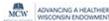




Is Sitting the New Smoking?

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Goals for this Talk

- Understand the importance of physical activity in health and longevity
- Identify “sitting disease” as an adverse health risk factor
- Understand applications of physical activity monitors in physical activity and behavioral research
- Know how to minimize sedentary behaviors



“Lack of activity destroys the good condition of every human being while **movement** and **methodical physical exercise** save it and preserve it”

-Plato 380 BC



London – a study from 1953

Hypothesis:

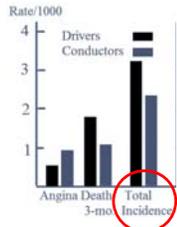
Sedentary London Transport Authority bus drivers will have a higher risk of cardiac events than their more active conductor peers.



Morris JN, Heady JA, Raffle PA, Roberts CG, Pinks JW. Coronary heart-disease and physical activity of work. *Lancet* 1953; 262: 1111-20.

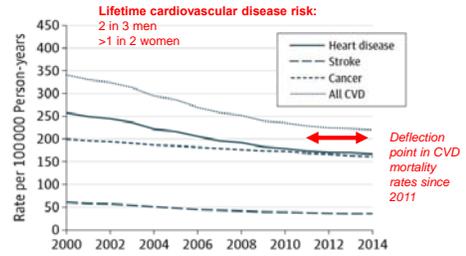


Coronary heart disease and physical activity of work.



Conductors climbed about 600 stairs/day on these buses and were at a 30% lower risk of coronary heart disease.

Mortality rates in the U.S.



Ideal Cardiovascular Health

- Ideal health behavior metrics**
 - No smoking
 - Healthy weight
 - Sufficient physical activity
 - Healthy diet
- Ideal health factor metrics**
 - Cholesterol
 - Blood pressure
 - Absence of diabetes



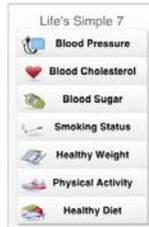
What percent of U.S. adults meet all 7 criteria for "ideal cardiovascular health" ?

- 70%
- 50%
- 25%
- 10%
- Less than 1%



What percent of U.S. adults meet all 7 criteria for "ideal cardiovascular health"?

1. 70%
2. 50%
3. 25%
4. 10%
5. **Less than 1%**



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Ideal Cardiovascular Health

- Ideal health behavior metrics
 - ✓ No smoking
 - ✗ Healthy weight
 - ✗ Sufficient physical activity
 - ✗ Healthy diet
- Ideal health factor metrics
 - ✓ Cholesterol
 - ✓ Blood pressure
 - ✗ Absence of diabetes



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Physical Activity Guidelines (Adults) 2008

- At least 150 minutes of moderate-intensity exercise per week OR
- At least 75 minutes of vigorous-intensity exercise per week OR
- An equivalent combination
- *...and, should be performed in episodes of **at least 8-10 minutes...***

HHS.gov
U.S. Department of Health & Human Services



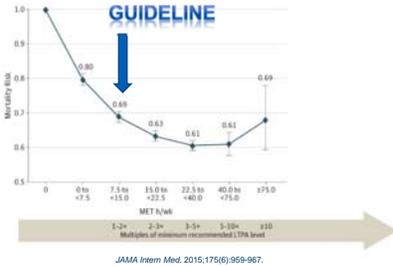
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"Activity" Definitions



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Physical Activity Decreases Mortality



Benefits of Physical Activity

- improves cardiorespiratory fitness
- reduces the risk of hypertension, heart disease, stroke, diabetes, breast and colon cancer, Alzheimer's disease
- improves mood, better sleep, less depression
- reduces the risk of falls and hip fractures
- fundamental to weight control
- improves bone and functional health
- improves quality of life



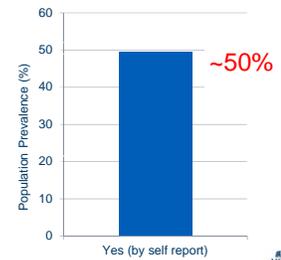
Physical Activity Numbers



- Physical inactivity is the 4th leading risk factor for global mortality, estimated to account for **10% of deaths**.
Hypertension: 13%
Tobacco use: 9%
Diabetes: 6%
- Physical inactivity is the **MAIN** cause for 25% of breast and colon cancers and 30% of diabetes and ischemic heart disease burden.
- **“Physical activity should not be mistaken for sport...”**
 - Any bodily movement produced by the skeletal muscles that uses energy.

