Walking Research and Opportunities from the National Cancer Institute

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National Institutes of Health

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Walking Research and Opportunities from the National Cancer Institute and Beyond

David Berrigan PHD MPH
October 18th, 2019
Portland State University
Topics

1. Physical Activity, Walking, Cancer and Health
2. Where I’m Coming From
3. Surveillance and Data
   1. National Health Interview Survey (NHIS)
   2. Family Life, Activity, Sun Health and Eating Study (FLASHE)
   3. Health Information National Trends Survey (HINTS)
4. Measurement and Tools
   1. National Collaborative on Childhood Obesity Research (NCCOR)
   2. Physical Activities Completed over Time in 24 Hours
   3. Metabolic Equivalent of Task (MET) Score Resources
5. Funding, Emerging Research, Convening
   1. Natural Experiments
   2. Conference on Health and Active Transportation (CHAT)
Part 1: Physical Activity, Cancer and Mortality

1. Lack of PA is a risk factor for cancer at multiple sites
2. For mortality, sedentary time, light, moderate, and vigorous PA all matter
3. Emerging perspective that attention is needed to the entire 24 hour cycle of behavior
4. Walking an important target for health promotion and cancer prevention
Physically active adults have a significantly lower risk of developing several commonly occurring cancers:

- Bladder
- Breast
- Colon (proximal and distal)
- Endometrium
- Esophagus (adenocarcinoma);
- Kidney;
- Lung; and
- Stomach (cardia and non-cardia adenocarcinoma)

Preventing Cancer by increasing Physical activity

PAF (%) and Number of Cases for various risk factors.

- All risk factors: 41.5%
- Cigarette sm.: 14.5%
- Excess B.W.: 10.9%
- Alcohol: 6.4%
- Phys. inact.: 4.4%
- UV Radiation: 3.7%
- HPV infection: 2.5%
- Low fru/veg: 1.5%
- Low fiber: 1.0%
- Processed meat: 0.5%
- H. Pyl. infection: 0.5%
- Low calcium: 0.5%
- Red meat: 0.3%
- Secondhand sm.: 0.3%
- HIV infection: 0.1%
- HCV infection: 0.1%
- HBV infection: 0.1%
- HHV8 infection: <0.1%

Number of Cases:

- 327,240 (319,540–336,040)
- 114,520 (113,160–115,930)
- 85,680 (81,470–89,810)
- 50,110 (43,180–57,920)
- 34,670 (29,450–40,010)
- 29,320 (29,000–29,630)
- 19,470 (19,090–19,840)
- 11,980 (10,320–13,620)
- 7,540 (5,460–9,580)
- 4,320 (3,240–5,440)
- 4,070 (3,670–4,400)
- 4,020 (3,600–4,420)
- 2,630 (1,640–3,710)
- 2,340 (1,510–3,230)
- 990 (720–1,290)
- 900 (580–1,200)
- 700 (320–1,050)
- 120 (100–140)

Islami et al. 2018
Mortality in Relation to Time Spent in Sedentary, Light and Moderate+ Activity

- Meta-analysis of 8 studies linking mortality and accelerometry data
- Substantial benefits of light activity
- Total activity rather than intensity or bout length
- Increased risk associated with sedentary time, especially after about 9 hours
A 24 hour Perspective is Required

- Time spent in activities is correlated
- PA from multiple activities adds up to benefit health
- Demands on more holistic approach to data collection
- Inspires use of 24 recalls or devices
- Can inspire thinking about intervention targets
- Encourages multidisciplinary thinking

Matthews et al. 2019; Harms et al. 2019; Rosenberger et al 2019
Walking is an Important Public Health Target

"The journey to better health begins with a single step."

-Surgeon General Dr. Vivek Murthy, U.S. Department of Health and Human Services
Part 2: Where I’m From - The Health Behavior Research Branch in the Behavioral Research Program of the Division of Cancer Control and Population Sciences at the National Cancer Institute

Vision
A world in which individuals, families, and communities engage in healthy lifestyle behaviors to prevent cancer, improve treatment outcomes, extend life, and optimize health and well-being.

Mission
To support and catalyze research on the discovery, development, testing, and implementation of effective strategies to promote healthy lifestyle behaviors for cancer prevention and control.

Purpose
The Branch aims to support research at multiple levels of analysis to improve cancer-related health behaviors and risk factors.

