The Case for Green Schoolyards in LAUSD

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Removing asphalt and replacing it with nature-based green space on schoolyards has multiple benefits including, but not limited to: decreased ambient temperature and pollution, improved academic performance, improved mental, social, and physical health of people. In the urban environment, green schoolyards address many inequities experienced by LAUSD students.

Current state of affairs in Los Angeles

  - 3.3 acres park space per 1000 people compared to 6.8 acres in other high density U.S. cities
  - Negative correlation between city/community economic hardship and park space per capita
  - African Americans and Latinos more likely to reside in cities/communities with less park space

- **Schools at the Heart of Urban Heat Island** (Moreno et al, 2015; Zhao et al, 2014)
  - 20% of LAUSD schoolyards are paved surfaces with zero tree canopy coverage (4.1% average tree canopy coverage on play areas)
  - Large swaths of asphalt with high surface temperatures contribute to urban heat island and temperatures that are on average 6 degrees hotter than the desert
  - Average temperatures will $\uparrow$ 3-4 degrees by 2041 in coastal areas and more inland; contributes to 75-85% $\uparrow$ in days with poor air quality and greater stress on electricity and water supplies

  - 356 of L.A. County schools are located within 500 ft. of a freeway
  - On average, 7.4% of L.A. County children have asthma
    - Younger children with asthma miss more days of school in inner L.A. schools; asthma explains 14 – 18% of student absenteeism after accounting for other health and social risks
  - 6.3% (133,000) L.A. County children diagnosed with ADD or ADHD
  - In 2013-2014, 88% of LAUSD students reported experiencing ≥ 3 traumatic events in their lifetime, 55% of whom showed symptoms of PTSD, depression, or anxiety
  - On average, 84.9% of L.A. County children do NOT meet aerobic and muscle-strengthening physical activity guidelines; >25% are obese, 6.5% report fair or poor health status
    - Girls, children of color, children from low-income families (80% LAUSD students), and children living in neighborhoods that lack quality green space experience higher than average rates of physical inactivity and obesity
  - In 2015-2016, 10% fewer LAUSD students scored at or above proficient (44.3%) on the standardized test in Science compared to students across the State of California (54.4%)
  - In 2018-2019, the percentage of LAUSD students in the Healthy Fitness Zone according to FitnessGram tests were consistently 5-10% lower than students across California

Student-level outcomes from green schoolyard studies performed in the U.S. and abroad

- Nature exposure at school $\Rightarrow$
  - $\uparrow$ student focus and attention; $\downarrow$ classroom disruptions; less severe ADD & ADHD symptoms
  - $\downarrow$ self-reported and physiological measures of stress/anxiety
  - $\uparrow$ physical activity participation & long-term physical activity self-efficacy
    - > participation in moderate-to-vigorous physical activity directly related to > on-task behavior in the classroom and academic performance in all subject areas
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References:
- Dadvand et al, 2015; Faber et al, 2011; Kuo & Taylor, 2004,2009; Largo-Wight et al, 2018; Szcztyko et al, 2018
- Bell & Dyment, 2008; Li & Sullivan, 2016; Wiens, 2016
- Andersen et al, 2015; Dyment et al, 2009; McCracken et al, 2016
motor skill development through appropriate risk and physical challenge (Lim et al., 2017; Prieske et al., 2014)
- physical fitness levels directly related to brain development & function and therefore academic performance (better predictor than obesity) (Chaddock-Heyman et al., 2016; Coe et al., 2013; Esteban-Cornejo et al., 2014; Kahn & Hillman, 2014; Kohl & Cook, 2013; London & Castrechini, 2011)
- prosocial interactions and collaborative play; bullying (Bates et al., 2018; Hyndman, 2015; Parrish et al., 2012)
- environmental values and pro-environmental behaviors (Braun & Dierkes, 2017; Mullenbach et al., 2019; Soga et al., 2016)
- standardized test scores, engagement with curriculum if delivered outdoors, graduation rates (Klemmer et al., 2005; Kweon et al., 2017; Lieberman & Hoody, 1998; Matsuoka, 2010)

**Student-level outcomes from green schoolyard studies performed in LAUSD**

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**LAUSD CERR Proposal #212:** Effect of playground design changes on recess physical activity type and intensity at Eagle Rock Elementary

**LAUSD CERR Proposal #670:** Effects of schoolyard green space on health and academic outcomes among urban schoolchildren


- **Urban Heat Island Benefits:** Temperatures on natural surfaces are significantly lower than asphalt
  - Relative to bare asphalt in direct sunlight, the temperature difference was 10 – 13°C for woodchips, 13 – 17°C for decomposed granite, 25 – 28°C for bare dirt, 16 – 19°C for wood logs, 28 – 32°C for grass
  - In the shade of trees, bare asphalt was 21 – 24°C cooler

- **Physical Activity Benefits:** Large-scale greening renovations ↑ moderate-to-vigorous physical activity (MVPA) and better utilization of the schoolyard during recess; all benefits maintained 16-months post-greening
  - Prior to greening, < 25% students located in play zones with greatest square footage; after greening, > 50% of students located in the same play zones
    - boys consistently more active than girls on hardscape; no sex-based difference between MVPA levels in green play zones
  - ↓ participation in traditional playground games (handball, tetherball, 4-square, dodgeball)
  - ↑ participation in gymnastics/dance, climbing/jumping, tag/chasing, and creative play
    - at 16-months post-greening, the most popular activity modes for boys were traditional playground games in large groups and the most popular activity for girls were gymnastics, climbing, jumping, and dance in small groups
  - ↓ percentage of students sedentary (53.8% to 47.6%); 33 – 40 of students who were sedentary pre-greening were active post-greening during each recess period
  - ↑ number of MVPA recess minutes spent by individual students (+ 20 – 30 weekly minutes)
    - Greatest change experienced by older students, students who typically experience significant drop in activity level just prior to middle school

- **Social Interaction Benefits:** Large-scale greening renovations ↑ prosocial and ↓ antisocial interactions during free-play
  - ↓ minutes spent alone with concomitant ↑ in time spent in small groups; small group activity is positively correlated with the frequency of prosocial interactions
  - Antisocial interaction frequency for individual students ↓ 40 – 50%

- **Design of green space determines extent of benefits:** Comparison of recess behaviors at schools with different schoolyard designs suggests that adding grass is not enough to maximize benefits
  - ↑ division of space and introduction of diverse features that challenge motor skills maximize MVPA & prosocial interactions for students of all ages
  - Green space NOT designed for sport helps eliminate activity gap between sexes