Objectively Measured Environmental Correlates of Adolescent Physical Activity

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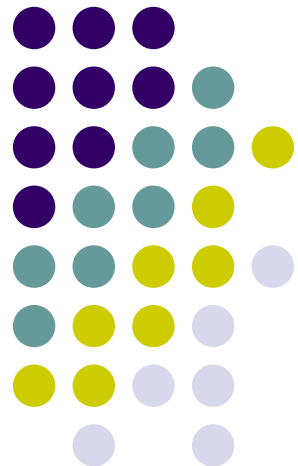


Background

- Adult physical activity related to:
  - Neighborhood “walkability” factors (Saelens et al, 2003)
  - Access to and aesthetic qualities of recreational facilities (Humpel et al, 2002)
- Youth physical activity related to:
  - Access to recreational facilities & programs
- No published studies of objectively assess neighborhood environments and youth PA

- **Hypothesis:** Adolescent physical activity related to environmental factors
  - Neighborhood walkability
  - Proximity to public & private recreational facilities
- **Study design:** cross-sectional
- **Study population:** 689 San Diego adolescents (10 to 16 years) from the PACE intervention study.

Participants

- Recruited from primary health care clinics
- Agreed to be in randomized study
- Excluded if adolescent had a physical disability that would interfere with exercise or nutrition program

Participants

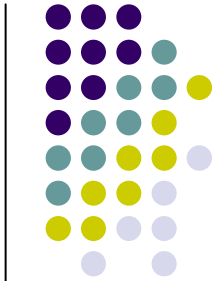
- N: 314 boys & 375 girls

- Ethnic distribution

	Females	Males
Asian Pacific Islander	2.59	4.81
Black Afrcian American	5.41	7.49
Native American Indian	0.94	0.53
Latino Hispanic	13.88	12.30
White	57.18	56.42
Multi-race-ethnic	16.71	13.64
Other	3.29	4.81

- BMI, % at risk or overweight: 46.82%

Environmental Variables: Neighborhood Walkability

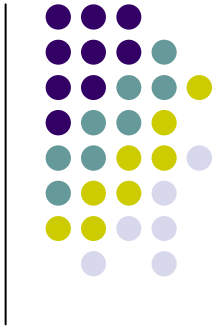


- Walkability Index (L. Frank): adopted from urban planning and design literatures & computed from:
  - Intersection Density (# of intersections/acre)
  - Residential Density (# of households/acre)
  - Entropy (land use mix)
  - Retail Floor Area Ratio (building sq ft / lot sq ft)

High Retail FAR:
Built for pedestrians

Low Retail FAR:
Built for cars

Environmental Variables: Recreational Facilities



- Variables
  - Number of parks
  - Number of private facilities (from yellow pages)
  - Number of Schools

- Environmental variables computed for area within ½ mile and 1 mile of participant's residence.
- Street network distance used to define study areas.

Physical Activity Measurement

- Physical Activity measured with Actigraph accelerometer (small monitor worn on the waist; sensitive to movement).
- Validity as an objective method is supported for youth in field settings. (Janz, 1994; Trost, 2001)
- Worn for 4-7 days by 689 adolescents at baseline
- Summary variable is mean daily minutes of moderate + vigorous

Analysis

- Linear regression models fitted for PA
- Separate analyses were conducted for males and females
- Box-cox transformation used to transform PA to meet normality assumption for regression
- Demographic confounders assessed: ethnicity, marital status, education, & employment status

Analysis

- *Univariate Analysis* (significance set at $p < .10$) determined which environmental variables would be assessed in regression

- *Forward Selection* determined which demographic variables confounded PA / Environment relationships (significance set at $p < .05$)

Female Total Physical Activity (1 mile buffer)

Variable	Beta	Sig.	Squared Partial Corr.
Intersection Density	-5.95	0.004*	0.022
Acreage of Parks	-0.001	0.693	0.003
No. of Rec Facilities	0.191	0.004*	0.022
Age	-1.249	<.0001*	0.220

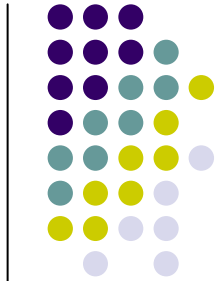
Male Total Physical Activity (1 mile buffer)

Variable	Beta	Sig.	Squared Partial Corr.
Walkability Index	0.180	0.265	0.012
Retail Floor Area Ratio	4.851	0.026*	0.017
Ethnicity			
Caucasian	-------	-------	-------
Other	1.758	0.119	0.006
Home Educ.			
< Bachelors	-------	-------	-------
Bachelors	-2.851	0.038*	0.013
Graduate	-1.092	0.418	0.000
Age	-3.553	0.001*	0.200

Community Design Findings

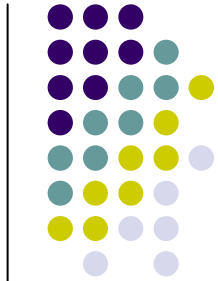
- Intersection Density inversely related to girl's PA
  - Unexpected finding. Girls may use cul-de-sacs for active play or prefer walking on low-traffic streets
  - Perhaps significant for girls only because they tend to do PA closer to home
  - Can't assume that environmental characteristics have similar roles for different populations
- Retail Floor Area Ratio related to boy's PA
  - Consistent with adult literature on neighborhood walkability
  - Pedestrian-oriented retail design may stimulate walking for transport

Community Design Findings



- Walkability Index not significant
  - Index was not designed to explain total PA, & active transport was not measured in this study
  - Perhaps different index needs to be developed for adolescents that is relevant for PA for multiple purposes
  - Detailed study is needed to identify relevant environmental variables for adolescents

Recreation Environment Findings



- Number of private recreation facilities related to girl's PA
  - Girls may use facilities for dance or other structured activities
- Number of Parks / Acreage of Parks not related to PA
  - More detailed measures of park quality may be needed
- More data needed on <u>where</u> adolescents are active

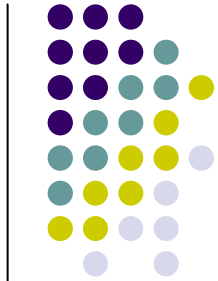
Strengths of Study

- One of first studies of walkability and PA in adolescents
- Use of objective measurements of the environment and PA
- Evaluated wide range of community design and recreation environment variables
- Large N allowed for separate analyses for males and females

Limitations

- Cross-sectional study
- Could not assess ethnic-specific effects
- Results are dependent on compliance with monitoring
- Accelerometers underestimate common youth activities such as bicycling & swimming
- No assessment of PA for various purposes
- San Diego has limited variation in walkability

Future Studies



- Do changes in one's community lead to increased physical activity?
- What are relationships between environmental factors and various types and purposes of activity?
- Development of youth-specific environmental variables

Implications

- Some environmental variables related to PA for both girls and boys
- Access to private recreational variables and nearby retail development may facilitate youth PA – urban planners should consider these findings
- Inverse relation of intersection density and girl's PA requires more study