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# Moving Your Way to A Healthier Heart: Physical Activity, Fitness, and Reduction of Sitting Time on CVD Risk

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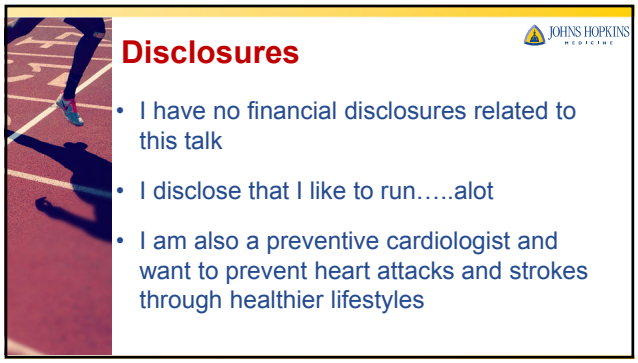
February 11, 2019



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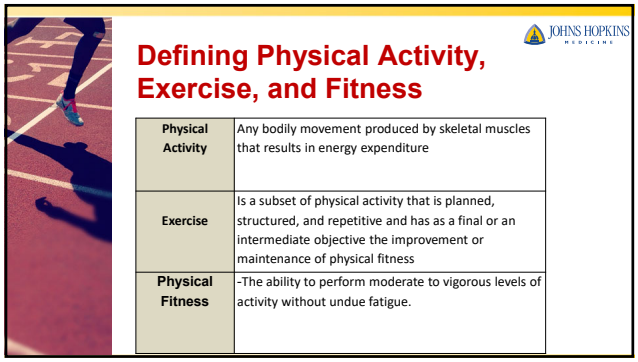
## Disclosures

- I have no financial disclosures related to this talk
- I disclose that I like to run…..alot
- I am also a preventive cardiologist and want to prevent heart attacks and strokes through healthier lifestyles



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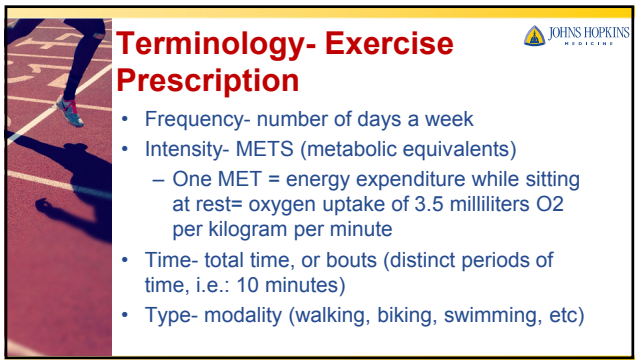
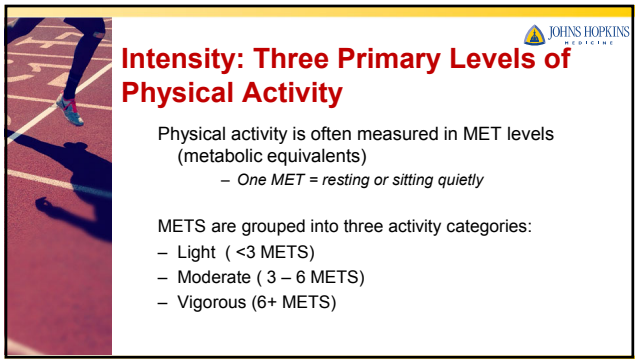
## Defining Physical Activity, Exercise, and Fitness

| | |
|---|---|
| **Physical Activity** | Any bodily movement produced by skeletal muscles that results in energy expenditure |
| **Exercise** | Is a subset of physical activity that is planned, structured, and repetitive and has as a final or an intermediate objective the improvement or maintenance of physical fitness |
| **Physical Fitness** | -The ability to perform moderate to vigorous levels of activity without undue fatigue. |



## Terminology- Exercise Prescription

- Frequency- number of days a week
- Intensity- METS (metabolic equivalents)
  - One MET = energy expenditure while sitting at rest= oxygen uptake of 3.5 milliliters O2 per kilogram per minute
- Time- total time, or bouts (distinct periods of time, i.e.: 10 minutes)
- Type- modality (walking, biking, swimming, etc)



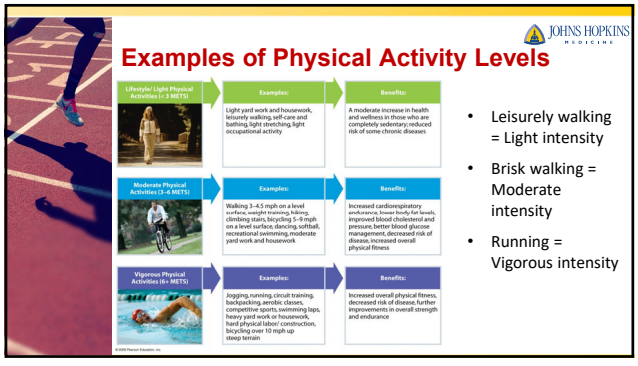
## Intensity: Three Primary Levels of Physical Activity

Physical activity is often measured in MET levels (metabolic equivalents)

- *One MET = resting or sitting quietly*

METS are grouped into three activity categories:

- Light ( <3 METS)
- Moderate ( 3 – 6 METS)
- Vigorous (6+ METS)



## Examples of Physical Activity Levels

| | Examples: | Benefits: |
|---|---|---|
| Lifestyle/ Light Physical Activities (< 3 METS) | Light yard work and housework, leisurely walking, self-care and bathing, light stretching, light occupational activity | A moderate increase in health and wellness in those who are completely sedentary; reduced risk of some chronic diseases |
| Moderate Physical Activities (3–6 METS) | Walking 3–4.5 mph on a level surface, weight training, biking, climbing stairs, bicycling 5–9 mph on a level surface, dancing, softball, recreational swimming, moderate yard work and housework | Increased cardiorespiratory endurance, lower body fat levels, improved blood cholesterol and pressure, better blood glucose management, decreased risk of disease, increased overall physical fitness |
| Vigorous Physical Activities (6+ METS) | Jogging, running, circuit training, backpacking, aerobic classes, competitive sports, swimming laps, heavy yard work or housework, hard physical labor/ construction, bicycling over 10 mph up steep terrain | Increased overall physical fitness, decreased risk of disease, further improvements in overall strength and endurance |

- Leisurely walking = Light intensity
- Brisk walking = Moderate intensity
- Running = Vigorous intensity

## AHA PA Guidelines

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The American Heart Association Recommendations for Physical Activity in Adults

For Overall Cardiovascular Health:


- For substantial health benefits, adults should do:
  - at least **150 minutes** (2.5 hours) a week of moderate-intensity aerobic activity
    OR
  - **75 minutes** (1.25 hours) a week of vigorous-intensity aerobic physical activity
    OR
  - an **equivalent combination** of moderate- and vigorous-intensity aerobic activity."

