The Global Pandemic of Physical Inactivity: An Urgent Public Health Priority

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@billkohl #physicalactivity


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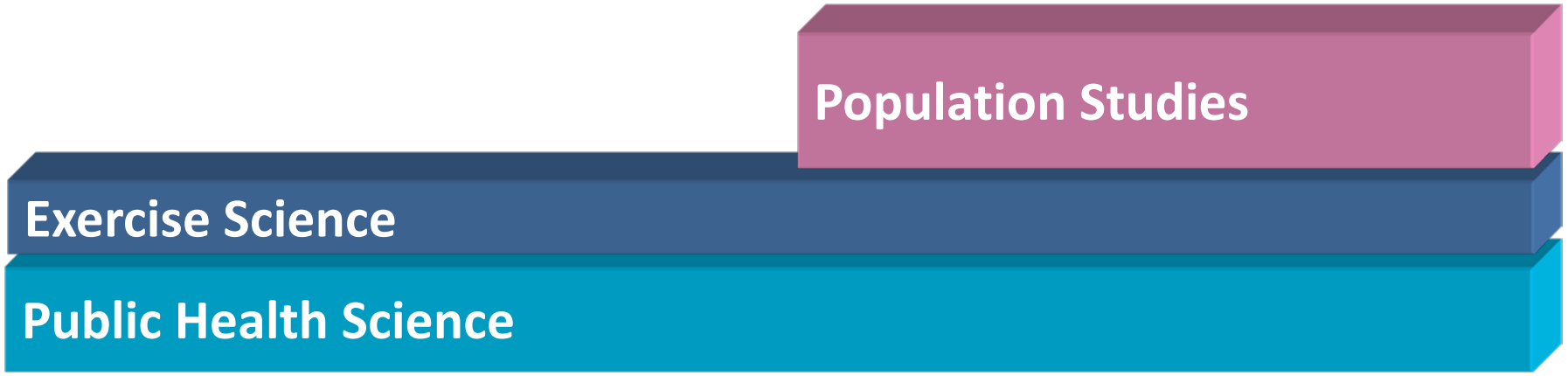
Overview

- Evolution of Physical Activity and Public Health as a subdiscipline
- Urgent public health problem
- Physical activity and air quality

Physical Activity and Public Health – Development of a Field



1900 1953


Shoreditch Bank
Southwark Bridge
Lambeth Bridge
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MANSION HOUSE STN
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Background 1950 - 1970
Factors leading to initial guideline development

- A rapidly evolving science indicating that habitual physical activity had something to do with health.

- Individuals promoting health-oriented fitness programs for the public and patients - what was the truth, what was the best?

- Concern by the medical community & public about the safety of exercise by middle-aged and older persons.

Physical Activity and Health Guidelines & Position Stands for the General Public: 1975 - 1995

- American Heart Association - 1975 *Exercise Testing and Training of Healthy Adults* and *Exercise Testing and Training of Individuals with Heart Disease or at High Risk for Its Development*

- American Heart Association - 1978 *Exercise Statement and Exercise Standards (updated 1992 & 1995)*

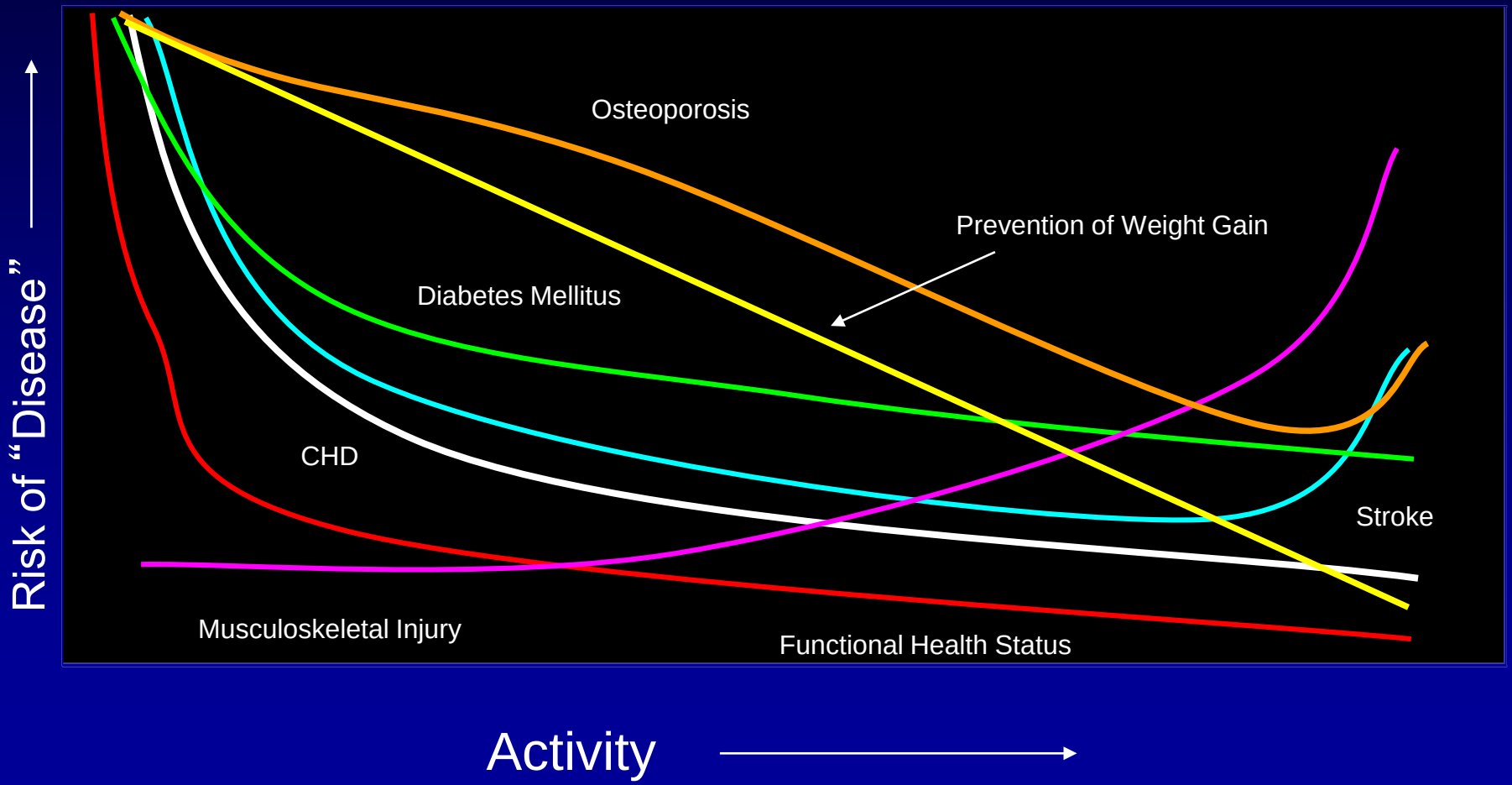
- ACSM - 1975 *Guidelines for Graded Exercise Testing and Exercise Prescription (multiple updates)*

- *ACSM - 1978 Position Stand: The Recommended Quantity and Quality of Exercise for Developing and Maintaining Fitness in Healthy Adults (multiple updates)*

Early 1990s

- Accumulated, moderate-intensity physical activity provides health benefits.
- Only 10% meeting vigorous physical activity standard.
- Vigorous standard may be barrier.
- Public health gain created; with avoidance of sedentary status.

Physical Inactivity and Health



Special Communication

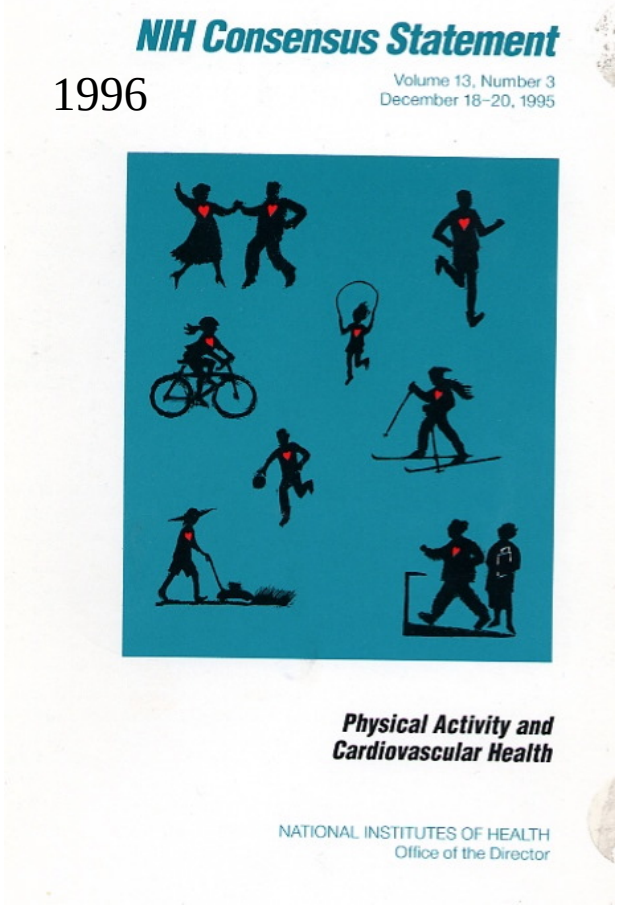
Physical Activity and Public Health

1995

A Recommendation From the Centers for Disease Control and Prevention and the American College of Sports Medicine

Russell R. Pate, PhD; Michael Pratt, MD, MPH; Steven N. Blair, PED; William L. Haskell, PhD; Caroline A. Macera, PhD; Claude Bouchard, PhD; David Buchner, MD, MPH; Walter Ettinger, MD; Gregory W. Heath, DHSc; Abby C. King, PhD; Andrea Kriska, PhD; Arthur S. Leon, MD; Bess H. Marcus, PhD; Jeremy Morris, MD; Ralph S. Paffenbarger, Jr, MD; Kevin Patrick, MD; Michael L. Pollock, PhD; James M. Rippe, MD; James Sallis, PhD; Jack H. Wilmore, PhD

1996



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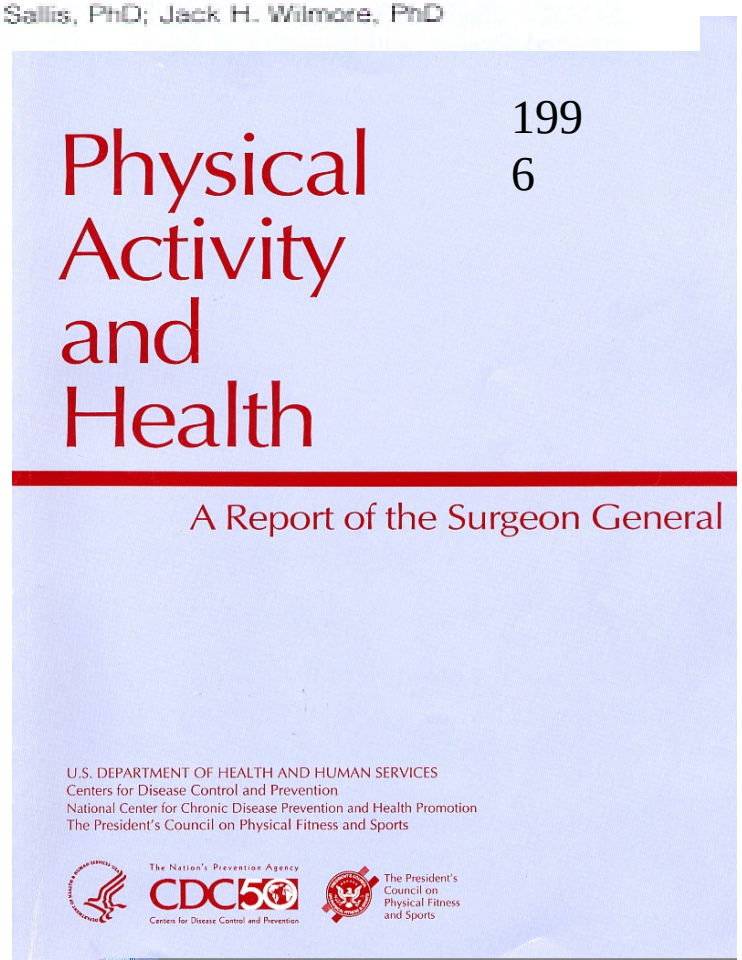


Physical Activity Public Health Recommendations

Every adult American should accumulate at least 30 minutes of moderate-to-vigorous physical activity on most, preferably all, days of the week.

Pate, et al., JAMA 1995

2008 Physical Activity Guidelines for Americans

Preventive Health Benefits of Physical Activity: Strong Evidence

- Lower risk of:
  - Early death
  - Coronary heart disease, stroke
  - High blood pressure, adverse lipid profile
  - Type 2 diabetes
  - Cancers: Colon and Breast
- Prevention of weight gain
- Weight loss (with reduction of caloric intake)
- Prevention of falls
- Depression, cognitive function (older adults)

4 Key Adult *Guidelines*

- 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

Children and Adolescents (ages 6-17)

- 60 or more minutes of physical activity daily
  - Aerobic: Most of the 60 or more minutes per day should be either moderate- or vigorous-intensity aerobic physical activity. Include vigorous-intensity physical activity at least 3 days per week.
  - Muscle-strengthening: Include muscle-strengthening physical activity on at least 3 days of the week, as part of the 60 or more minutes.
  - Bone-strengthening: Include bone-strengthening physical activity on at least 3 days of the week, as part of the 60 or more minutes.
- Encourage participation in physical activities that are:
  - Age appropriate, enjoyable, and offer variety

Inactivity

- “All adults should avoid inactivity. Some physical activity is better than none, and adults who participate in any amount of physical activity gain some health benefits.”

Muscle-Strengthening Guideline

- “Adults should also do muscle-strengthening activities that are moderate or high intensity and involve all major muscle groups on 2 or more days a week, as these activities provide additional health benefits.”

Key Older Adult Guidelines

- The 4 key guidelines for adults apply to older adults, but there are 4 additional qualifying guidelines
  - Guideline for adults who cannot do 150 minutes/week
  - Balance exercise
  - Only use relative intensity to determine the level of effort
  - Chronic conditions and injury risk

Physical Activity Guidelines

- Upcoming Guidelines +
- Current Guidelines +
- Report on Strategies for Youth +
- Related Resources +
- Supporter Network Member List
- Be Active Your Way Blog

Get email updates

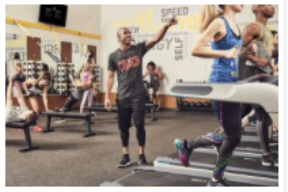
Sign up for emails about physical activity

Physical Activity

Physical activity is key to improving the health of the Nation. Based on the latest science, the Physical Activity Guidelines for Americans is an essential resource for health professionals and policymakers that provides recommendations on how everyone can improve their health through regular physical activity. Learn ways to help people understand the benefits of physical activity and how to make it a part of their regular routine.

News & Announcements

5 Factors That Help People Stick to a New Exercise Habit



Posted on Jan 10, 2018

During the month of January, health and fitness is top of mind for people setting resolutions for a healthy new year...

Read more

The Exercise Training Paradigm

Early guidelines (AHA 1975, ACSM 1978,1990) were based primarily on endurance exercise to enhance performance - especially aerobic capacity.

