Nature for Health in Cities & Towns: 
the importance of trees

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Trees serve as nature's engineers in cities

A house sparrow perches in a young budding tree in downtown Cedar Rapids on Friday, March 31, 2017. (Liz
trees in the background

public awareness & appreciation?
WHO Health Definition

A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (1946)
Social Determinants
Outline

City Trees & Health: the evidence

Economics

Evidence Based Goals & Measures
Urban Forests and Newborns
the natural environment may affect pregnancy outcomes . . .
10% increase in tree-canopy cover within 50m of a house
= lower number of low weight births
(1.42 per 1000 births)

Donovan et al., Health & Place 2011;
Hystad et al., Env Health Perspectives 2014
New Climate Change Warning: More Infant Heart Defects
— Heat extremes seen raising incidence of congenital abnormalities
Trees & Physical Activity

- school children in cities grades 6 to 8
- relationship of tree cover to outside-of-school physical activity
- *5% increase in treed area cover = 5% increase in free-time physical activity*

Sacramento Study :: LIDAR x CHIS data
7,900 adults, 250 m buffer, covariates

more tree cover
= better overall health
= better social cohesion

EAB Tree Loss & Public Health

1990 to 2007, 1,296 counties in 15 states infected areas vs. no bugs
15,000 more deaths from cardiovascular disease
6,000 more deaths from lower respiratory disease
controlled for demographic, human mortality, and forest health data at the county level

Toledo, Ohio in 2006, pre EAB

2009, EAB in neighborhood

photo credits: Dan Herms, Ohio State U
Improving Depression

20 adults with major depression walk in a park setting and a built setting

- 50-minute walks one week apart
- before-after testing:
  - Mood: Positive and Negative Affect (PANAS)
  - Cognition: Backward Digit Span (BDS)

Berman et al. 2012. *Journal of Affective Disorders*

cognitive and affective improvements after walking in a nature setting
City Trees & Human Health

newborn & infant health
increased physical activity for kids
overall adult health
social cohesion
respiratory & cardiovascular health
reduced depression
Literature Review – City Trees & Human Health

USDA Forest Service, U of WA, Health Canada, Natural Resources Canada, Tree Fund

182 peer-reviewed articles

in publication review - do not duplicate or distribute -

figure credit: Sharon Lam
Outline

City Trees & Health: the evidence

Economics

Evidence Based Goals & Measures
healthy trees.
happy people.
What causes the most deaths in Norway?

<table>
<thead>
<tr>
<th>2007 Ranking</th>
<th>2017 Ranking</th>
</tr>
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<tbody>
<tr>
<td>Ischemic heart disease</td>
<td>1</td>
</tr>
<tr>
<td>Alzheimer's disease</td>
<td>2</td>
</tr>
<tr>
<td>Stroke</td>
<td>3</td>
</tr>
<tr>
<td>COPD</td>
<td>4</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>5</td>
</tr>
<tr>
<td>Lower respiratory infect</td>
<td>6</td>
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<tr>
<td>Colorectal cancer</td>
<td>7</td>
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<tr>
<td>Prostate cancer</td>
<td>8</td>
</tr>
<tr>
<td>Falls</td>
<td>9</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>10</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>11</td>
</tr>
</tbody>
</table>

source: Institute for Health Metrics and Evaluation, Univ of Washington
### Economics!

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Norway</strong></td>
<td>$6,647</td>
<td>$10,224</td>
</tr>
<tr>
<td><strong>United States</strong></td>
<td></td>
<td></td>
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<tr>
<td>annual per capita spending (USD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Domestic Product GDP</td>
<td>9.9%</td>
<td>17.9%</td>
</tr>
<tr>
<td>Nation ranking</td>
<td>average for all high income countries = 11.5%</td>
<td></td>
</tr>
</tbody>
</table>

Kathleen L. Wolf, Ph.D.

also in Spanish! and Arabic!

design: milepost

author:

printing:

The Nature Conservancy

also in Spanish! and Arabic!
Nearby nature experiences are important across the entire life cycle, from cradle to grave.