## PA Recommendation Achievement: NHANES 2015

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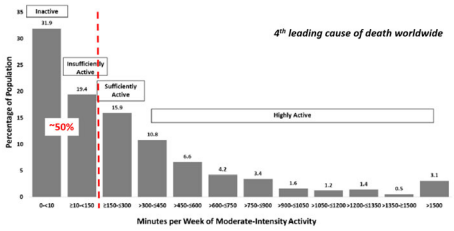


*4th leading cause of death worldwide*

US PAGAC 2018

## What problem?

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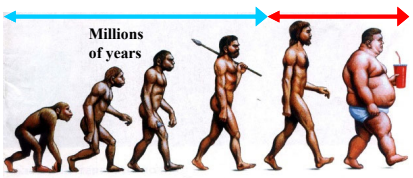
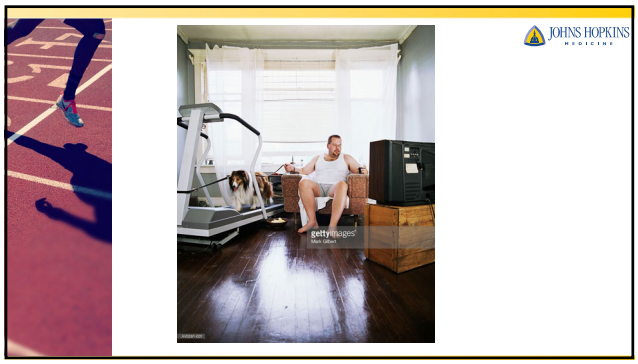



**Increased caloric intake + refined carb consumption & physical inactivity → explosion in incidence of abdominal obesity & epidemic of insulin resistance.**




## The health and economic cost of physical inactivity

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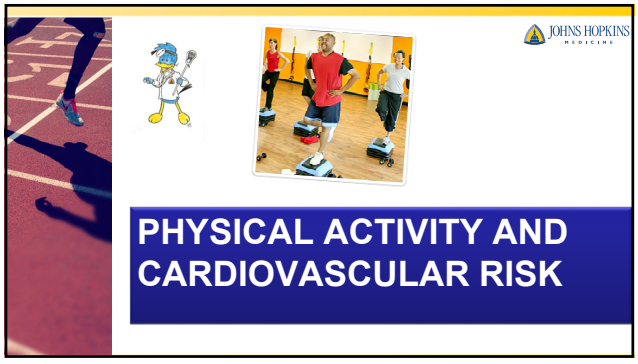
- Physical inactivity causes 10% of premature deaths in the United States
- Nearly $117 billion in annual healthcare costs attributable to failure to meet the aerobic PA levels recommended in the guidelines
- Obesity disqualifies nearly one-third of American youth, aged 17 to 24 years from military service.

Dr. Brett Giroir, Assistant Secretary for Health at the HHS
https://www.tctmd.com/news/sit-less-move-more-new-physical-activity-guidelines-stress-movement-all-ages




## PHYSICAL ACTIVITY AND CARDIOVASCULAR RISK

## *Incidence of coronary heart disease per 1000 London transport workers per year*

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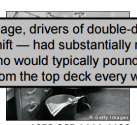
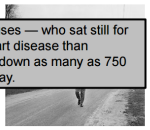
**Drivers 2.7**


**Conductors 1.9**

Controlling for age, drivers of double-decker buses — who sat still for 90% of their shift — had substantially more heart disease than conductors, who would typically pound up and down as many as 750 steps to and from the top deck every working day.





Morris, et. al. Lancet 1953:265:1111-1120

## Cardiovascular Disease Mortality in Harvard Alumni By Physical Activity Level

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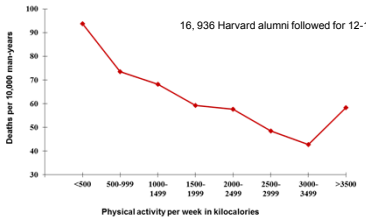
16, 936 Harvard alumni followed for 12-16 years




Paffenbarger, et. al. NEJM 1986:314:605-613

## Physical Activity (PA) and CVD Risk: 21 yr follow-up of the ARIC cohort

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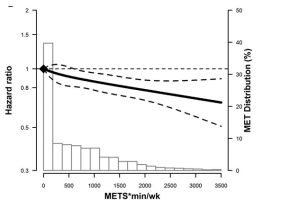
ARIC

- 9996 ARIC participants
- Mean follow-up 21 years for CVD events (MI and stroke).
- <40% met AHA recommended PA levels at baseline
- After accounting for demographics and CVD risk factors, those meeting recommended PA levels compared to poor were 16% less likely to have a CVD event: (hazard ratio 0.84, 95% CI 0.74–0.94)




*Model is adjusted for age, sex, race/center, education, BMI, smoking status, and alcohol intake.

Florido R……Michos ED. J Am Heart Assoc 2016;5:e003505

## PA and CHD Prevention: Meta-analysis of 9 studies

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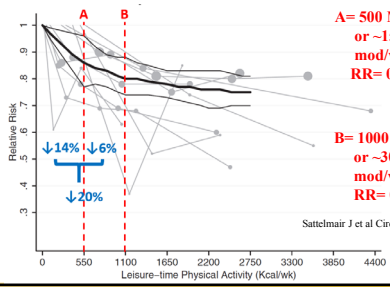


A= 500 MET-min/wk
or ~150min
mod/vig PA
RR= 0.86 (0.77-0.96)

B= 1000 MET-min/wk
or ~300min
mod/vig PA
RR= 0.80 (0.74-0.88)

Sattelmair J et al Circulation 2011; 124:789-795

## PA and CHD Prevention: Meta-analysis of 9 studies

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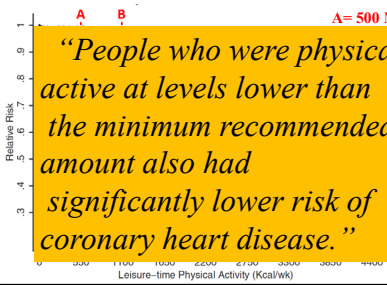


A= 500 MET-min/wk

-0.96)

n/wk

-0.88)

124:789-795

*"People who were physically active at levels lower than the minimum recommended amount also had significantly lower risk of coronary heart disease."*

## PA and Heart Failure : Meta-analysis of 12 studies

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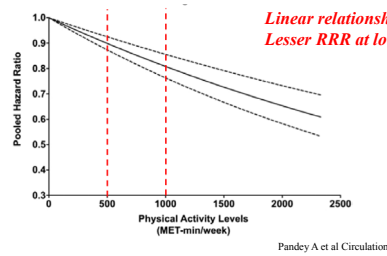
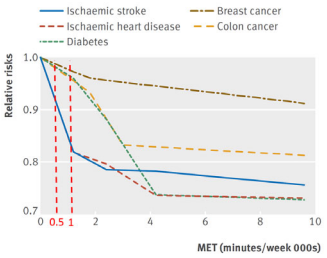



*Linear relationship*
*Lesser RRR at lower PA levels*

Pandey A et al Circulation 2015; 132:1786-1794.