TRAINING  PERFORMANCE

RATIONALE: Increases in aerobic capacity are most rapidly achieved by increasing the intensity of endurance exercise

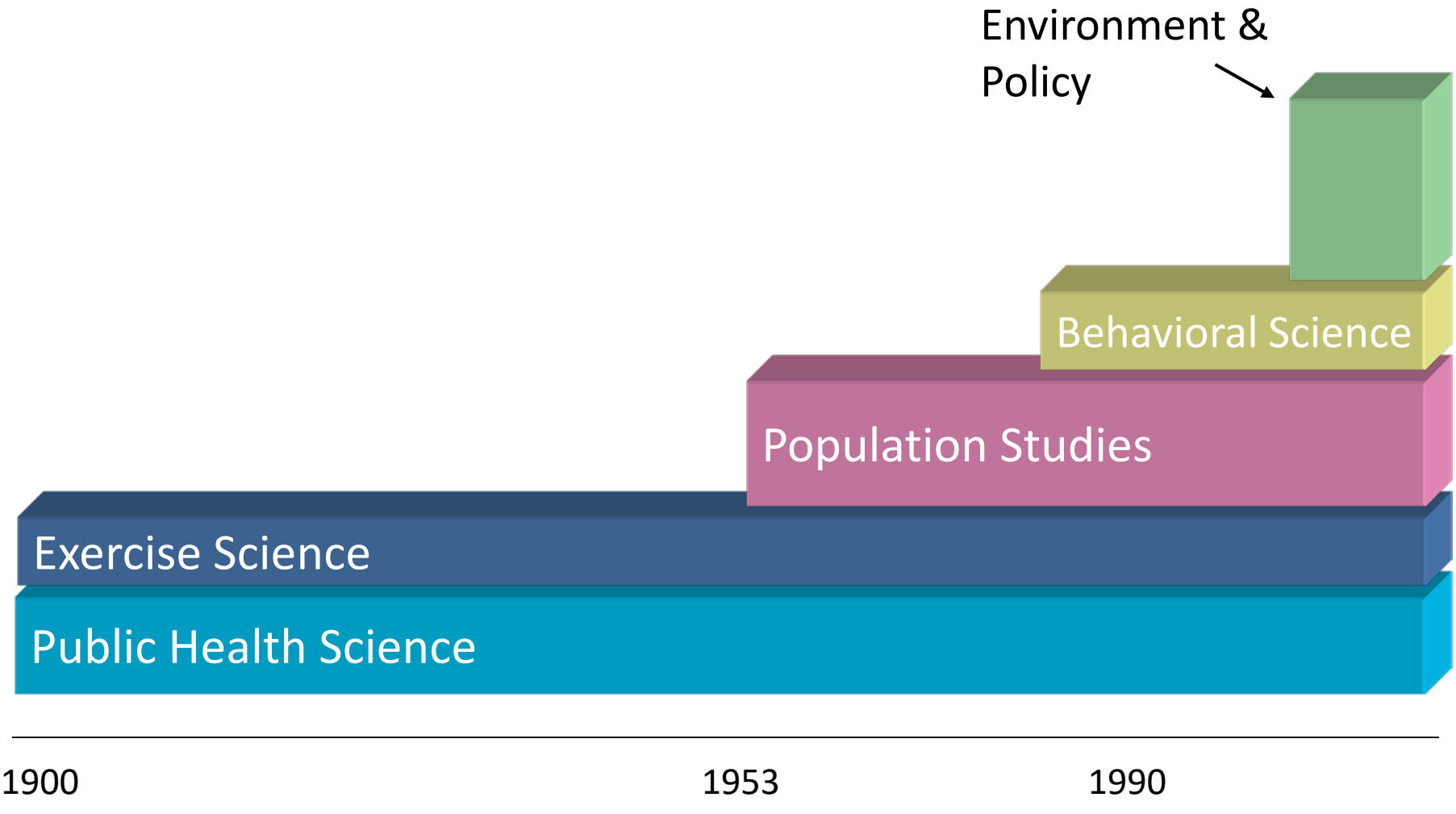
The Physical Activity - Health Paradigm

Public health oriented guidelines since 1995 include the accumulation of ≥ 30 minutes of ≥ of moderate intensity activity on ≥ 5 days per week .

ACTIVITY  HEALTH

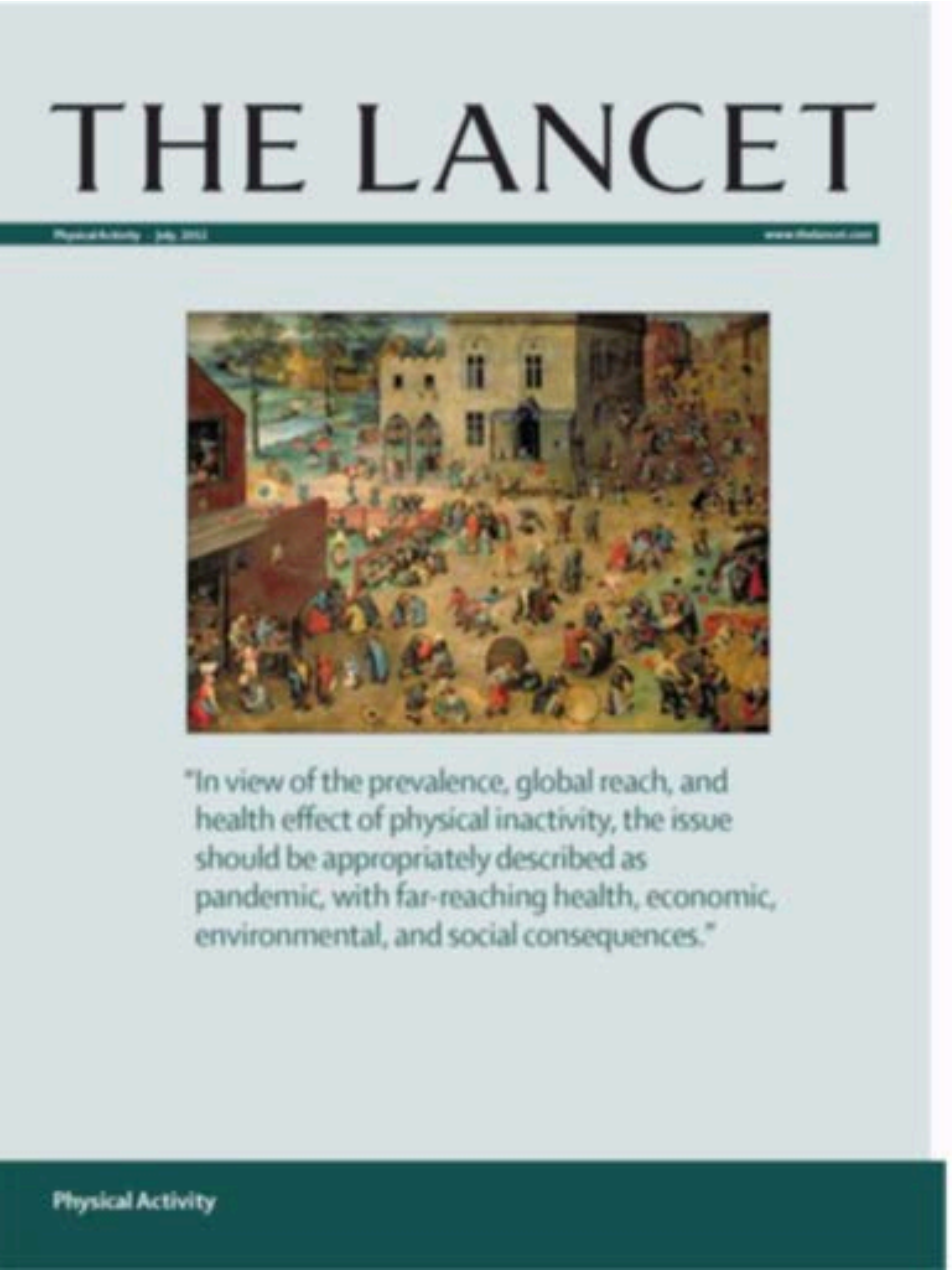
RATIONALE: Data from observational and experimental studies demonstrate health-related outcomes from moderate intensity activity accumulated throughout the day.

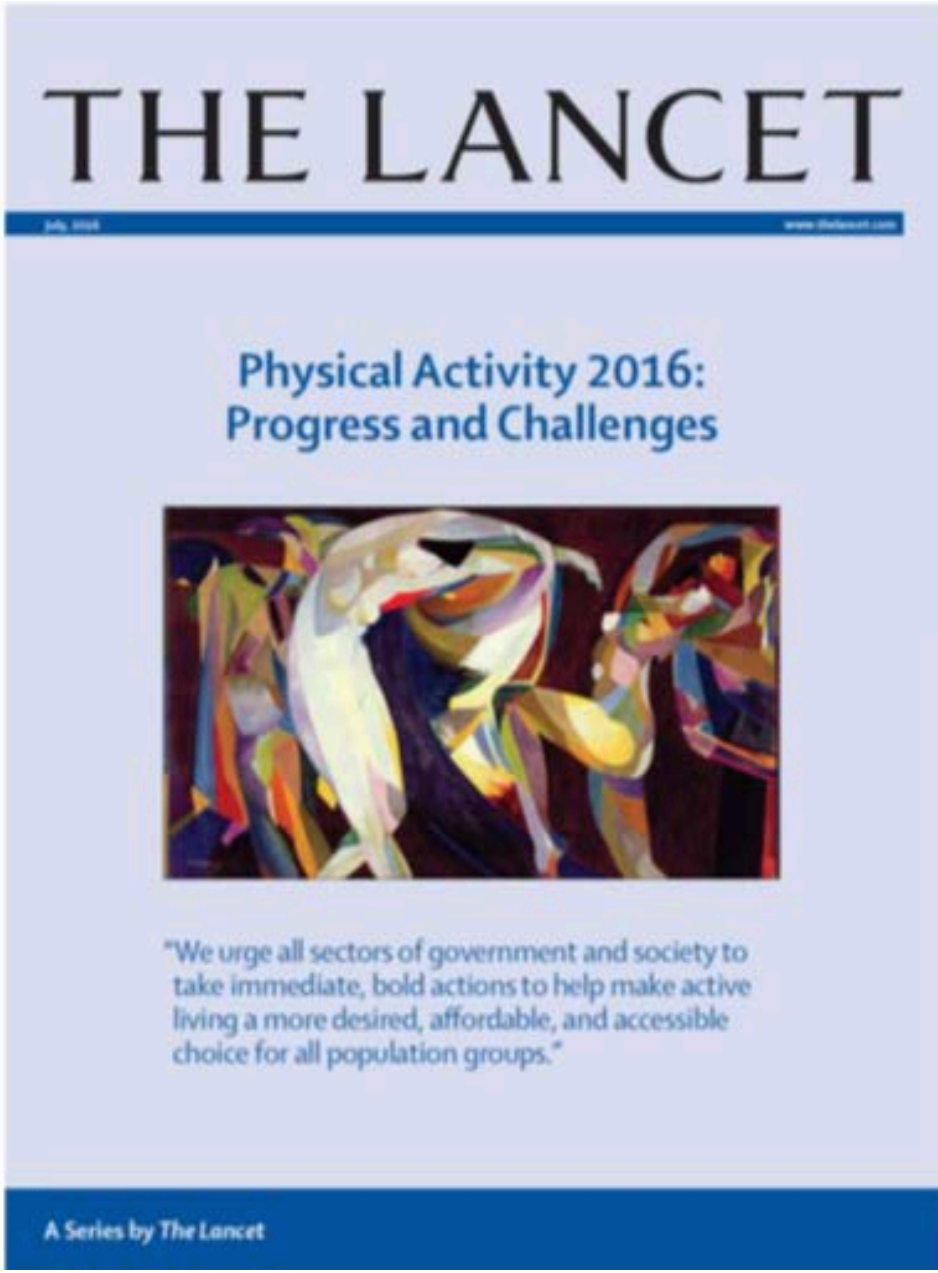
Physical Activity and Public Health – Development of a Field