Assessing Activity Time: Self-report of Exercise

What % of individuals achieve the recommended physical activity guidelines in the US?



Circulation 2009; 119:e21-e181
Med Sci Sports Exerc. 2008; 40:181

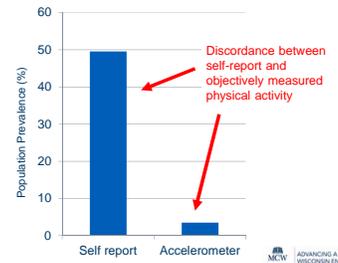
Physical Activity Monitors



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Assessing Activity Time: Self-report v Accelerometer

What % of individuals achieve the recommended physical activity guidelines in the US?



Circulation 2009; 119:e21-e181
Med Sci Sports Exerc. 2008; 40:181



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Too much sitting raises risk of death, even if you exercise

30 Comments | Share | Like | Retweet | Email

Last Updated Jan 20, 2015 10:24 AM EST

Beware, couch potatoes: The evidence is piling up that too much sitting can take a serious toll on your health.



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Sedentary Activity Associated With Metabolic Syndrome Independent of Physical Activity

Diabetes Care 2011; 34:100-107

CLINICAL RESEARCH

Prevention and Epidemiology

Sedentary time and cardio-metabolic biomarkers in US adults: NHANES 2003-06

Sedentary Behavior as a Mediator of Type 2 Diabetes

Mac T. Hamilton • Deborah G. Hamilton • Theodore W. Zelnick

American Diabetes Research Center, Baton Rouge, La, USA

Sitting Time and Mortality from All Causes, Cardiovascular Disease, and Cancer

PETER T. SANTANIELLO, TRISTYAN A. CHENOV, CORAL L. CHANG, and CLAUDE BAKKELDIP

University of Toronto, Toronto, Ontario, Canada; Boston University, Boston, MA; and University of Illinois at Chicago, Chicago, Illinois, USA

Sitting can take 2 years off your life; Epidemiologist finds correlation between sitting and a shorter lifespan

You don't need to exercise from sunrise to sunset - you simply need to stay on your feet longer, whether at work, home, or on the go.



BY MICHAEL WALSH / NEW YORK DAILY NEWS

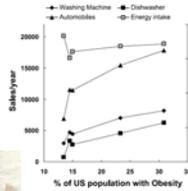
WEDNESDAY, JULY 11, 2012, 3:30 PM

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Sitting is everywhere in modern society

Industrialization/urbanization:

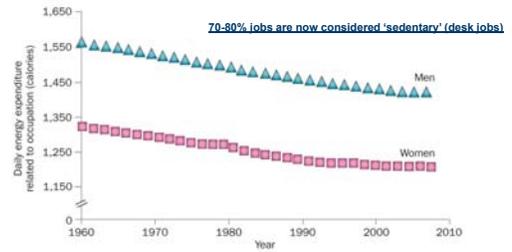
- Drive-thru banks, coffee, restaurants
- Escalators, other motorized walkways
- Washing machines for clothes and dishes
- Email, online shopping (groceries too!)
- Television/computers, video games
- Transportation time
- Social media



Am J Physiol Endocrinol Metab 286: E675-E680, 2004

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↓ in occupation-related energy expenditure accounts for a significant portion of the increase in mean U.S. body weight over past 5 decades



Church TS, et al. Trends over 5 Decades in U.S. Occupation-Related Physical Activity and Their Associations with Obesity. PLoS ONE 6(5): e19657, 2011

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Physical Inactivity Paradigm

Too much sitting ≠ too little exercise

- 1) How much exercise activity (as recommended by physical activity guidelines)?
- 2) How much sitting (work, computer, driving)?



