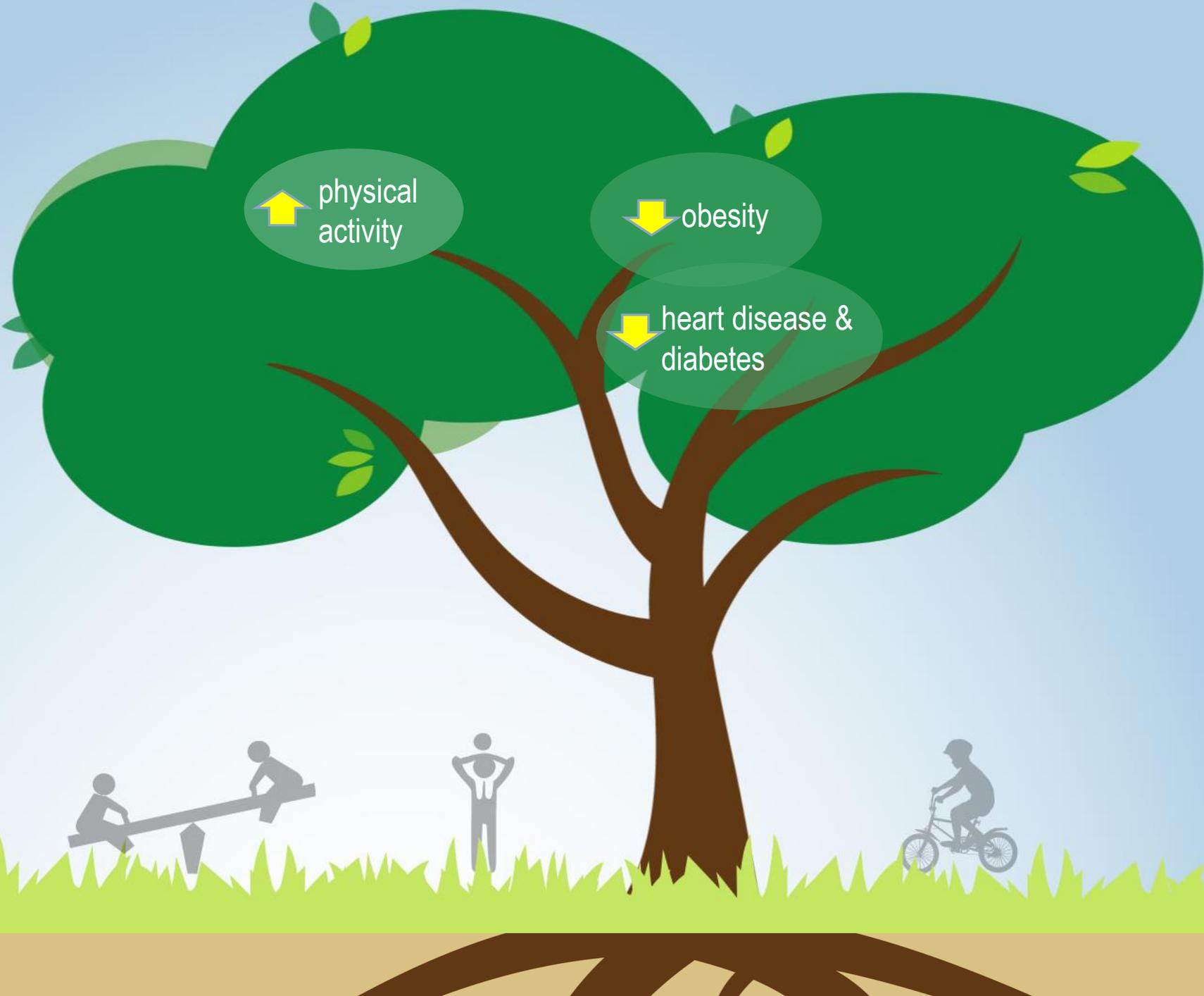


# URBAN GREEN SPACE, DISPARITIES & HEALTH

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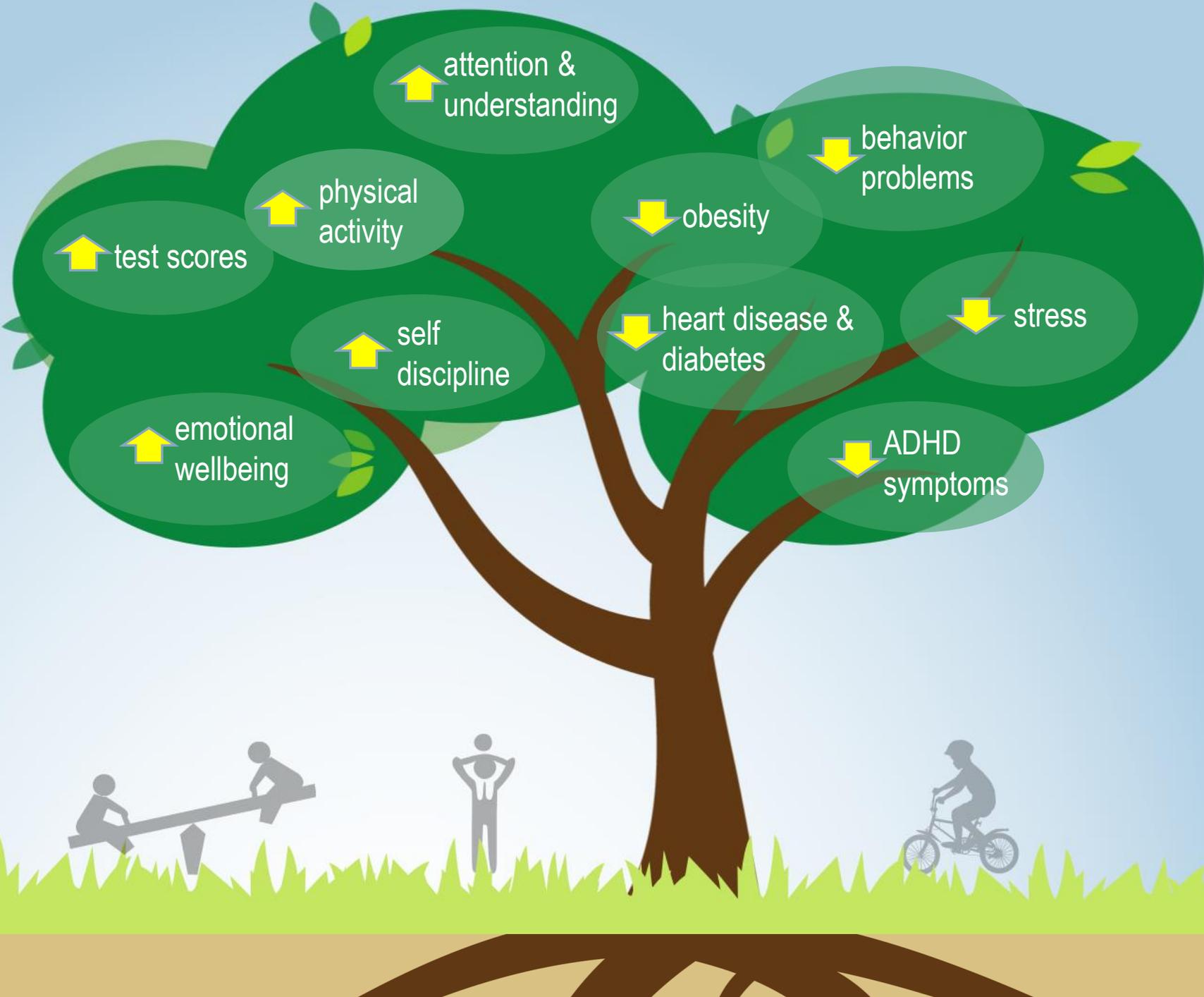
**Park Use &  
Access =  
Health  
Promotion**



