

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

- **Public Park/Recreational Space Shortage** (LAC Dep. Parks & Rec, 2016; LAC Dep. Public Health, 2016; Trust for Public Land, 2019)
 - 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 ↑ 3-4 degrees by 2041 in coastal areas and more inland; contributes to 75-85% ↑ in days with poor air quality and greater stress on electricity and water supplies
- **Suboptimal Student Wellness and Academic Performance** (Bonilla et al, 2005; California Dept. of Education, 2016; Johnson et al, 2019; LAC Dep. Public Health, 2015; LAC Dep. Public Health, 2017; LAC Dep. Public Health, 2018; LAC Dep. Public Health, 2020; LAUSD, 2020; Lovasi et al, 2013)
 - 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 ⇒
 - ↑ student focus and attention; ↓ classroom disruptions; less severe ADD & ADHD symptoms (Dadvand et al, 2015; Faber et al, 2011; Kuo & Taylor, 2004,2009; Largo-Wight et al, 2018; Szczytko et al, 2018)
 - ↓ self-reported and physiological measures of stress/anxiety (Bell & Dymont, 2008; Li & Sullivan, 2016; Wiens, 2016)
 - ↑ physical activity participation & long-term physical activity self-efficacy (Andersen et al, 2015; Dymont et al, 2009; McCracken et al, 2016)
 - > participation in moderate-to-vigorous physical activity directly related to > on-task behavior in the classroom and academic performance in all subject areas (Carlson et al, 2008; Coe et al, 2006; Drollette et al, 2014; Lambourne et al, 2013; Rasberry et al, 2011; Mahar et al, 2006; Raney et al, 2017; Riley 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

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- **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