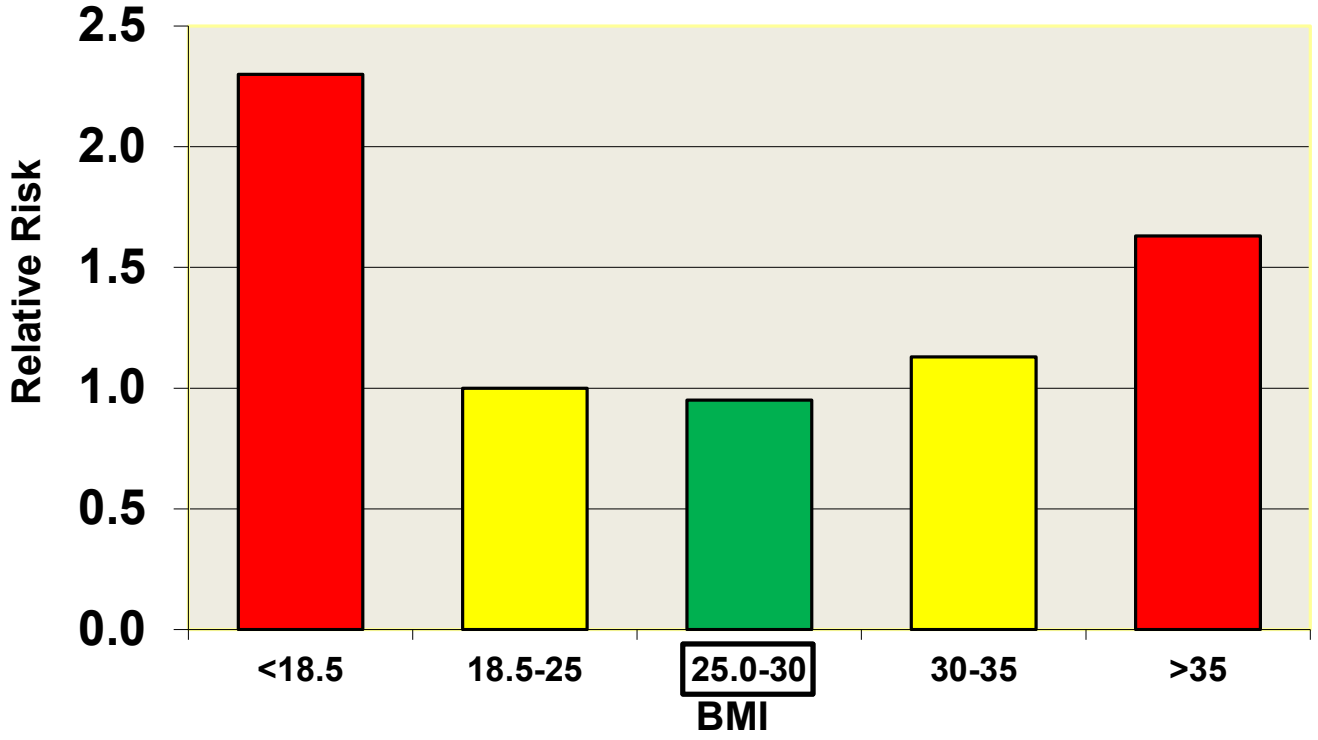
Effect	Odds Ratio	95% CI
Age >60	4.01	3.06 - 5.25
Gender M vs F	1.72	1.46 - 2.01
Hx of Organ Transplant	4.25	2.37 – 7.62
Race (B vs W)	1.18	0.91 - 1.54
A1C >= 8%	1.64	1.27 - 2.12
BMI 30-40 BMI >40	0.89 1.90	0.72 - 1.10 1.43 - 2.54
Smoker COPD	1.24 1.28	1.05 - 1.47 1.06 - 1.53
Kidney Disease	1.50	1.24 - 1.81
Cancer	1.04	0.75 - 1.44
Hypertension	1.30	1.06 - 1.60
Inactive vs Active	2.49	1.33 - 4.67
Inactive vs Some Activity	1.32	1.09 - 1.60

