Abstract

Introduction: Urban roadside nature provides an important opportunity for individuals to experience the natural world while going about their everyday lives. Urban trees and green space have been shown to improve mental health, facilitate social interaction, and encourage physical activity; however, their distribution may vary across a city. This study assessed the association between neighborhood street green infrastructure and both recreational exercise and active transportation.

Methods: Data on self-reported physical activity were derived from a prospective cohort of participants residing in Milwaukee and Green Bay (n=752). Percent green space and tree cover along walkable roads within 500 and 1000 meter buffers were calculated using 1-meter resolution land cover data within 500 and 1000 meter network buffers around study participants’ homes. Logistic regression was used to assess the association between neighborhood environment and physical activity, controlling for sociodemographic and neighborhood characteristics.

Results: Having more than 35% street green space along walkable roads within 500 and 1000 meter buffers increased the odds of recreational physical activity by 2.1 and 2.5 times, controlling for socio-demographics (odds ratio (OR)=2.1, 95% confidence interval ([CI]) [1.1, 3.9]) and OR=2.5, 95% CI [1.2, 5.5], respectively). Study participants with greater than 15% tree cover along walkable roads within 500 and 1000 meters of their homes were approximately one and a half times more likely to choose active transportation once within a 30 day window than those with less than 15% tree cover, adjusting for socio-demographics (OR=1.5, 95% CI [0.8, 2.9] and OR=1.4, 95% CI [0.3, 3.2], respectively).

Conclusions: These findings suggest that the proximate neighborhood environment may influence an individual’s decision to exercise for recreation or transportation; however, more work on neighborhood preference is needed.

Background

Trees and green spaces benefit health in many ways.

Street trees:
- Health perceptions
- Stress recovery
- Recreational walking
- Traffic safety
- Antidepressant prescriptions
- Child obesity
- Crime

Total green space:
- Mental health
- Mortality
- Cardiovascular disease

Green exercise:
- Emotional health
- Mental health
- Pulmonary function
- Restoration, self-esteem, tension, anxiety, memory, happiness

Methods

Data:
- Survey of the Health of Wisconsin (SHOW):
  - 800-1000 sampled across Wisconsin annually
  - Two-stage, probability-based cluster sampling approach
  - Our study pulled Milwaukee and Green Bay data from 2008-2013; n=752
- 3 measures of physical activity
  - Recreational walking
  - Recreational moderate or vigorous physical activity (MVPA-R)
  - Active transportation

U.S. EPA, EnviroAtlas:
- USDA 2010 NAIP aerial photography and supplemental data
- 1-meter resolution classified land cover: free and publicly available in 16 cities
- Our study used 5 measures of tree cover and green space
- Sidewalk tree cover
- Street tree cover
- Street green space
- Overall tree cover
- Overall green space

Assessment:
- Physical Activity:
  - “Over the past 30 days you…”
    - Walked
    - Walked, run, jogged, biked, roller bladed (MVPA-R)
    - Walked or bicycled as part of getting to and from work or school, or to do errands

Tree Cover and Green Space:

Table 1. Descriptive statistics of the study population.

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Figure 1. Screenshot of the EnviroAtlas Eco-Health Relationship Browser interactive literature review.

Figure 2. Eastern U.S. (left) and state of Wisconsin (right) with the study area outlined in orange.

Figure 3a-c. Odds ratios for physical activity given street green space or street tree cover, and circular buffer sensitivity results.
   a) Recreational walking and street green space
   b) Recreational physical activity (MVPA-R) and street green space
   c) Active transportation and street tree cover

Figure 4. 500 m network (L) and circular (R) buffers.

Analysis:
- Logistic regression – odds of physical activity at least once in the past 30 days given tree cover or green space exposure
- Maximum likelihood imputation for missing data
- Backwards selection to eliminate non-significant variables
- Assessed interaction based on a priori hypotheses
- Sensitivity analyses – overall tree cover and green space

Conclusions

- Strongest associations were seen between street green space and MVPA-R
  - Aesthetics may be more important than other benefits (e.g., shade)
- Location of trees may be important
  - Street trees had stronger associations than overall tree cover and green space
- Especially for active transport
- Slight, inconsistent differences between 500m and 1000m sized buffers
- Correlates of active transportation and recreational physical activity differ
- Causal pathway is unclear
- More research is needed in additional cities and to control for neighborhood self-selection

References

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