# Park Use & Access = Health Promotion



# Park Use & Access = Health Promotion





**Park Use & Access =  
Community Health**

livability

less background noise

cooler neighborhoods

community connectivity

sense of peace & tranquility

less air pollution

# YOUTH BEHAVIOR & GREEN SPACE

Evidence from Los Angeles, CA

# CITIES, AGGRESSION & GREEN SPACE



Diana Younan, MPH, PhD Candidate

Younan D, Tuvblad C, Li L, Wu J, Lurmann F, Franklin M, Berhane K, McConnell R, Wu AH, Baker L, Chen JC. (2016). **Environmental Determinants of Aggression in Adolescents: Role of Urban Neighborhood Greenspace.** *Journal of the American Academy of Child & Adolescent Psychiatry.*

- 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
  - Adolescence is a critical period of neurobehavioral development

# CITIES, AGGRESSION & GREEN SPACE



- 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

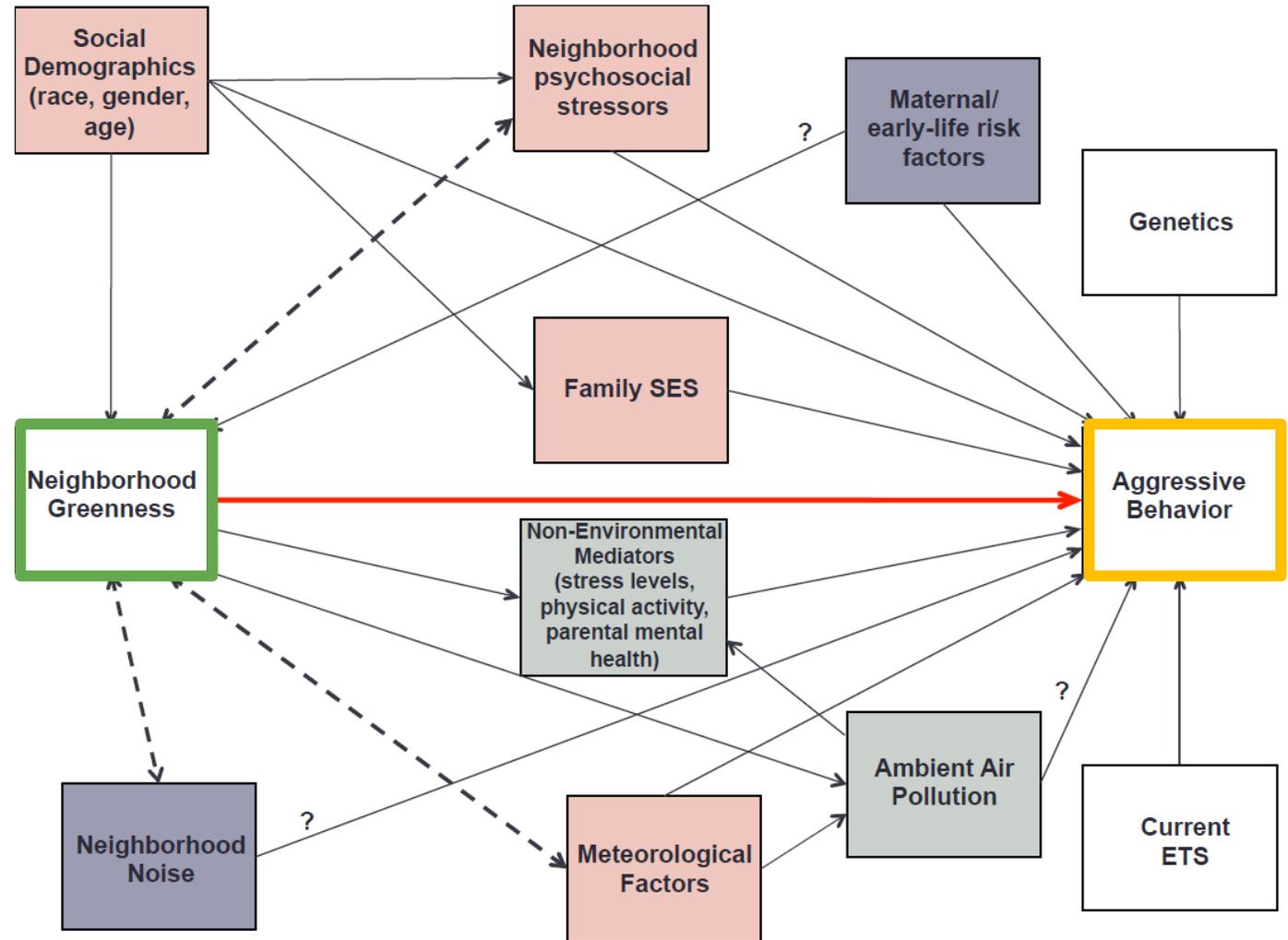
# CITIES, AGGRESSION & GREEN SPACE



- 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

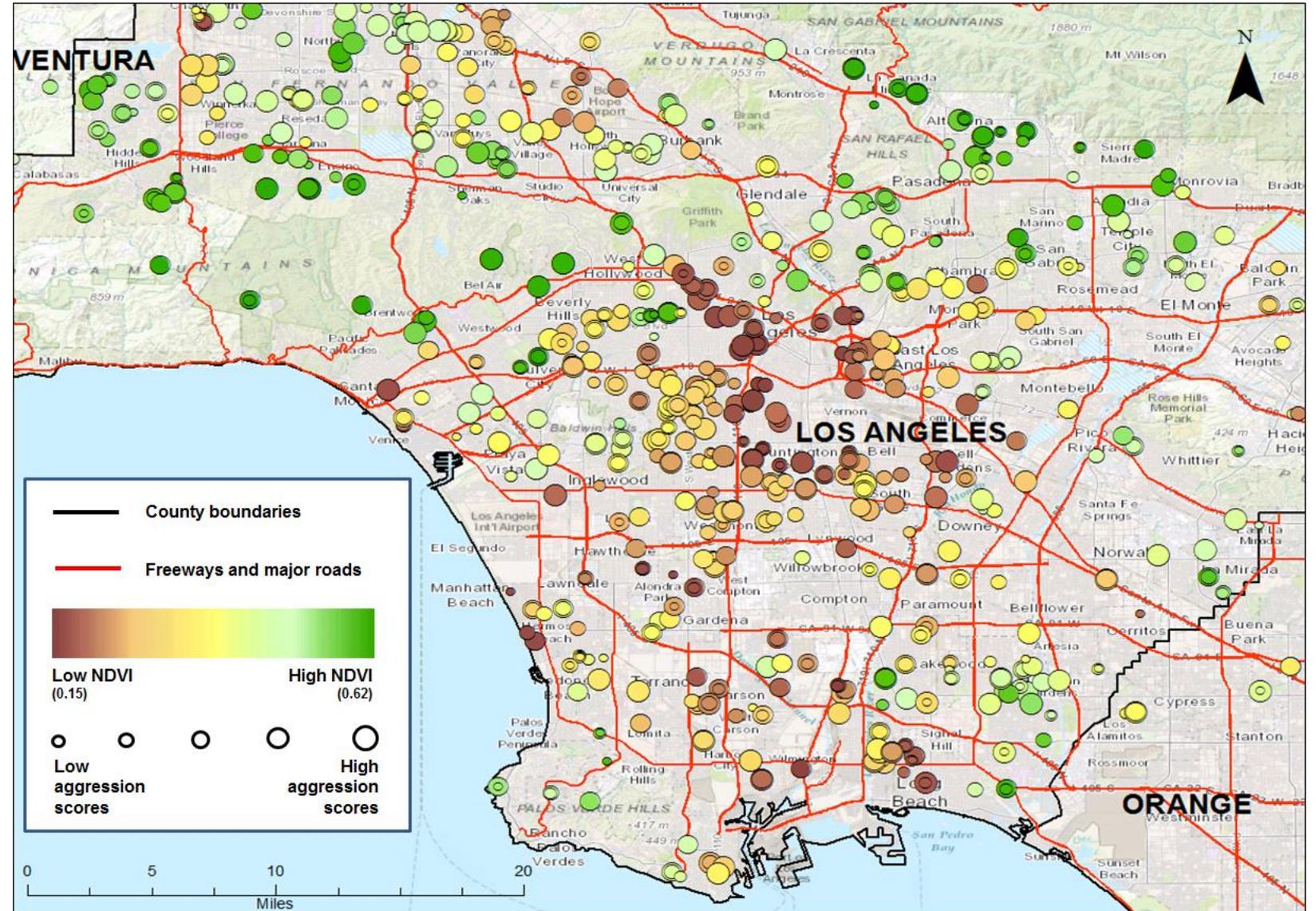
# DESIGN

- 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

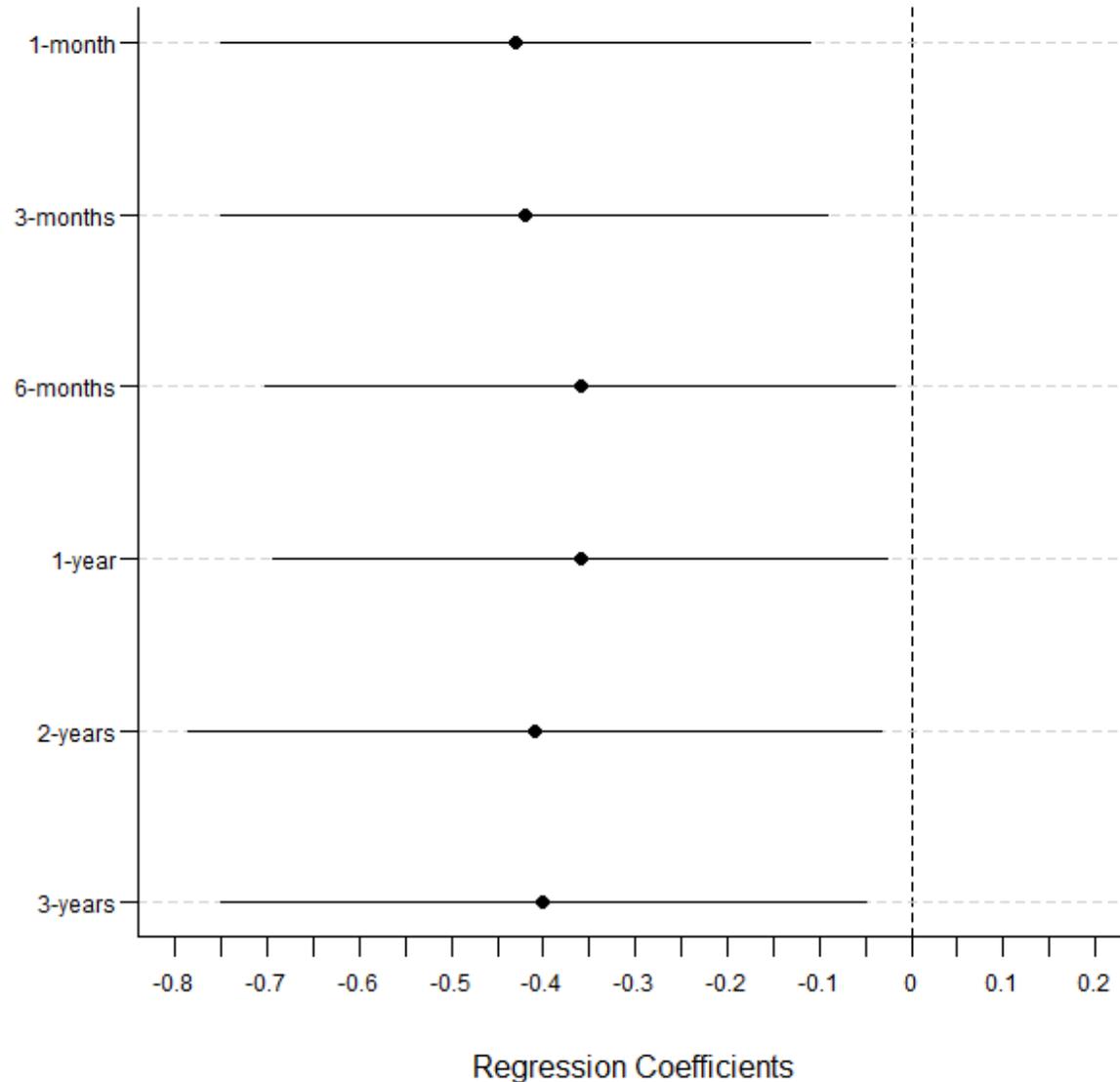


# RESULTS

- Participants living near the highest quartile of green space (1000m buffer) were more likely to be:
  - White
  - Higher SES household
  - Have a better perception of neighborhood quality
  - 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