Research about nature benefits and economic value is fairly new. Some of the quantified health benefits of nature in cities are easier to convert to economic value than others. Here are some preliminary valuations—estimated for the entire U.S. on an annual basis.

**INFANTS**

**BIRTH WEIGHT**

*Potential economic value: $9.26 million savings on annual health care costs.*

Birth weight influences long-term childhood health and development, and has been linked to some serious diseases. Low birth weight is associated with both short- and long-term health costs, such as longer hospital stays and increased illness. Pregnant women who have more tree canopy and green space near their homes generally have babies with healthier birth weights.

**IMMUNE FUNCTION**

*Potential economic value: $1.65 million savings on medication costs per year.*

We are most vulnerable in the early months of our lives, when the body and mind are growing and developing at an astonishing rate. The 'thrifty gene hypothesis' suggests that early contact with outdoor microorganisms stimulates the development of a healthy immune response.

**FAMILY DYNAMICS**

*Potential economic value: $2.72 million savings on counseling services.*

An infant's parents and siblings adjust their lives after a baby arrives, and the changes can bring stress and anxiety. Nurture parks and walks help reduce these conditions and improve interactions between people within the household.

**CHILDREN & TEENS**

**OVERALL HEALTH AND WELL-BEING**

*Potential economic value: $3.12 million savings on medical services.*

Increased physical activity, reduced asthma, and reduced risk of adult skin conditions.

Expenses associated with childhood obesity and overweight are substantial. Regular physical activity can help children develop healthy habits that last a lifetime.

**ADHD**

*Potential economic value: $3.03 million savings on medication costs per year.*

Children with ADHD often have difficulty concentrating and may require more medication. Outdoor activities can help improve their focus and attention.

**CARDIOVASCULAR DISEASE**

*Potential economic value: $3.08 million savings on medication costs per year.*

Millions of children ages 3-17 are treated for Attention Deficit Hyperactivity Disorder (ADHD) in the U.S. Nature exposure in a potential alternative treatment study showed that activity within nature or green spaces, such as play or just 30 minutes of walking, reduces symptoms.

**OLDER ADULTS**

**DEPRESSION AND STRESS**

*Potential economic value: $3.04 million savings on medication costs per year.*

Reduced frustration, mental stress, and depression disorders, and improved body image, self-esteem, and life satisfaction.


**MOBILITY & QUALITY OF LIFE**

*Potential economic value: $3.20 million savings on health care costs from falls per year.*

One in three older adults falls each year, giving rise to falls and related injuries. Residents' falls within older care facilities are particularly expensive medical situations. Being out in nature maintains personal mobility, leading to reduced falls and reduced need for medications. Further, those who are socially isolated are more likely to be insufficiently active, engaging in nature activities that promote social interactions support relationship formation, and quality of life.

**HYERTENSION**

*Potential economic value: $3.20 million savings on treatment costs annually.*

Hypertension, or high blood pressure, is one of the five most expensive conditions impacting older adults. Nature exposure in an environment within nature or green spaces has been shown to reduce blood pressure.

**COGNITIVE DISORDERS**

*Potential economic value: $1.28 million savings on medical services.*

About one in five older adults experiences mental and cognitive disorders, with age being the greatest risk factor. In 2016, about 59% of people aged 50 or older were still in the workforce. Those with dementia have fewer than three times as many hospital stays per year as other elders. Encouragement with nature improves symptoms related to cognitive disorders, such as agitation, depression, and reduced mobility.

**CRIME & SAFETY**

*Potential economic value: $1.28 million savings for crime victims and property owners per year.*

Reduced risk of juvenile violence, and reduced property crime.