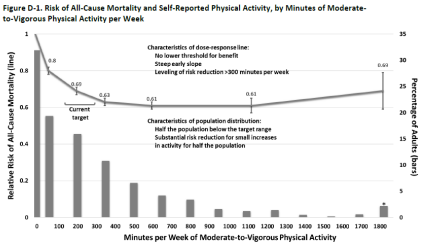
## PA and Global Burden of Disease




43 studies IHD, 26 ischemic stroke

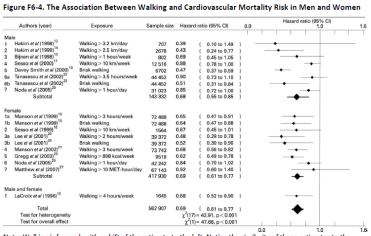
Kyu H et al BMJ 2016; 354: i3875

## Is the sweet spot 150-300 min/wk of MVPA?

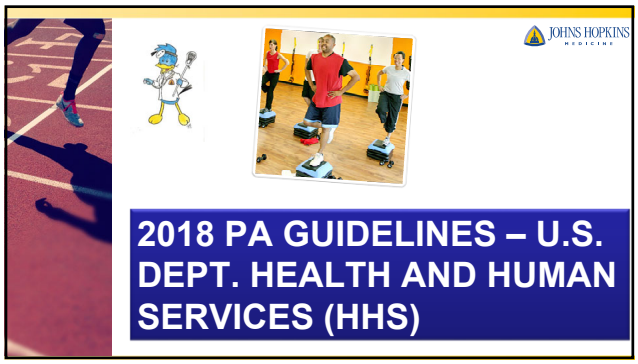



Note: *Includes all adults reporting greater than 1800 minutes per week of moderate-to-vigorous physical activity.
Source: Adapted from data found in Arem et al., 2015[2] and National Center for Health Statistics, 2015.[3]

## Even walking has benefit




Note: Walking is favored, with a shift of the estimate to the left. Notice the similarity of these estimates to the effects on all-cause mortality in Question 1, Figure F6-1.
Source: Reproduced from [Walking and primary prevention: A meta-analysis of prospective cohort studies, Hamer and Chida[4], 42, 2008] with permission from BMJ Publishing Group Ltd.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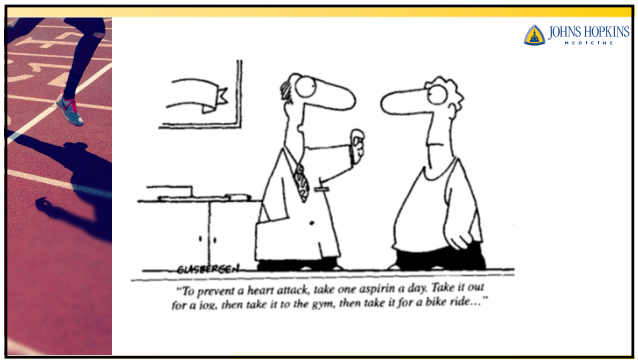
2018 PA GUIDELINES – U.S. DEPT. HEALTH AND HUMAN SERVICES (HHS)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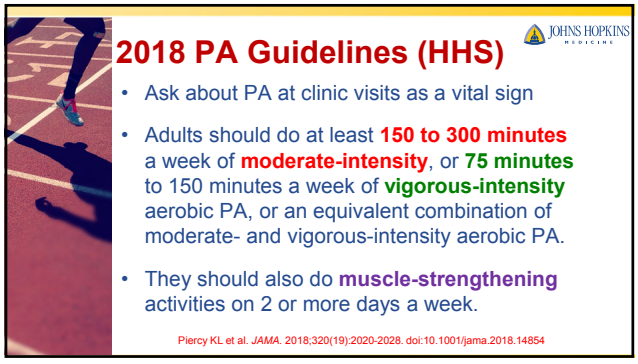
GLASBERGEN
"To prevent a heart attack, take one aspirin a day. Take it out for a jog, then take it to the gym, then take it for a bike ride…"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2018 PA Guidelines (HHS)
• Ask about PA at clinic visits as a vital sign
• Adults should do at least 150 to 300 minutes a week of moderate-intensity, or 75 minutes to 150 minutes a week of vigorous-intensity aerobic PA, or an equivalent combination of moderate- and vigorous-intensity aerobic PA.
• They should also do muscle-strengthening activities on 2 or more days a week.
Piercy KL et al. JAMA. 2018;320(19):2020-2028. doi:10.1001/jama.2018.14854

## 2018 PA Guidelines (HHS)

- Kids 3 to 5 y.o. should be active throughout day to enhance growth & development, with a target of 3 hrs/day of activity.

- Children 6 to 17 y.o.: 60 min/day of either moderate or vigorous intensity aerobic PA with goal of at least 3 hrs of vigorous PA per week

Piercy KL et al. *JAMA*. 2018;320(19):2020-2028. doi:10.1001/jama.2018.14854

## 2018 PA Guidelines (HHS)

- Older adults should do multicomponent PA that includes balance training as well as aerobic and muscle-strengthening activities.

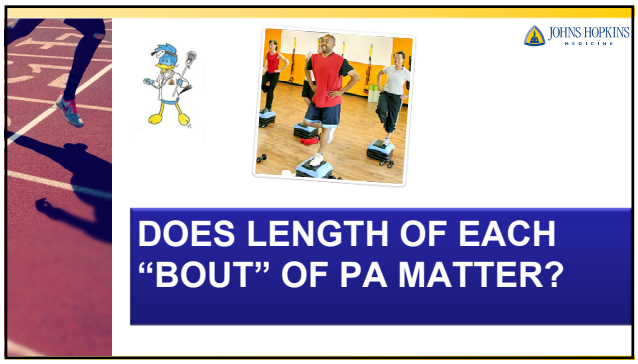
- Pregnant and postpartum women should do at least 150 minutes of moderate-intensity aerobic PA per week.

Piercy KL et al. *JAMA*. 2018;320(19):2020-2028. doi:10.1001/jama.2018.14854

## 2018 PA Guidelines (HHS)

- Individuals performing the least physical activity benefit most by even **modest** increases in moderate-to-vigorous physical activity.
- Additional benefits occur with more physical activity

