EXERCISE: MIRACLE DRUG OR UNREALISTIC MEDICINE?

William Denq, MD
University of Utah
How to join

Web

Text

1. 

2. 

Start the presentation to see the content. Still no live content? Install the app or get help at PM365.com/app.
Do you meet the US recommendations for physical activity?

- Yes
- No
- Not sure
Per guidelines, what percentage of high school students and adults in the US are getting enough activity?
BOTTOM LINE RECOMMENDATIONS

3-5 yrs:
> 3 hrs/day of active play

6-17 yrs:
>60 mins/day moderate-vigorous intensity aerobic

>18 yrs:
>150 mins/week moderate-intensity aerobic
2 days of muscle strengthening
LEARNING OBJECTIVES

1. Describe the national guidelines as they pertain to each age group
2. Explain the immediate and long term health benefits of physical activity
3. Summarize the different methodologies to encourage physical activity
Basic Concepts

Guidelines

Review the Evidence

- Physical Activity Benefits
- Encouraging Physical Activity
<table>
<thead>
<tr>
<th>Intensity</th>
<th>METs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average oxygen uptake</td>
<td>3.5 mL/kg/min</td>
</tr>
<tr>
<td>at rest</td>
<td>1 MET</td>
</tr>
<tr>
<td>Walking 3 mph</td>
<td>3.3 METs</td>
</tr>
<tr>
<td>Running 5 mph</td>
<td>8.3 METs</td>
</tr>
<tr>
<td>Light-intensity</td>
<td>1.6 – 2.9 METs</td>
</tr>
<tr>
<td>Moderate-intensity</td>
<td>3.0 – 5.9 METs</td>
</tr>
<tr>
<td>Vigorous-intensity</td>
<td>&gt;= 6 METs</td>
</tr>
</tbody>
</table>
Light (1.6-2.9)
- Cooking
- Slow walking
- Scanning groceries

Moderate (3.0–5.9)
- Walking briskly
- Vacuuming
- Raking a yard

Vigorous (6.0+)
- Running
- Carrying groceries up stairs
- Shoveling snow
- Mowing
- Aerobic class
What level of activity intensity is Peter demonstrating?
Basic Concepts

Guidelines

Review the Evidence

- Physical Activity Benefits
- Encouraging Physical Activity
BOTTOM LINE RECOMMENDATIONS

- **3-5** years old:
  - > 3 hrs/day of active play

- **6-17** years old:
  - >60 mins/day moderate-vigorous intensity aerobic

- **>18** years old:
  - >150 mins/week moderate-intensity aerobic
  - 2 days of muscle strengthening
Canadian Physical Activity Guidelines

FOR ADULTS - 18 – 64 YEARS

Guidelines

To achieve health benefits, adults aged 18-64 years should accumulate at least 150 minutes of moderate- to vigorous-intensity aerobic physical activity per week, in bouts of 10 minutes or more.

It is also beneficial to add muscle and bone strengthening activities using major muscle groups, at least 2 days per week.

More physical activity provides greater health benefits.
Basic Concepts

Guidelines

Review the Evidence

- Physical Activity Benefits
- Encouraging Physical Activity
<table>
<thead>
<tr>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3 to &lt;6 Years of Age</strong></td>
</tr>
<tr>
<td>Improved bone health and weight status</td>
</tr>
<tr>
<td><strong>6 to 17 years of age</strong></td>
</tr>
<tr>
<td>Improved cognitive function (ages 6 to 13 years)</td>
</tr>
<tr>
<td>Improved cardiorespiratory and muscular fitness</td>
</tr>
<tr>
<td>Improved bone health</td>
</tr>
<tr>
<td>Improved cardiovascular risk factor status</td>
</tr>
<tr>
<td>Improved weight status or adiposity</td>
</tr>
<tr>
<td>Fewer symptoms of depression</td>
</tr>
</tbody>
</table>
## Adults, all ages