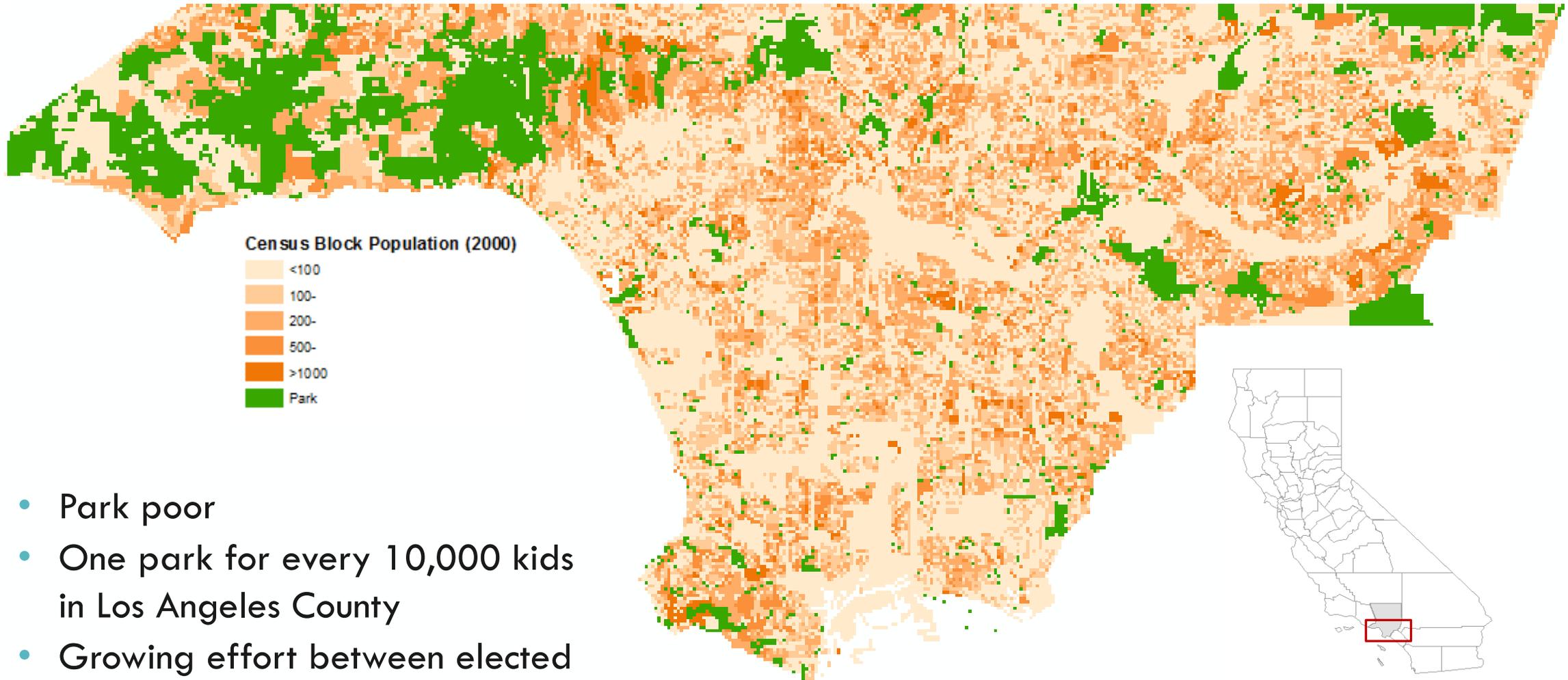
- Residential green space may have a neuroprotective effect on aggressive behavior in adolescents
- Lowest NDVI in residences near buildings, shopping centers or roads while highest quartile near fields, parks or golf course
- The benefits of increasing vegetation over the range ( $\sim 0.12$  in NDVI) commonly seen in urban environments were equivalent to  $\sim 2$  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
  - Park inequities = health inequities
- How do we increase green space and parks in urban communities?
- Parks & increase in physical activity is always good – right?