All-Cause Mortality, Relative Risk, Age *25-59*
NHANES Data



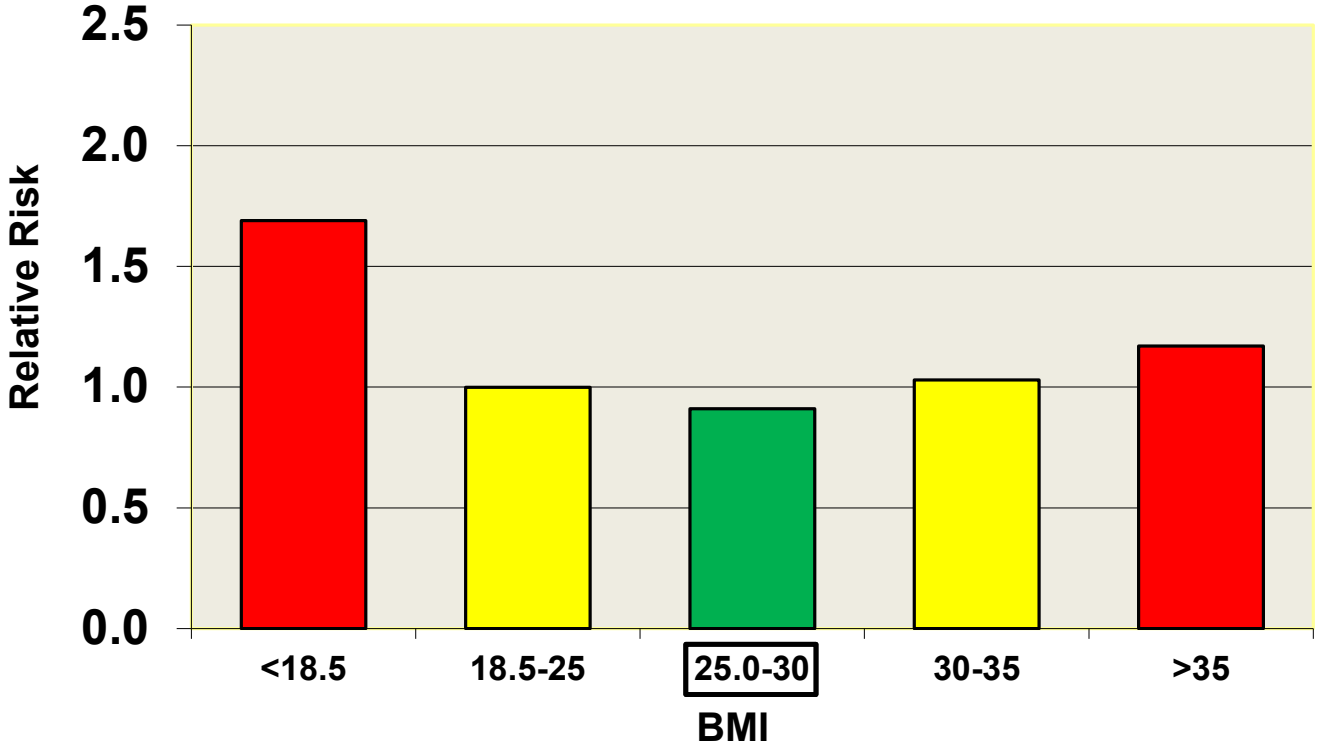
Flegal; *JAMA*, 2005

All-Cause Mortality, Relative Risk, Age 60-69
NHANES Data



Flegal; *JAMA*, 2005

All-Cause Mortality, Relative Risk, Age ≥70
NHANES Data



Flegal; *JAMA*, 2005

Where should our Focus be to Lower Mortality? Fitness vs BMI vs Smoking

- Fit and normal BMI (non-smoker)
- Fit and elevated BMI (non-smoker)
- Fit, normal BMI, & smoker
- Unfit and normal BMI (non-smoker)
- Unfit and abnormal BMI (non-smoker)
- Unfit, abnormal BMI, & smoker

Blair; Aerobics Center Data

A Tale of 2 Male Patients;
Which one will likely die from Heart Disease?



