

# Built Environment: Measure Considerations

Brian E. Saelens, Ph.D.

Workshop presentation: Modifiable Environmental and  
Behavioral Determinants of Overweight among  
Children and Adolescents

June 22-23, 2004

# Published Empirical Evidence Regarding Built Environment and Childhood Obesity

- Outdoor play space availability important for young children's physical activity
  - Outdoor time related to total PA
- One study examined overweight and proximity to nearest public playgrounds and fast food restaurants (Burdette & Whitaker, 2004 *Prev Med*) among 3-5 year olds
  - No difference in distance between overweight and non-overweight children
- ??????

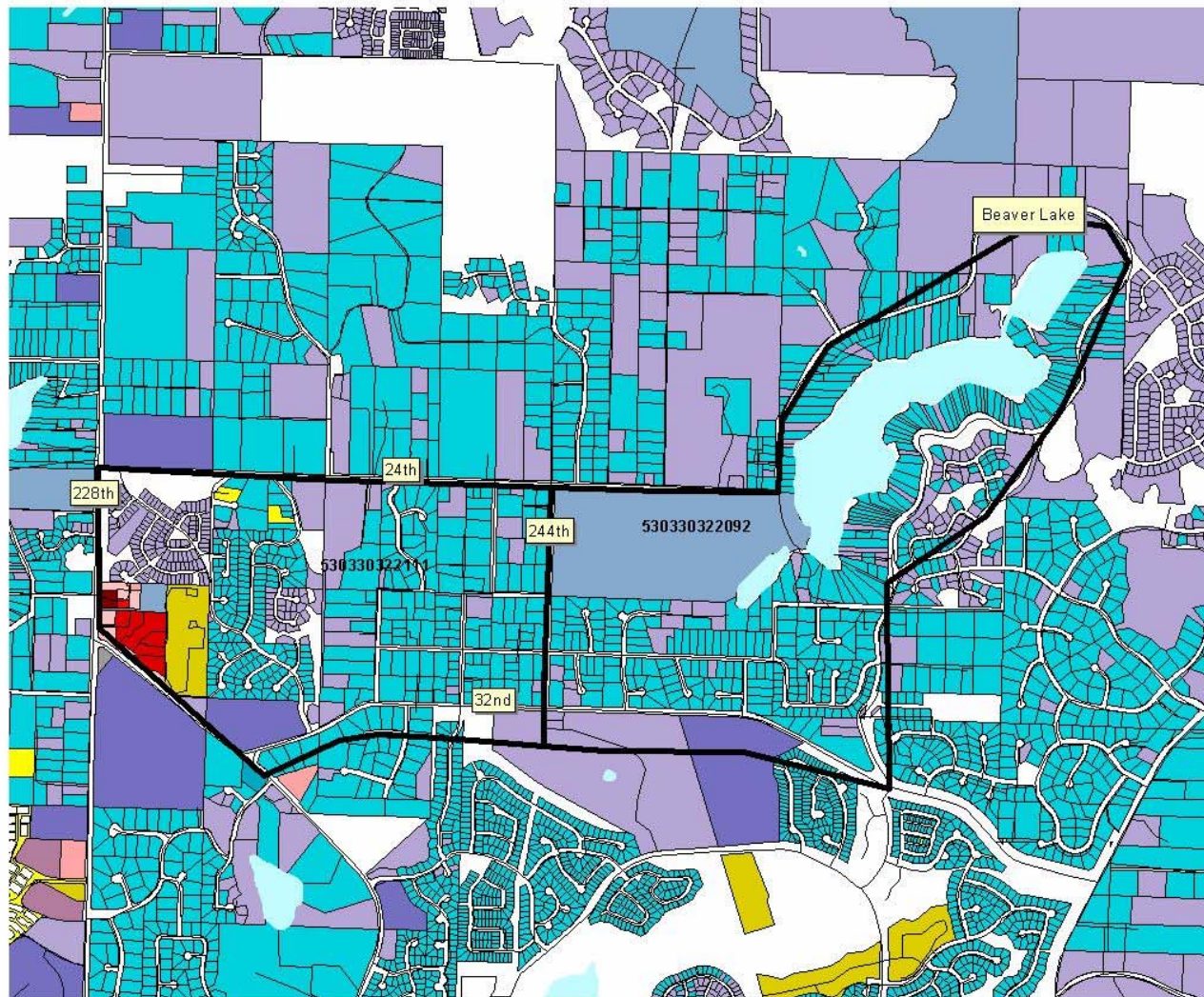
# Constituents of Walkability

- Among adults, built environment factors related to non-motorized travel and perhaps physical activity
  - Land use mix
  - Street connectivity
  - Residential density