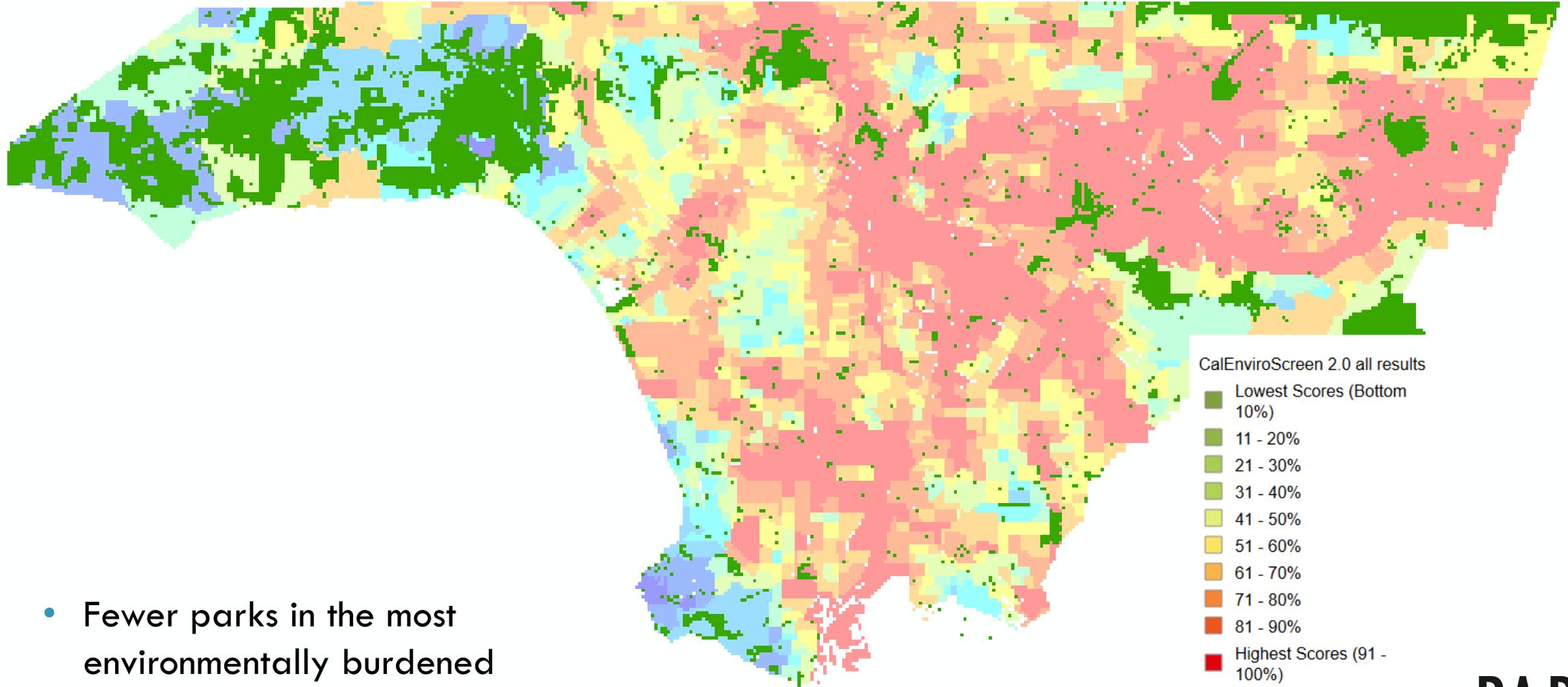
# COLLISION OF THE BEST INTENTIONS

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

## PARK REALITY



CalEnviroScreen 2.0 all results

- Lowest Scores (Bottom 10%)
- 11 - 20%
- 21 - 30%
- 31 - 40%
- 41 - 50%
- 51 - 60%
- 61 - 70%
- 71 - 80%
- 81 - 90%
- Highest Scores (91 - 100%)

- Fewer parks in the most environmentally burdened communities
  - California EnviroScreen 2.0 (pollution & vulnerability)

# PARK DISPARITIES

# PARK ACCESS

**Park Inequities**  
=  
**Health Inequities**

Children of color have access to much less park space

2.9

Black

5

Latino

6.3

Asian

95.7

White

Park acres per 1,000 children in Los Angeles County

**Too Far Away**



**2 in 3**

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

# 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.”*

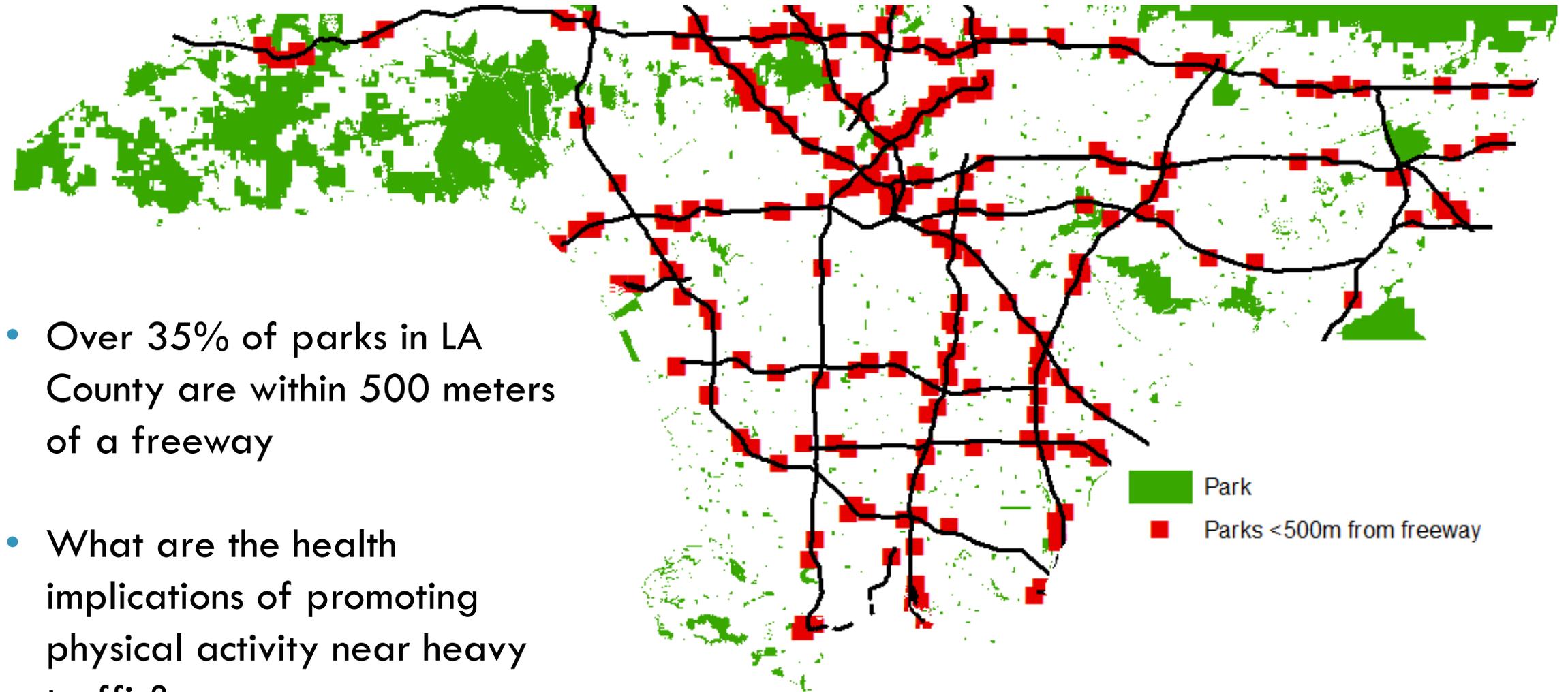
*“Should I exercise in polluted areas?”*