Children’s Games, Pieter Bruegel the Elder, 1560

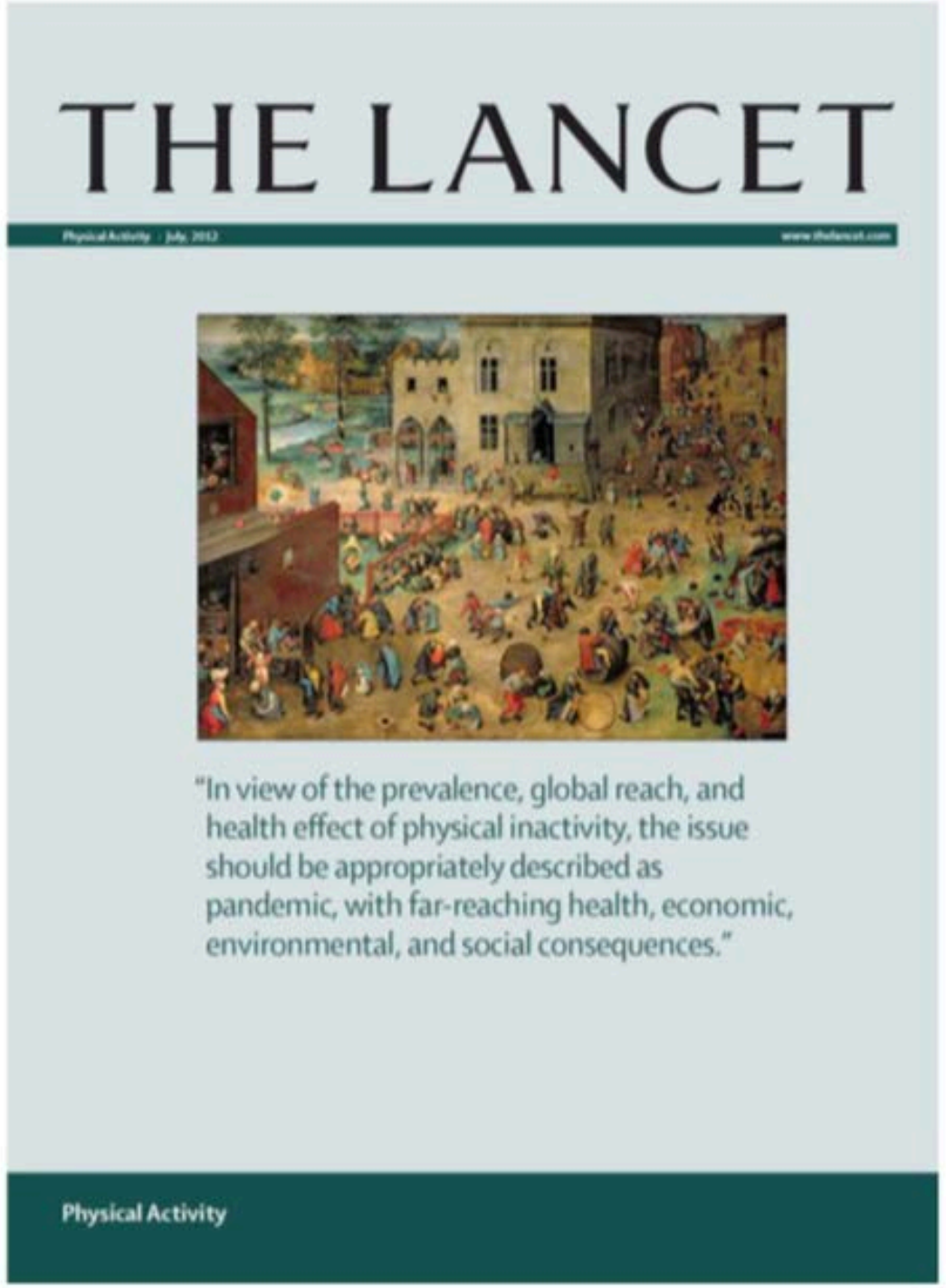
Current situation





http://www.thelancet.com/series/physical-activity

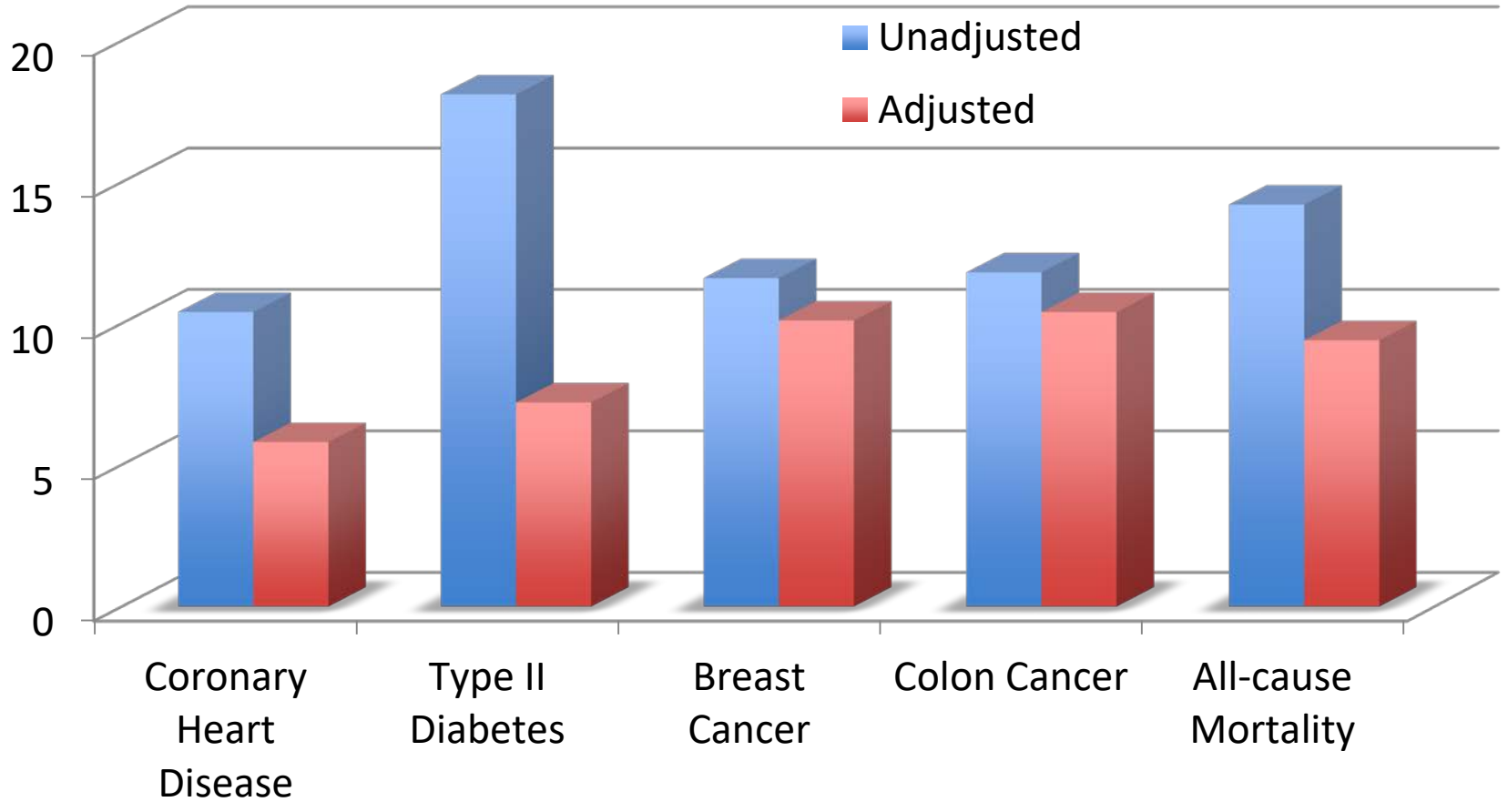
"Governments, policy makers and the research community should help to build societies in which the choice of being physical active is not only healthy, but also convenient, enjoyable, safe, affordable and valued"



A Public Health Problem

- Importance
- Prevalence and trends
- Solutions

Population attributable fraction for major NCDs associated with physical inactivity



Lee et al Lancet 2012

Burden of Disease

~ 6-10% of major NCDs worldwide is attributable to physical inactivity

6% Coronary heart disease

7% Type 2 diabetes

10% Breast cancer

10% Colon cancer

9% Premature mortality

	Coronary heart disease	Type 2 diabetes	Breast cancer*	Colon cancer	All-cause mortality
Prevalence of inactivity in population (%)†	35·2% (22·3–40·5)	35·2% (22·3–40·5)	38·8% (23·3–44·3)	35·2% (22·3–40·5)	35·2% (22·3–40·5)
Prevalence of inactivity in people eventually developing the outcome (%)†	42·2% (23·0–56·2)	43·2% (23·6–57·6)	40·7% (22·5–56·7)	42·9% (23·4–57·1)	42·9% (23·4–57·1)
RR, unadjusted‡	1·33 (1·18–1·49)	1·63 (1·27–2·11)	1·34 (1·25–1·43)	1·38 (1·31–1·45)	1·47 (1·38–1·57)
RR, adjusted‡	1·16 (1·04–1·30)	1·20 (1·10–1·33)	1·33 (1·26–1·42)	1·32 (1·23–1·39)	1·28 (1·21–1·36)
PAF with unadjusted RR (%)§	10·4% (7·2–13·4)	18·1% (10·8–22·8)	11·6% (6·8–15·5)	11·8% (6·8–15·1)	14·2% (8·3–18·0)
PAF with adjusted RR (%)§	5·8% (3·2–7·8)	7·2% (3·9–9·6)	10·1% (5·6–14·1)	10·4% (5·7–13·8)	9·4% (5·1–12·5)

Some Perspective

	Inactivity	Smoking	Obesity
PAF	**9%**	**9% [a]**	**5% [a]**
Deaths attributed to risk factor (per y)	**5.3M**	**5M [a b]**	**3M [a]**
Potential gain in LE with removal of factor	**0·68 y from birth**	**1·1–2·2 y [c] from age 50 (9 high-income countries)**	**0.7–1.1 y [d] from birth (USA)**

[a] 2009 WHO Global Health Risks; [b] Ezzati 2003; [c] Crimmins 2011; [d] Olshansky 2005

Importance

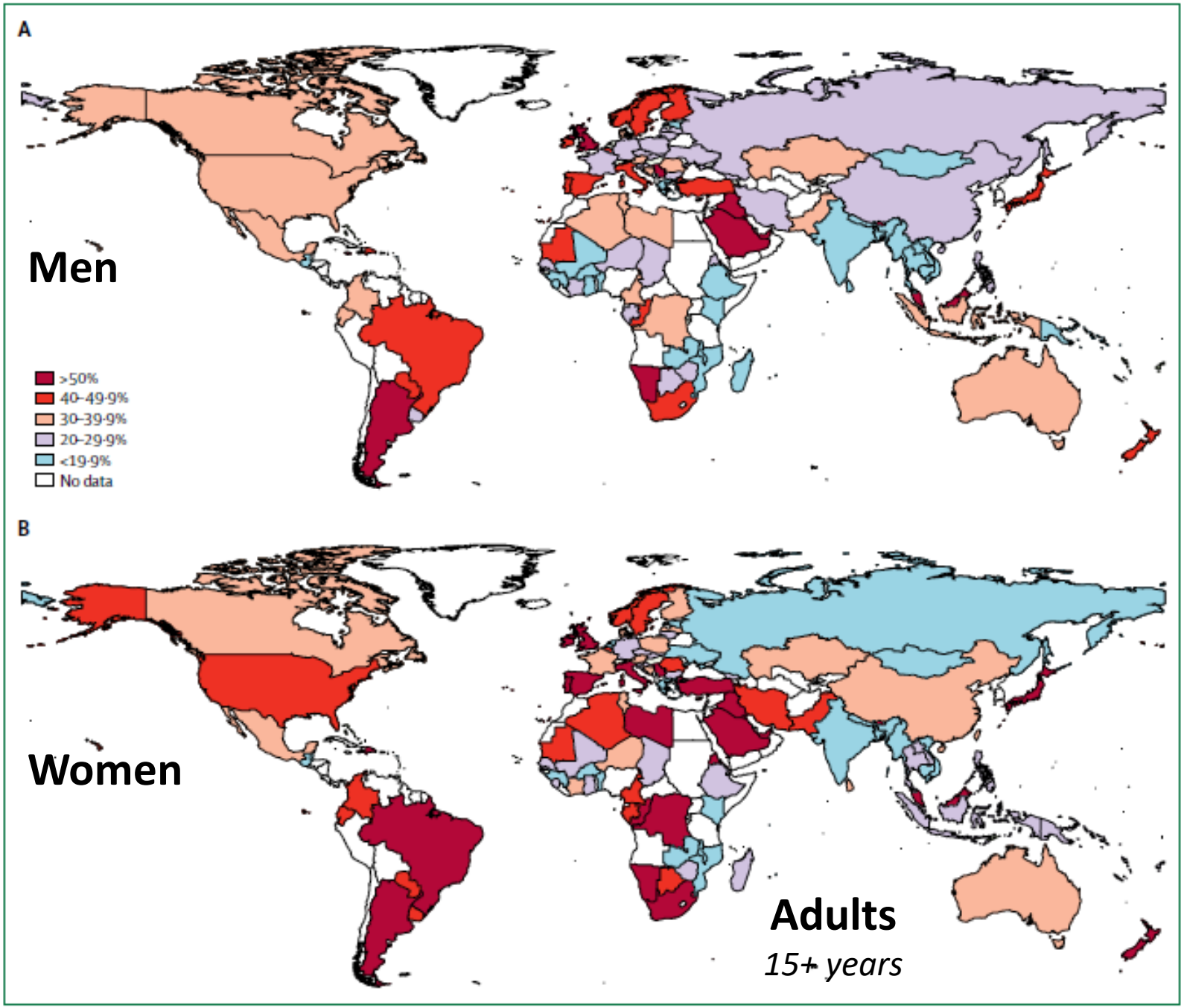
- Between 6-10% of deaths due to the world's major NCDs is attributable to inactivity
- By eliminating inactivity, >5.3 M deaths/y may be prevented
- This leads to an increase of 0.68 years in the world's life expectancy

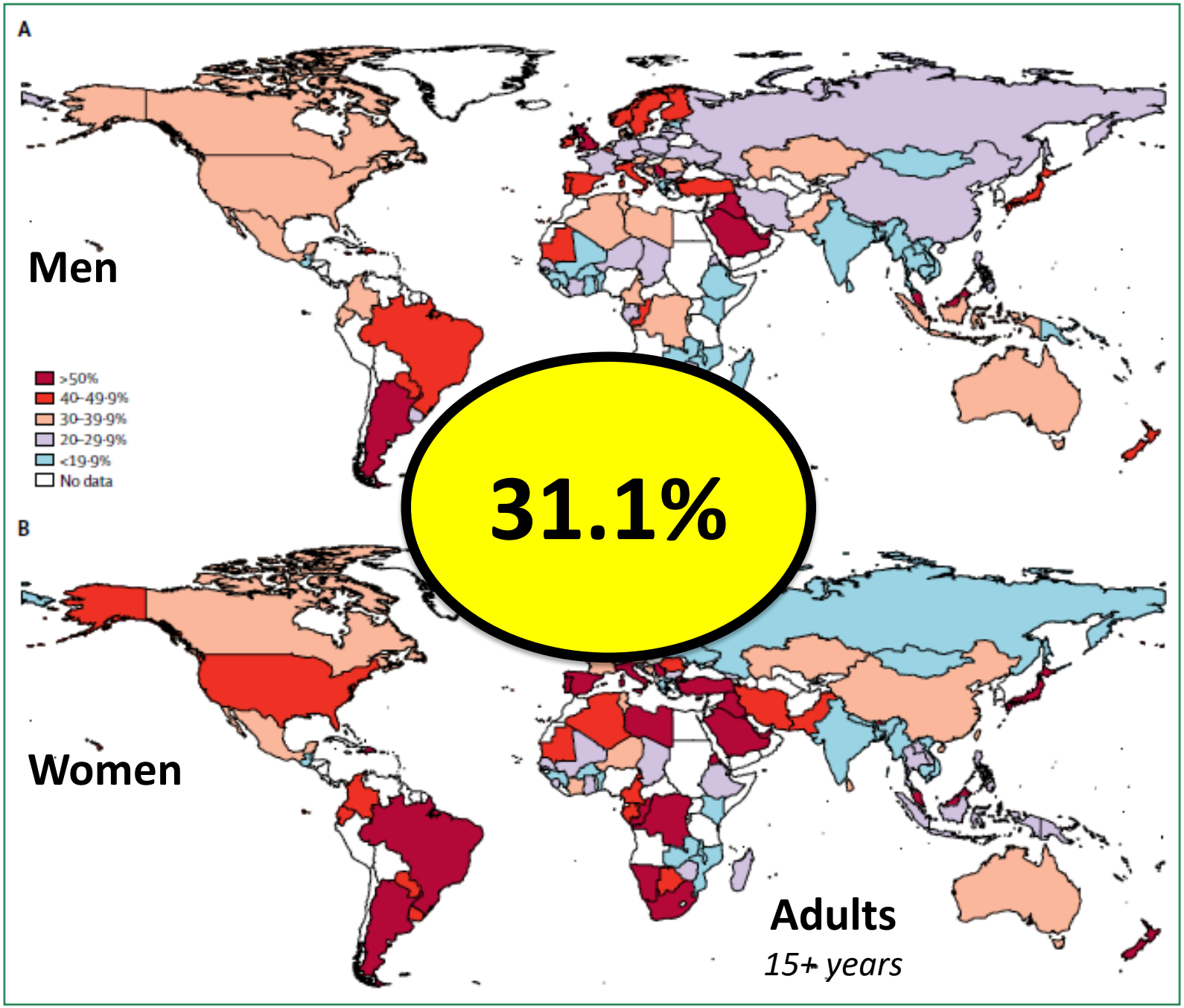
Pandemic?

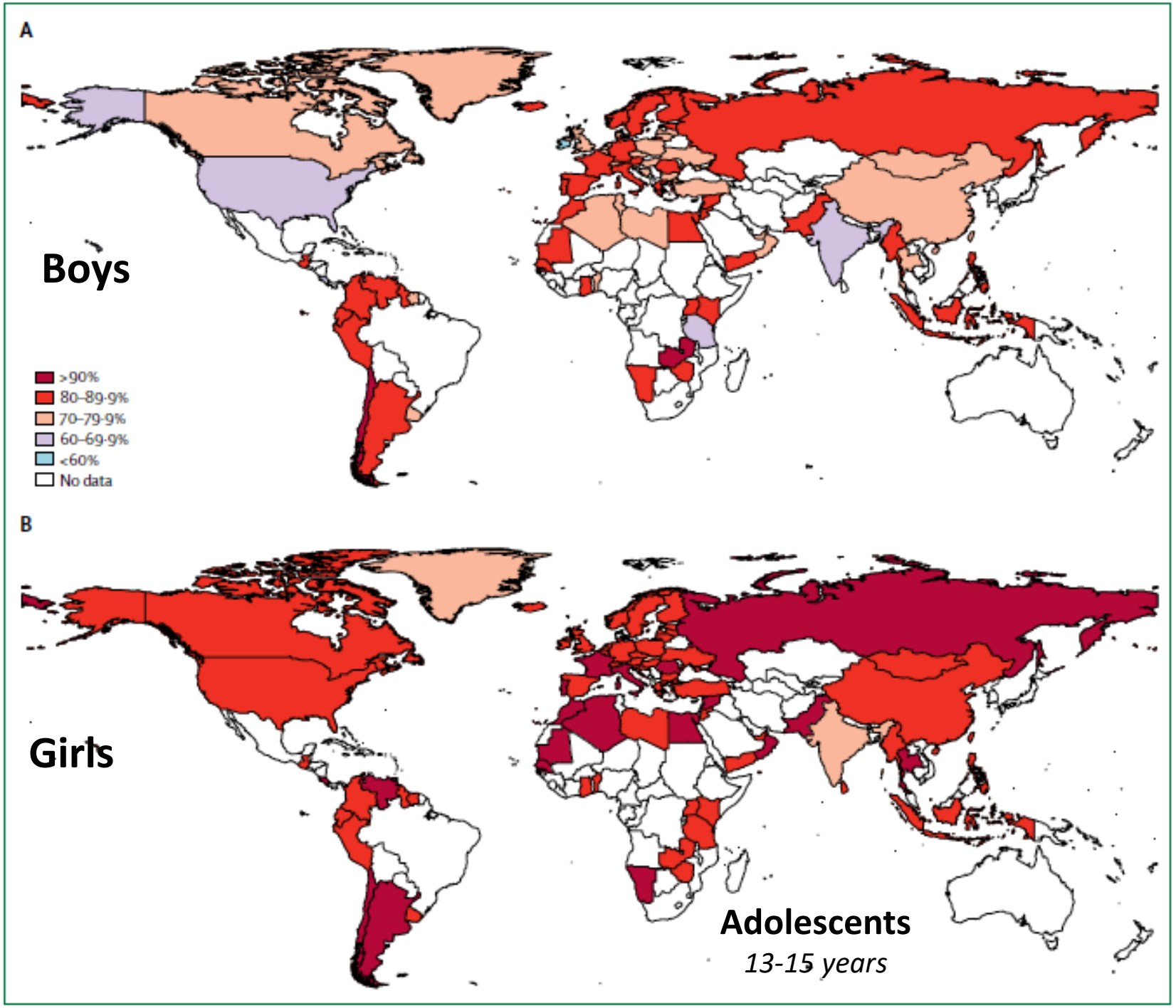
Pandemic?