<table>
<thead>
<tr>
<th>Category</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-cause mortality</td>
<td>Lower risk</td>
</tr>
<tr>
<td>Cardiometabolic conditions</td>
<td>Lower cardiovascular incidence and mortality (including heart disease and stroke)</td>
</tr>
<tr>
<td></td>
<td><strong>Lower incidence of hypertension</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Lower incidence of type 2 diabetes</strong></td>
</tr>
<tr>
<td>Cancer</td>
<td>Lower incidence of bladder, breast, colon, endometrium, esophagus, kidney, stomach, and lung cancers</td>
</tr>
<tr>
<td>Brain health</td>
<td>Reduced risk of dementia</td>
</tr>
<tr>
<td></td>
<td>Improved cognitive function</td>
</tr>
<tr>
<td></td>
<td><strong>Improved cognitive function following bouts of aerobic activity</strong></td>
</tr>
<tr>
<td></td>
<td>Improved quality of life</td>
</tr>
<tr>
<td></td>
<td>Improved sleep</td>
</tr>
<tr>
<td></td>
<td><strong>Reduced feelings of anxiety</strong> and depression in healthy people and in people with existing clinical syndromes</td>
</tr>
<tr>
<td></td>
<td>Reduced incidence of depression</td>
</tr>
<tr>
<td>Weight status</td>
<td>Reduced risk of excessive weight gain</td>
</tr>
<tr>
<td></td>
<td>Weight loss and the prevention of weight regain following initial weight loss when a sufficient dose of moderate-to-vigorous physical activity is attained</td>
</tr>
<tr>
<td></td>
<td>An additive effect on weight loss when combined with moderate dietary restriction</td>
</tr>
<tr>
<td>Older Adults</td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Falls</td>
<td>Reduced incidence of falls</td>
</tr>
<tr>
<td></td>
<td>Reduced incidence of fall-related injuries</td>
</tr>
<tr>
<td>Physical function</td>
<td>Improved physical function in older adults with and without frailty</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Women who are Pregnant or Postpartum</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>During pregnancy</td>
<td>Reduced risk of excessive weight gain</td>
</tr>
<tr>
<td></td>
<td>Reduced risk of gestational diabetes</td>
</tr>
<tr>
<td></td>
<td>No risk to fetus from moderate-intensity physical activity</td>
</tr>
<tr>
<td>During postpartum</td>
<td>Reduced risk of postpartum depression</td>
</tr>
<tr>
<td>Condition</td>
<td>Benefits</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>Reduced risk of all-cause and breast cancer mortality</td>
</tr>
<tr>
<td>Colorectal cancer</td>
<td>Reduced risk of all-cause and colorectal cancer mortality</td>
</tr>
<tr>
<td>Prostate cancer</td>
<td>Reduced risk of prostate cancer mortality</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td>Decreased pain, improved function and quality of life</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Reduced risk of progression of cardiovascular disease, increased blood pressure over time</td>
</tr>
<tr>
<td>Type 2 diabetes</td>
<td>Reduced risk of cardiovascular mortality, reduced progression of disease indicators: hemoglobin A1c, blood pressure, blood lipids, and body mass index</td>
</tr>
<tr>
<td>Multiple sclerosis</td>
<td>Improved walking, improved physical fitness</td>
</tr>
<tr>
<td>Dementia</td>
<td>Improved cognition</td>
</tr>
<tr>
<td>Some conditions with impaired executive function (attention deficit hyperactivity disorder, schizophrenia, multiple sclerosis, Parkinson’s disease, and stroke)</td>
<td>Improved cognition</td>
</tr>
</tbody>
</table>

Note: Benefits in **bold font** are those added in 2018; benefits in normal font are those noted in the 2008 Scientific Report. Only outcomes with strong or moderate evidence of effect are included in the table.
What is one immediate benefit of physical activity?
WHAT IS THE COST TO US?

$117 billion

10% premature mortality
Basic Concepts

Guidelines

Review the Evidence

• **Physical Activity Benefits**
• **Encouraging Physical Activity**
Physical Activity

All Cause Mortality

Weight

CV

Pre-existing conditions

Brain Health

Cancer
Physical Activity

CV

Brain Health

Cancer

Pre-existing conditions

Weight

All Cause Mortality
Review of the epidemiological evidence for physical activity and health from low- and middle-income countries

Karen Milton, Rona Macniven & Adrian Bauman
Pages 369-381 | Received 03 Sep 2013, Accepted 15 Jan 2014, Published online: 03 Apr 2014

Leisure Time Physical Activity and Mortality
A Detailed Pooled Analysis of the Dose-Response Relationship
Hannah Arem, MHS, PhD1; Steven C. Moore, PhD1; Alpa Patel, PhD2; et al.