Levels of Analysis
Biological/genetic, psychological, behavioral, social, environmental, and policy levels, individually and in combination.
Behavioral Intervention Priorities

Cancer-related Behavioral Risk Factors of Interest

- Behavior genetics
- Diet
- Physical activity and sedentary behavior
- Other emerging cancer risk behaviors
- Energy balance
- Obesity
- Alcohol use
- Sleep and circadian dysfunction
- Adherence to cancer-related medical and behavioral regimens
A multi-level, translational framework for understanding & improving cancer-related health behaviors
Part 3. Walking and Walkability in the NHIS

- Large Nationally Representative Health Survey administered by in Person Interview
- Currently around 35,000 households per year
- In 2005, 2010, and 2015 the Cancer Control Supplement included questions about transportation and leisure walking
- In 2015, a module of questions about walkability
- These modules were developed in collaboration by NCI (Berrigan and Bowles) and CDC (Fulton, Watson, Carlson, Whitfield, Ussery et al.) and Outside Experts (Adams, Brownson, James)
- Enthusiasm about the modules is high because of the importance of walking to CDC priorities, so they will continue to be fielded starting again next year in the NHIS redesigned sampling program
### Timeline and the California Health Interview Survey (CHIS)

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### CHIS

Walking items concerning transportation and leisure from 2003 - 2017
Walking Questions

**Transportation**

1. The next questions are about walking for transportation. I will ask you separately about walking for other reasons like relaxation or exercise. During the past 7 days, did you walk to get some place that took you at least 10 minutes?

2. In the past 7 days, how many times did you do that?

3. How long did that walk take? / On average, how long did those walks take?

**Leisure**

1. Sometimes you may walk for fun, relaxation, exercise, or to walk the dog. During the past 7 days, did you walk for at least 10 minutes for any of these reasons? Please do not include walking for transportation.

2. In the past 7 days, how many times did you do that?

3. How long did that walk take? / On average, how long did those walks take?
Walkability Questions

1. How often are there people walking within sight of your home? Would you say…
   Every day, Every 2-3 days, About once a week, Less than once a week
2. How often does the weather make you less likely to walk? Would you say…
   Almost always, Most of the time, Some of the time, A little of the time

The next questions are about where you live. (Yes/No)
1. Where you live, are there roads, sidewalks, paths or trails where you can walk?
2. Are there shops, stores, or markets that you can walk to?
3. Are there bus or transit stops that you can walk to?
4. Are there places like movies, libraries, or churches that you can walk to?
5. Are there places that you can walk to that help you relax, clear your mind, and reduce stress?
6. Do most streets have sidewalks?
7. Does traffic make it unsafe for you to walk?
8. Does crime make it unsafe for you to walk?
9. Do dogs or other animals make it unsafe for you to walk?
An overview of results and then a little more detail on a couple of new analyses


12. Carlson SA, Whitfield GP, Peterson EL, Berrigan D, Fulton JF. Weather as a barrier to walking, National Health Interview Survey, 2015. MS
1. Self-report of walking increased from 2005-2015

![Graph showing self-report of walking from 2005 to 2015 for overall, men, and women, with trends for any transportation walking, any leisure walking, and any walking highlighted.]

Ussery et al. 2017; 2018
Leisure and Transportation Walking
Younger, male, white western people report more destination types from among Shops+, Bus/transit stops, Movies+, and places to relax

Whitfield et al. 2018a
Crime and dogs are perceived barriers to walking for Race/ethnic groups other than non-Hispanic whites

Whitfield et al. 2018b
Analyses in progress concerning self reported walking, a walkability index and weather as a barrier to walking


2. Carlson SA, Whitfield GP, Peterson EL, Berrigan D, Fulton JF. Weather as a barrier to walking, National Health Interview Survey, 2015. MS
The National Walkability Index and Walking

• Examine associations between self reported walking and the EPA walkability index
• Index elements include design, distance to transit, and diversity
• Index scores were linked to NHIS data based on the respondent’s and classified into least, below average, above average, and most walkable communities.
• Linkage was in the RDC at the Block group level
• Associations between Index categories and walking were examined using regression models
• Urban—rural residence was determined from the Census Bureau’s 2010 urban definition which is primarily based on residential population density and densely developed territory
• The Index ranks block groups according to their relative walkability based on four indicators: intersection density, proximity to transit stops, and a mix of employment and household types
https://www.epa.gov/smartgrowth/smart-location-mapping%23walkability
Transportation and Leisure Walking and Walkability in Urban and Rural areas

- Please Email me if you want a copy of the published paper
- Strong positive correlation between reported walking and EPA walkability index in urban areas, weak correlation between leisure walking and index in rural areas
- What is “walkability” in rural areas?
Mean minutes of walking show similar relationships

Transportation
Urban  Rural

Leisure
Urban  Rural

Weekly Walking (Minutes)

Walkability

Please Email me if you want a copy of the published paper
berrigad@mail.nih.gov
So what?