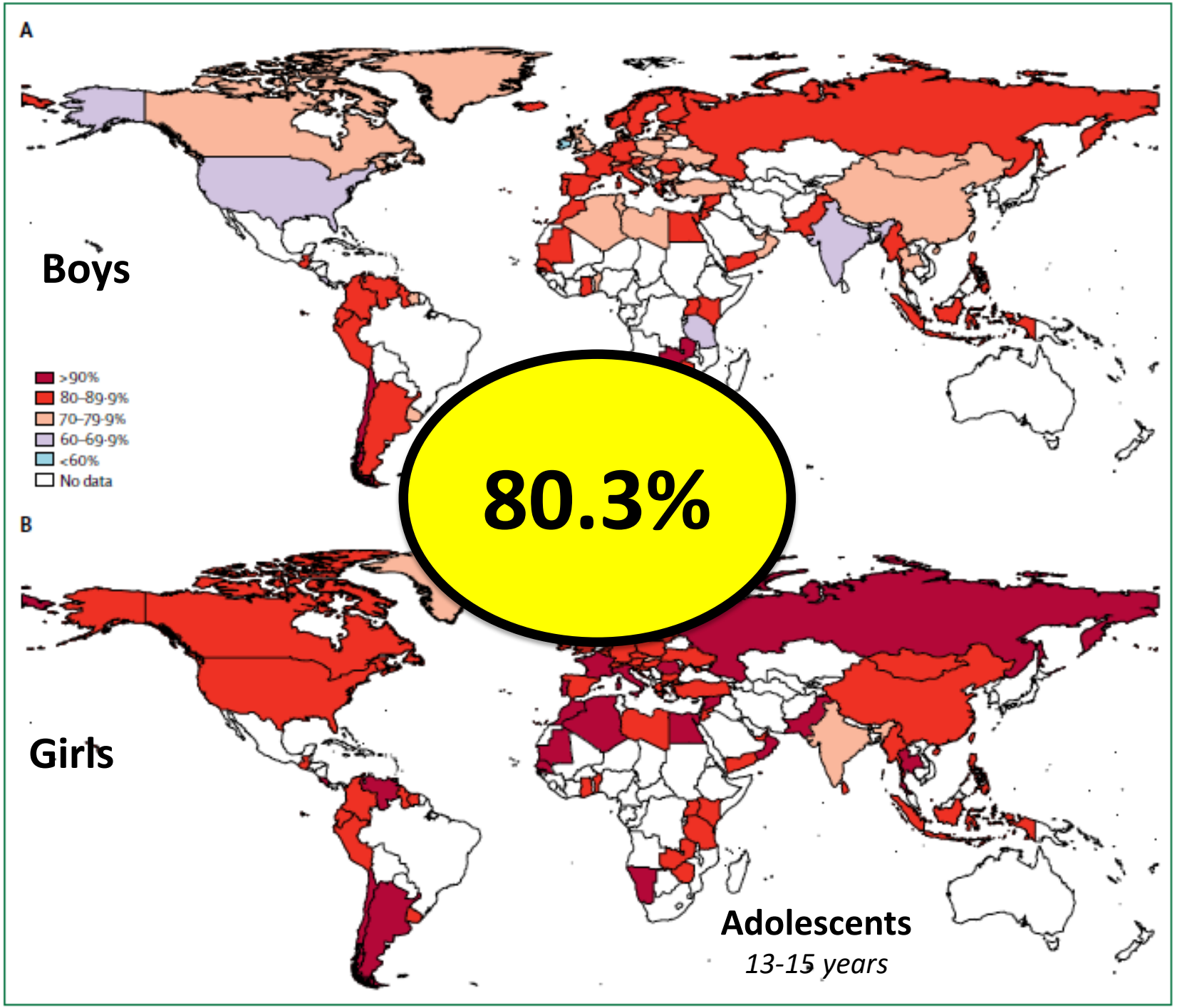
- "…an epidemic occurring worldwide, or over a very wide area, crossing international boundaries, and usually affecting a large number of people…"
- "…the occurrence in a community or region of cases of an illness, **specific health related behavior**, or other health related events clearly in excess of normal expectancy…"

Last – Dictionary of Epidemiology, 4th edition


A
Men
>50%
40–49·9%
30–39·9%
20–29·9%
<19·9%
No data
B
Women
Adults
15+ years


A
Men
>50%
40–49·9%
30–39·9%
20–29·9%
<19·9%
No data
31.1%
B
Women
Adults
15+ years


A
Boys
>90%
80–89·9%
70–79·9%
60–69·9%
<60%
No data
B
Girls
Adolescents
13-15 years


A
Boys
>90%
80–89·9%
70–79·9%
60–69·9%
<60%
No data
80.3%
B
Girls
Adolescents
13-15 years

Wide Spread

- 1/3 of the adults and 4/5 of the adolescents (13-15y) worldwide reported not reaching public health guidelines for physical activity
  - Adults: 150 minutes/week
  - Adolescents: 1 hour/day
- Males are more active than females
  - Among adults and adolescents
- Adults
  - Global average: 31.1%

Hallal et al Lancet 2012

Surveillance

#PhysAct2016

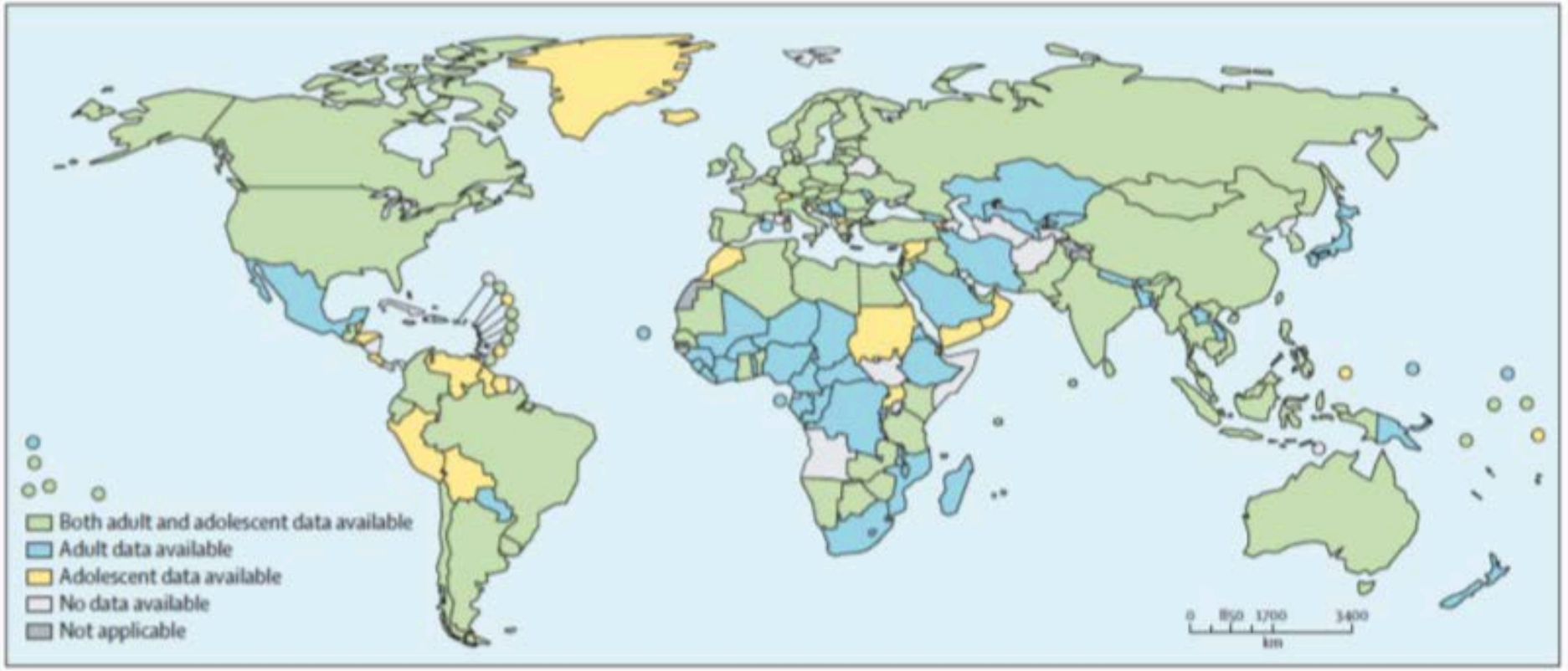


Figure 1: Physical activity data availability for school-going adolescents (aged 11–17 years) and adults (aged ≥18 years)
Data are from WHO Global Health Observatory, 2015.

Adults: 122 countries (2012), 146 (2016)
Adolescents: 105 countries (2012), 120 (2016)
No changes in prevalence over the 4-years period

A conceptual approach to determinants of PA

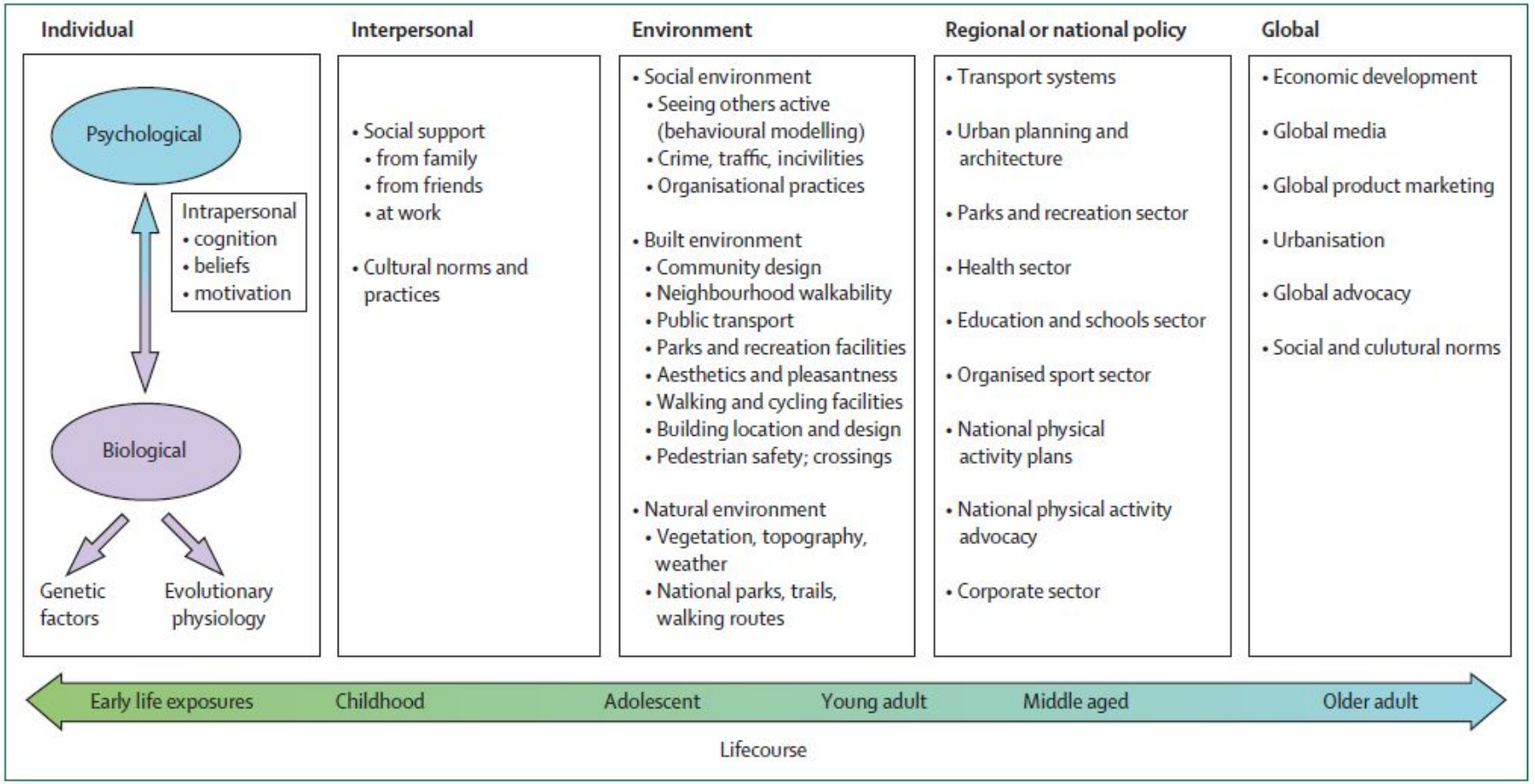


Figure 1: Adapted ecological model of the determinants of physical activity

Bauman et al. Lancet 2012; 380 (9838): 258-71

Examples of variables identified as consistent correlates

Non-environmental factors

	children	adolescents	adults
Reported health			direct
Male sex	direct	direct	direct
Intention to exercise			direct
Self-efficacy	direct	direct	direct
Previous physical activity	direct	direct	direct
Social support		direct	

Environmental factors

	children	adolescents	adults
Neighbourhood design	direct		
Recreation facilities and locations	direct		direct
Transport environments	direct		direct
Aesthetics			direct

Bauman et al. Lancet 2012; 380 (9838): 258-71

Correlates and Determinants

Many potential factors studied

For children and adolescents

- Gender [Boys], parental physical activity, parental support, confidence, previous activity [for adolescents]
- Physical Environments – for active travel to school, for recreation

For adults

- Age, gender, health status, education
- Confidence, readiness to change, previous activity, support from friends/peers

Environmental correlates

- Walkability
- Land use, residential density
- Access to facilities

Bauman et al Lancet 2012

Strategies that Work

Approaches	Strategy	Classification
Campaigns and Informational	Point-of-decision Prompts	EFFECTIVE
	Community-wide Campaigns	EFFECTIVE/ PROMISING
	Mass media Campaigns	PROMISING
	Short Informational Messages	EMERGING
Behavioral and Social	School-based Strategies	EFFECTIVE
	Social Support in Communities	EFFECTIVE
	Provider-based Counseling	PROMISING
	Community PA Classes	PROMISING
Policy and Environmental	Community-scale Urban Design	EFFECTIVE
	Street-scale Urban Design/Land use	EFFECTIVE
	Transportation Policies and Practice	EMERGING
	Community-wide Planning and Policies	EMERGING

Heath et al Lancet 2012

#PhysAct2016

Correlates and interventions (LMICs)

- + studies on correlates and determinants from LMICs
  - 7.2 per year (up to 2012) to 32.8 per year (2012 onwards)
  - Urban residents less active
  - Virtually all studies from upper-middle income countries

- 15 intervention studies from LMICs identified since 2012
  - Promising interventions from Iran, Brazil and Colombia