# 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)



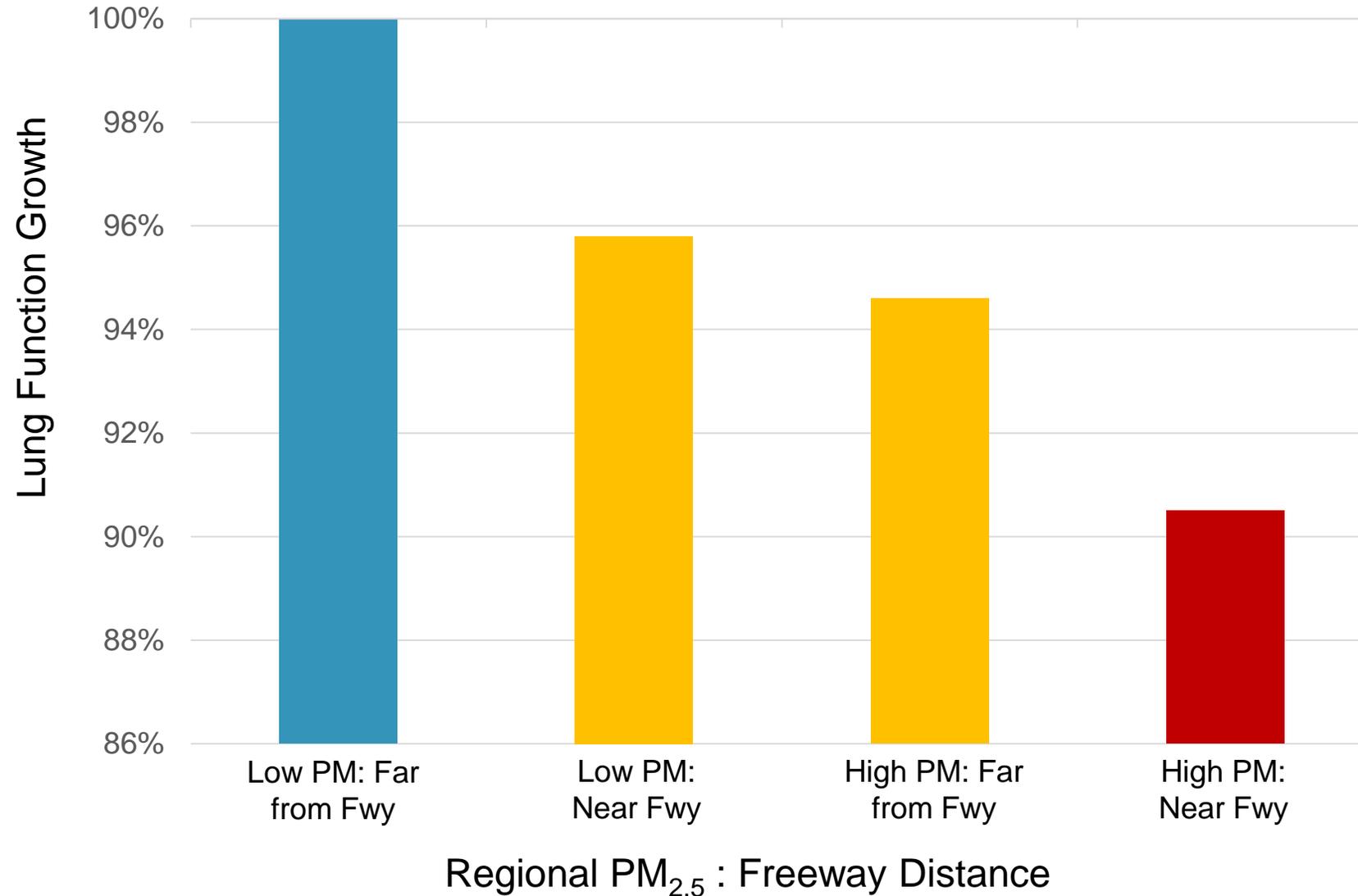


- Over 35% of parks in LA County are within 500 meters of a freeway
- What are the health implications of promoting physical activity near heavy traffic?
- How should we balance park needs vs siting concerns?