Piercy KL et al. *JAMA*. 2018;320(19):2020-2028. doi:10.1001/jama.2018.14854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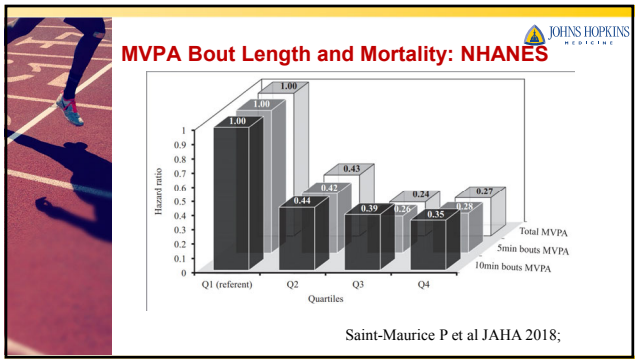
DOES LENGTH OF EACH "BOUT" OF PA MATTER?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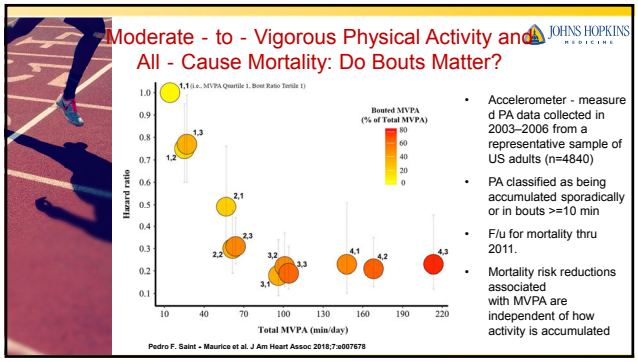
MVPA Bout Length and Mortality: NHANES
Hazard ratio
Quartiles
Q1 (referent)
Q2
Q3
Q4
Total MVPA
5min bouts MVPA
10min bouts MVPA
1.00
1.00
1.00
0.44
0.42
0.43
0.39
0.26
0.24
0.35
0.28
0.27
Saint-Maurice P et al JAHA 2018;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Moderate - to - Vigorous Physical Activity and All - Cause Mortality: Do Bouts Matter?
Hazard ratio
Total MVPA (min/day)
Bouted MVPA (% of Total MVPA)
Pedro F. Saint - Maurice et al. J Am Heart Assoc 2018;7:e007678
Accelerometer - measured PA data collected in 2003–2006 from a representative sample of US adults (n=4840)
PA classified as being accumulated sporadically or in bouts >=10 min
F/u for mortality thru 2011.
Mortality risk reductions associated with MVPA are independent of how activity is accumulated

## 2018 PA Guidelines (HHS)

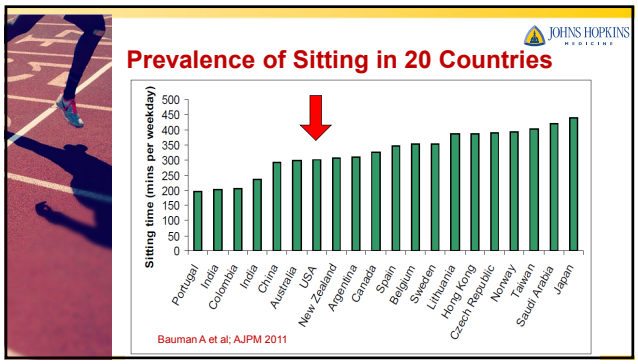
- Gone are the recommendations that PA should be done in at least 10-minute "bouts".
- Adults are simply encouraged to move more and sit less throughout the day.
- Dr. Brett Giroir, Assistant Secretary at HHS, states "Everyone can dramatically improve their health just by moving. "Anytime, anywhere, and by any means that gets you active."

Piercy KL et al. *JAMA*. 2018;320(19):2020-2028. doi:10.1001/jama.2018.14854

## "SITTING DISEASE" AND CARDIOVASCULAR RISK

**Sitting Hurts**

- **2X** Greater Risk Of Diabetes
- **90%** Greater Risk Of Cardiovascular Disease
- **49%** Greater Risk Of All-Cause Mortality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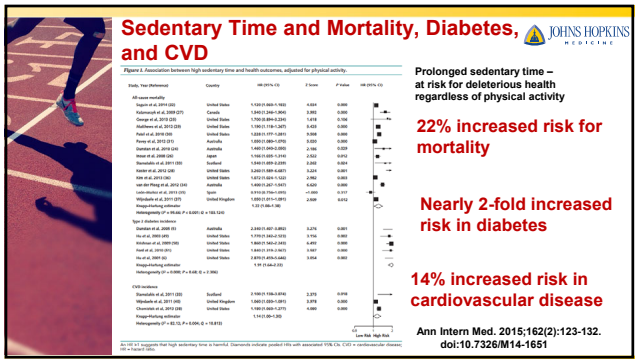
Prevalence of Sitting in 20 Countries
Sitting time (mins per weekday)
500
450
400
350
300
250
200
150
100
50
0
Portugal
India
Colombia
India
China
Australia
USA
New Zealand
Argentina
Canada
Spain
Belgium
Sweden
Lithuania
Hong Kong
Czech Republic
Norway
Taiwan
Saudi Arabia
Japan
Bauman A et al; AJPM 2011


Sedentary Time and Mortality, Diabetes, and CVD
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Prolonged sedentary time – at risk for deleterious health regardless of physical activity
22% increased risk for mortality
Nearly 2-fold increased risk in diabetes
14% increased risk in cardiovascular disease
Ann Intern Med. 2015;162(2):123-132.
doi:10.7326/M14-1651

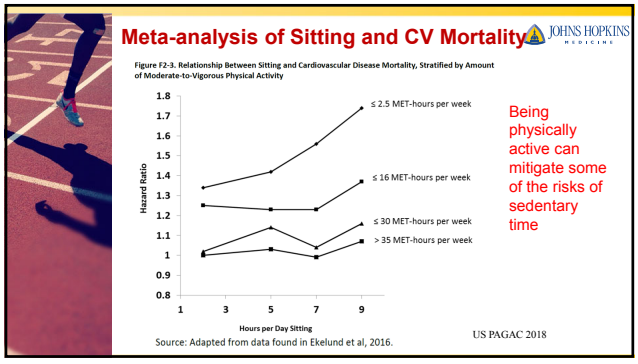
Meta-analysis of Sitting and CV Mortality
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Figure F2-3. Relationship Between Sitting and Cardiovascular Disease Mortality, Stratified by Amount of Moderate-to-Vigorous Physical Activity
Hazard Ratio
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
1
3
5
7
9
Hours per Day Sitting
≤ 2.5 MET-hours per week
≤ 16 MET-hours per week
≤ 30 MET-hours per week
> 35 MET-hours per week
Being physically active can mitigate some of the risks of sedentary time
Source: Adapted from data found in Ekelund et al, 2016.
US PAGAC 2018

## TV Time and CVD Mortality: AARP Cohort Findings

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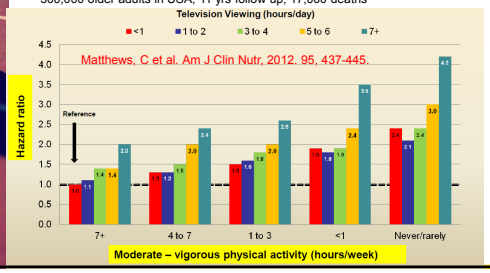
300,000 older adults in USA; 11 yrs follow up, 17,000 deaths




Matthews, C et al. Am J Clin Nutr, 2012. 95, 437-445.