An Urgent Public Health Problem

Prevalence and Trends

- ✧Not meeting PA recommendations: 31%
- ✧Prevalence: 17%
- ✧Leisure-time PA: Increased
- ✧Incidental, Occupational, and Transportation PA: Decreased
- ✧Economic Shift: Low-income populations have increased NCD's
- ✧Urbanization: reduced occupational time PA and increased TV viewing

Magnitude and Risk

- ✧6-9% of all NCD deaths are attributed to inactivity
- ✧5-5.3 million deaths/year attributed to inactivity

Global Consequences

- ✧Health
- ✧Healthcare (Economic)
  - ◆$28-334pp: Indirect Costs
  - ◆$155-419pp: Direct Costs
- ✧Reduced Quality of Life

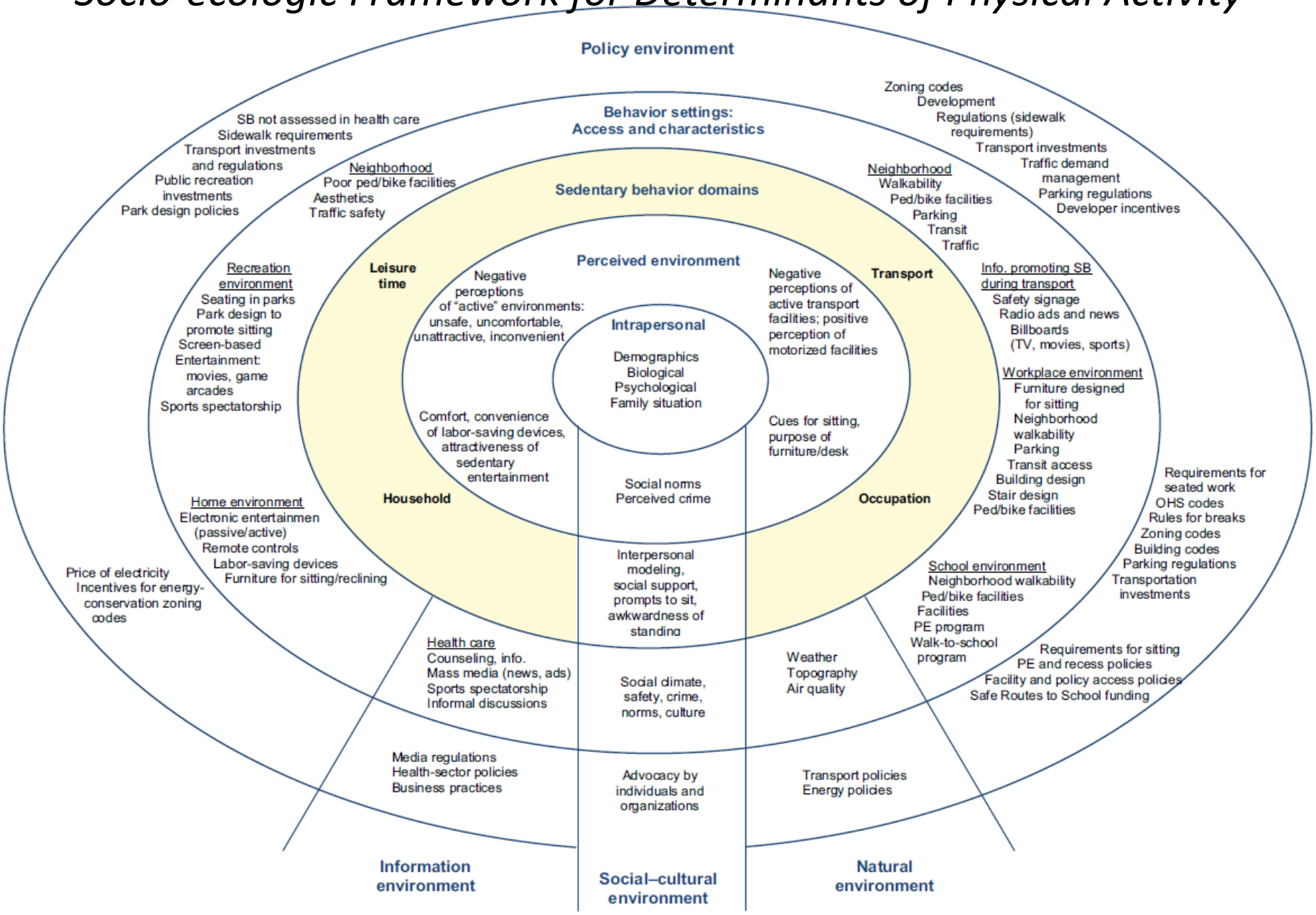
Prevention and Control

- ✧Effective methods across age, social groups, countries
- ✧Potential of Global Information and Technologies on PA

Public Health Action Priority

Physical Activity and Public Health – The Way Forward

Socio-ecologic Framework for Determinants of Physical Activity



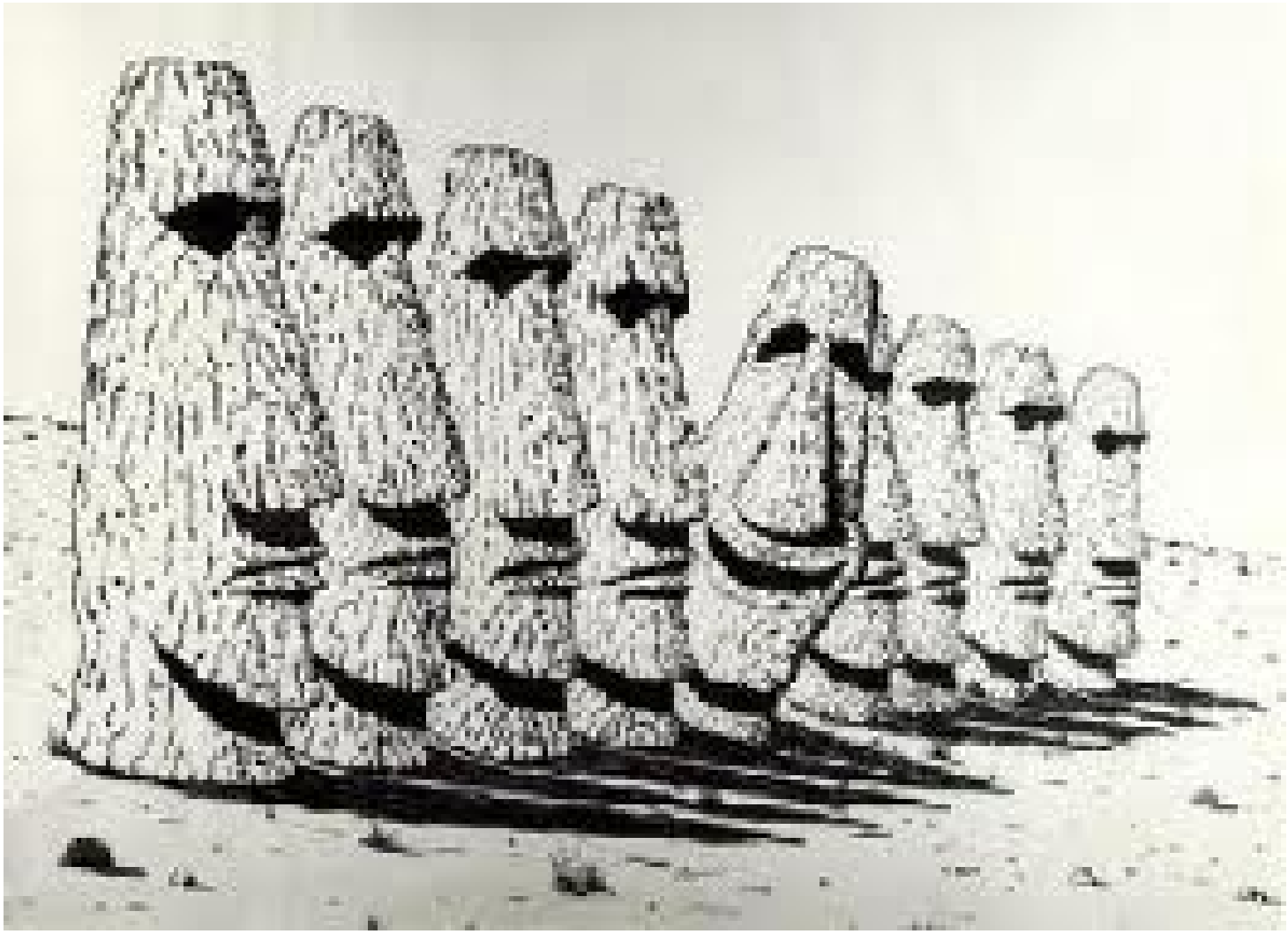
- The fundamental assumption that Health Behavior = Public Health is flawed.
- Research and promotion to date has relied on traditional analytic thinking
  - Exercise Science
  - Public Health Science
  - Behavioral science
  - Environmental Science

- Public Health requires integration and understanding of interrelations for physical activity has been lacking.
- We have ridden the SocioEcologic Model horse as far as it can take us in terms of public health

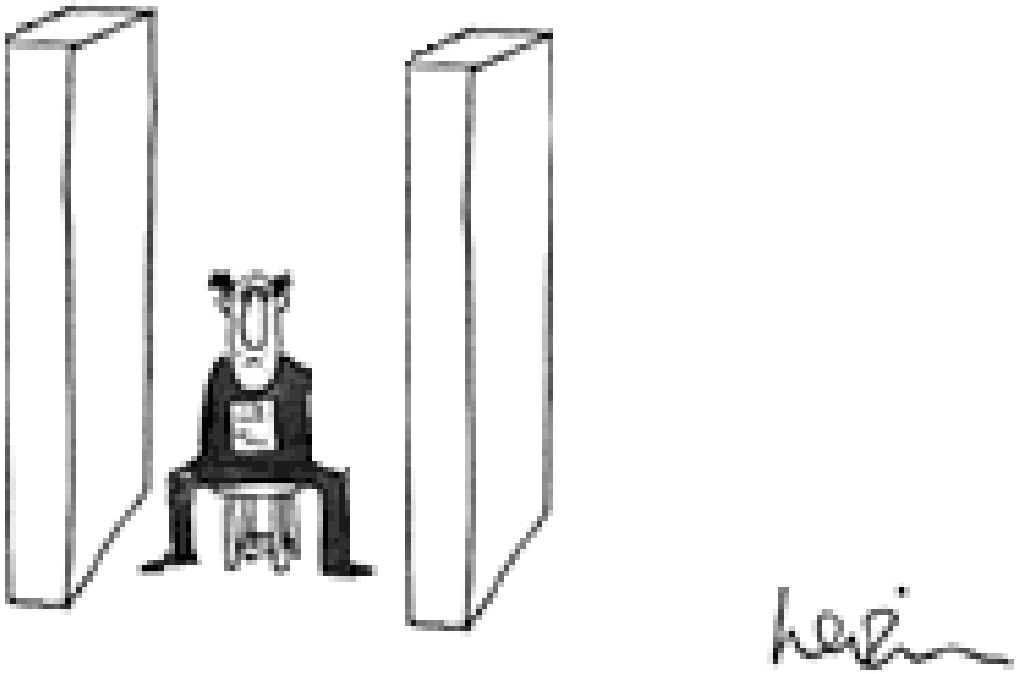
The whole concept of public health is founded on the insight that health and illness have causes or conditions that
go beyond the biology and behavior of the individual human being.

Midgley G. Systemic intervention for public health. Am J Public Health. 2006;96:466–472.

Thinking Differently

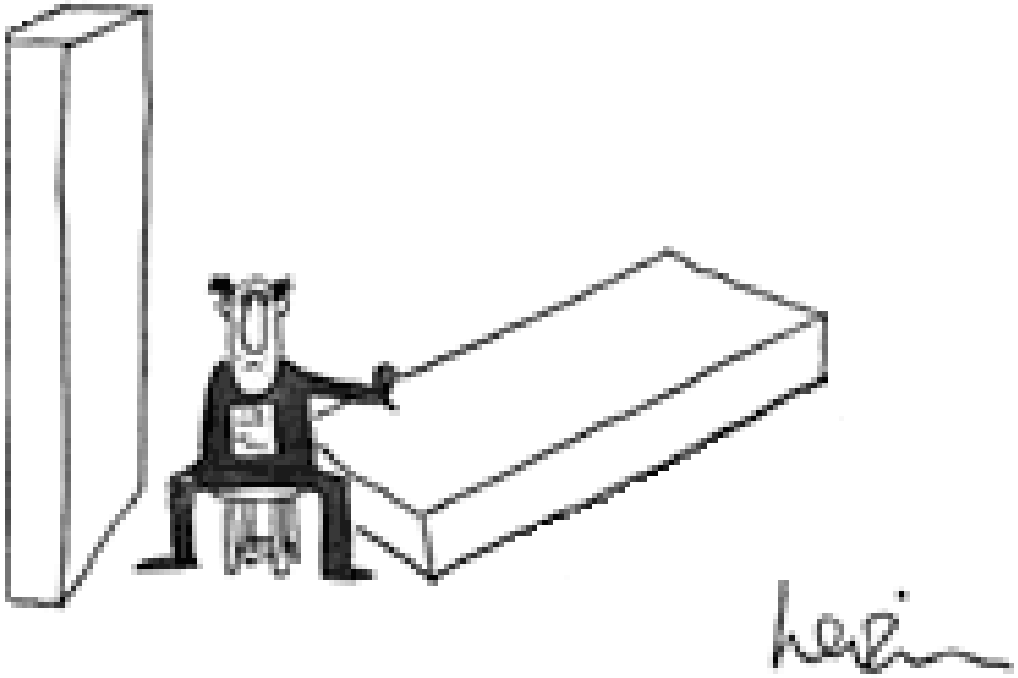


Managing Complexity



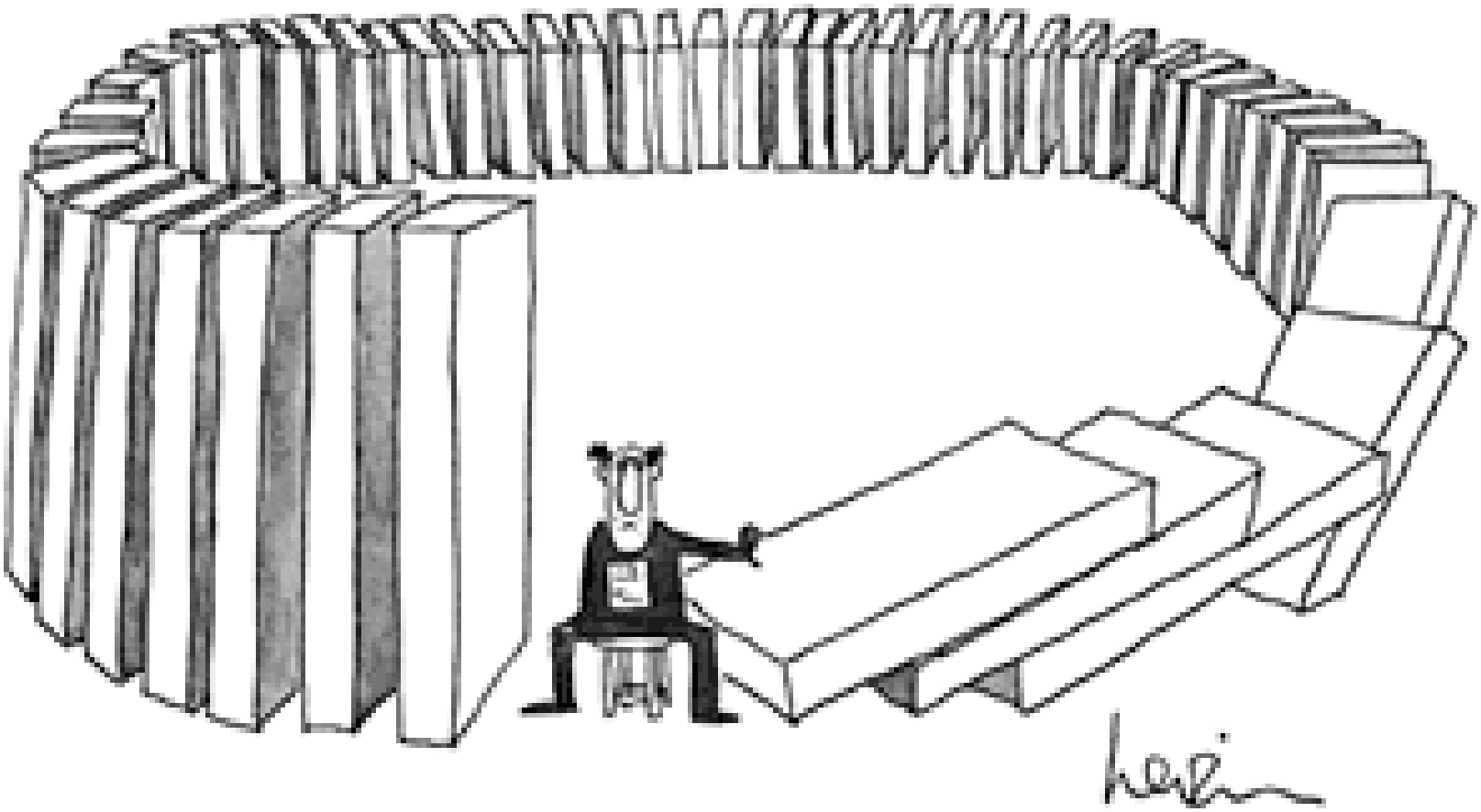
Arnie Levin, New Yorker, December 27, 1976

Managing Complexity



Arnie Levin, New Yorker, December 27, 1976

Complexity & Unintended Consequences



Arnie Levin, New Yorker, December 27, 1976

Systems Approach

Complexity of Behavior

- Complex non-linearity of health behaviors
  - interactions, adoption delays, adaptations, competing actions, and unintended consequences
- Systems Approach
  - Inputs and levels of influence are considered to be interdependent
  - Identifies enablers, accelerants, synergies, and interconnectedness of multiple influences and multiple sectors of influence
  - Has the highest potential to affect population physical activity

Physical Activity and Air Quality

Unintended consequence?