Author Affiliations
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 and National Center for Health Statistics, 2015.
Physical Activity

All Cause Mortality

Weight

CV

Brain Health

Pre-existing conditions

Cancer
Dose Response Between Physical Activity and Risk of Coronary Heart Disease

A Meta-Analysis

Jacob Sattelmair, Jeremy Pertman, Eric L. Ding, Harold W. Kohl III, William Haskell, and I-Min Lee

Originally published 1 Aug 2011 | https://doi.org/10.1161/CIRCULATIONAHA.110.010710 | Circulation. 2011;124:769–795

Figure F6-5. Plot with Spline and 95% Confidence Intervals of Relative Risk of Coronary Heart Disease by Kilocalories per Week of Leisure-time Physical Activity

Note: Individual study results are plotted with grey lines; the thick black line shows the trend line for both sexes combined from a random spline-fit model and the thinner black lines show the 95% CI for the trend.
Source: Sattelmair et al., 2011,61 Dose response between physical activity and risk of coronary heart disease, a Meta-Analysis, Circulation, 124: 789-795. https://doi.org/10.1161/CIRCULATIONAHA.110.010710
Association Between Push-up Exercise Capacity and Future Cardiovascular Events Among Active Adult Men

Justin Yang, MD, MPH1,2; Costas A. Christophi, PhD1,3; Andrea Farioli, MD, PhD4; et al.

Author Affiliations


https://i.ytimg.com/vi/lnR_kb5Wjf8/maxresdefault.jpg
DOES HOW LONG MATTER?

Sporadic and Bouted Physical Activity and the Metabolic Syndrome in Adults

JANINE CLARKE¹,² and IAN JANSSSEN¹,³

¹School of Kinesiology and Health Studies, Queen’s University, Kingston, Ontario, CANADA; ²Health Statistics Division, Statistics Canada, Ottawa, Ontario, CANADA; and ³Department of Community Health and Epidemiology, Queen’s University, Kingston, Ontario, CANADA

March 2017

Association of “Weekend Warrior” and Other Leisure Time Physical Activity Patterns With Risks for All-Cause, Cardiovascular Disease, and Cancer Mortality

Gary O’Donovan, PhD¹,²; I-Min Lee, ScD¹; Mark Hamer, PhD³,⁴; et al

Author Affiliations
Attention, memory, crystallized intelligence, processing speed, executive control
Academic and neuropsychological performance

Aerobic activity, Muscle Strengthening, Yoga, Play
individuals representing a gradient of normal to impaired cognitive health status. These effects are found across a variety of forms of physical activity, including aerobic activity (e.g., brisk walking), muscle-strengthening activity, yoga, and play activities (e.g., tag or other simple low organizational
Can Exercise Make You Smarter?

The effects of cardiovascular exercise on human memory: A review with meta-analysis

Marc Roig a, b, *, Sasja Nordbrandt a, *, Svend Sparre Geertsen f, g, Jens Bo Nielsen f, g

Aerobic Exercise and Neurocognitive Performance: a Meta-Analytic Review of Randomized Controlled Trials

Patrick J. Smith, MA, 1 James A. Blumenthal, PhD, 1 Benson M. Hoffman, PhD, 1 Harris Cooper, PhD, 2 Timothy A. Strauman, PhD, 2 Kathleen Welsh-Bohmer, PhD, 1 Jeffrey N. Browndyke, PhD, 1 and Andrew Sherwood, PhD 1
ALZHEIMER’S AND PHYSICAL INACTIVITY

- 13% Worldwide
- 21% United States
- 25% reduction in physical inactivity
- Prevent 230,000 cases

The projected effect of risk factor reduction on Alzheimer’s disease prevalence

Dr Deborah E Barnes PhD,1,2,3,4, Prof Kristine Yaffe MD 1,2,3,4

https://doi.org/10.1016/S1474-4422(11)70072-2
CAN PHYSICAL ACTIVITY REDUCE RISK FOR COGNITIVE DECLINE?

A meta-analysis of prospective studies on the role of physical activity and the prevention of Alzheimer’s disease in older adults

Michael W Beckett, Christopher I Arden and Michael A Rotondi

BMC Geriatrics 2015 15:9

Physical activity and risk of cognitive decline: a meta-analysis of prospective studies


Francesco Sofi, MD, PhD. Department of Medical and Surgical Critical Care, Thrombosis Centre, University of Florence, Viale Morgagni 85, 50134, Florence, Italy. (fax: +39-055-7949418; e-mail: francescosofi@gmail.com)
The effects of physical activity on sleep: a meta-analytic review

M. Alexandra Kredlow · Michelle C. Capozzoli · Bridget A. Hearon · Amanda W. Calkins · Michael W. Otto
Exercise training improves sleep quality in middle-aged and older adults with sleep problems: a systematic review

Pei-Yu Yang 1, Ka-Hou Ho 1, Hsi-Chung Chen 2, Meng-Yueh Chien 1, 2

Show more
https://doi.org/10.1016/S1836-9553(12)70106-6

Protective and risk factors for adolescent sleep: A meta-analytic review

Kate A. Bartel, Michael Gradisar, Paul Williamson

Show more
https://doi.org/10.1016/j.smrv.2014.08.002
Cognition
Alzheimer’s and other dementia
Sleep
What is the % reduction of developing Alzheimer's dementia in older adults who are physically active?
Physical Activity

All Cause Mortality

CV

Brain Health

Pre-existing conditions

Weight

Cancer
4 out of 10 men and women will be diagnosed with an invasive cancer over their lifetime.