## Continuous Dose-Response Association Between Sedentary Time and Risk for CVD: A Meta-analysis

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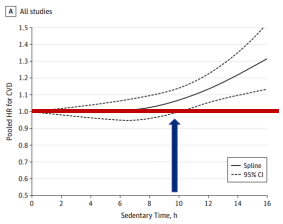
Figure 3. Continuous Dose-Response Association Between Total Sedentary Duration and Risk for Cardiovascular Disease (CVD)




**How much sitting time is harmful?**

In this analysis of 9 pooled studies of over 700,000 participants, **10 hours** seemed to be the critical threshold after accounting for age, sex, BMI, physical activity, and other CVD risk factors

Pandey A. JAMA Cardiol 2016. doi:10.1001/jamacardio.2016.1567

## Domains of Sedentary Time

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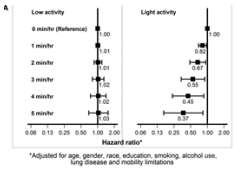
## Replacing sitting time with even light activity associated with lower mortality




2 min/hr tradeoff of sedentary duration with an equal duration of light-intensity activity was associated with a lower mortality risk in the entire cohort

**Mortality associations of tradeoff of 1–5 min/hr of sedentary duration with durations of low- or light-intensity activities from NHANES 2003-2004**

Srinivasan Beddhu et al. CJASN 2015;10:1145-1153

CJASN

AHA SCIENCE ADVISORY

## Sedentary Behavior and Cardiovascular Morbidity and Mortality

**A Science Advisory From the American Heart Association**

*Endorsed by The Obesity Society*

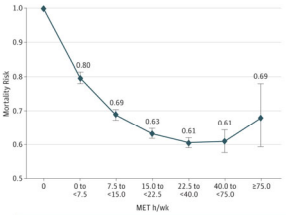
*The evidence to date is suggestive, but not conclusive, that sedentary behavior contributes to CVD and diabetes mellitus risk. Nonetheless, there is evidence to suggest that sedentary behavior could contribute to excess morbidity and mortality. However, there currently is insufficient evidence on which to base specific public health recommendations regarding the appropriate limit to the amount of sedentary behavior required to maximize CVD health benefits. Given the current state of the science on sedentary behavior and in the absence of sufficient data to recommend quantitative guidelines, it is appropriate to promote the advisory, "**Sit less, move more**."*

AHA Sedentary Behavior Advisory *Circulation* 2016

## IS TOO MUCH EXERCISE HARMFUL?

Most Americans need to worry about doing too little exercise than too much

## Leisure Time Physical Activity and Mortality




- 6 pooled studies from 1992-2003
- Self-reported physical activity
- 661,137 participants
- median age 62
- 116, 686 deaths
- Median follow-up time 14.2 yrs.
- **Lowest mortality at 3-5x minimum recommend PA level**
- No signal for harm at 10x recommended levels

Arem H, et al. JAMA Intern Med. 2015.

## Running with Hearts of Stone?

**CONCLUSIONS AND RELEVANCE** This study suggests there is evidence that high levels of physical activity (≥3000 MET-min/wk) are associated with prevalent CAC but are not associated with increased all-cause or CVD mortality after a decade of follow-up, even in the presence of clinically significant CAC levels.

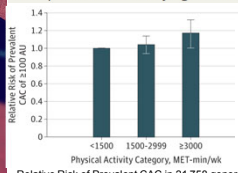


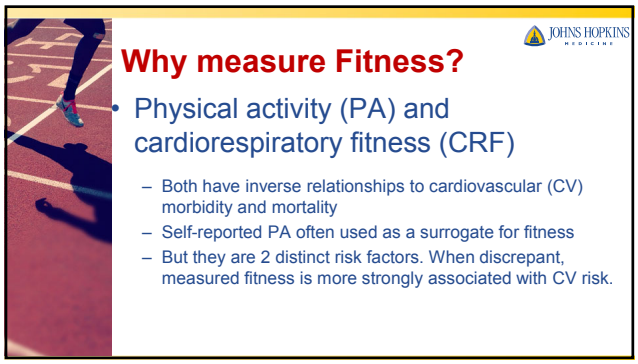

Table 3. Hazards for All-Cause and CVD Mortality in 21 758 Generally Healthy Men by CAC and Physical Activity Category

| Physical Activity Category, MET-min/wk | CAC Category, HR (95% CI) | | | |
|---|---|---|---|---|
| | <100 AU | | ≥100 AU | |
| | Age-Adjusted | Fully Adjusted[a] | Age-Adjusted | Fully Adjusted[a] |
| All-cause mortality | | | | |
| <1500 | 1 [Reference] | 1 [Reference] | 1 [Reference] | 1 [Reference] |
| 1500-2999 | 0.73 (0.53-1.01) | 0.78 (0.56-1.07) | 0.82 (0.62-1.10) | 0.87 (0.65-1.17) |
| ≥3000 | 0.55 (0.32-0.94) | 0.52 (0.29-0.91) | 0.72 (0.49-1.08) | 0.77 (0.52-1.15) |
| CVD mortality | | | | |
| <1500 | 1 [Reference] | 1 [Reference] | 1 [Reference] | 1 [Reference] |
| 1500-2999 | 0.69 (0.31-1.52) | 0.66 (0.29-1.51) | 0.58 (0.31-1.09) | 0.66 (0.36-1.23) |
| ≥3000 | 0.45 (0.11-1.83) | 0.39 (0.08-1.79) | 0.75 (0.36-1.54) | 0.80 (0.39-1.64) |

Relative Risk of Prevalent CAC in 21 758 generally healthy men. The model was adjusted for age, body mass index, levels of glucose and cholesterol, systolic blood pressure, and smoking status. P = .006 for trend.

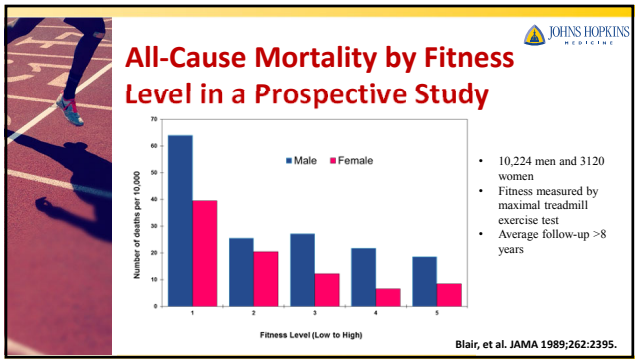
DeFina LF et al. JAMA Cardiol 2019

## FITNESS AND CARDIOVASCULAR RISK



## Why measure Fitness?

- Physical activity (PA) and cardiorespiratory fitness (CRF)
  - Both have inverse relationships to cardiovascular (CV) morbidity and mortality
  - Self-reported PA often used as a surrogate for fitness
  - But they are 2 distinct risk factors. When discrepant, measured fitness is more strongly associated with CV risk.