- Individual and population level benefits of physical activity could be muted by low air quality.
- Outdoor physical activity – especially transit and discretionary time
- Unclear benefit/risk ratios.

Physical Activity and Air Quality

- Physical activity increases oxygen demand – proportional to intensity to a maximum.
- Nasal filtration system bypassed with higher respiratory rate.
- Inflammation of airways, asthmatic response, lung function (especially in vulnerable people), and increase risk of sudden cardiac death.
- Increase risk of NCD (cardiovascular disease, some cancers).

Association of Self-Reported Leisure-Time Physical Inactivity with Particulate Matter 2.5 Air Pollution

Xiao-Jun Wen, M.D.
Lina S. Balluz, Sc.D., M.P.H.
Jeffrey D. Shire, M.S.
Ali H. Mokdad, Ph.D.
Harold W. Kohl, III, Ph.D.

Abstract

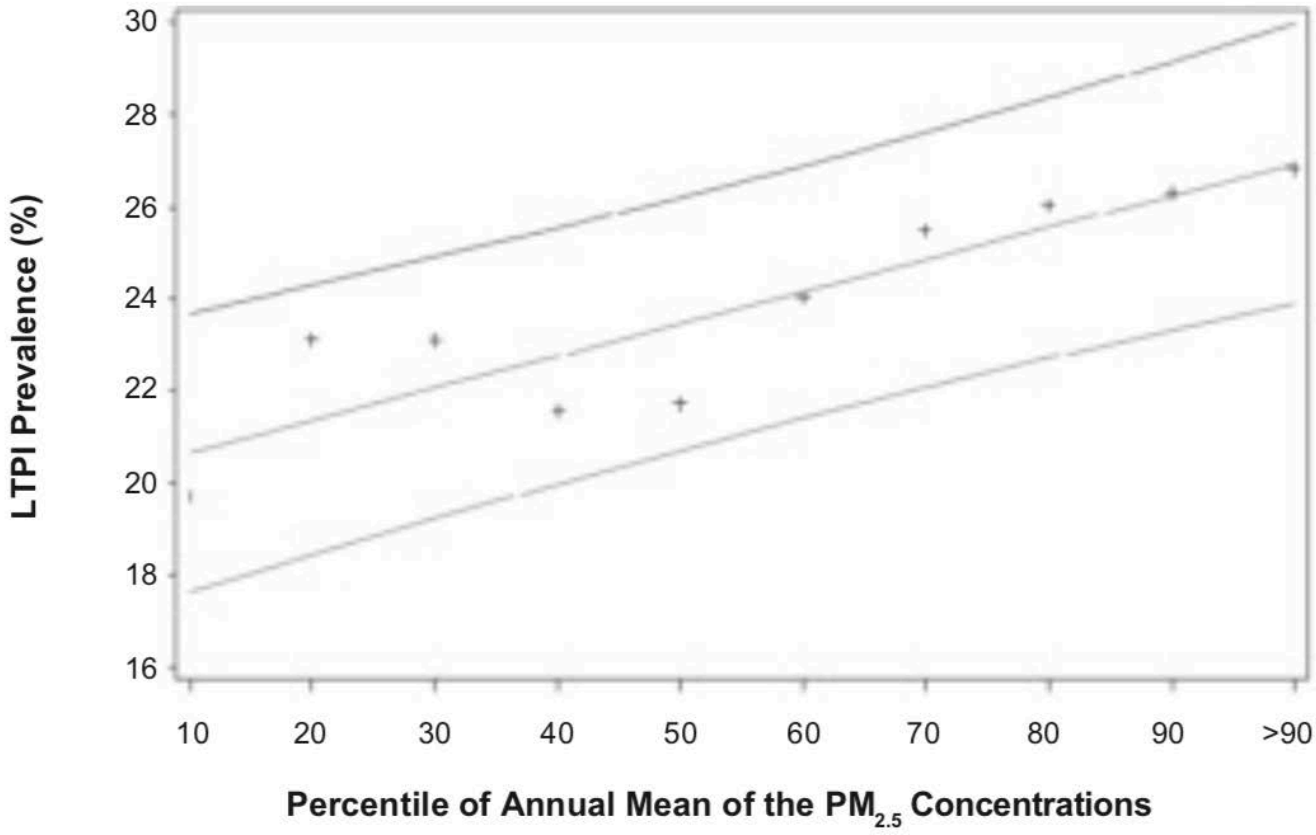
This study examines the association between annual levels of particulate matter ($PM_{2.5}$) and self-reported leisure-time physical inactivity (LTPI) in the Behavioral Risk Factor Surveillance System (BRFSS) among 63,290 survey respondents who participated in the 2001 BRFSS from 142 counties in the U.S. The average prevalence of self-reported LTPI was about 24.9% (*SE* = 0.3%). LTPI prevalence was positively associated with annual mean of $PM_{2.5}$ concentration ($p < .0001$). The authors demonstrate that LTPI was associated with $PM_{2.5}$ pollution with statistical significance with and without adjustment for covariates (adjusted odds ration [*OR*] = 1.16; 95% *CI*: [confidence interval] 1.06–1.27). This study suggests that ambient $PM_{2.5}$ air pollution is associated independently with LTPI. $PM_{2.5}$ pollution and physical inactivity are both risk factors of chronic diseases. Therefore, it is important for environmental officials to implement measures to reduce ambient air pollution while public health officials simultaneously promote regular physical activity by encouraging the general public to remain physically active.

participation, and protective social and community factors are associated positively with increased physical activity (Brennan, Baker, Haire-Joshu, & Brownson, 2003; Giles-Corti & Donovan, 2002).

Particulate matter of aerodynamic diameter less than 2.5 μm ($PM_{2.5}$) is a mixture of solid, liquid, or solid and liquid particles that are suspended in the air. $PM_{2.5}$ comes mostly from the emissions from the combustion of fossil fuels from stationary sources, such as heating and power generation, and in motor vehicles. It is well known that ambient air pollution has been associated with an increased risk of chronic diseases, including respiratory and cardiovascular diseases (Laden, Neas, Dockery, & Schwartz, 2000; Pope & Dockery, 1999; Schwartz, 1991). It is conceivable, but not yet demonstrated, that $PM_{2.5}$ may influence physical inactivity in the densely populated areas where the sources of PM generation are abundant.

FIGURE 1

Association of Weighted Prevalence of Leisure-Time Physical Inactivity with the Annual Mean of $PM_{2.5}$ Concentrations



+: Weighted LTPI prevalence

Middle line: predicted value of the LTPI prevalence.

Upper line: upper limit of the 95% Confidential Interval.

Button line: lower limit of the 95% Confidential Interval.

The association between ambient fine particulate air pollution and physical activity: a cohort study of university students living in Beijing

Hongjun Yu[1*], Miao Yu[2], Shelby Paige Gordon[3] and Ruiling Zhang[3]

Abstract

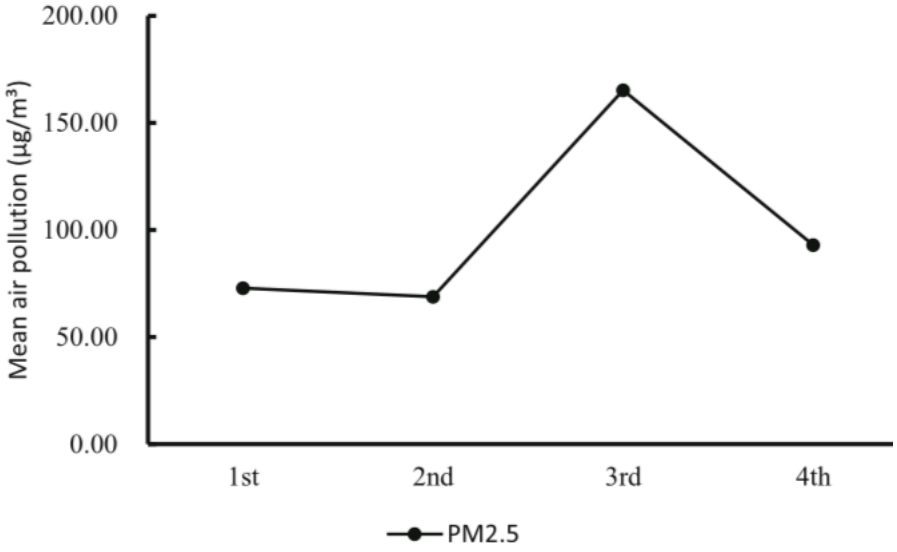
Background: Air pollution has become a substantial environmental issue affecting human health and health-related behavior in China. Physical activity is widely accepted as a method to promote health and well-being and is potentially influenced by air pollution. Previous population-based studies have focused on the impact of air pollution on physical activity in the U.S. using a cross-sectional survey method; however, few have examined the impact on middle income countries such as China using follow-up data. The purpose of this study is to examine the impact of ambient fine particulate matter ($PM_{2.5}$) air pollution on physical activity among freshmen students living in Beijing by use of follow-up data.

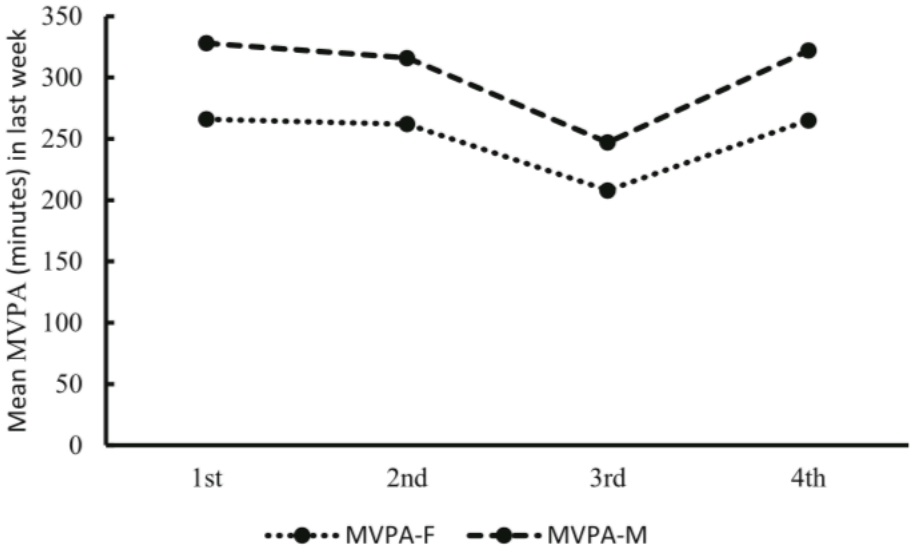
Methods: We conducted 4 follow-up health surveys on 3445 freshmen students from Tsinghua University from 2012 to 2013 and 2480 freshmen completed all 4 surveys. Linear individual fixed-effect regressions were performed based on repeated-measure physical activity-related health behaviors and ambient $PM_{2.5}$ concentrations among the follow-up participants.

Results: An increase in ambient $PM_{2.5}$ concentration by one standard deviation (44.72 $\mu g/m^3$) was associated with a reduction in 22.32 weekly minutes of vigorous physical activity (95% confidence interval [CI] = 24.88–19.77), a reduction in 10.63 weekly minutes of moderate physical activity (95% CI = 14.61–6.64), a reduction in 32.45 weekly minutes of moderate to vigorous physical activity (MVPA) (95% CI = 37.63–27.28), and a reduction in 226.14 weekly physical activity MET-minute scores (95% CI = 256.06–196.21). The impact of ambient $PM_{2.5}$ concentration on weekly total minutes of moderate physical activity tended to be greater among males than among females.

Conclusions: Ambient $PM_{2.5}$ air pollution significantly discouraged physical activity among Chinese freshmen students living in Beijing. Future studies are warranted to replicate study findings in other Chinese cities and universities, and policy interventions are urgently needed to reduce air pollution levels in China.

