Physical Activity and Public Health: History, Status, Needs

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Outline

- Quick history
- What we know now:
  - Physical activity and health
  - Increasing physical activity
- Research needs
A Quick History of the Science on Physical Activity and Health

400 B.C. to 1990 A.D.
Hippocrates, 460-357 B.C.

“Walking is man’s best medicine”
-Hippocrates
Jeremy N. Morris (1910-2009) found that bus conductors had fewer heart attacks than sedentary drivers (1953)
Ralph Paffenbarger, Jr. (1922-2007) found that active longshoremen (cargo handlers) had coronary death rates two thirds lower than sedentary longshoremen (1970).
Bonnie Prudden (1914-2011)

- Advocate of physical fitness
- Administered Kraus-Weber test & presented results to President Eisenhower in 1955
- Wrote 15 books
William J. Bowerman (1911-1999)

- Track and field coach
- Introduced jogging as a fitness routine
- *Jogging* published in 1966 & 1967 with W.E. Harris
Kenneth H. Cooper

- The “Father of Aerobics”: published *Aerobics* in 1968
- Founded The Cooper Institute in 1970
- Aerobic Center Longitudinal Study (aka CCLS)
- The Cooper test: 12-min run test to assess CRF
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Year</th>
<th>MODE</th>
<th>FREQ (d/wk)</th>
<th>DUR (min)</th>
<th>INT (% FC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACSM</td>
<td>1975</td>
<td>Aerobic</td>
<td>3-5</td>
<td>20-45</td>
<td>70-90</td>
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<td>1980</td>
<td>Aerobic</td>
<td>3-5</td>
<td>15-60</td>
<td>50-85</td>
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<tr>
<td></td>
<td>1986</td>
<td>Aerobic</td>
<td>3-5</td>
<td>15-60</td>
<td>50-85</td>
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<tr>
<td></td>
<td>1991</td>
<td>Aerobic</td>
<td>3-5</td>
<td>15-60</td>
<td>40-85</td>
</tr>
</tbody>
</table>
Heart Attack Risk Reduction
Harvard Alumni Study

Leisure-time PA & Risk of CHD and Death, MRFIT

Leon et al. *JAMA* 1987;258:2388-95
Physical Fitness & All-Cause Mortality - ACLS

Age-adjusted death rates per 10,000 person y

Fitness Groups

1 Low
2
3
4
5 High

Men
Women

Blair et al. *JAMA* 1989;262:2395-401
Inactivity is recognized as a risk factor for coronary artery disease.
Change in PA – Harvard Alumni Health Study

Relative Risk of All-Cause Mortality

* P < 0.02

Paffenbarger et al. *NEJM* 1993;328:538-45
Change in Physical Fitness & All-Cause Mortality - ACLS

Blair et al. *JAMA* 1995;273:1093-8
PA & Public Health: A Recommendation from CDC & ACSM

- Every US adult should accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week.

  Pate et al. JAMA 1995;273:402-7
NIH Consensus Statement

Volume 13, Number 3
December 18-20, 1995

Physical Activity and Cardiovascular Health
National Institutes of Health
Office of the Director
1996 – Physical Activity & Health

Physical Activity and Health

A Report of the Surgeon General

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Center for Chronic Disease Prevention and Health Promotion
The President’s Council on Physical Fitness and Sports
Publications 1960-2012
“Health and...”

Number of Publications

- Exercise
- PA

What We Know About Physical Activity and Health
The report was presented to the Secretary of Health and Human Services and published in June 2008.
Health Benefits of Physical Activity
Adults and Older Adults
Strong Evidence

- Lower risk of:
  - Early death
  - Heart disease
  - Stroke
  - Type 2 diabetes
  - High blood pressure
  - Adverse blood lipid profile
  - Metabolic syndrome
  - Colon and breast cancers

- Prevention of weight gain
- Weight loss when combined with diet
- Improved cardiorespiratory and muscular fitness
- Prevention of falls
- Reduced depression
- Better cognitive function (older adults)
Health Benefits of Physical Activity