The average non-exercising person may become even more unhealthy if they sit too much!



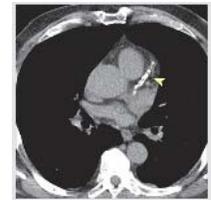
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Sitting is associated with plaque in arteries!



**Excluded those with known cardiovascular disease*

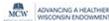
Higher sedentary time:
Older age
Higher body weight
Diabetes
Hypertension



Kulinski J, et al. JACC Cardiovasc Imaging. 2016 Dec;9(12):1470-72.

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Avoiding sedentary behavior throughout the day may represent an important companion strategy to improve health, outside of regular exercise activity.



"Sitting Disease"

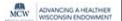
What Researchers Say

- ❖ For people who sit most of the day, their risk of heart attack is about the same as smoking! – *Raitha Grogan*, cardiologist, Mayo Clinic
- ❖ Today, our bodies are breaking down from obesity, high blood pressure, diabetes, cancer, depression, and the cascade of health ills and everyday malaise that come from what scientists have named sitting disease." – *James Levine, MD, PhD*
- ❖ Prolonged sitting should be considered within occupational health and safety policies and practices just like other elements of posture." – *British Journal of Sports Medicine*



"We've become so sedentary that 30 minutes a day at the gym may not counteract the detrimental effects of 8, 9 or 10 hours of sitting."

– *Genevieve Healy, PhD*



Minimize Sedentary Behavior

How do we implement this?



- | | | |
|---|---|---|
| <ul style="list-style-type: none"> • Take the stairs • Eat standing up • Get up & pace while on the phone • Reduce "screen" time • Get up during commercials • Instead of emailing co-worker, get up and go talk to them • Park your car farther away • Fidget? • Put your treadmill in front of the TV • Break up sitting time | <ul style="list-style-type: none"> • Public education programs • Standing/treadmill desks • Isometric exercise balls • Walking meetings at work • Work "Wellness Programs" • Pedometers • Physician role • Nurse-lead team approach | <ul style="list-style-type: none"> • Community-based interventions • Make cities more walk-able • Built environment • Workplace regulations • Transportation planning • Innovation in the design of communication technologies (phone apps) • Policy changes |
|---|---|---|



Read & Ride (North Carolina)



More time on the bike correlated with better reading proficiency



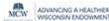
Break up your sitting time!

"There is considerable evidence of the positive effects of breaking up prolonged time spent sitting on metabolic outcomes."

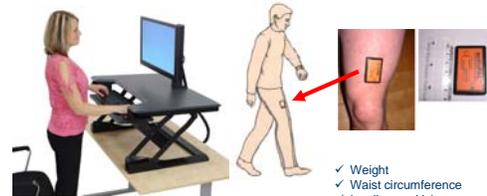
...the type, intensity, and frequency of physical activity needed to counteract the detrimental effects of sitting may depend on the subjects' habitual physical activity level



Bennell FB, Ried-Larsen M. "The Effects of Breaking up Prolonged Sitting Time: A Review of Experimental Studies." *Med. Sci. Sports Exerc.* 2015. Vol. 47, No. 10, pp.2053-61



Reduce Sedentary Behavior at Work (study in progress)



6-month intervention for sedentary office workers

- ✓ Weight
- ✓ Waist circumference
- ✓ Insulin sensitivity
- ✓ Cholesterol levels
- ✓ Inflammation
- ✓ Vascular health



Take Home Points

- The modern, sedentary lifestyle is a threat to health (sitting is the new smoking!)
- Exercise may not fully counteract the harms of sitting too much throughout the day
- Make conscious efforts to reduce sedentary behavior

Move More, Sit Less!



Thank You!