A Tale of 2 Male Patients;
Which one will likely die from Heart Disease?

Patient #1

- **5’8” Tall**
- **158 lbs.**
- **Never drank alcohol**
- **Low Fat/High Fiber Diet**
- **Marathon Runner**
- **Former smoker**

Patient #2

- **5’8” Tall**
- **270 lbs.**
- **Heavy drinker**
- **High Fat/Low Fiber Diet**
- **Sedentary**
- **Heavy cigarette and cigar smoker**

Jim Fixx; died age 52 while jogging

- **5’8” Tall**
- **158 lbs.**
- **Never drank alcohol**
- **Low Fat/High Fiber Diet**
- **Marathon Runner**
- **Former smoker**



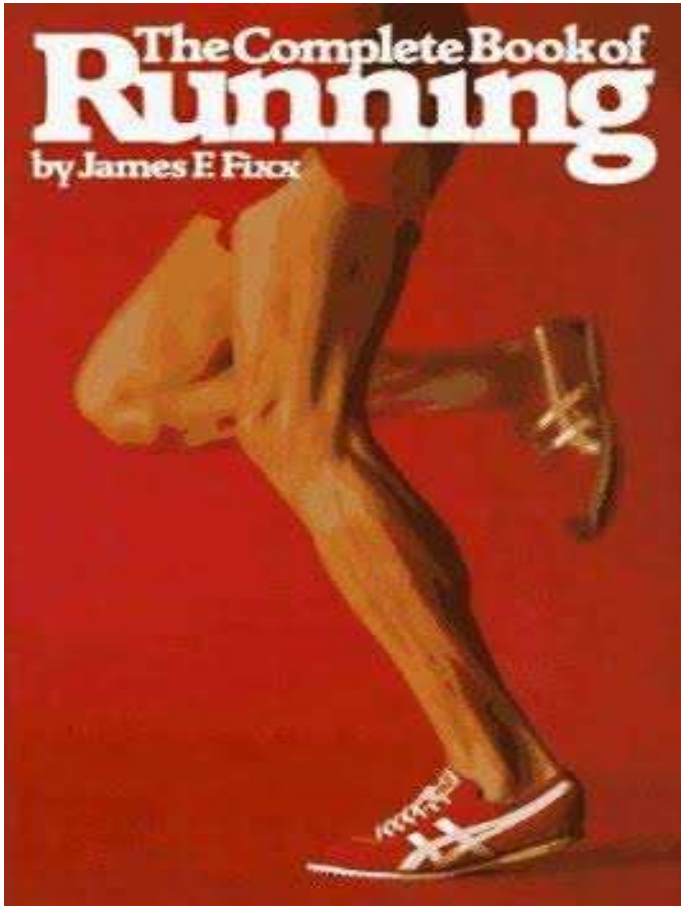
Winton Churchill; died age 90 at home



- **5’8” Tall**
- **270 lbs.**
- **Heavy drinker**
- **High Fat/Low Fiber Diet**
- **Sedentary**
- **Heavy cigarette and cigar smoker**