Adults and Older Adults

- **Moderate to Strong Evidence:**
  - Better functional health (older adults)
  - Reduced abdominal obesity

- **Moderate Evidence:**
  - Weight maintenance after weight loss
  - Lower risk of hip fracture
  - Increased bone density
  - Improved sleep quality
  - Lower risk of lung and endometrial cancers
Health Benefits of Physical Activity
Children and Adolescents

- **Strong Evidence:**
  - Improved cardiopulmonary endurance and muscular fitness
  - Favorable body composition
  - Improved bone health
  - Improved cardiovascular and metabolic health biomarkers

- **Moderate Evidence:**
  - Reduced symptoms of anxiety and depression
More Information:
http://www.health.gov/paguidelines
Adults (18–64 years)

- 2 hours & 30 min/week of moderate-intensity aerobic PA, or 1 hour & 15 min/week of vigorous-intensity aerobic PA, or an equivalent combination of both

- Episodes of at least 10 min, spread across the week

- Additional health benefits with 300 min/week of moderate-intensity aerobic PA, or 2 hours & 30 min/week of vigorous-intensity PA, or an equivalent combination of both

- Muscle-strengthening activities on 2 or more days/week
Children and Adolescents (6–17 years of age)

- **1 hour (60 minutes) or more of PA every day**
  - Most of the 1 hour or more a day should be either moderate- or vigorous-intensity aerobic PA
  - Vigorous-intensity PA at least 3 days per week
  - Muscle-strengthening and bone-strengthening activity at least 3 days per week
Adults: Prevalence of Meeting PA Recommendations – BRFSS 2007

Carlson et al. MMWR 2008;57(48):1297-1300
Youth: Prevalence of achieving 60 min/d of MVPA on all 7 days - YRBS 2010

CDC MMWR 2012;61(4):1-168
Adults: Prevalence of Meeting PA Recommendations - Accelerometry

Youth: Prevalence of attaining 60 min of MVPA per day - Accelerometry

## Preventable Causes of Death, US 2005

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Attributable Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco smoking</td>
<td>467,000</td>
</tr>
<tr>
<td>Hypertension</td>
<td>395,000</td>
</tr>
<tr>
<td>Overweight &amp; obesity</td>
<td>216,000</td>
</tr>
<tr>
<td><strong>Physical Inactivity</strong></td>
<td><strong>191,000</strong></td>
</tr>
<tr>
<td>High dietary salt</td>
<td>102,000</td>
</tr>
<tr>
<td>Low dietary omega-3 fatty acids</td>
<td>84,000</td>
</tr>
<tr>
<td>High dietary trans fatty acids</td>
<td>82,000</td>
</tr>
</tbody>
</table>

Percent Disease Burden Caused by Physical Inactivity, Worldwide, 2008

Lee et al. Lancet 2012;380:219-29
What We Know About Intervening to Increase Physical Activity
Methods: Guide to Community Preventive Services - 2002

- Systematic review of the literature for PA interventions:
  - Individual approaches
  - Setting-specific interventions
  - Community-wide interventions

- Published between 1980 and 2000

- 94 studies included

Conclusions: *Guide to Community Preventive Services - 2002*

Informational Approaches to Increase PA:

- **Strong Evidence:**
  - Community-wide campaigns

- **Sufficient Evidence:**
  - Point-of-decision prompts

- **Insufficient Evidence:**
  - Mass media campaigns
  - Classroom-based health education focused on information provision

Conclusions: *Guide to Community Preventive Services - 2002*

Behavioral & Social Approaches to Increase PA:

- **Strong Evidence:**
  - School-based physical education
  - Social support interventions in community settings
  - Individually-adapted health behavior change programs

- **Insufficient Evidence:**
  - College-based health education and PE interventions
  - Classroom-based health education focused on reducing TV and video game playing
  - Family-based social support

Environmental & Policy Approaches to Increase PA:

- Strong Evidence:
  - Creation of or enhanced access to places for physical activity combined with informational outreach activities

Evidence-based Intervention in Physical Activity: Lessons from Around the World.