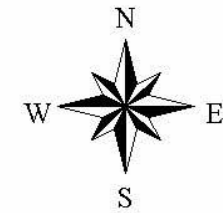




# East Sammamish (Low-High)



- Case Study Blockgroups
- Roads
- Bodies of Water
- Parcels**
- Agriculture
- Comm. Food/Restaurant
- Comm. Large
- Comm. Office
- Comm. Services
- Comm. Small
- Comm. Sports
- Ent. General
- Ent. Lodging
- Ind. General
- Ind. Manufacturing
- Inst.
- Misc.
- Open Space
- Parking
- Rec. Active
- Res. Group Quarters
- Res. MF Large
- Res. MF Small
- Res. Misc.
- Res. SF
- Services
- Vacant



0.7                      0                      0.7                      1.4 Miles

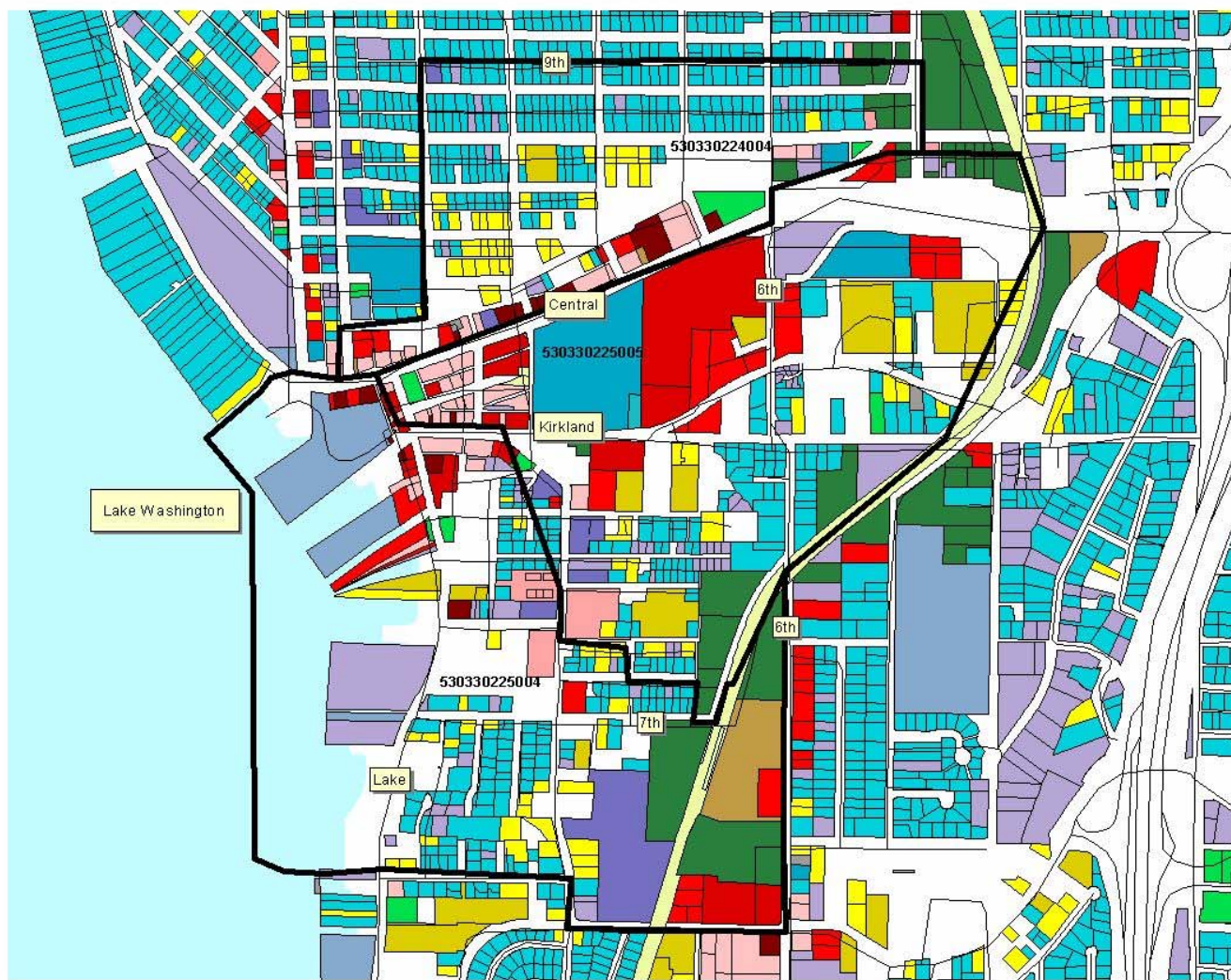




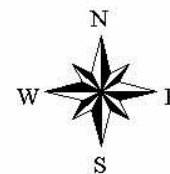




# Kirkland (High-High)



- Blockgroup Boundry
- Roads
- Parcels**
- Agriculture
- Comm. Food/Restaurant
- Comm. Large
- Comm. Office
- Comm. Services
