Environmental correlates of objectively measured physical activity in adolescent girls

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Research team

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Background

- Home distance to physical activity facilities, home access to parks associated with adolescent physical activity

- Relevance of context for physical activity in adolescent females
  - 33% of their time is spent more than 1km away from home (Wiehe et al 2008)
  - 50% of 12th graders employed. For them, 33% of physical activity happened at work (Dowda et al 2007)

Objective

- Examine associations between the built environment and moderate and vigorous physical activity (MVPA) intensity as measured with passive, portable accelerometer and GPS

- Hypothesize that parks, physical activity facilities, street connectivity, and population density positively associated to MVPA
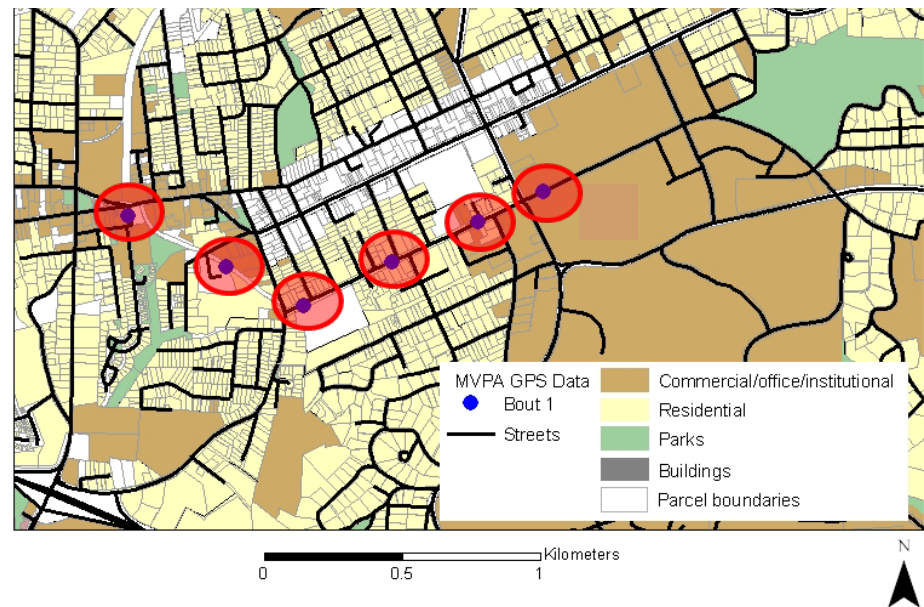
Methods –Data

- San Diego and Minneapolis /St Paul, 2 of original 6 TAAG sites

- 303 respondents enrolled between 10th to 12th grade, measured twice

- At each measurement, for 6 consecutive days, participants wore

  - Portable GPS unit (Foretrex; 1 min epochs)
  - Accelerometer (Actigraph 7164; 30 sec epochs)

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Methods –Research design

■ Examine point-by-point (min by min) physical activity and location around each point

■ Rather than overall physical activity and the home neighborhood

MVPA GPS Data
● Bout 1
— Streets

Commercial/office/institutional
Residential
Parks
Buildings
Parcel boundaries

Kilometers
0   0.5   1

N

Methods –Research design

- Consider all MVPA points within key counties; ignore points within 60 m of home and within school sites
  - Actual counts, not imputed counts
- Sample sedentary and light points in equal numbers

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Methods –Outcome

- For each point
  - Sedentary activity (< 100 counts/min)
  - Light activity (>=100, < 3000 counts/min),
  - Moderate or vigorous activity (MVPA >=3,000 counts/min)
  - Cutpoints specific to this population (Treuth et al., 2004)

Methods –Built environment

- Measure built environment within 50 m of each point
  - Population density, road length, presence of PA facilities, presence of parks, presence of schools, # of food outlets, presence of fast food outlets
  - Also examined points within 80 m

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Statistical analysis

- Multinomial logistic regression models with random intercepts estimated

- Models were estimated for each site separately

- All exposures included in each model

Results –Cohort description

- N=293 (148, San Diego; 145 Minneapolis)
- Mean age when first observed: 16.3 years
- 53% White, 28% Hispanic, 8% Asian, 5% Black
- 26% qualified for free or reduced lunch

