OVERVIEW

- Urban green spaces
- Public health & safety
- Extreme heat & air pollution
- Current status
- Moving forward
URBAN GREENING: IN LOS ANGELES

65th L.A. ranking among the 100 largest U.S. cities in the Trust for Public Land’s national “ParkScore” ranking

1/2 L.A. County residents with a park within walking distance

<1/2 of those parks in good condition

80% of those experience overcrowding from users
■ Whiter, wealthier neighborhoods historically benefited from investment in trees, parks, & other green spaces

■ A lack of accessibility to nature is most apparent in low-income & non-white communities (TPL 2020)

■ In addition to lower prevalence, these neighborhoods have lower quality & usability of green spaces (Wen et al. 2013; Schwarz et al. 2015)
SOCIAL DETERMINANTS OF HEALTH

- Determine quality-of-life measures like educational attainment, income, incarceration rates (Marmot 2005; Caruso 2017)
- Fewer & lower quality green spaces in underserved communities
  - Increased prevalence of chronic illness: asthma (Nardone et al. 2020), cardiovascular disease (Kershaw Kiarri et al. 2015), depression (Lorant et al. 2003)
  - Tend to be less safe despite more policing (Edwards, Lee, & Esposito 2019; Feldman et al. 2019)
- COVID-19 pandemic
URBAN GREENING: HEALTH BENEFITS

- Lower risk of all-cause mortality
- Reductions in obesity
- Lower rates of mental illness
- Cardiovascular health
- Amelioration of pathologies (e.g., dementia and ADHD)
- Mental resilience & stress alleviation
- Maternal health & birth outcomes
- Child & adolescent development
Birth certificate records for 3.7M births in California from 2001-2008
- Characterized green spaces (satellite data) & air pollution (EPA monitoring station)
- Controlled for maternal age, race/ethnicity, education, median household income

- Exposure to residential green space associated with decreased risk of preterm birth
- Synergistic effect between low green space & high air pollution levels

*Increasing exposure to green space may be more beneficial for women exposed to high air pollution during pregnancy*
URBAN GREENING & HEALTH: CHILD & ADOLESCENT DEVELOPMENT

Higher test scores, graduation rates, & plans to apply to college, as well as fewer criminal behaviors (Matsuoka 2010; Wu et al. 2014)

Outdoor playtime improves mental well-being through social connection & physical connectivity (Grigsby-Toussaint et al. 2011)

Children with ADHD experience less symptoms & concentrate better in natural environments (Faber Taylor & Kuo 2011; Taylor, Kuo, & Sullivan 2001)

Improves adolescent mental health—increases in screen vs. non-screen activities are hypothesized to contribute to accelerations in the rate of youth suicide (31% increase) and depression (33%) from 2010-2015 (Twenge et al. 2017)
URBAN GREENING: PSYCHOSOCIAL FACTORS

Lower risk of all-cause mortality
Rates of obesity
Lower rates of mental illness
Cardiovascular health
Maternal health & birth outcomes
Alleviation of pathologies (ex: dementia, ADHD)
Mental resilience & stress alleviation
Child & adolescent development
URBAN GREENING: PSYCHOSOCIAL FACTORS

- General wellbeing & mental health
- Physical activity
- Attention & cognition
- Psychological restoration & lower stress
- Social cohesion & neighborhood ties
- Eliminates pollutants from the air
- Relief from heat
- Mitigation of noise pollution

- Lower risk of all-cause mortality
- Rates of obesity
- Lower rates of mental illness
- Cardiovascular health
- Maternal health & birth outcomes
- Alleviation of pathologies (ex: dementia, ADHD)
- Mental resilience & stress alleviation
- Child & adolescent development
URBAN GREENING: LESS AGGRESSION, VIOLENCE, CRIMINAL ACTIVITY

Buildings with more surrounding greenery had fewer property & violent crime (Kuo & Sullivan 2001)

Neighborhoods with more tree canopy had lower crime rates for assault, battery, robbery, & narcotics (Schusler et al. 2018)

Greening vacant lots (ex: cleaning, planting grass/trees) associated with reductions in gun crimes & improvements in residents’ perceptions of safety (Garvin, Cannuscio, & Branas 2013)
EFFECTS OF HIGH TEMPERATURES AND POLLUTION

- Mortality and morbidity (Green et al. 2019)
- Negative mood (Denissen et al. 2008; Zheng et al. 2019)
- Interpersonal conflict (Hsiang, Burke, and Miguel 2013)
- Mental illness & suicide rate (Burke et al. 2018; Chong & Castle 2004)
IMPACTS OF GREEN SPACES ON CLIMATE