• EPA Walkability index a useful measure for making sense of transportation walking

• A good covariate for studies of other causes of walking

• A guide for planning

• Highlights need for measures of environmental influences on walking in Rural areas and for Leisure walking

• What’s Next? - Combined analysis of EPA Walkability index and perceptions of the environment
Weather as a barrier to walking, National Health Interview Survey, 2015. MS

Carlson et al. 2019, In Prep
Weather

• Reporting weather as a barrier to walking was associated with lower prevalence and duration of walking

• Higher temperatures and perception of the weather as a barrier to walking showed some weak interactions in their association with reported leisure walking

• These results have encouraged us to incorporate humidity into the analysis so we will calculate a ‘comfort index’ or ‘Humindex’ that combines temperature and humidity and we think this should be a stronger predictor of activity
The NHIS redesign and upcoming data on both walking and perceived walkability

More walking related papers and data resources


• Interactions between PA, walking, sunburn and sun protective behaviors in NHIS (Tribby et al. 2019a,b)

• 2017 National Household Travel Survey allows rich analyses of mode choice, context and walking (Tribby et al MS)

• The NHIS Mortality Linkage - https://www.cdc.gov/nchs/data-linkage/mortality.htm
  • NHIS 1986-2014
  • Linkage to Dec 31st, 2015
Part 4: Measurement and Tools

1. National Collaborative on Childhood Obesity Research (NCCOR)
2. Physical Activities Completed over Time in 24 Hours
3. Metabolic Equivalent of Task (MET) Score Resources
National Collaborative on Childhood Obesity Research (NCCOR)

- Searchable Registry of Measures of Physical activity and PA Environments
- Monograph Length Guides to measurement of PA, Diet and Environments
- And these brand-new online training modules ....

JUST RELEASED

Measures Registry Learning Modules

Fast, easy, and mobile. The Measures Registry Learning Modules are designed to walk you through measurement selection at your own pace and on your own time!
Driving or riding in car or truck

If you drove or rode in a vehicle as part of your job, then please go to ‘Occupation, or working for pay’ and select ‘Sitting: driving or riding in a vehicle’ to enter your time.

What time did you start? 6:05am
What time did you stop? 6:15am (10min)

What was the main purpose of the trip? (Check ALL that apply)
- Commuting to work
- Commuting to school
- Drop off/Pick up someone
- To go home
- Shopping, errands, appointments
- Visiting friends or family
- Eating or socializing
- To get to/from car, bike, or public transportation
- Other

Add Activity  Cancel
Physical Activities Completed over Time in 24 Hours (ACT-24)

 Recall Data (scored)

 Automated scoring

 Tracking completion
 - Manually
 - Automated (API)

 Complete recall (Y/N)

 Decision for make-up
 > Recall+QC = done
 > No recall = re-invite
 > Recall+no QC = re-invite

 Research Team

 Review and Analyze

 Register study

 Researcher Site

 Retrieve participant access keys

 Invitation & recall tracking database

 Participant Site

 Participants

 Invitation (access key)

 Components

 Research Team

 Participant Site

 Researcher Site

 Components
Next Steps and Try it Out

• Completing REDCap Linkage
• Hard Launch of ACT24 Website
• US National sample of ACT24 recalls using NORC Amerispeak Panel

To Try it: Create a research project and enroll yourself

• The Researcher Site can be found here: https://act24.nci.nih.gov/act24/researcher/login

• The Participant Site can be found here: https://act24.nci.nih.gov/act24/participant/login

• Details regarding data summary and scoring methods can be found on the Researcher Site (Analytic Data tab)
Metabolic Equivalent of Task (MET) Score Resources

Connecting self-reported activities to common (MET) units

• Adult Compendium – https://sites.google.com/site/compendiumofphysicalactivities/home
• Newly Updated NCCOR Youth Compendium - https://www.nccor.org/tools-youthcompendium/
• American Time Use Survey Activities/MET score linkage - https://epi.grants.cancer.gov/physical/MET/
• Met score linkage with Multinational Time Use Activity Categories – Harms et al. 2019 BMC Public Health 2019 19:453
• Standardised criteria for classifying the International Classification of Activities for Time-Use Statistics (ICATUS) activity groups into sleep, sedentary behaviour, and physical activity Liangruenrom et al. 2019 Almost in Press, IJBNPA
Part 5. **Funding**, Emerging NIH Funded Research, Convening