Keywords: Air pollution, Fine particulate matter, Physical activity, Moderate-to-vigorous physical activity, youth


200.00
150.00
100.00
50.00
0.00
Mean air pollution (μg/m³)
1st
2nd
3rd
4th
PM2.5


350
300
250
200
150
100
50
0
Mean MVPA (minutes) in last week
1st
2nd
3rd
4th
MVPA-F
MVPA-M

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A travel mode comparison of commuters' exposures to air pollutants in Barcelona

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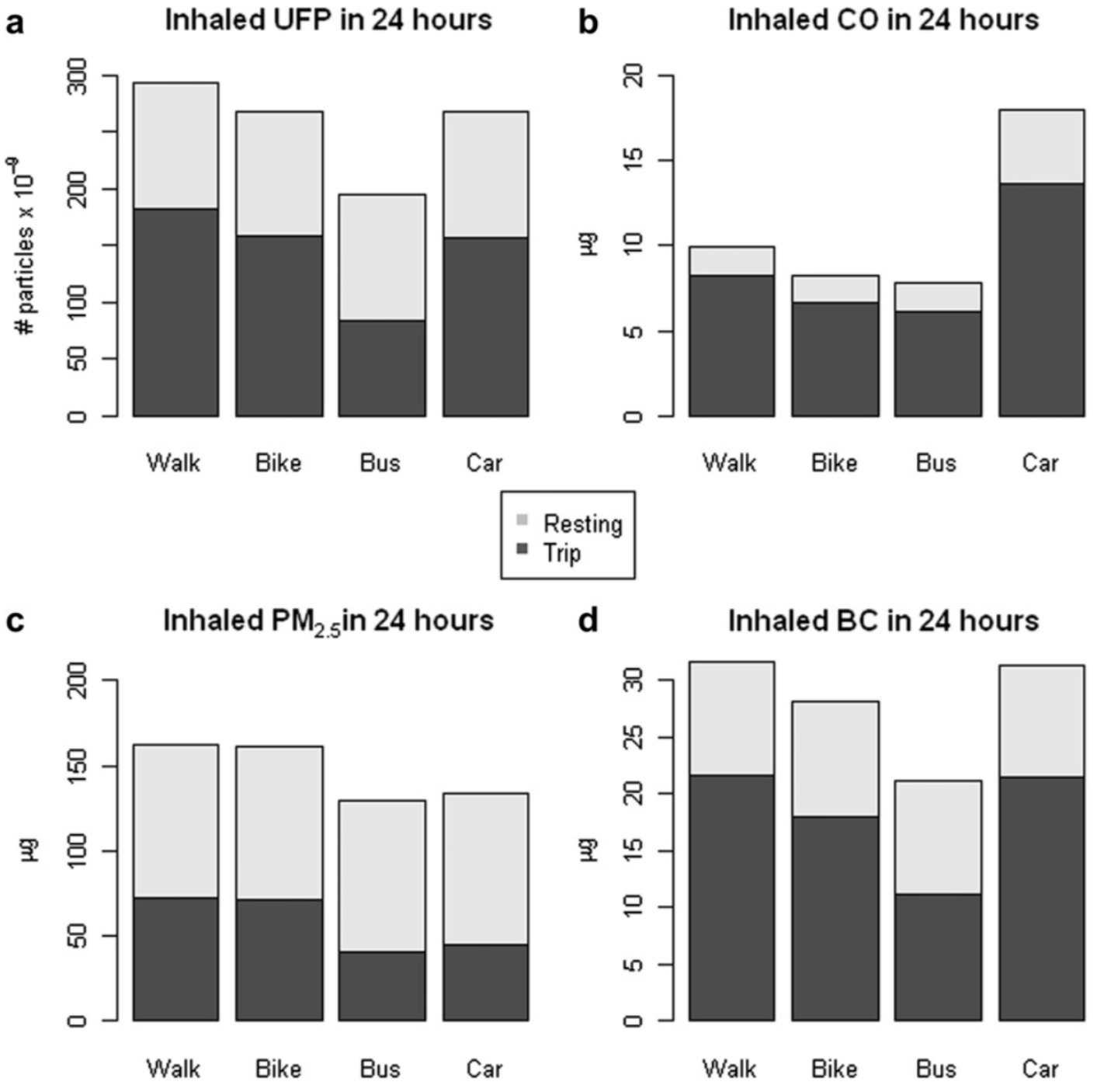
HIGHLIGHTS

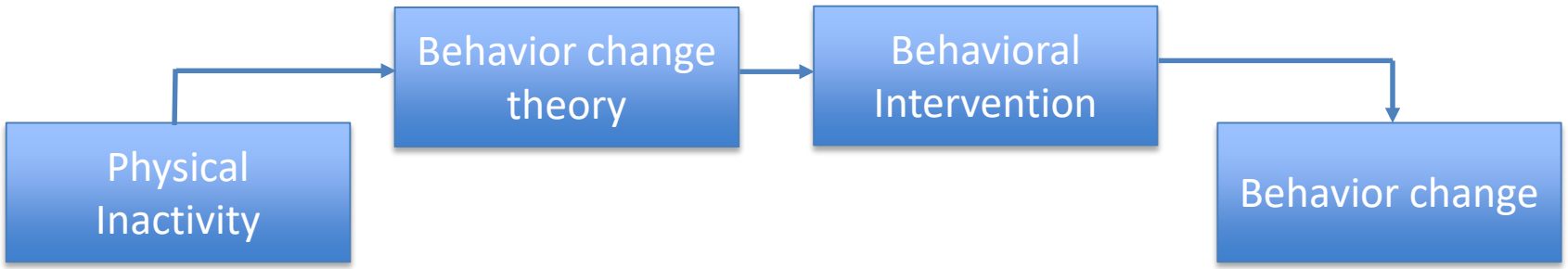
- We measured air pollution in travel microenvironments in a Southern European city.
- Travel modes explained much more of commuters' exposure variability than meteorology.
- Particulate pollutants in cars were 2–3 times higher than in active modes (walk, bike).
- Contrasts between modes were greatest for primary pollutants (CO then BC and UFP).
- Accounting for inhalation rate differences, pedestrians and cyclists pollution doses were comparable to car drivers.


a
Inhaled UFP in 24 hours
particles x 10^{-9}
0
50
100
200
300
Walk
Bike
Bus
Car
b
Inhaled CO in 24 hours
µg
0
5
10
15
20
Walk
Bike
Bus
Car
Resting
Trip
c
Inhaled $PM_{2.5}$ in 24 hours
µg
0
50
100
150
200
Walk
Bike
Bus
Car
d
Inhaled BC in 24 hours
µg
0
5
10
15
20
25
30
Walk
Bike
Bus
Car

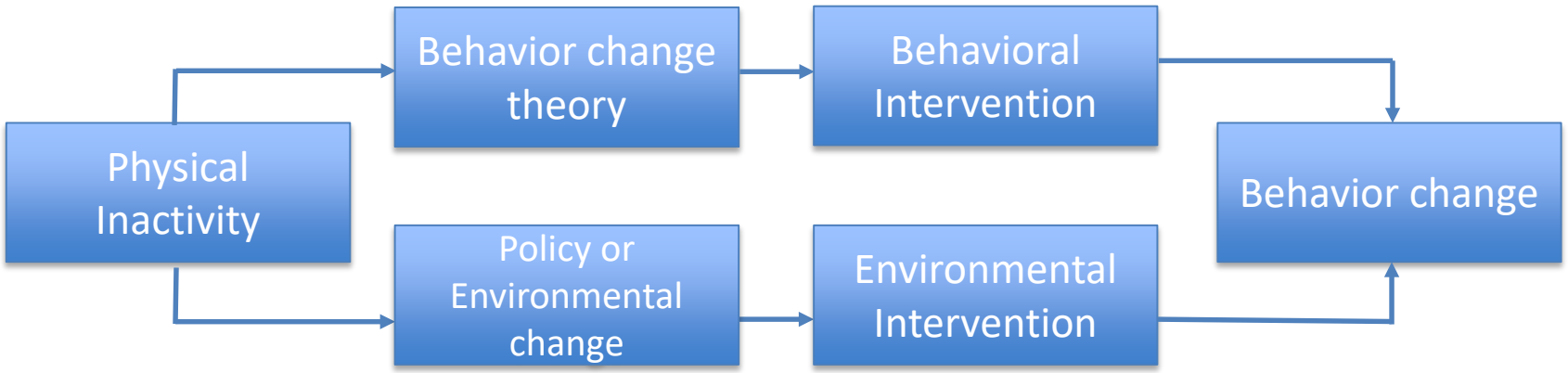
Final Thoughts

- More research into the combined effects of air pollution exposure, physical activity, and health outcomes – emphasis on mode of physical activity and specific pollutant.
- Better communication/collaboration
- Moving to real time AQI reporting may be useful and requires further study for implementation.
- Finding ways to improve air quality.

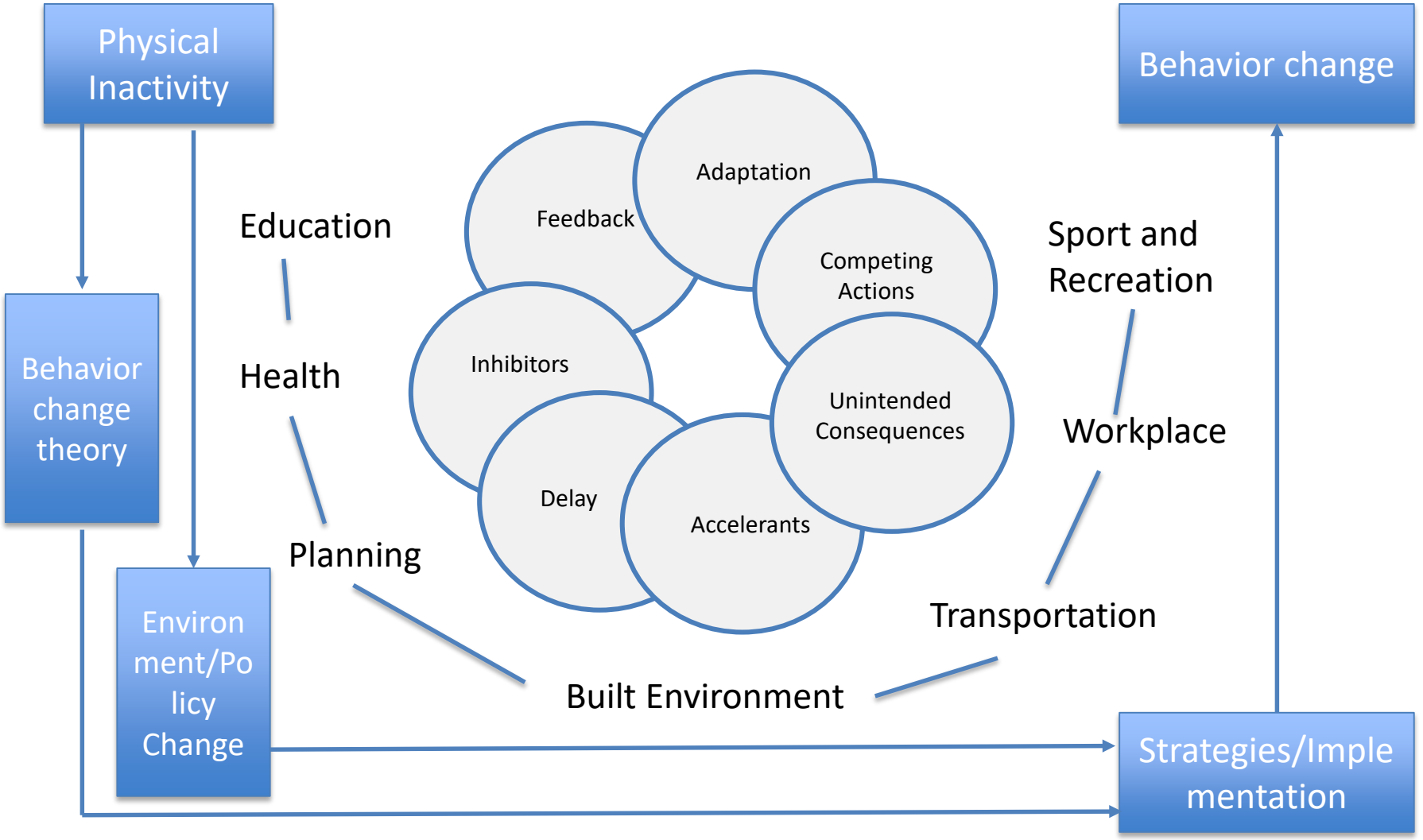
Behavioral Approaches to Health Behavior Change for Physical Inactivity



Behavioral and Environmental Approaches to Health Behavior Change for Physical Inactivity



Toward a Systems Approach for Physical Inactivity



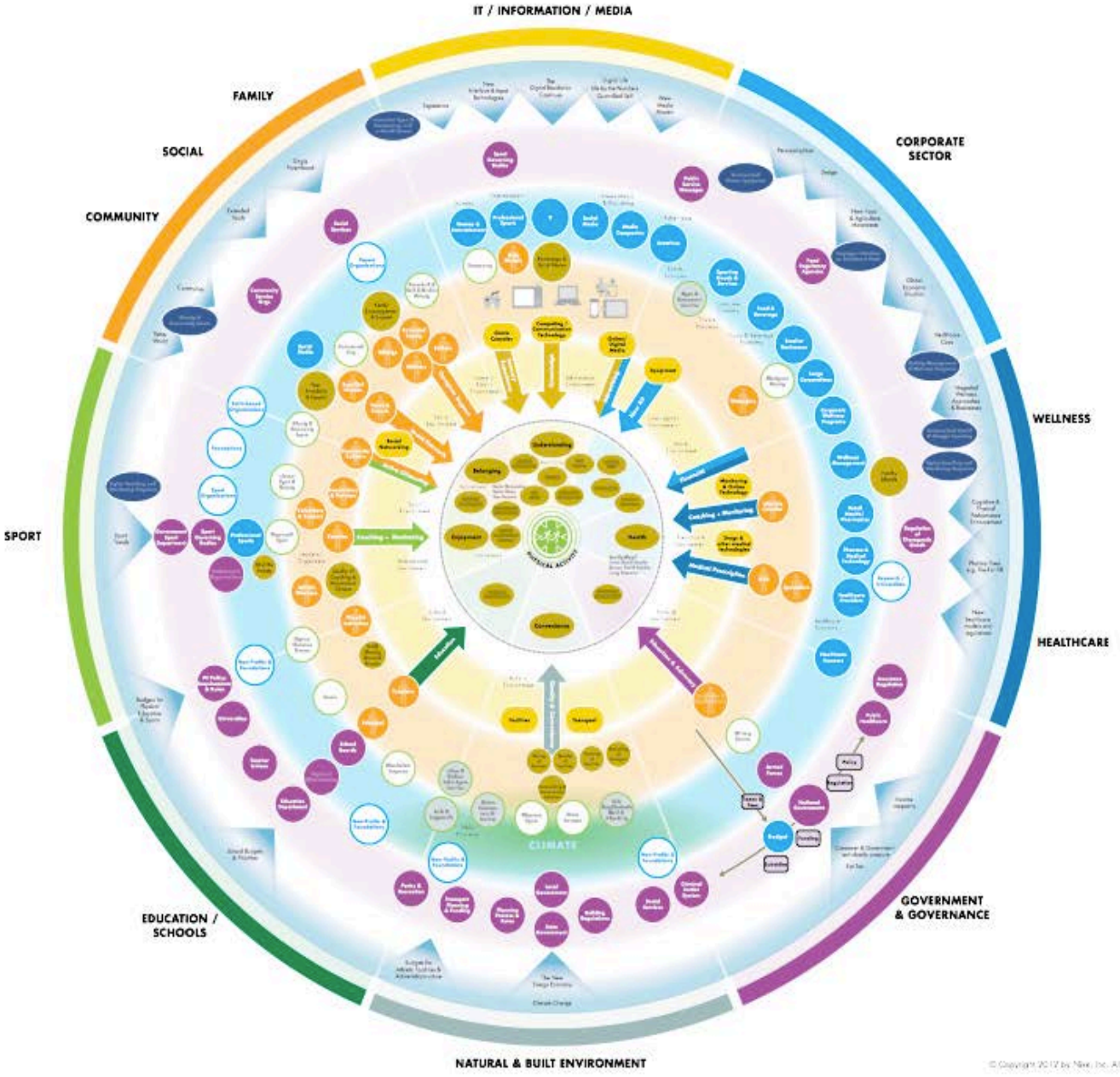
Kohl et al Lancet 2012

PHYSICAL ACTIVITY SYSTEM OVERVIEW

An interdependent system determines just how physically active a population will be.