Source: American Cancer Society, 2016
Association of Leisure-Time Physical Activity With Risk of 26 Types of Cancer in 1.44 Million Adults

Steven C. Moore, PhD, MPH\(^1\); I-Min Lee, MBBS, ScD\(^2\); Elisabete Weiderpass, PhD\(^3,4,5,6\); et al

Author Affiliations


| Cancer | Lower incidence of bladder, breast, colon, endometrium, esophagus, kidney, stomach, and lung cancers |
HOW DOES PHYSICAL ACTIVITY AFFECT CANCER PREVENTION?

- Limited evidence: Lymphoma, myeloma, other HEENT, ovarian, pancreatic, prostate, glioma, meningioma

- No evidence: Thyroid, rectal, liver, gallbladder, small intestine, soft tissue, melanoma
PRE-EXISTING CONDITIONS

CV/Resp
- HCM
- HTN
- DM2
- OSA

Brain
- ADHD
- Schizophrenia
- MS
- Parkinson’s
- CVA
- Dementia
- Insomnia

Cancer
- Breast
- Colorectal
- Prostate

MSK
- OA
- LBP
- Osteoporosis
- Tendinopathy
Physical Activity

Pre-existing conditions

Weight

All Cause Mortality

CV

Brain Health

Cancer
Figure F5-1. Odds of Maintaining a Healthy Weight by Level of Physical Activity

Source: Adapted from data found in Brown et al., 2016.20
The influence of 15-week exercise training on dietary patterns among young adults
IS PHYSICAL ACTIVITY BAD?


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 and National Center for Health Statistics, 2015.
MOVING HELPS, BUT DOES NOT MOVING HARM?
Sedentary Time and Its Association With Risk for Disease Incidence, Mortality, and Hospitalization in Adults: A Systematic Review and Meta-analysis

Aviroop Biswas, BSc; Paul L. Oh, MD, MSc; Guy E. Faulkner, PhD; Ravi R. Bajaj, MD; Michael A. Silver, BSc; Marc S. Mitchell, MSc; David A. Alter, MD, PhD

Association Between Television Viewing Time and All-Cause Mortality: A Meta-Analysis of Cohort Studies

Jiang-Wei Sun, Long-Gang Zhao, Yang Yang, Xiao Ma, Ying-Ying Wang, Yong-Bing Xiang


Published: 14 November 2015  Article history
CANCER RISK

Sedentary Behavior and Incident Cancer: A Meta-Analysis of Prospective Studies
Dong Shen, Weidong Mao, Tao Liu, Qingfeng Lin, Xiangdong Lu, Qiong Wang, Feng Lin, Ulf Ekelund, Katrien Wijnhdaele
Published: August 25, 2014 • https://doi.org/10.1371/journal.pone.0105709

Television Viewing and Time Spent Sedentary in Relation to Cancer Risk: A Meta-Analysis
Daniela Schmid, Michael F. Leitzmann
JNCI: Journal of the National Cancer Institute, Volume 106, Issue 7, 1 July 2014, dju098,
https://doi.org/10.1093/jnici/dju098
Published: 16 June 2014 • Article history ▼
HIIT

Effects of high-intensity interval training on cardiometabolic health: a systematic review and meta-analysis of intervention studies

Romeo B Batacan Jr., Mitch J Duncan, Vincent J Dalbo, Patrick S Tucker, Andrew S Fenning

Physical Activity/Metabolic Effects

The effects of high-intensity interval training on glucose regulation and insulin resistance: a meta-analysis


The Potential for High-Intensity Interval Training to Reduce Cardiometabolic Disease Risk

Holly S. Kessler, Susan B. Sisson, Kevin R. Short
Physical Activity

All Cause Mortality

CV

Brain Health

Cancer

Pre-existing conditions

Weight
NEED FOR FUTURE STUDIES

- Aerobic vs anaerobic exercise
  - How much is too much?
    - HIIT
Basic Concepts

Guidelines

Review the Evidence

• Physical Activity Benefits
• Encouraging Physical Activity
Attention, memory, crystallized intelligence, processing speed, executive control
DO WORKSITE INTERVENTIONS WORK?

