Nature and Children’s Health: effects of the natural environment on children’s health & well-being

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Research Evidence:

- Physical activity / Obesity
- Social & community well-being
- Cognitive Functioning & ADHD
- Psychological well-being / resilience
- Myopia
- Birth weight
Childhood obesity has tripled since the 1980’s.

Children are not achieving recommended levels of physical activity (PA). Among ages 6-11, only 42% achieve the recommended 1 hour of PA per day, while only 8% of adolescents achieve this goal (Troiano et al, 2007).
One of the best predictors of children’s physical activity is **time spent outdoors** (Sallis, Prochaska & Taylor, 2000).

Among (N=428) low income children age 2-5, those living in areas with greater **street tree density** are more physically active; those with more **park access** had smaller skin folds (Lovasi et al 2011).

In NYC (n=11,000+) higher **street tree density** was associated with 12% lower prevalence of obesity (Lovasi et al 2014).

In Spain, (n=3000+) 9-12 year olds - both **surrounding greenness** and **residential proximity to forests** were associated with significantly lower prevalence of overweight/ obesity (Dadvand et al., 2014)
Does nature matter…?

Physical Activity & Obesity

- Longitudinal studies indicate…
  - …children who had more parks and “greenness” nearby had lower BMI at end of 2 years (Bell, et al, 2008).
  - …of 3000+ children age 9-10 years indicate those with access to parks within 500 m and recreation programs within 10 km had reduced risk of obesity at age 18 (Wolch et al, 2011).
  - …school gardens linked to increased time spent in physical activity during the school day (Wells, Myers & Henderson, 2014)
Does nature matter…?

Social & Community Well-Being

A Natural Experiment…

- Robert Taylor Homes in Chicago Public Housing
- architecturally identical buildings
- some buildings with and some without trees + vegetation
  (Kuo, Sullivan, Faber Taylor)

Helps to address the issue of self-selection…
Does nature matter…?

Social & Community Well-Being

A Natural Experiment…

**Nature Draws People Together…**

*Children & Adults*
Treed spaces $\rightarrow$ more use & interaction
(Coley, Kuo & Sullivan, 1997)

*Children*
Green Spaces $\rightarrow$ children’s play interaction w/ adults
(Faber Taylor, Wiley, Kuo & Sullivan, 1998)
Does nature matter…?

Social & Community Well-Being

- **Children’s play in natural environments** linked to improved communication skills and relationships among children (Pyle, 2002; Bixler et al., 2002; Moore, 1986; Moore & Wong, 1997).

- **Schoolyard greening** studies indicate that diverse vegetative landscapes promote cooperation, civility and harmony (Dyment & Bell, 2008; Moore & Cosco, 2000).

- **Play in natural spaces** fosters children’s creative play (Cobb, 1977, Faber Taylor et al., 1998)
Does nature matter…?

Cognitive Functioning & Academic Performance

- Increases in **nearby nature** when children move are associated with improvements in **cognitive functioning** (Wells, 2000).

- **Natural views from the high school cafeteria** are associated with higher standardized test scores, higher graduation rates, a greater percentage of youth planning to attend 4-year colleges and lower incidence of criminal behavior (Matsouka, 2010).
**Attention Restoration Theory (ART)**


- **Directed Attention** ("voluntary attention")
  - effortful attention; to focus, to concentrate

- **Involuntary Attention**
  - Is captured effortlessly.

- **Directed Attention Fatigue**… occurs after prolonged use of effortful attention. Symptoms include distractibility, difficulty concentrating & irritability.

  Nature captures *involuntary attention* and fosters recovery from Directed Attention Fatigue.
Does nature matter...?

Attention Deficit Disorder

- Parents of children with ADHD report that green, outdoor activities reduce symptoms more than activities in other settings (Faber Taylor, Kuo & Sullivan, 2001; Kuo & Faber Taylor, 2004).

- When randomly assigned to a nature walk, neighborhood walk, or downtown walk, children with ADD perform better cognitively after a nature walk (Faber Taylor & Kuo, 2009).

- Children with ADHD performed better on concentration task in a wooded area, compared to in a small town (van den Berg + van den Berg, 2010).
Nearby nature buffers the effects of stress and adversity on psychological well-being (Wells & Evans, 2003).
Does nature matter...?

Psychological Well-Being

- **Nearby nature** buffers the effects of stressful life events and adversity on psychological well-being (Wells & Evans, 2003).

- **Nature at home and school** moderates the effects of stressful events on perceived stress (Corraliza, Collado & Bethelmy, 2012).

- **Green space** bolsters resilience among poor children, age 3-5 (Flouri et al., 2014).
Myopia

• Globally, myopia rates are on the rise. In the US, myopia have increased from 24% to 34% from 1970’s to ~2000. In Taiwan, rates have increased from 6% (1983) to 21% (2000) among 7 year olds.

• Myopia at a young age is linked to increased risk of later-life glaucoma, cataracts, and blindness. According to the WHO, myopia is among top priorities aimed at preventing avoidable blindness.
Does nature matter…?

Myopia

- Appears to be an inverse relation between time outdoors and incidence or progression of myopia.

- Among 12 y.o. in Sydney, Australia and 11-20 y.o. in Singapore, levels of outdoor activity show a strong inverse correlation with myopia prevalence (Rose et al., 2008; Dirani et al., 2009).

- Sherwin et al (2012) conclude:
  - For each + 1 hour spent outdoors per week, the odds of developing or worsening myopia drops by 2%.
  - Difference between nonmyopes’ and future myopes’ time outdoors was 7.98 v. 11.65 hours/week.

- Further research needed to understand underlying mechanism: e.g., light, eye exercise?
Does nature matter…?

Birth Weight

- **Low birth weight** is a major cause for neonatal + infant mortality and a correlate of some adverse outcomes in childhood + beyond.

- A number of recent, large-scale epidemiological studies document a positive association **between nearby greenness** and birth weight.

  - Donovan 2011, N=5295, 2006-2007, United States
  - Dadvand, 2012a, N=8246, 2001-2005, Spain
  - Dadvand, 2012b, N=2393, 2003-2008, Spain
  - Laurent, 2013, N=81,186, 1997-2006, United States
  - Hystad, 2014, N=64,705, 1999-2002, Canada
Nature & Children’s Health Outline

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Future Research

• Measuring Nature: what is “nature”?

• Dose-response relations. How much nature is “enough”?

• Pathways from nature to health: Mediating mechanisms