**INCOMPATIBLE  
LAND USE?**

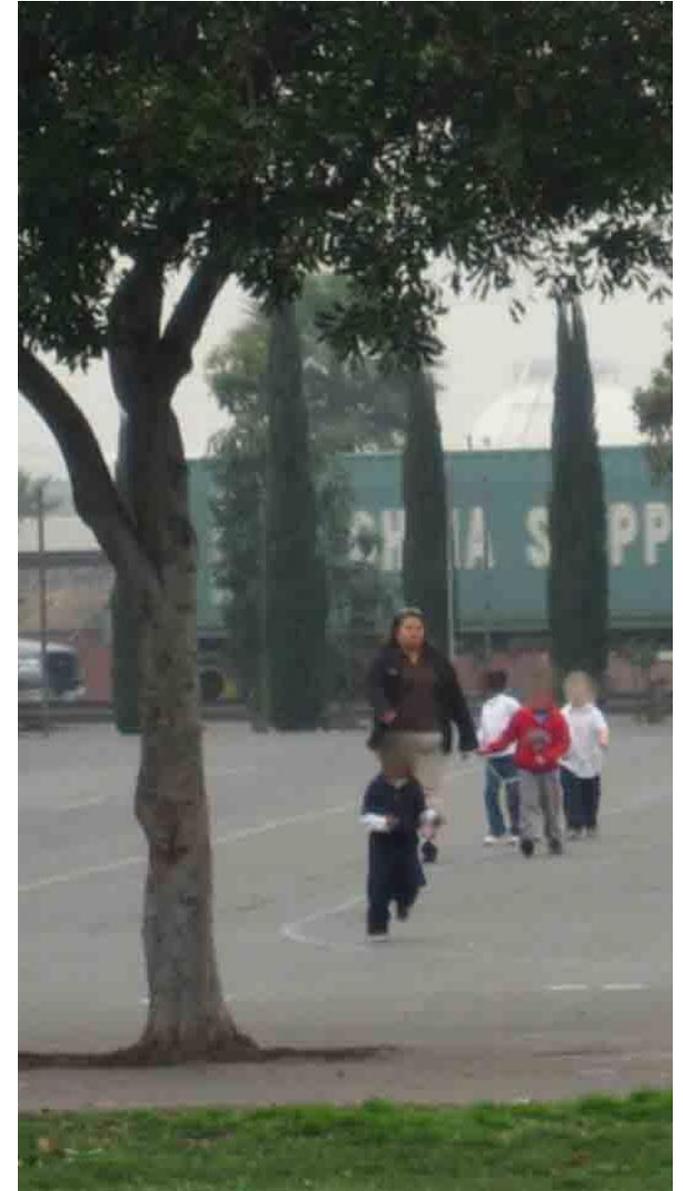
# PROXIMITY TO TRAFFIC MATTERS

CHILDREN WHO LIVE NEAR TRAFFIC HAVE DIMINISHED LUNG CAPACITY



# INEQUITY

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



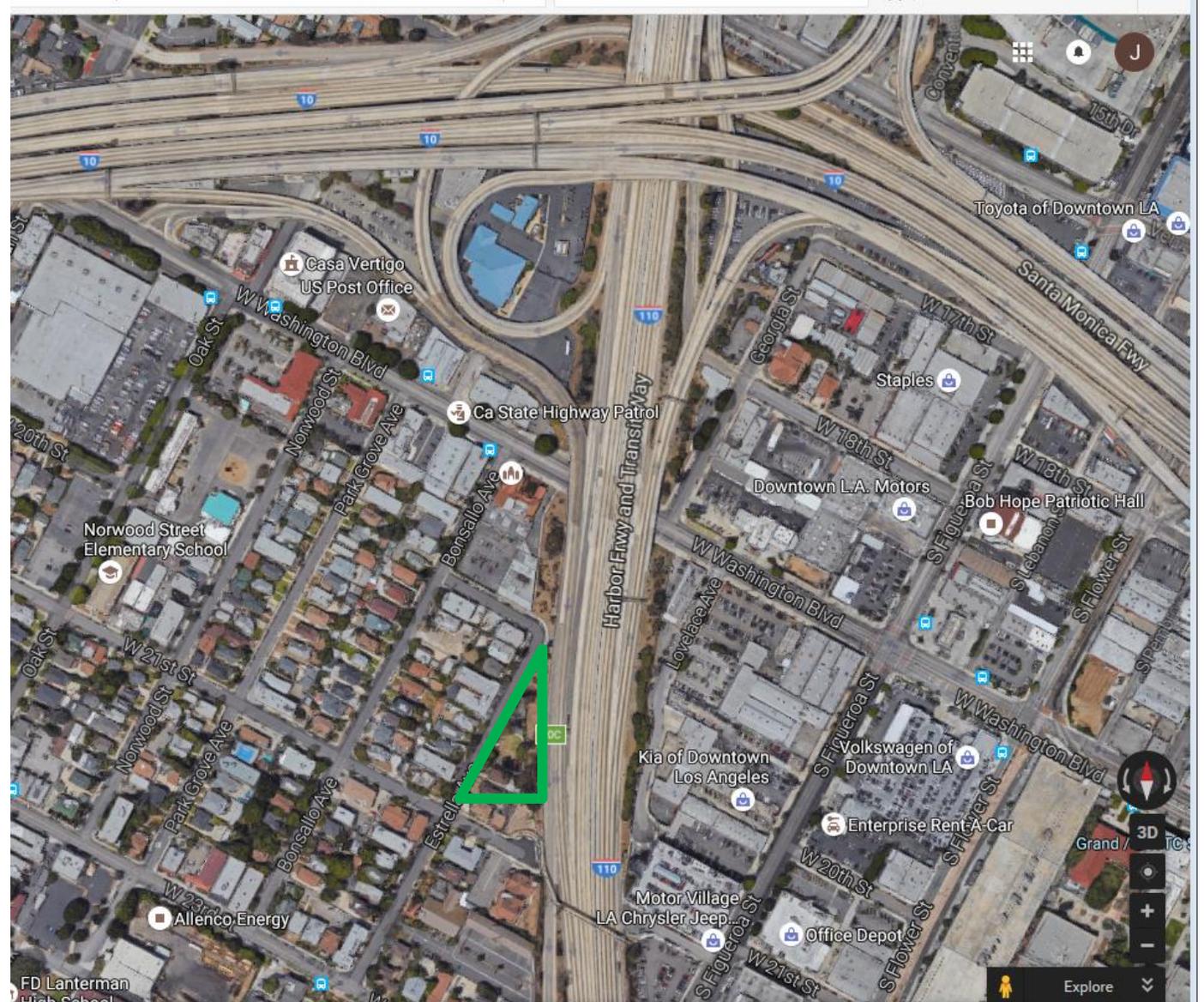
# ACTION IS WARRANTED FOR HEALTH

- 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



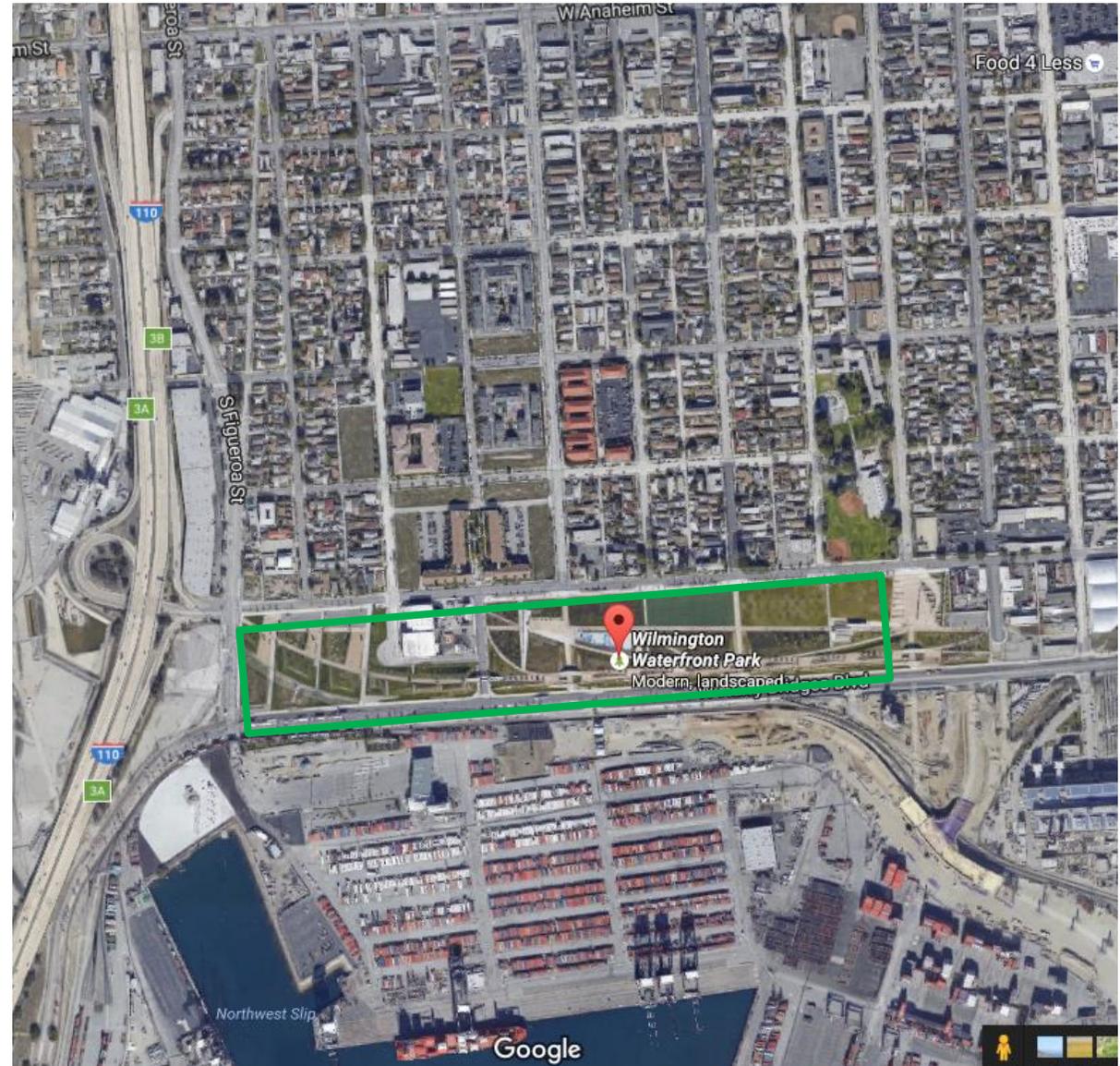
# ESTRELLA PARK

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



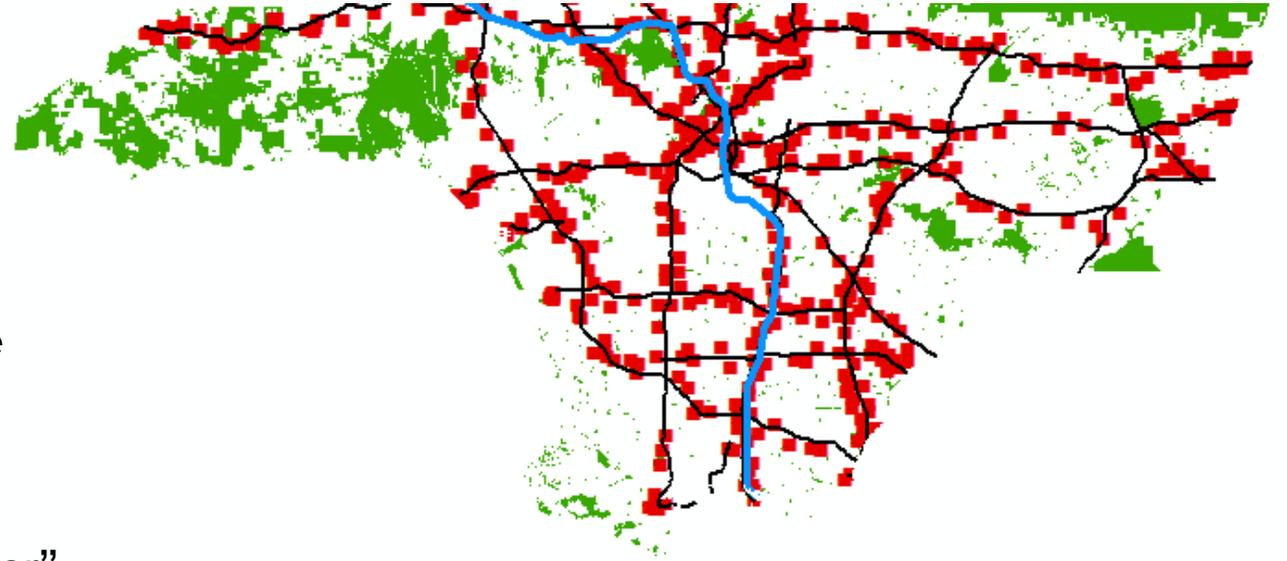
# WATERFRONT PARK

- 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”



# GROWING THE CONVERSATION

- Gentrification concerns: Adding environmental amenities to environmental justice communities, while keeping residents in those neighborhoods
- Bringing environmental health into the conversation
  - Obesity prevention
  - Urban planning & design
  - Parks advocates
- Long-term strategies to decrease air pollution from goods movement and industrial sites



# NEXT STEPS

- Engage urban planners, policy experts and community organizations
  - How to increase park space in environmental justice communities?