Evidence-based Intervention in Physical Activity - Methods

- Systematic review of reviews
- Published between 2000 and 2011
- 100 reviews included:
  - School = 5
  - Workplace = 5
  - Community = 14
  - Clinical or primary care = 18
  - Several settings = 58

Heath et al. *Lancet* 2012;380:272-81
Evidence-based Intervention in Physical Activity - Conclusions

- Effective approaches:
  - Public communication & informational approaches
    - Community-wide campaigns
    - Mass media campaigns
    - Decision prompts encouraging use of stairs
  - Initiatives to increase social support for PA within communities, neighborhoods and worksites
  - Environmental and policy approaches can create or enhance access to places for PA
    - Urban design of land use
    - Planning at community and street scales
    - Active transport policies and practices

Heath et al. Lancet 2012;380:272-81
PAG Mid-course Report: Strategies to Increase PA among Youth

PAG Mid-course Report: Strategies to Increase PA among Youth

- Systematic review of reviews
- Youth ages 3-17 years
- Published between Jan 2001 and July 2012
- 31 reviews included:
  - Schools
  - Preschools and childcare facilities
  - Community
  - Family and home
  - Primary care
## PAG Mid-course Report: Strategies to Increase PA among Youth

<table>
<thead>
<tr>
<th>Intervention Type</th>
<th>Conclusion</th>
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</thead>
<tbody>
<tr>
<td>Multi-Component School Intervention</td>
<td>Sufficient</td>
</tr>
<tr>
<td>Physical Education</td>
<td>Sufficient</td>
</tr>
<tr>
<td>Active Transportation</td>
<td>Suggestive</td>
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<tr>
<td>Activity Breaks</td>
<td>Emerging</td>
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<tr>
<td>School Physical Environment</td>
<td>Insufficient</td>
</tr>
<tr>
<td>After School</td>
<td>Insufficient</td>
</tr>
<tr>
<td>Preschool &amp; Childcare Center</td>
<td>Suggestive</td>
</tr>
<tr>
<td>Built Environment</td>
<td>Suggestive</td>
</tr>
<tr>
<td>Camps &amp; Youth Organizations</td>
<td>Insufficient</td>
</tr>
<tr>
<td>Other Community Programs</td>
<td>Insufficient</td>
</tr>
<tr>
<td>Home &amp; Family</td>
<td>Insufficient</td>
</tr>
<tr>
<td>Primary Care</td>
<td>Insufficient</td>
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</table>
National Physical Activity Plan

http://www.physicalactivityplan.org
What is a Physical Activity Plan?

A comprehensive set of strategies including policies, practices, and initiatives aimed at increasing physical activity in all segments of the population.
8 Sectors of the National PA Plan

- Public Health
- Education
- Volunteer & Not for Profit Organizations
- Transportation, Urban Design, Community Planning
- Mass Media
- Healthcare
- Business & Industry
- Parks, Recreation, & Sports
Content of the Plan

Sector-specific Strategies & Tactics

• 52 Strategies
• 215 Tactics
Education

- Provide access to & opportunities for high-quality, comprehensive PA programs, anchored by PE, in pre-K through grade 12 educational settings.
- Ensure that the programs are physically active, inclusive, safe, & developmentally & culturally appropriate.
Business & Industry

- Identify, summarize, and disseminate best practices, models, and evidence-based PA interventions in the workplace
  - Cognitive and behavioral interventions
  - Environmental changes that support and encourage PA (e.g. shower facilities)
  - Policies that encourage workers to be physically active (e.g. flex time, lunch time walking groups)
Parks, Recreation, Fitness, & Sports

- Increase joint use agreements between parks and recreation, schools and youth serving organizations through workshops and presentations.
Health Care

- Increase by 10% targeted healthcare organizations that encourage members to assess and counsel patients on physical activity.
Research Needs

- Program evaluation
- Efficacy studies
- Translation
  - Dissemination
  - Implementation
- NIH-wide coordination