- Comm. Small
- Comm. Sports
- Ent. General
- Ent. Lodging
- Ind. General
- Ind. Manufacturing
- Inst.
- Misc.
- Open Space
- Parking
- Rec. Active
- Res. Group Quarters
- Res. MF Large
- Res. MF Small
- Res. Misc.
- Res. SF
- Services
- Vacant
- Bodies of Water



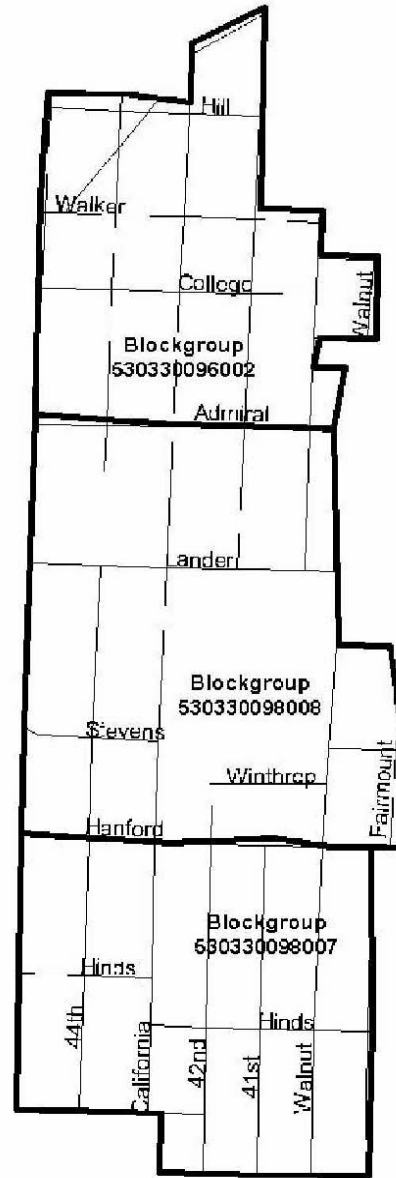
0.3      0      0.3      0.6 Miles







# West Seattle (Admiral)













# Accelerometer Values by Neighborhood

	High walkable	Low walkable
Moderate intensity PA	188.7*	136.9
Vigorous intensity PA	18.1	6.7
Total PA	206.8*	143.6

Time in average minutes per week; \* $p < .05$ ;

Saelens, Sallis, Chen, & Black 2004; *Am J Pub Health*

# Weight Status By Neighborhood

	High Walkable	Low walkable	p value
Body mass index	25.3	27.4	.051
Percentage overweight (BMI > 25)	35%	60%	.009