- Share environmental health concerns as part of new parks initiatives
  - Los Angeles County + City of Los Angeles
- 2017 Conference
  - The links between air pollution, obesity and environmental justice



Hosted by the Environmental Health Centers based at  USC University of Southern California



Southern California Children's Environmental Health Center

# THANK YOU

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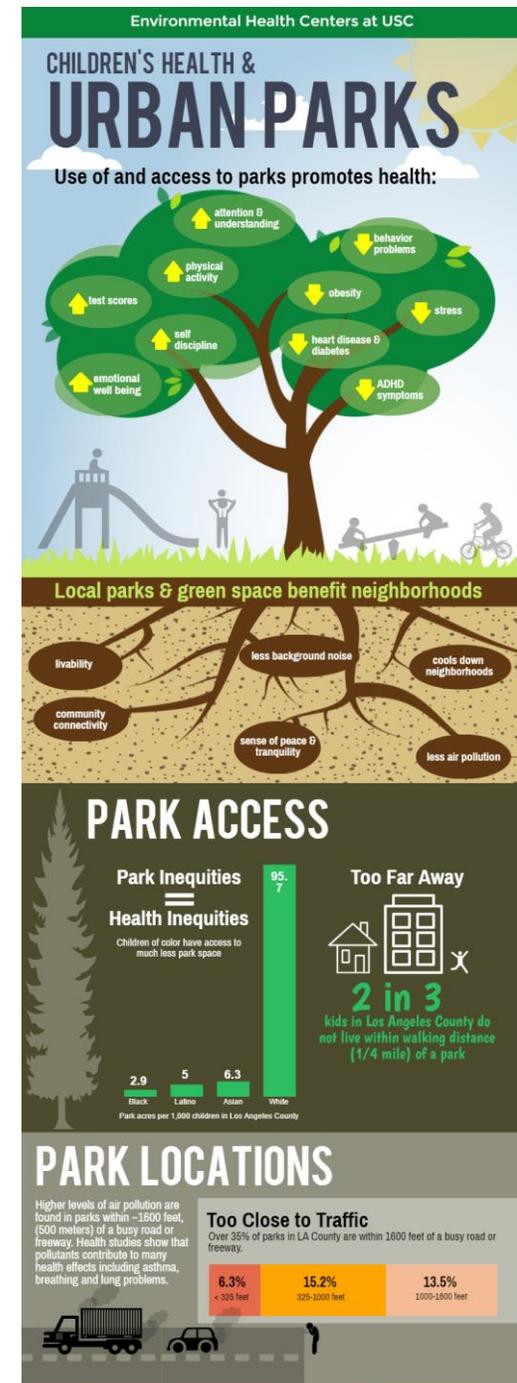
## Acknowledgements:

- Rob McConnell
- JC Chen
- AirPolBrain

- Community Engagement Team: Andrea Hricko, Wendy Gutschow, Carla Truax
- THE Impact Project, East Yard Communities for Environmental Justice, Long Beach Alliance for Children with Asthma, Asian Pacific Islander Obesity Prevention Alliance



Southern California  
Children's Environmental Health Center



# 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](http://usceh.blogspot.com/p/infografia_22.html)

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

<http://www.ncbi.nlm.nih.gov/pubmed/?term=Environmental+Determinants+of+Aggression+in+Adolescents%3A+Role+of+Urban+Neighborhood>