- Provides shade and cooling, even in microclimates like parking lots (Scott, Simpson, & McPherson 1999)
- Eliminates pollutants from the air (Nowak, Crane, & Stevens 2006)
- Greatest impact in historically marginalized neighborhoods, which often lack other mitigators like air conditioning (Beesley 2020)
**UNderserved Neighborhoods & Redlining**

- Compared to non-redlined neighborhoods, formerly redlined districts:
  - are majority non-white
  - have more pollution (Bravo et al. 2016)
  - are ~7°C hotter (Hoffman, Shandas, & Pendleton 2020)
  - in eight California cities, had residents 2.4x more likely to visit the emergency room for asthma (Nardone et al. 2020)

- In L.A. County, majority white neighborhoods have 3x the tree canopy & 1/2 the heat absorbing surfaces of Black (>80%) communities (Morello-Frosch 2007)

- During heat waves:
  - Black Angelenos were 2x as likely to die than other residents (Morello-Frosch 2007)
  - emergency room visits by Black & Latino Californians rose by >2x that of white Californians (TPL 2020)
HARMS OF EXTREME HEAT & AIR POLLUTION

Decreases productivity & family income

The physiological response to heat stress is to slow down work, take more frequent breaks, reduce working hours (Kjellstrom et al. 2019)

Harms academic achievement & economic prospects

Warmer temperatures & heightened air pollution damage cognition in adults (Simmons et al. 2008; Lavy, Ebenstein, and Roth 2014) & children (Dadvand et al. 2015; Sunyer et al. 2015)

Every additional degree of heat translates to 1% less learning (Park et al. 2020)

Disproportionately affects minority students & accounts for 5% of the racial achievement gap (Park et al. 2020)
Better physical health

Lower aggression & criminal behaviors

Better mental health

Relief from heat & air pollution

Healthier mothers & children
CURRENT STATUS: FUNDING MECHANISMS

- Local sources
- Property taxes
- Grants
- Matching by state and local contributions
- City budgets
- Legislation
CURRENT STATUS: ISSUES

- Input from stakeholders & local organizations
- Transparency/details around implementation & budget
- Greenery aside from trees
- Maintenance
- Ambitious, long-term legislation
MOVING FORWARD: POTENTIAL SOLUTIONS

Focus on environmental justice & community involvement

• Avoid gentrification & displacement
• Direct influences of local organizations, activists, residents on locations & types of initiatives
• Prioritize residents’ quality of life over increasing economic activity (e.g., community benefit agreements, accountability)

Small-scale, low-cost, efficient changes

• E.g., Greening walkways, community gardens, planting along sidewalks, maintaining existing greenery
• Widespread reproducibility, cost-effectiveness, easy implementation & maintenance (Branas et al. 2016)
• Can reduce practices related to gentrification (e.g., property development around a centralized location (Wolch, Byrne, & Newell 2014)
Budgeting disparity between public safety departments & other community-investment measures does not proportionally improve safety relative to its detrimental cost to public health.

Inequities in green spaces are largely due to a history of structural inequalities inherent to housing & neighborhood development.

Reappropriating city funds would help restore trust, counter historic injustices, & begin to address the root causes of disparities in public health and safety.
PRIORITIZE URBAN GREENING AS A PUBLIC SAFETY MEASURE

- No correlation between police or incarceration budgets & crime reductions (Bump 2020; Roeder et al. 2015)
- Traditional public safety measures can exacerbate issues they are designed to manage (Cullen, Jonson, and Nagin 2011; Spohn and Holleran 2002)
- Over-policing can create public mistrust (La Vigne, Fontaine, and Dwivedi 2017)
- Presence of law-enforcement has profound health consequences (Ang 2020; Bor et al. 2018; Del Toro et al. 2019; Geller et al. 2014; Massoglia and Pridemore 2015; APHA 2018)
- As public opinion moves towards alternative mechanisms of public safety, urban greenery could be prioritized as an unconventional but data-driven solution
MOVING FORWARD

- Long evident that the canonical approach to public safety has come at an enormous cost to the well-being of marginalized communities.

- Shifting the focus to address root causes & motivating factors of inequalities in community well-being & neighborhood safety could begin to effectively improve public health & safety.

- Alternative solutions that are driven by scientific evidence, designed to address historic inequities, & motivated to promote public health are long overdue.
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