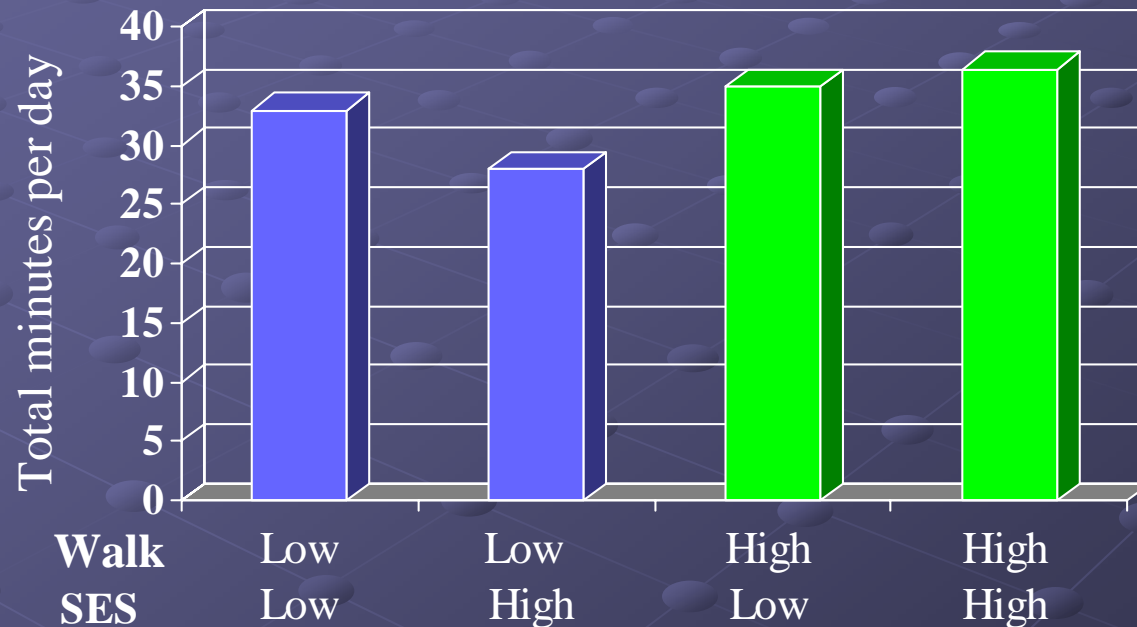
Saelens, Sallis, Chen, & Black 2004; *Am J Pub Health*

