Measuring the Health Impacts of Parks and Trails
A Roundtable Discussion

Dee Merriam, CDC
Courtney Schultz, NC State
Stephanie Tepperberg, NPS

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The findings and conclusions in this presentation have not been formally disseminated by the Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy.
Session Plan:

• Introduction – Dee Merriam, CDC
  – Why park metrics
  – Project overview

• Literature review - Courtney Schultz, NC State

• Suggested metrics- Stephanie Tepperberg, NPS

• Small group discussions / feedback on metrics

• Report out and discussion
Healthy Community Design Initiative
What We Do

Public Health Issues
- Environment
- Injury
- Chronic Disease

Focus Sectors
- Transportation
- Planning and Development
- Parks and Recreation

Key Activities
- Partnerships
- Public Health Surveillance
- Evaluation
- Health Impact Assessments
- Research
- Communication and Education
Health Impact Pyramid

Increasing Population Impact

Changing the Context to make Individuals’ Default Decisions Healthy

Socio-Economic Factors

Long-lasting Protective Interventions

Clinical Interventions

Counseling

Increasing Individual Effort Needed

Frieden, AJPH, 2010
What are “metrics” and why do we need them?

Metric - A standard of measurement, especially one that evaluates a complex process or system.*

Examples:
- Death rates
- Incidence of disease
- Obesity rates
- Number of parks per thousand population

* http://www.thefreedictionary.com/metric
FIGURE 1. Crude death rate* for infectious diseases — United States, 1900–1996†

*Per 100,000 population per year.
Prevalence* of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2013

All states exceed 20%
2 states exceed 35%

2013

* Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be compared to prevalence estimates before 2011.
Physical Activity for Children

The Physical Activity Guidelines for Americans\(^1\) recommends that children and adolescents do:

✓ **60 minutes (1 hour) or more of physical activity**
  - Moderate-intensity aerobic activity, such as brisk walking, or running at least 3 days per week.
  - Muscle Strengthening activities, such as gymnastics or push-ups, at least 3 days per week
  - Bone Strengthening activities, such as jumping rope or running, at least 3 days per week

✓ **each day**

Additional evidence indicates:
- Children may be more active in outdoor settings\(^2\)

- Children who walk to parks can:
  - go more frequently, and
  - get more exercise\(^3\)

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Physical Activity in America - Children

Less than 30 percent of youth (grades 9-12) in the US get recommended amounts of aerobic physical activity. *

<table>
<thead>
<tr>
<th>US Children Physical Activity Indicators</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>• No physical activity</td>
<td>15.2</td>
</tr>
<tr>
<td>• Met aerobic recommendation</td>
<td>27.1</td>
</tr>
</tbody>
</table>

Parks can address multiple public health goals:

- Hazard mitigation
- Environmental services
- Community and social engagement
- Education contact with nature
- Physical activity
But to understand their impact we want to be able to:

- Compare findings across time and geography
- Identify trends
- Generalize research
- Report common findings
Common metrics are needed in order to have robust data about how parks influence health.

CDC is working with the National Park Service and NC State to identify metrics that can be used for park system planning.

**Step 1** - Literature review that identified areas where parks are believed to impact health.

**Step 2** - Create a draft list that relates to park system planning.

**Step 3** - Review the list with key stakeholders.

**Step 4** - Refine suggested metrics and share with planning professionals.
Example:
Percentage of people living within \( \frac{1}{2} \) mile of a park by county

National average: 39%

http://ephtracking.cdc.gov/showAccessToParksAndSchools.action
Examples:

**Potential data sources:**

- Park boundaries
  - United States Geologic Survey (USGS)
- Traffic safety near parks
  - Local traffic safety department
- Community health profile
  - Local health department, County Health Rankings
- Crimes
  - Local public safety department
- Demographics
  - US Census
Example:

Opportunities for using the metrics to promote health

Walking to a park is an important public health benefit. Understanding who can walk to park entrances can inform:

– Site design
– Planning reviews
– Disparities
– State of the park system
– Resource allocation
Roundtable next steps

- Literature review - Courtney Schultz, NC State
- Suggested metrics - Stephanie Tepperberg, NPS
- Discussion/ feedback
Thank You!

Dee Merriam, CDC
770-488-3981
dmerriam@cdc.gov
www.cdc.gov/healthyplaces

Courtney Schultz, NC State
(262) 490-2151
clschul2@ncsu.edu

Stephanie Tepperberg, NPS
(202) 354-6902
stephanie_tepperberg@nps.gov
Parks and Trails Metrics: Supporting Health Promotion

Courtney Schultz, Ph.D Student
Department of Parks, Recreation, & Tourism Management
North Carolina State University
North Carolina State University

- Michael Edwards, Ph.D.
- Jason Bocarro, Ph.D.
- Myron Floyd, Ph.D.
- Roger Moore, Ph.D.
- Nilda Cosco, Ph.D.
- Robby Layton, FASLA, PLA, CPRP

Centers for Disease Control and Prevention

- Dee Merriam

National Park Service

- Attila Bality
- Stephanie Tepperberg
State of the Science

Health is “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 1946)
Health and Parks

The connection between the outdoor environment and general well-being has been intuitively recognized for centuries…

- Guidelines: general principles or practices
- Standards: levels of quality or attainment
- Metrics: refers to forms of measurement
Systematic Literature Review

Databases/Libraries

- CAB Abstracts, CAB Archive, MEDLINE, PubMed, ProQuest Health Management, PsycINFO, SportDiscus

Search Terms

- Combinations of the following search terms were used to search the databases and online libraries.

