URBAN GREEN SPACE, DISPARITIES & HEALTH

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Park Use & Access = Health Promotion
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- Physical activity
- Obesity
- Heart disease & diabetes
- Stress
- Emotional wellbeing
Park Use & Access = Health Promotion

- physical activity
- attention & understanding
- test scores
- emotional wellbeing
- self discipline
- obesity
- heart disease & diabetes
- stress
- ADHD symptoms
- behavior problems
Park Use & Access = Community Health

- Livability
- Community Connectivity
- Less Background Noise
- Cooler Neighborhoods
- Sense of Peace & Tranquility
- Less Air Pollution
YOUTH BEHAVIOR & GREEN SPACE

Evidence from Los Angeles, CA
CITIES, AGGRESSION & GREEN SPACE

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• Approximately half of the world's population currently resides in urban areas
• Aggressive behavior in childhood is a key precursor to violence and mental illness
  o Adolescence is a critical period of neurobehavioral development
How do the physical characteristics of an urban environment affect aggressive behavior in youth?

- Prior studies examined air pollution, weather and noise
- No previous studies on the role of green space
Leverage a prospective multi-ethnic cohort of twins & triplets living in Los Angeles and surrounding areas from the Risk Factors for Antisocial Behavior Study (n=1287)

- Normalized Difference Vegetation Index (NDVI) used as a proxy for neighborhood greenspace
DESIGN

• Outcome: Child Behavior Checklist – Parent-reported total aggression

• Covariates
  • Demographics: age, gender, race/ethnicity
  • Household socioeconomic status
  • Neighborhood psychosocial stressors: parent-perceived neighborhood quality, neighborhood SES
  • Neighborhood noise: proximity to freeways/roads, traffic density
  • Spatial: meteorological factors
  • Maternal smoking or exposure to secondhand smoke during pregnancy
RESULTS

• Participants living near the highest quartile of green space (1000m buffer) were more likely to be:
  o White
  o Higher SES household
  o Have a better perception of neighborhood quality
  o Be born to non-smoking mothers
ASSOCIATION BETWEEN GREEN SPACE & AGGRESSION

- Multi-level mixed-effects model
- Aggressive behaviors decreased with increasing exposure to green space
  - Short-term and long-term average NDVI in 1000m buffer
KEY FINDINGS

• Residential green space may have a neuroprotective effect on aggressive behavior in adolescents

• Lowest NDVI in residences near buildings, shopping centers or roads while highest quartile near fields, parks or golf course

• The benefits of increasing vegetation over the range (≈0.12 in NDVI) commonly seen in urban environments were equivalent to ≈2 to 2.5 years of age-related behavioral maturation.
  - Could not be explained by SES, race, traffic density or maternal smoking

• No evidence of effect modification by sociodemographic factors or neighborhood quality, suggesting the universal benefits of neighborhood greenspace.
KEY QUESTIONS

• Strong and growing evidence about benefits of green space
  o Park inequities = health inequities

• How do we increase green space and parks in urban communities?

• Parks & increase in physical activity is always good – right?
COLLISION OF THE BEST INTENTIONS

Urban development, parks and the public health conflicts in Los Angeles
• Park poor
• One park for every 10,000 kids in Los Angeles County
• Growing effort between elected officials, non-profits and community organizations to increase access to parks & green space in urban LA County
• Fewer parks in the most environmentally burdened communities
  - California EnviroScreen 2.0 (pollution & vulnerability)
PARK ACCESS

Park Inequities = Health Inequities
Children of color have access to much less park space

95.7

Too Far Away
2 in 3 kids in Los Angeles County do not live within walking distance (1/4 mile) of a park

2.9 5 6.3
Black Latino Asian White

Park acres per 1,000 children in Los Angeles County
COMMUNITY VOICES

“We have to take parks wherever we can get them.”

“Will the air pollution from playing at parks make my asthma worse?”

“I don’t let my children play outside. Our neighborhood is too polluted.”

“Should I exercise in polluted areas?”
PARKS & POLLUTION

• Exercise may amplify respiratory uptake of air pollution
• New onset asthma in children was associated with increased participation in team sports in communities with high concentrations of ozone
• Exercising in a park with high air pollution may induce adverse rather than beneficial health effects
• Others suggest exercise almost always outweighs air pollution risk (in the US)

McCurdy, 2997; Campbell, 2005; McConnell, 2002; Woodward, 2016
• Over 35% of parks in LA County are within 500 meters of a freeway

• What are the health implications of promoting physical activity near heavy traffic?

• How should we balance park needs vs siting concerns?
PROXIMITY TO TRAFFIC MATTERS
CHILDREN WHO LIVE NEAR TRAFFIC HAVE DIMINISHED LUNG CAPACITY

Lung Function Growth

Regional PM$_{2.5}$ : Freeway Distance

Gauderman et al., 2015
INEQUITY

- Parks within 1000m of freeways had higher concentrations of NO$_2$ and PM$_{2.5}$ than the other parks.
- Higher levels of NO$_2$ and PM$_{2.5}$ characterized public parks in low-income neighborhoods and communities of color, especially in Latino areas.
ACTION IS WARRANTED FOR HEALTH

- There is strong health science justification for regulating exposures near roadways with heavy traffic

- Existing efforts in LA
  - Buffer for new school construction (500 feet)
  - Enhanced air filters for apartment complexes (1000 feet) in 3 “Clean Up Green Up” neighborhoods
ESTRELLA PARK

• North of USC campus
• Previously a junkyard
• Revitalized in 2006 – at request of local community

WATERFRONT PARK

• Community victory
• Next to the largest port in the country & major transport corridor for trucks
• “Buffer” from environmental impacts as a result of port expansion
LOS ANGELES RIVER

- Plans for continuous greenway and bike path along 51 miles of the LA River
- Adjacent to freeways, industrial zones
  - Community working to “Reclaim the River”

Photo credits: East Yard Communities for Environmental Justice, Youth in Action
GROWING THE CONVERSATION

• Gentrification concerns: Adding environmental amenities to environmental justice communities, while keeping residents in those neighborhoods

• Bringing environmental health into the conversation
  o Obesity prevention
  o Urban planning & design
  o Parks advocates

• Long-term strategies to decrease air pollution from goods movement and industrial sites

Photo credits: East Yard Communities for Environmental Justice, Youth in Action
NEXT STEPS

• Engage urban planners, policy experts and community organizations
  o How to increase park space in environmental justice communities?

• Share environmental health concerns as part of new parks initiatives
  o Los Angeles County + City of Los Angeles

• 2017 Conference
  o The links between air pollution, obesity and environmental justice
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RESOURCES

USC Environmental Health Blog
http://usceh.blogspot.com/

Parks Infographic (with citations)

English:
http://usceh.blogspot.com/p/infographic-childrens-health-urban-parks.html

Spanish
http://usceh.blogspot.com/p/infografia_22.html

Environmental Determinants of Aggression in Adolescents: Role of Urban Neighborhood Greenspace