Jim Fixx

Author and Marathon Runner



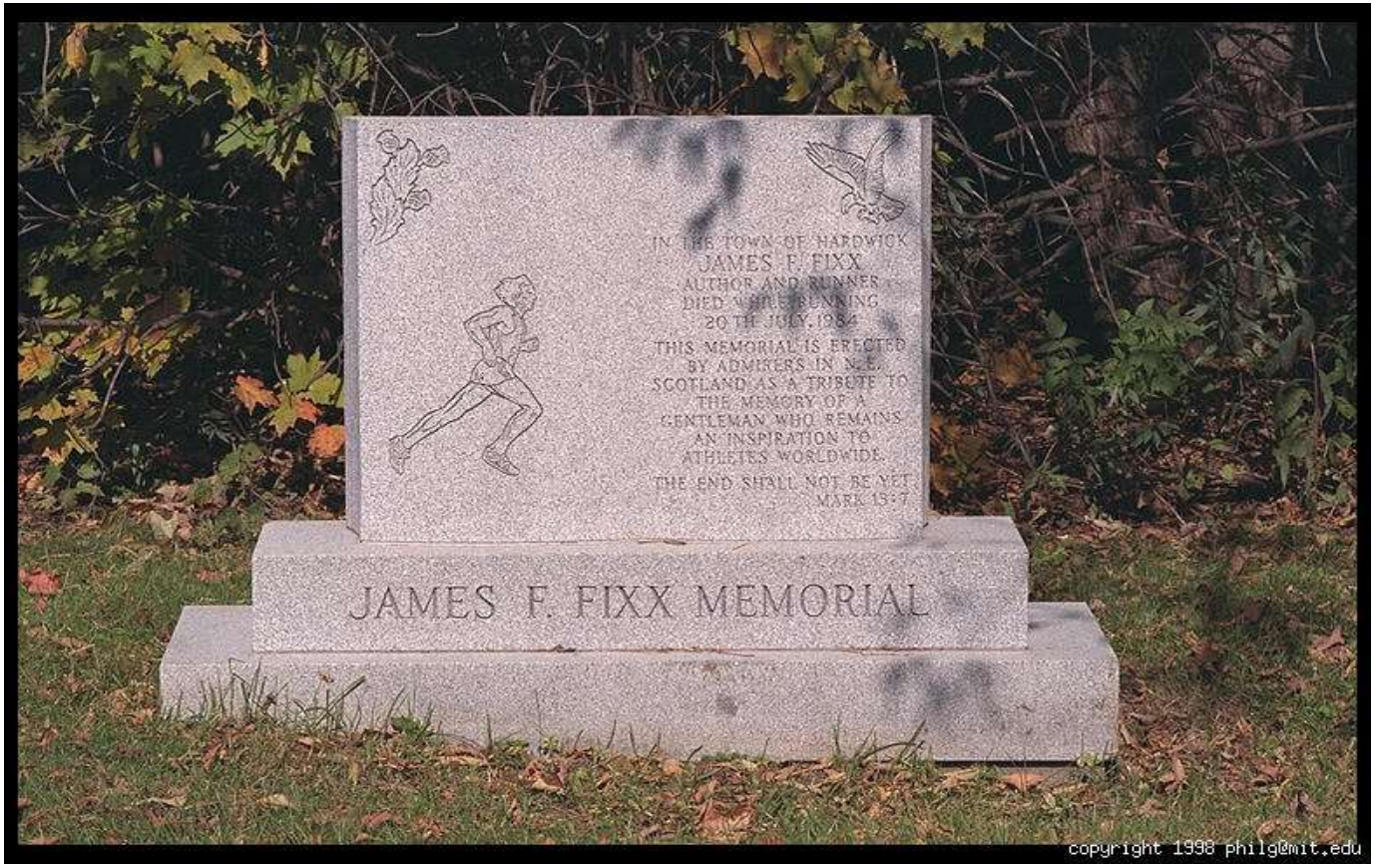


The Truth About Jim Fixx

- Former 2 pack per day smoker
- Overweight much of his life (lost 70 lbs. in his late 30's)
- Strong family history of heart disease (father died of heart attack at age 43)
- Died of triple vessel coronary artery disease



Sometimes you cannot outrun (or out-diet) your genes!



Summary

- Strong evidence suggests you CAN outrun a bad diet and it doesn't take a lot of effort to do this
- Multiple studies have proven that you are better off being "Fat & Fit" than "Skinny & Unfit"
- For this reason, the promotion of PA should be placed on at least equal footing with weight management
- Healthcare providers should assess their patients PA level, inform them of the risks of being sedentary and prescribe a proper exercise regimen

Questions?



OCTOBER 4-8, 2026

Outrigger Kona Resort & Spa, Kailua-Kona, HI