- Clear, important idea
- Eliminate every reason for the reviewers to say no
- NIH Institute Mission Oriented?
- Conversation with Program Directors
- Collaboration with experienced NIH Grantee’s
- Perseverance
Emerging Research: Selected Transportation Oriented Grants

5R01CA228921  LEE, CHANAM et al  FIGHTING OBESITY BY REINVENTING PUBLIC TRANSPORTATION: A NATURAL EXPERIMENT (PD Berrigan NCI - 2018)

1R01CA178343  SAELENS, BRIAN E  STRUCTURAL & PROGRAMMATIC EFFECTS OF BUS RAPID TRANSIT ON PHYSICAL ACTIVITY (PD Berrigan NCI - 2013)

5R01DK101593  KOHL, HAROLD WILLIS  EFFECTS OF LIGHT RAIL TRANSIT ON PHYSICAL ACTIVITY: A NATURAL EXPERIMENT (PD Kuczmarski NIDDK - 2013)

1R01DK103385-01  FORTMANN, STEPHEN PAUL  HEALTH AND ECONOMIC EFFECTS OF LIGHT RAIL LINES: A NATURAL EXPERIMENT ((PD Kuczmarski NIDDK - 2013)

5R01CA157509  BROWN, BARBARA BESS  COMPLETE THE STREETS 3 WAYS: EFFECTS ON ACTIVITY AND BMI (PD McKinnon NCI - 2011)

5R01HL114091  GORDON-LARSEN, PENNY  ENVIRONMENTAL CHANGES AND HEALTH OUTCOMES ACROSS 25 YEARS: FOUR US CITIES (PD Reis, NHLBI - 2011)
Find More Grants and Read Their Abstracts

https://projectreporter.nih.gov/reporter.cfm
The Second International Electronic Conference on Environmental Health Sciences

- At ISBNPA 2019 in Prague there was a lot of concern about our carbon footprints for travel

- Virtual Conference - https://iecehs-2.sciforum.net/ - Looks like a pretty small number of submissions – but an interesting idea

- My keynote – Putting Cancer in its Place: Geospatial Approaches to Cancer Control and Populations Sciences
The 2019 Conference on Health and Active Transportation (CHAT), convened by the Transportation Research Board, will bring together an interdisciplinary cadre of practitioners and researchers in urban planning, public health, transportation and civil engineering, health care and health economics. The purpose of this conference is to explore and collaborate on identifying impacts of the health effects of transportation policies, planning, and infrastructure, and to develop an understanding of the institutional opportunities and barriers for considering health within transportation field. The need to integrate health into transportation continues to grow with greater acceptance of the influence of transportation policy and infrastructure on health behaviors and outcomes. This two-day meeting will endeavor to raise awareness of the need to incorporate health and health equity into transportation planning, policy, and infrastructure across institutional disciplines at local, regional, state, and federal levels.

6. Conclusions/What’s Needed?

1. Advancing the body of evidence supporting benefits of specific interventions and policies
2. Addressing inequities in environment and behavior
3. Sequencing policy changes for steady health behavior gains
4. Rigorous evaluation of behavioral consequences of transportation programs and policy
5. National transportation related data layers for linkage with epidemiological cohorts
6. Addressing physical activity, time use, walking and transportation over the 24 hour day
Conclusions and the 2015 Step It Up! The Surgeon General’s Call to Action to Promote Walking and Walkable Communities

“First, the Call to Action focuses on promoting optimal health before disease occurs.

Second, the Call to Action is applicable to the health of people at all ages and stages of life. Walking is the most common activity of teens and adults.

Third, the Call to Action recognizes that everyone should have access to spaces and places that make it safe and easy for us to walk or wheelchair roll—whether in urban, suburban, or rural settings.

My goal for this Call to Action is for each one of us to recognize and embrace our role in building the great American community, a place where being physically active is not only easier but also more engaging and fun. Find ways to make walking a part of your daily routine and invite friends, family, and colleagues to join you. Make your voice heard in decisions that affect how your city or town is planned. “

Questions?
berrigad@mail.nih.gov

www.cancer.gov

www.cancer.gov/espanol