# Actigraph: Moderate PA (*mins/day*)

Walkability:  $F=13.49$ ,  $p<.001^*$

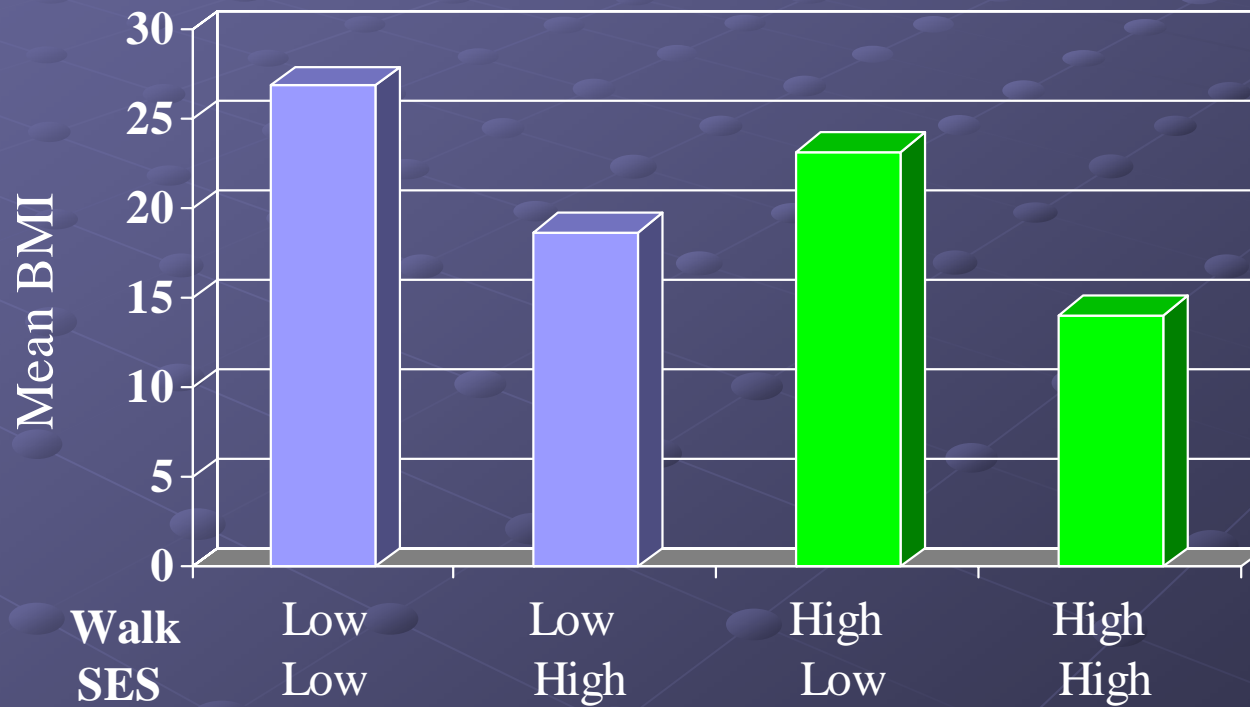
Income:  $F=1.54$ ,  $p=.21$

Walkability X Income:  $F=5.09$ ,  $p=.024$



Adjusted for age and sex

# Percent Obese (BMI>30.0)



# Walkability Measurement Tools

- Land use mix
  - high quality parcel level data
    - Diversity of types
    - Square footage
    - Specific type of mix (e.g., restaurant, retail)
- Street connectivity
  - high quality road network and pedestrian network data
    - e.g., intersection density
- Residential density
- Can create indices for areas or make specific to individual households

# Walkability Measurement Tools (continued)

- Can obtain perceptions of these constructs
  - e.g., Neighborhood Environment Walkability Survey
    - [www.drjamesallis.sdsu.edu](http://www.drjamesallis.sdsu.edu)
- Can obtain more detailed information about the pedestrian infra-structure of routes
  - e.g., Pikora et al., 2002 *Am J Prev Med*

# Considerations of Children and Walkability Constructs

- Children make considerably fewer utilitarian trips than adults (exception of walking to school)
- Children engage in more recreational physical activity
- Characteristics that increase adult walkability may limit children's physical activity
- Children may have different sensitivities to the walkability constructs
- Children may be reactive to different walkability constructs





ANTONIO M. BERTOLINI, M.D.  
ORTHOTIC & PROSTHETIC  
PHYSICIAN  
PHYSICIAN - 732-260-3600  
WITH DANIEL M.D. - GENERAL SURGERY



# Accessibility of Physical Activity Facilities

- Could include parks, playgrounds, paid facilities, etc.
- Availability of physical activity facilities may be related to children's use
  - Cost
  - Quality of facility
  - Safety
- Still unclear “if you build it, they will come”, but more clear that they certainly won't come if it is not there



# Environmental Correlates of Adults' Walking for *Exercise and Recreation*

**Correlate**

**Significant**

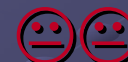
**Non-significant**

## Accessibility

general



beach/coast



open space



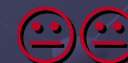
facilities



sidewalks



## Aesthetics



## Traffic



## Safety (no crime)



## Weather



Owen (2004) ACSM

# Measures of Accessibility

- Another type of land use in parcel-level database
  - can evaluate distance
  - can evaluate characteristics of route
- Many have used telephone book and other information-based resources
- Currently evaluating tools to better specify the elements and quality of physical activity facilities



Prior intervention tool.....





New intervention tool.....

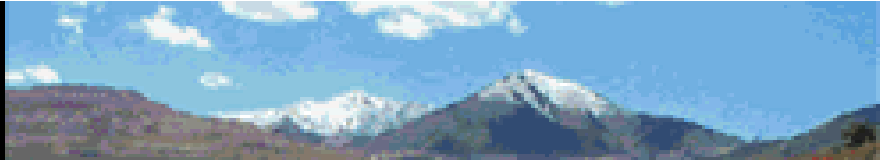






**Are environments modifiable?**









# Conclusions

- May never get to randomized trials on environmental impacts on obesity
- Enough natural experiments already occurring at threshold levels for environmental and outcome variables (physical activity, diet, obesity)
  - Need to catch environmental change
  - Need to understand more about how environmental change happens
- Need sound measurement of environmental constructs (development happening)
- Need to test environmental factors as mediators of childhood obesity prevention and intervention effects