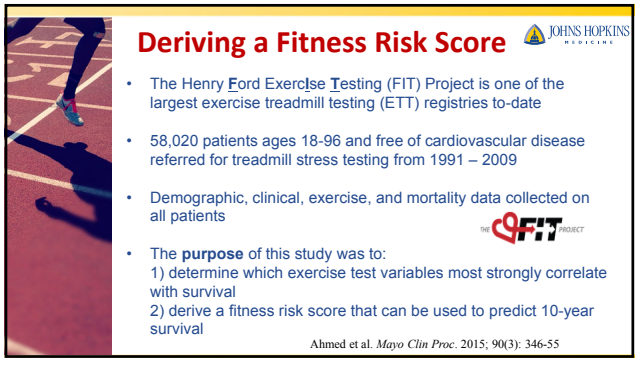


## All-Cause Mortality by Fitness Level in a Prospective Study




- 10,224 men and 3120 women
- Fitness measured by maximal treadmill exercise test
- Average follow-up >8 years

Blair, et al. JAMA 1989;262:2395.



## Deriving a Fitness Risk Score

- The Henry Ford Exercise Testing (FIT) Project is one of the largest exercise treadmill testing (ETT) registries to-date
- 58,020 patients ages 18-96 and free of cardiovascular disease referred for treadmill stress testing from 1991 – 2009
- Demographic, clinical, exercise, and mortality data collected on all patients
- The **purpose** of this study was to:
  1) determine which exercise test variables most strongly correlate with survival
  2) derive a fitness risk score that can be used to predict 10-year survival

Ahmed et al. *Mayo Clin Proc.* 2015; 90(3): 346-55

# FIT Treadmill Score and Survival Estimation

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**FIT Treadmill Score**

The variables from Model 4 were included in a Cox proportional hazards model to yield the following Cox coefficients:

$$\text{Survival} = 0.014(\%\text{MPHR}) + 0.182(\text{METs}) + 0.6381(\text{female sex}) - 0.0613(\text{age})$$

$$\text{FIT Treadmill Score} = \%\text{MPHR} + 12(\text{METs}) - 4(\text{age}) + 43 \text{ if female}$$

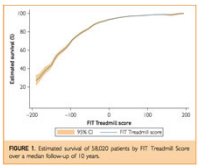


FIGURE 1. Estimated survival of 58,020 patients by FIT Treadmill Score over a median follow-up of 10 years.

MPHR = maximal age predicted heart rate

Ahmed et al. *Mayo Clin Proc*. 2015; 90(3): 346-55

FIT

# Survival by Fitness Level

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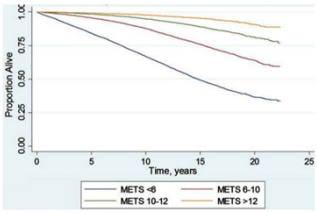


Figure 3. Unadjusted Kaplan-Meier survival of the entire Henry Ford Exercise Testing Project cohort. There is a graded decrease in survival with decreasing functional capacity ($P < 0.001$). Abbreviations: METS, metabolic equivalents.

Al-Mallah et al. *Clin Cardiol.* 2014; 37(8): 456-61

Dr. Mouaz H. Al-Mallah
King Abdullah International Medical Research Center, King Saud bin Abdulaziz University for Health Sciences, Riyadh, Kingdom of Saudi Arabia

FIT

# Resting Heart Rate Predicts Mortality

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FIT

Table 2
Hazard ratio and 95% confidence interval for all-cause mortality according to resting heart rate group

| Resting Heart Rate | <60 | 60-69 | 70-79 | 80-89 | ≥90 | p for trend |
|---|---|---|---|---|---|---|
| | n=7,203 | n=16,206 | n=16,881 | n=10,457 | n=5,887 | |
| Crude IR* | 10.8 | 9.6 | 9.3 | 10.2 | 12.3 | |
| Overall | | | | | | |
| Model 1† | Reference | 1.02 (0.94-1.11) | 1.12 (1.03-1.22) | 1.33 (1.21-1.45) | 1.69 (1.53-1.86) | <0.001 |
| Model 2‡ | Reference | 1.02 (0.94-1.11) | 1.14 (1.05-1.25) | 1.29 (1.18-1.342) | 1.58 (1.43-1.675) | <0.001 |
| Model 3§ | Reference | 0.97 (0.89-1.05) | 1.03 (0.94-1.12) | 1.10 (0.99-1.20) | 1.22 (1.10-1.35) | <0.001 |

Resting HR ≥ 90 bpm compared to <60 was associated with a 22% increased risk of mortality over 11-year follow-up even after considering other risk factors

* Crude Incidence Rate (IR) is per 1,000 person-years.
† Model 1 – age, race, sex.
‡ Model 2 – Model 1 + systolic blood pressure, diastolic blood pressure, hypertensive medication use, history of dyslipidemia, lipid lowering medication use, smoking, pulmonary disease medication, diabetes, family history coronary artery disease, obesity, reason for stress test, atrioventricular-nodal blocking medication.
§ Model 3 – Model 2 + METS achieved.
¶ Interaction by sex: p <0.001 (Model 3, trend).

**Aladin Al.... Michos ED. *Am J Cardiol.* 2014; 114(11): 1701-6**

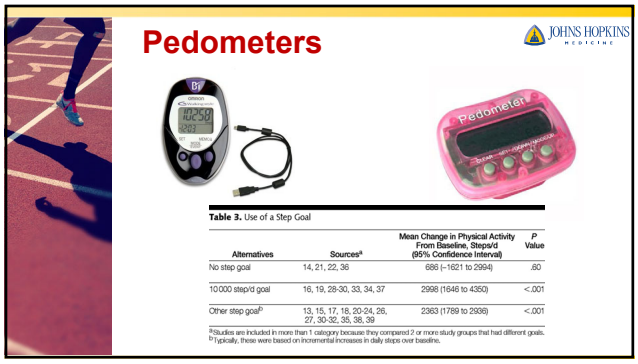
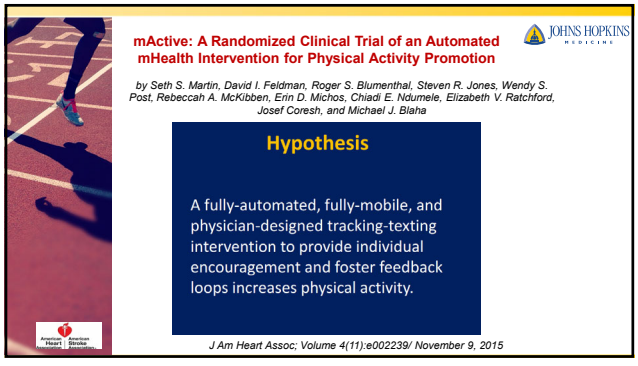




**Table 3.** Use of a Step Goal

| Alternatives | Sources[a] | Mean Change in Physical Activity From Baseline, Steps/d (95% Confidence Interval) | *P* Value |
|---|---|---|---|
| No step goal | 14, 21, 22, 36 | 686 (−1621 to 2994) | .60 |
| 10 000 step/d goal | 16, 19, 28-30, 33, 34, 37 | 2998 (1646 to 4350) | <.001 |
| Other step goal[b] | 13, 15, 17, 18, 20-24, 26, 27, 30-32, 35, 38, 39 | 2363 (1789 to 2936) | <.001 |

[a] Studies are included in more than 1 category because they compared 2 or more study groups that had different goals.
[b] Typically, these were based on incremental increases in daily steps over baseline.