Contributing analysts:
Dr. Stephen Grado & Marcus Measells, MSU; Dr. Alicia Robbins, Weyerhaueser
Outline

City Trees & Health: the evidence

Economics

Evidence Based Goals & Measures
Story: Human Health Benefits Across the Life Cycle
ADHD and nature contact

- 96 children aged 7-12 diagnosed ADD or ADHD
- Parents gave postactivity attentional functioning ratings (PAAF) –

- 4 measures:
  - Can’t stay focused on unappealing tasks (homework or chores)
  - Can’t complete tasks
  - Can’t listen and follow directions
  - Easily distracted

Faber Taylor. 2001. *Environment & Behavior*
ADHD and nature contact

- 17 children aged 7-12 with diagnosed ADHD
- 20-minute guided walks
  - Park
  - Neighborhood
  - Downtown
- Pre-walk puzzles
- Post-walk cognitive test

Faber Taylor & Kuo. 2009. *Journal of Attention Disorders*
Healthy Microbiome

- control obesity & asthma
- boost immune function
- improve mental health

need contact with ‘Old Friends”

put aside the Hygiene Hypothesis
Intestinal microbiome development

~10 to 100 trillion microbes in healthy gastrointestinal (GI) tract

Arrieta et al. 2014. Frontiers in Immunology
Eat Dirt!
Create
Forests!
Fiddleheads Forest School
Washington Park Arboretum (Seattle)
cognitive
social & physical learning
public health officials
moderate activity
recommendations

parks, active living, active transit
Walking Programs

children
elders
families
Walking Meetings

creativity, energy, communication, health
Parks Prescription

Date: _______________________

Dr: _______________________

Name: _______________________

I recommend:

☐ Walking  ☐ Other:____________

______________ minutes a day

______________ days per week

* Health Canada suggests moderate activity of 30 minutes per day | 5 days a week

Benefits of daily activity

• Improve overall physical and mental health
• Maintain a healthy weight
• Reduce the risk of diabetes and other chronic conditions
• Lower cholesterol levels
• Manage stress and anxiety

Signature: ___________________
Parks Prescription

1. Get a prescription for ParksRx from your healthcare provider.

2. Visit www.REACHforbetterhealth.com
   2. Enter your zip code
   3. Click

3. Pick your park

4. Exercise in the park and share outcomes with your healthcare provider.

ParksRx
Your Prescription For Better Health

This information is provided for educational purposes and is not to be considered medical advice.
Green Streets for Walkability

evidence of lower frustration and higher meditation when moving into the greener streets

Experience the restorative powers of nature and join us for Strolls for Well-Being, a free 10-week program offered at Bloedel Reserve. If not already a member, participants are given a temporary membership to

DAY-USE STROLLS:
Since introducing the Strolls for Well-Being program in 2014, hundreds of people have benefited from the healing effects of nature.
Shinrin yoku (forest bathing)

• extensive research
• restorative experiences
• workers retirees
• networked system, 52 bases in Japan
Outline

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Evidence Based Goals & Measures
Vegetation & Mental Health

- vegetation cover and afternoon bird abundances
- lower prevalence of depression, anxiety, and stress:
  - depression, more than 20% cover
  - anxiety, more than 30% cover
  - stress, more than 20% cover

Canopy Cover & Stress

images of canopy cover varied 0-60%

Summary: Knowledge to Practice

• nearly 40 years of research: city trees, nearby nature
• critical mass of evidence – now what?
• integrate greening and health programming
• integrate urban forest goals with broader urban systems needs
Human Dimensions of Urban Forestry and Urban Greening

What's New?
Nature and Consumer Environments
Research about how the urban forest influences business district visitors.

Trees and Transportation
Studies on the value of having quality landscapes in urban roadsides.

Civic Ecology
Studies of human behaviors and benefits when people are active in the environment.

Policy and Planning
Integrating urban greening science with community change.

Urban Forestry and Human Benefits
More resources, studies and links...

Green Cities: Good Health
human health & well-being research

Projects Director
Kathleen L. Wolf, Ph.D.

www.naturewithin.info