**Health Terms:**

- Physical Activity, Health, Wellbeing, Well-being, Well being, Quality of Life, Social Cohesion, Mental, Psychological, Stress, Environment, Environmental, Metrics, Matrices, Indices

**Environmental Terms:**

Criteria for Inclusion

Included:

- Peer-reviewed studies
- Addressed measures of health or well-being related to natural space, parks, trails and greenways

Excluded:

- Articles not in English
- Studies without an explicit tie to human health or well-being
- Studies not explicitly defined as park, trail, greenspace or natural space
**Literature Search Process**

- **Initial Search of 500 articles**
  - 290 articles rejected
  - 210 articles included in the review

- **Physical**
  - 8 metrics

- **Psychological**
  - 6 metrics

- **Social**
  - 7 metrics

- **Ecosystems**
  - 6 metrics

- **Built Environment**
  - 15 metrics
### Defined Metrics by Health Impact

#### Physical
- AEE
- Direct Observation
- Self-Reported PA
- Time/Duration
- Frequency
- Mortality Rates
- BMI
- Size of Greenspace

#### Psychological
- Stress
- Mood
- Intrinsic Well-being
- Community Well-being
- Mental Fatigue
- Attention Functioning

#### Social
- Social Capital
- Social Density
- Aggressive Behavior
- Social Ties
- Collective Efficacy
- Social Interaction
- Levels of Crime

#### Ecosystems
- Noise Pollution
- Air Pollution
- Thermal Sensations
- Leaf Surface Area/Coverage
- Tree Inventory
- Levels of Naturalness

#### Built Environment
- Greenspace per Capita
- Demand Capacities
- Typologies
- % of Total Area
- % of Green
- Availability/Accessibility of Greenspace
- Proximity to Green
- Walking Time
- Buffers
- Population Density
- Type of Facility
- Type of Amenity
- Condition of Greenspace
- Incivilities
- Indicators of Positive Social Environment
# Health Metrics for Parks and Trails

<table>
<thead>
<tr>
<th>Metric</th>
<th>Health Outcome</th>
<th>Geographic Measurement Scale</th>
<th>Operational Definition</th>
<th>How to Measure</th>
<th>Example Reference(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity-related Energy Expenditure (AEE)</td>
<td>Parks and trails expected to have positive relation on users’ total energy expenditure.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
THANK YOU!

Courtney Schultz
CLSCHUL2@NCSU.EDU

Special thanks to our partnering agencies:
Suggested Health Metrics for Parks and Trail System Planning

Stephanie Tepperberg
National Park Service Rivers, Trails, and Conservation Assistance
stephanie_tepperberg@nps.gov
Draft Health Metric List

- Developed based on literature review and professional experience
- Organized by geographical scale
- Keyed to literature review measures
- Meet four key criteria:

1. Able to be compared across time and geography
2. Used to identify trends
3. Be generalizable
4. Can be aggregated to report common findings
National/State Measures

- Percentage of population living within 0.5 miles of a public park boundary or trail
Jurisdiction/System Measures

- Percentage of population with less than a 0.5 mile walk route to a park or trail entrance
- Percentage of land area in public parks
- Percentage of sensitive lands inclusive of 200’ buffer in public park land
Site Level Measures

- Percentage of population living within 0.5 mile of a park boundary or trail entrance who have less than a 0.5 mile walk route to entry points
- Percentage of park boundary next to a pedestrian friendly road
- Percent of site shaded from intense sunlight
- Number of injuries in the park or on the trail per month/year
- Cost of vandalism per month/year
Facility Measures

- Calories burned/hour by an average user * duration*
  number of users
- Number of users per week
- Capacity - potential number of persons served per week
- Ratio of use verses capacity
- Percent of trail within a 0.5 mile of a neighborhood entry point
Individual Measures

- Average number of visits per week
- Average length of a visit in hours
- Hours volunteered per year
- Calories burned by specific activity/hour
- Change in cortisol level after an hour in a park or on a trail
- Change in blood pressure after an hour in a park or on a trail
- Change in resting pulse rate after an hour in a park or on a trail
- Change in cognitive performance after an hour in a park or on a trail
- Change in BMI in a year after being in a park more than 2 times per week
Questions for Discussion & Feedback

1. Are there gaps in the list of metrics?

1. Rank your top 5 metrics.

1. How might you use each of the highly ranked metrics?

1. What resources or incentives would be needed to promote general use?
Thank you!

Stephanie Tepperberg, NPS
(202) 354-6902
Stephanie_tepperberg@nps.gov

Dee Merriam, CDC
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dmerriam@cdc.gov
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Courtney Schultz, NC State
(262) 490-2151
clschul2@ncsu.edu