## mACTIVE Trial

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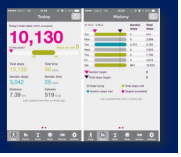
### Interventions

**Phase I: Unblinding**

- continuous access to activity data via smartphone




Martin S et al. J Am Heart Assoc; Volume 4(11):e002239/ November 9, 2015

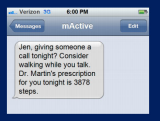
## mACTIVE Trial

JOHNS HOPKINS MEDICINE

### Interventions

**Phase 2: Smart Texts**

- smartphone-delivered coaching
- theory-based, physician-written
- leverage therapeutic relationship
- 3 times/day
  - customized to patient schedule
- booster and positive reinforcement messages
  - individual encouragement, foster feedback loops
- fully-automated using real-time activity data and 16 personal factors with a 10,000 steps/day goal




Martin S et al. J Am Heart Assoc; Volume 4(11):e002239/ November 9, 2015

## mACTIVE Trial

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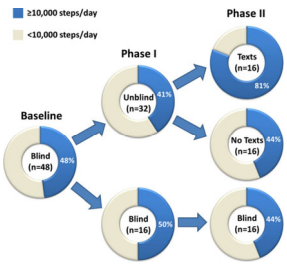
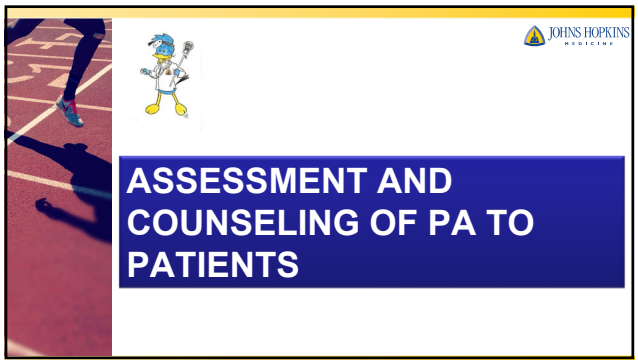
**Conclusions:**

An automated tracking-texting intervention increased physical activity with, but not without, the texting component. These results support new mHealth tracking technologies as facilitators in need of behavior change drivers.

Proportions attaining the 10 000 steps/day goal at baseline, in phase I, and phase II, by intervention group.




Seth S. Martin et al. J Am Heart Assoc 2015;4:e002239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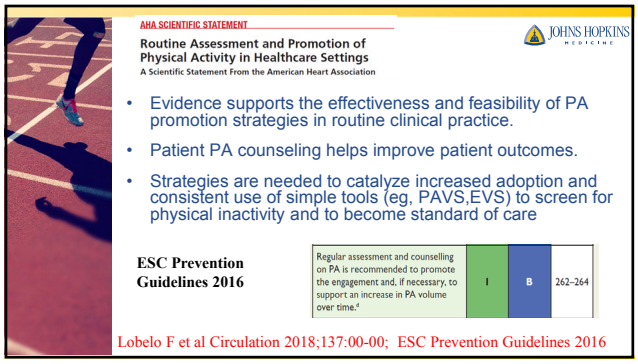
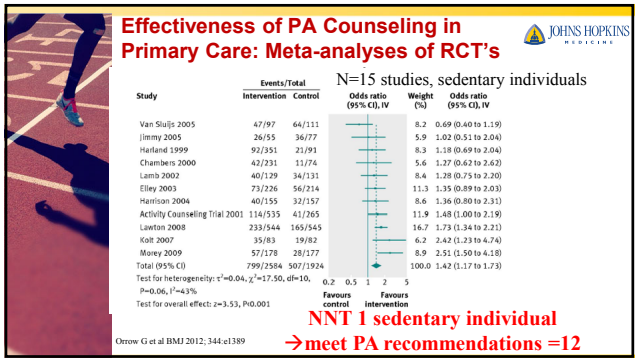
ASSESSMENT AND COUNSELING OF PA TO PATIENTS


AHA SCIENTIFIC STATEMENT
Routine Assessment and Promotion of Physical Activity in Healthcare Settings
A Scientific Statement From the American Heart Association
JOHNS HOPKINS
MEDICINE
• Evidence supports the effectiveness and feasibility of PA promotion strategies in routine clinical practice.
• Patient PA counseling helps improve patient outcomes.
• Strategies are needed to catalyze increased adoption and consistent use of simple tools (eg, PAVS,EVS) to screen for physical inactivity and to become standard of care
ESC Prevention Guidelines 2016
Regular assessment and counselling on PA is recommended to promote the engagement and, if necessary, to support an increase in PA volume over time.[4]
I
B
262–264
Lobelo F et al Circulation 2018;137:00-00; ESC Prevention Guidelines 2016


Effectiveness of PA Counseling in Primary Care: Meta-analyses of RCT's
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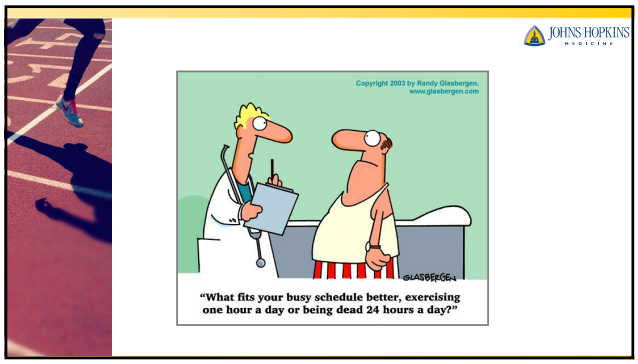
N=15 studies, sedentary individuals
Study
Events/Total Intervention Control
Odds ratio (95% CI), IV
Weight (%)
Odds ratio (95% CI), IV
Van Sluijs 2005 47/97 64/111 8.2 0.69 (0.40 to 1.19)
Jimmy 2005 26/55 36/77 5.9 1.02 (0.51 to 2.04)
Harland 1999 92/351 21/91 8.3 1.18 (0.69 to 2.04)
Chambers 2000 42/231 11/74 5.6 1.27 (0.62 to 2.62)
Lamb 2002 40/129 34/131 8.4 1.28 (0.75 to 2.20)
Elley 2003 73/226 56/214 11.3 1.35 (0.89 to 2.03)
Harrison 2004 40/155 32/157 8.6 1.36 (0.80 to 2.31)
Activity Counseling Trial 2001 114/535 41/265 11.9 1.48 (1.00 to 2.19)
Lawton 2008 233/544 165/545 16.7 1.73 (1.34 to 2.21)
Kolt 2007 35/83 19/82 6.2 2.42 (1.23 to 4.74)
Morey 2009 57/178 28/177 8.9 2.51 (1.50 to 4.18)
Total (95% CI) 799/2584 507/1924 100.0 1.42 (1.17 to 1.73)
Test for heterogeneity: τ²=0.04, χ²=17.50, df=10, P=0.06, I²=43%
Test for overall effect: z=3.53, P<0.001
0.2 0.5 1 2 5
Favours control
Favours intervention
NNT 1 sedentary individual
→meet PA recommendations =12
Orrow G et al BMJ 2012; 344:e1389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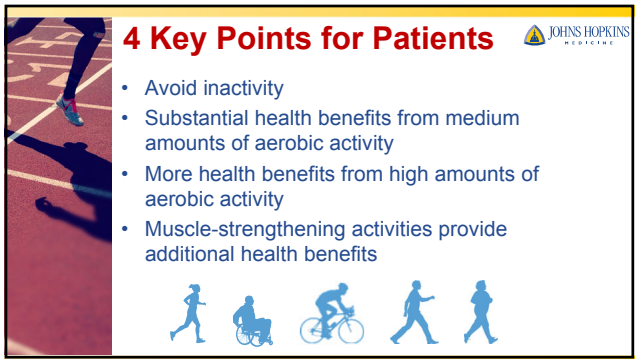
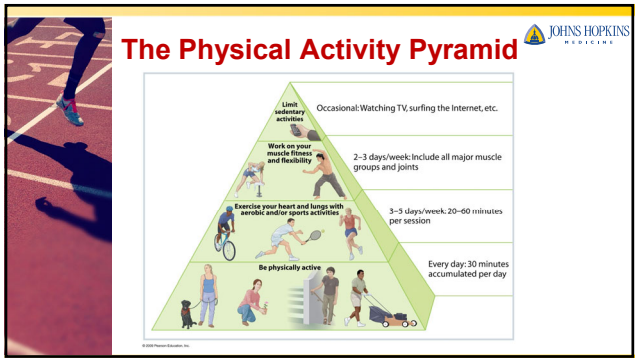
www.glasbergen.com
GLASBERGEN
"What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?"