SYSTEMS LEGEND

SYMBOLS LEGEND



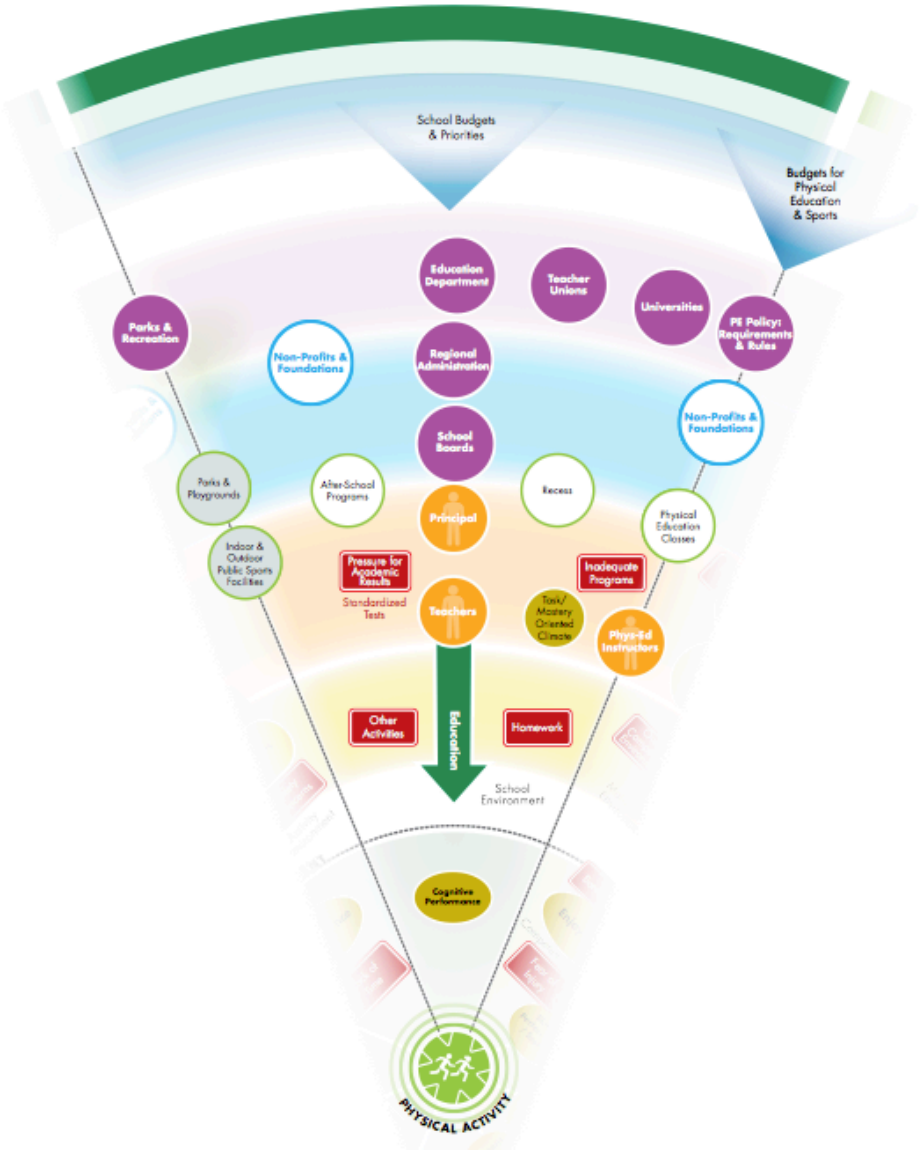
PHYSICAL ACTIVITY SYSTEM DETAIL

The elements of the physical activity system are interdependent. What happens in one aspect of a person's environment influences all others. Here's a closer look at just one sector: **School Environment**

SYSTEMS LEGEND

SYMBOLS LEGEND

EDUCATION / SCHOOLS



Call to Action

Call to Action

- United Nations and the World Health Organization
- World Bank, international development agencies, foundations, and other international agencies
- Countries
- Ministries of health
- Ministries of education and other education authorities
- Ministries of sport and other recreation sector authorities
- Ministries of planning
- Ministries of transport
- Employers, the private sector and media
- Academics and academia
- Individuals and organisations in civil society

Calls to Action

UN/WHO	World Bank/Foundations	Countries
Provide Leadership in a Systems Approach to National PA Policies, Strategies, and Plans	Support networks for PA promotion in planning of action plans	Develop and implement strategies and action plans for a systems approach to PA
Ensure adoptions of targets and Indicators for monitoring PA	Recognize the role of PA in the prevention of NCD and in enhancing health	Assign stewardship role for PA to a relevant government; allocate sufficient resources and accountability
Partner with other organization to provide training on PA, Policy, and Strategies	Support National Plans	Adopt evidence-based national recommendations and policy guidance

Calls to Action

MINISTRIES		
HEALTH	**EDUCATION**	**SPORT**
Re-orient Services and Funding at the National, Regional, and Local Levels to Prioritize PA	**Implement Policies that Support High-quality, Compulsory PE, Active Transport, PA during and after the School day, and a Healthy Environment**	**Develop and Implement Sport and Recreation Policy and Funding to enhance Access; Adapt Programs to the Needs Community**
Foster Partnerships	**PLANNING**	**TRANSPORT**
Make PA an Integral Part of Disease Prevention and Health Promotion Modeling	**Support and Implement Urban and Rural Planning Policies to Support Active and Public Transport, Safety, and Access**	**Prioritize Policies and Fund Infrastructure that support Active Transport**

Calls to Action

Employers, Private Sector, and Media	Academics and Academia	Individuals and Organizations
Develop and Implement Programs	Research; Translate Research into Practice	Advocate to decision-makers
Orient marketing, Advertising, and Promotional Messages	Create Graduate Training Programs	Commit to and Implement PA Plans
Collaborate with government and nongovernment organizations	Build a base for effective programming, national plans, and on cost-effectiveness	Seek ways to become and remain physically active

Guiding Principles

- Adopt evidence-based strategies that target the whole population as well as specific vulnerable sub-groups;
- Address the environmental, social and individual determinants of physical inactivity;
- In addressing determinants of physical activity behaviour, embrace an equity approach to reduce the disparity in access to opportunities for physical activity;
- Implement sustainable actions in partnership at national, regional and local levels and across multiple sectors to achieve greatest impact;
- Build capacity and support training in research, practice, policy, evaluation and surveillance;
- Use a life-course approach by addressing the needs of children, families, adults, older adults, and people with disabilities as well as specific settings such as worksite and schools;
- Advocate to decision makers and the general community for an increase in political commitment to and resources for physical activity;
- Ensure cultural sensitivity to tailor and adapt strategies to accommodate varying local realities, cultures, contexts and resources;
- Facilitate healthy personal choices by making the physically active choice the easy choice.

Physical Activity 4

The implications of megatrends in information and communication technology and transportation for changes in global physical activity

*Michael Pratt, Olga L Sarmiento, Felipe Montes, David Ogilvie, Bess H Marcus, Lilian G Perez, Ross C Brownson, for the Lancet Physical Activity Series Working Group**

Physical inactivity accounts for more than 3 million deaths per year, most from non-communicable diseases in low-income and middle-income countries. We used reviews of physical activity interventions and a simulation model to examine how megatrends in information and communication technology and transportation directly and indirectly affect levels of physical activity across countries of low, middle, and high income. The model suggested that the direct and potentiating effects of information and communication technology, especially mobile phones, are nearly equal in magnitude to the mean effects of planned physical activity interventions. The greatest potential to increase population physical activity might thus be in creation of synergistic policies in sectors outside health including communication and transportation. However, there remains a glaring mismatch between where studies on physical activity interventions are undertaken and where the potential lies in low-income and middle-income countries for population-level effects that will truly affect global health.

ISPAH

Key messages

- Non-communicable diseases account for 60% of deaths globally, and 80% of these deaths occur in low-income or middle-income countries
- Physical inactivity is one of the major risk factors for non-communicable diseases, accounting for an estimated 3·2 million deaths per year
- The challenges and opportunities in prevention of non-communicable diseases show several important megatrends—major forces in societal development that are likely to shape people's lives in the next 10–15 years
- Information and communication technologies in the form of internet and mobile phone access have grown enormously during the past decade; these technologies have the potential to affect physical activity
- Trends in transportation, including the growth in ownership and use of private cars and improved and well integrated public transit systems, have the potential to both negatively and positively affect participation in physical activity, especially walking
- On the basis of a review of publications about physical activity interventions, we modelled the effects of megatrends in internet access, mobile phone access, and car ownership on physical activity
- The direct and potentiating effects of mobile phone technology on physical activity in middle-income and upper-income countries are similar in size to the mean effects of planned physical activity interventions in community and clinical settings
- The greatest potential for increasing population physical activity might be in the creation of supportive policies in sectors outside health (transportation, urban planning, and communication)
- There is a glaring mismatch between where the studies of physical activity interventions have been done and where the potential lies for population-level effects that will truly affect global health (low-income and middle-income countries)

ISPAH

The Exercise Training Paradigm

Early guidelines (AHA 1975, ACSM 1978,1990) were based primarily on endurance exercise to enhance performance - especially aerobic capacity.

TRAINING  PERFORMANCE

RATIONALE: Increases in aerobic capacity are most rapidly achieved by increasing the intensity of endurance exercise

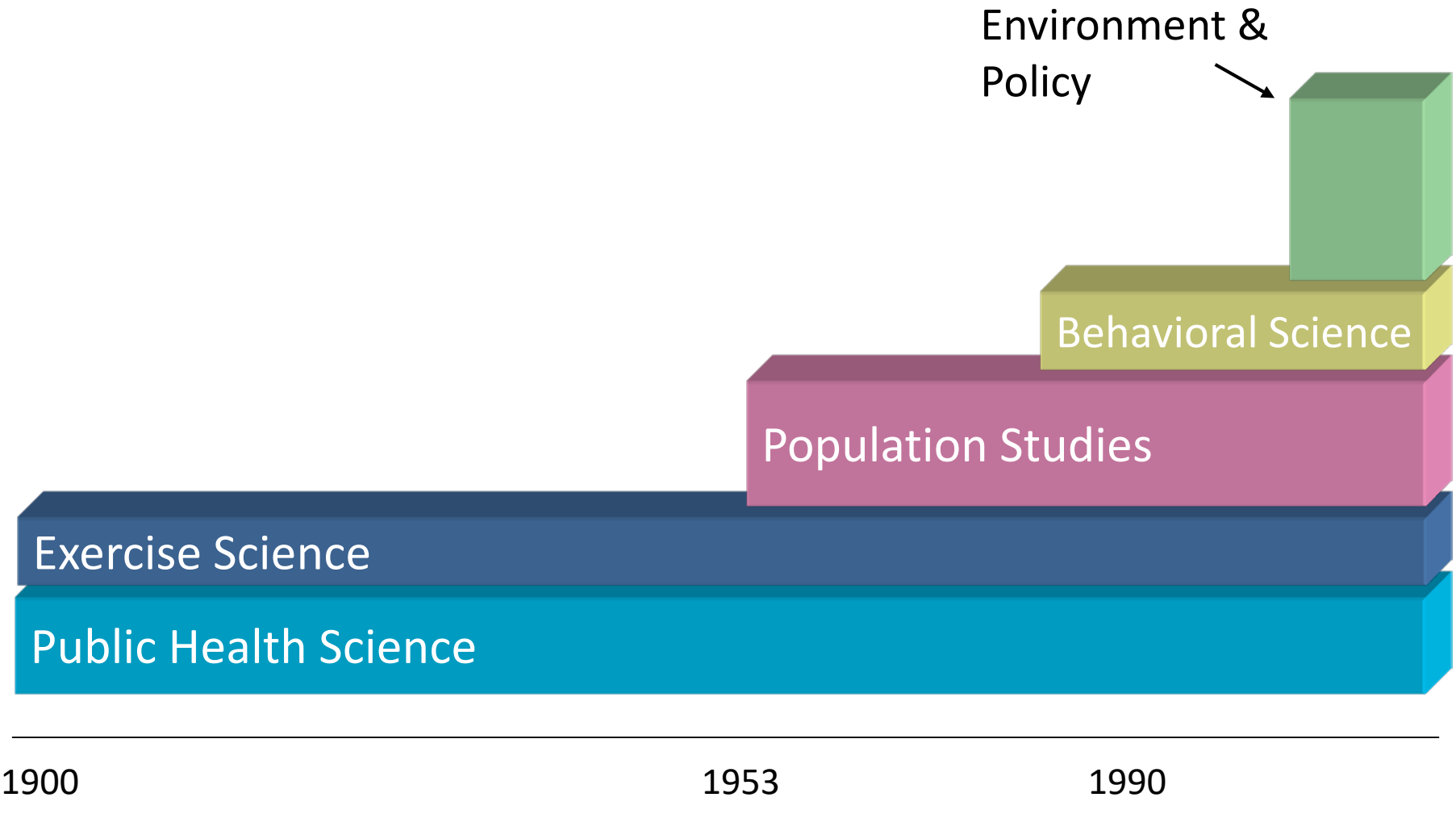
The Physical Activity - Health Paradigm

Public health oriented guidelines since 1995 include the accumulation of ≥ 30 minutes of ≥ of moderate intensity activity on ≥ 5 days per week .

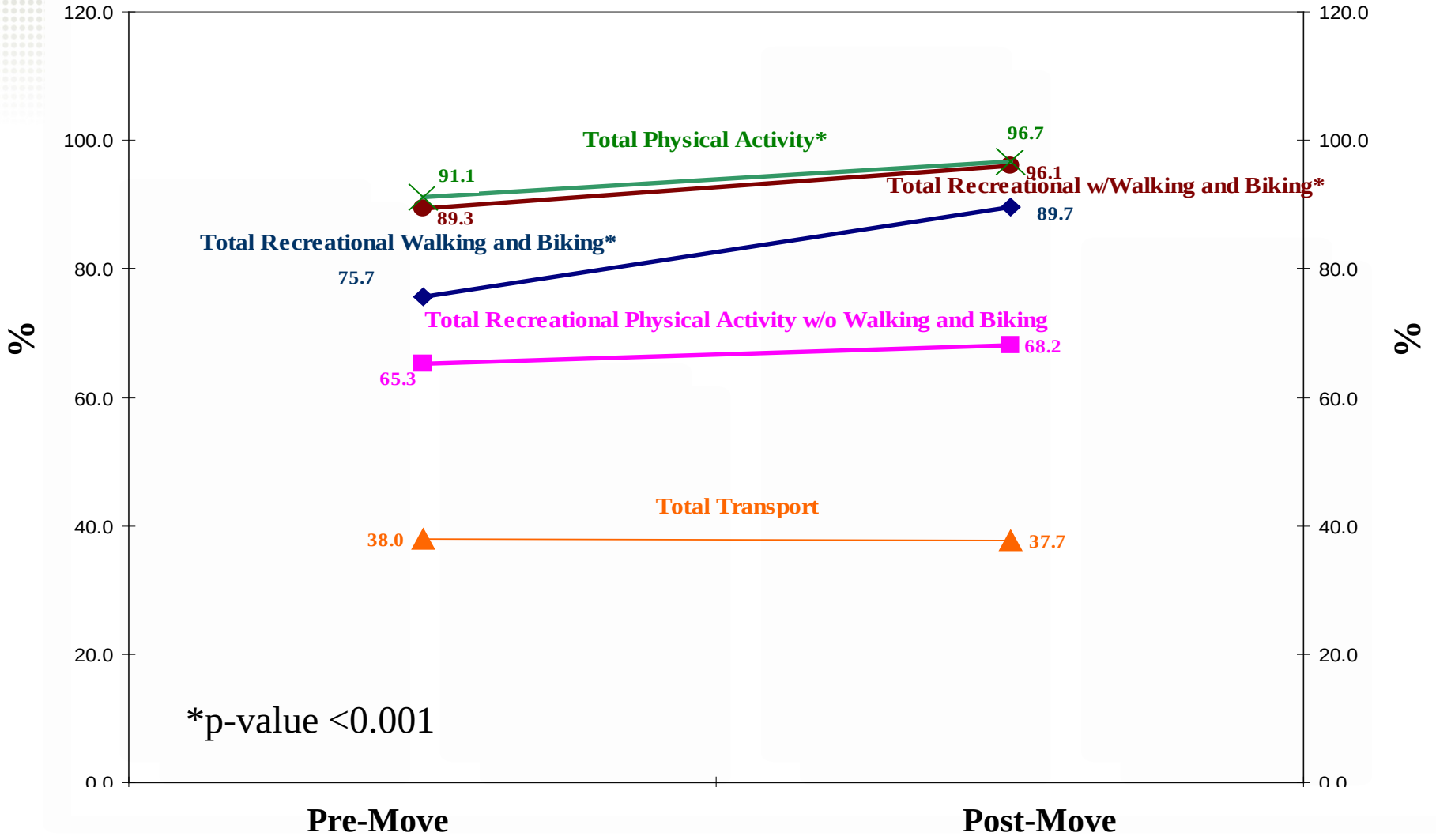
ACTIVITY  HEALTH

RATIONALE: Data from observational and experimental studies demonstrate health-related outcomes from moderate intensity activity accumulated throughout the day.

Physical Activity and Public Health – Development of a Field



Prevalence of Residents Engaging Physical Activity Pre- and Post-Move – Mueller 2009



Calise et al, 2012