Systematic Review of the Impact of Worksite Wellness Programs

Karen Chan Osilla, PhD; Kristin Van Busum, MPA; Christopher Schnyer, MPP; Jody Wozar Larkin, BSN, MLIS; Christine Eibner, PhD; and Soeren Mattke, MD, DSc

A systematic review of workplace health promotion interventions for increasing physical activity

Sumaira H. Malik, Holly Blake, L. Suzanne Suggs

First published: 04 July 2013 | https://doi.org/10.1111/bjhp.12052 | Cited by: 76
A Systematic Review of Interventions to Increase Stair Use
Cally A. Jennings PhD, Lina Yun MS, Christina C. Loitz PhD, Eun-Young Lee PhD, W. Kerry Mummery PhD
https://doi.org/10.1016/j.amepre.2016.08.014

A systematic review and meta-analysis of workplace intervention strategies to reduce sedentary time in white-collar workers
WEARABLES?

Do activity monitors increase physical activity in adults with overweight or obesity? A systematic review and meta-analysis
Herman J. de Vries, Thea J.M. Koolman, Miriam W. van Ittersum, Marco van Brussel, Martijn de Groot
First published: 26 September 2016 | https://doi.org/10.1002/oby.21619 | Cited by: 17

Step counter use in type 2 diabetes: a meta-analysis of randomized controlled trials
Shanhu Qiu 1,2, Xue Cai 1,2, Xiang Chen 1,2, Bingquan Yang 1,2 and Zilin Sun 1,2
1Contributed equally.
BMC Medicine 2014 12:36
https://doi.org/10.1186/1741-7015-12-36 © Qiu et al.; licensee BioMed Central Ltd. 2014
Received: 28 October 2013 | Accepted: 28 January 2014 | Published: 27 February 2014
Meta-analysis of internet-delivered interventions to increase physical activity levels
Cally A Davies1*, John C Spence2, Corneel Vandelanotte1, Cristina M Caperchione1,3 and W Kerry Mummery1,4
The use of technology to promote physical activity in Type 2 diabetes management: a systematic review
J. Connelly, A. Kirk, J. Masthoff, S. MacRury
First published: 22 July 2013 | https://doi.org/10.1111/dme.12289 | Cited by: 52
CAN WE CALL?

Interventions for promoting physical activity
Charles Foster,1 Melvyn Hillsdon2 Margaret Thorogood,3 Asha Kaur,1 and Thamindu Wedatilaka4

Telephone-Delivered Interventions for Physical Activity and Dietary Behavior Change: An Updated Systematic Review
Ana D. Goode MPH5,6,7, Marina M. Reeves PhD, Elizabeth G. Eakin PhD
Show more
https://doi.org/10.1016/j.amepre.2011.08.025
Make a plan to stay on track.
Set your own weekly goals, choose the activities you want to do, and get personalized tips to help you stay motivated. When you're done, print your plan or share it with friends and family.

So make your plan — and then get moving!

https://health.gov/MoveYourWay/Activity-Planner/
Name one intervention that will help encourage physical activity
PROMOTING PHYSICAL ACTIVITY

- Prescribe Exercise
- Worksite Intervention
- Intervention
- Worksite Environment
- Wearables
- Wellness Platforms
- Phones
BENEFITS OF PHYSICAL ACTIVITY

- Weight
- Pre-existing conditions
- Physical Activity
- All Cause Mortality
- CV
- Brain Health
- Cancer
How much physical activity do kids and teens need?

At least 60 minutes every day.
Most of that time can be **moderate-intensity aerobic activity** — anything that gets their heart beating faster counts.

And at least 3 days a week, encourage them to step it up to **vigorous-intensity aerobic activity**, so they’re breathing fast and their heart is pounding.

As part of their daily 60 minutes, kids and teens also need:

**Muscle-strengthening activity**
- at least 3 days a week
- Anything that makes their muscles work harder counts — like climbing or swinging on the monkey bars.

**Bone-strengthening activity**
- at least 3 days a week
- Bones need pressure to get stronger. Running, jumping, and other weight-bearing activities all count.

Walk. Run. Dance. Play. What’s your move?
Adults need a mix of physical activity to stay healthy.

**Moderate-intensity aerobic activity**
Anything that gets your heart beating faster counts.

- at least 150 minutes a week

**Muscle-strengthening activity**
Do activities that make your muscles work harder than usual.

- at least 2 days a week

If you prefer vigorous-intensity aerobic activity (like running), aim for at least 75 minutes a week.
If that's more than you can do right now, do what you can. Even 5 minutes of physical activity has real health benefits.

Do you meet the US recommendations for physical activity?

Yes

No

Not sure
Name one thing you learned today
REFERENCES


REFERENCES CONT