4 Key Points for Patients
JOHNS HOPKINS
MEDICINE
• Avoid inactivity
• Substantial health benefits from medium amounts of aerobic activity
• More health benefits from high amounts of aerobic activity
• Muscle-strengthening activities provide additional health benefits


The Physical Activity Pyramid
JOHNS HOPKINS
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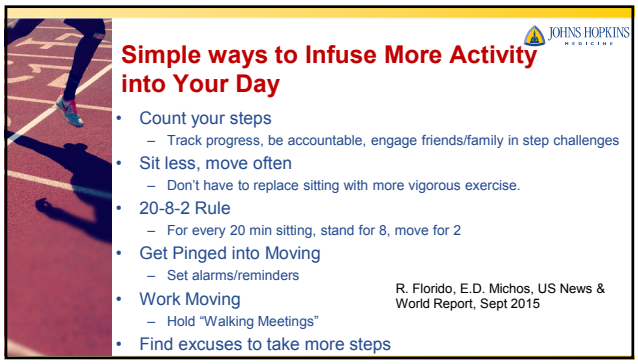
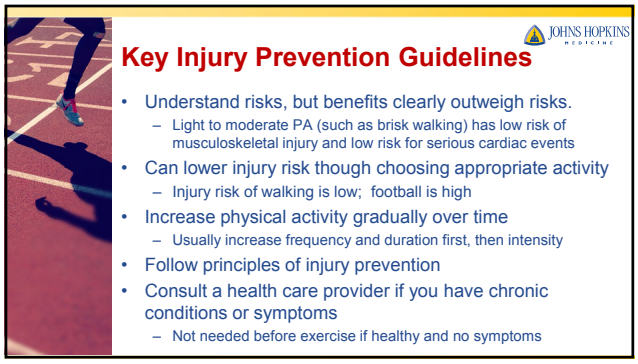
Limit sedentary activities
Occasional: Watching TV, surfing the Internet, etc.
Work on your muscle fitness and flexibility
2–3 days/week: Include all major muscle groups and joints
Exercise your heart and lungs with aerobic and/or sports activities
3–5 days/week, 20–60 minutes per session
Be physically active
Every day: 30 minutes accumulated per day



## Simple ways to Infuse More Activity into Your Day

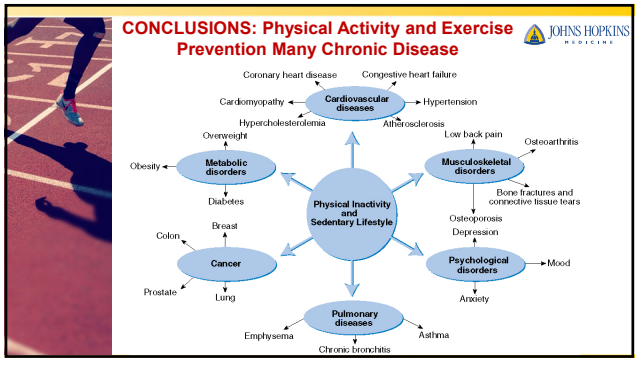
- Count your steps
  - Track progress, be accountable, engage friends/family in step challenges
- Sit less, move often
  - Don't have to replace sitting with more vigorous exercise.
- 20-8-2 Rule
  - For every 20 min sitting, stand for 8, move for 2
- Get Pinged into Moving
  - Set alarms/reminders
- Work Moving
  - Hold "Walking Meetings"
- Find excuses to take more steps

R. Florido, E.D. Michos, US News & World Report, Sept 2015



## Key Injury Prevention Guidelines

- Understand risks, but benefits clearly outweigh risks.
  - Light to moderate PA (such as brisk walking) has low risk of musculoskeletal injury and low risk for serious cardiac events
- Can lower injury risk though choosing appropriate activity
  - Injury risk of walking is low; football is high
- Increase physical activity gradually over time
  - Usually increase frequency and duration first, then intensity
- Follow principles of injury prevention
- Consult a health care provider if you have chronic conditions or symptoms
  - Not needed before exercise if healthy and no symptoms



## CONCLUSIONS: Physical Activity and Exercise Prevention Many Chronic Disease

## Exercise – For Everyone

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At the 2012 Olympic Games in London, Sarah Attar represents Saudi Arabia as the country's first Olympic female runner, competing in the women's 800 meters.



## Healthy Diet Choices
## Eat this….

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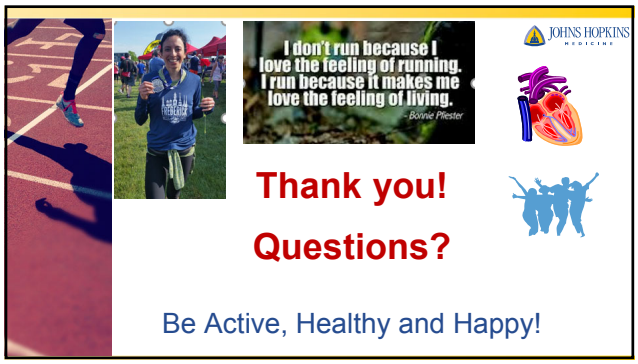
JOHNS HOPKINS MEDICINE

- Simple message that can work for many patients:

Eat Less
Eat Smart
and
**Move more daily**


I don't run because I love the feeling of running. I run because it makes me love the feeling of living.
-Bonnie Pliester
JOHNS HOPKINS
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Thank you!
Questions?
Be Active, Healthy and Happy!