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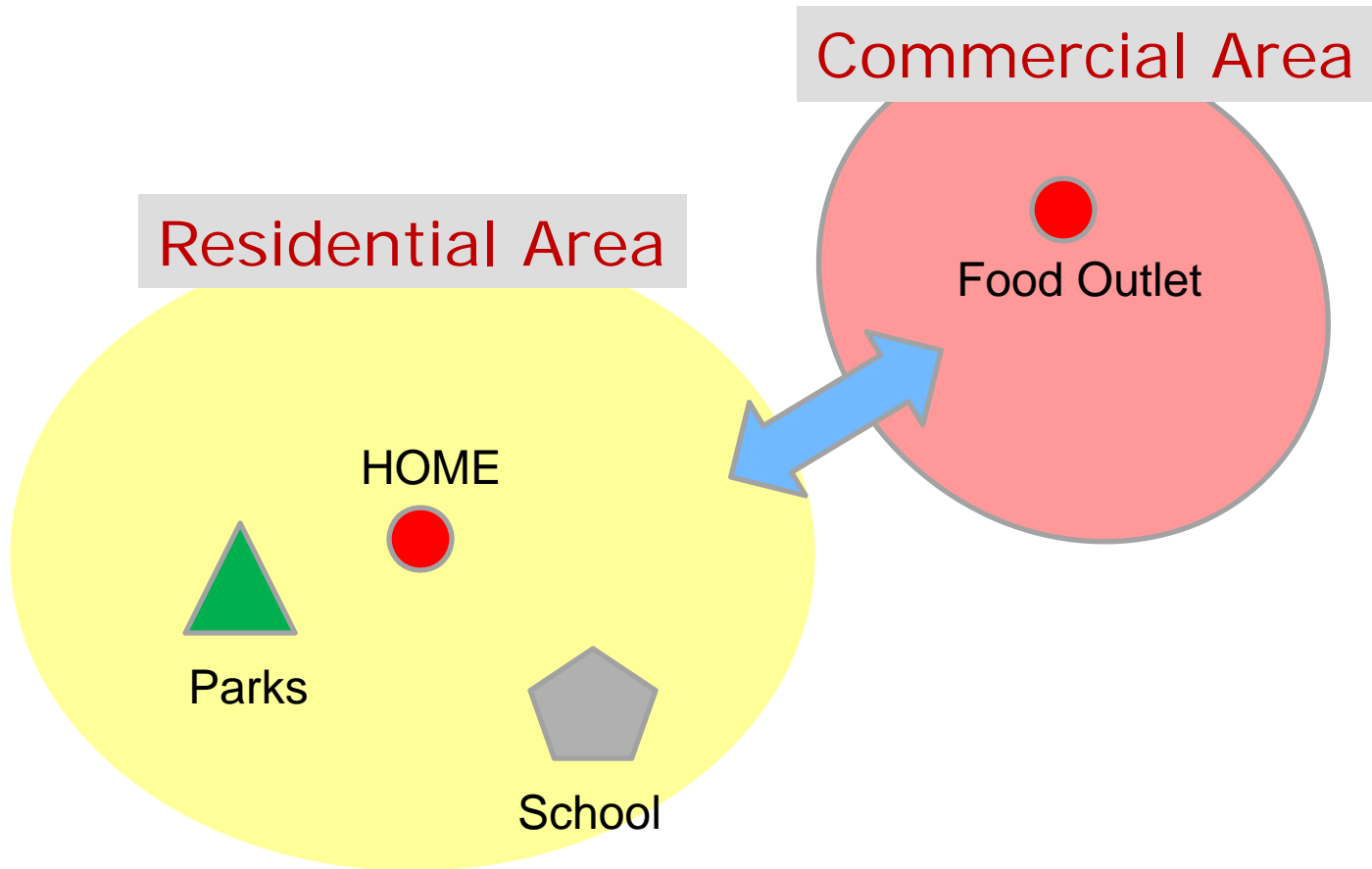Program

Adjusted odds ratios

	San Diego Site‡ (n=13,916)			Minneapolis Site‡ (n=9738)	
	MV vs. Sedentary			MV vs. sedentary	
	OR	95% CI		OR	95% CI
Pop. density (1000s per sq. mile)	1.01	[1.00,1.02]		1.04	[1.02,1.07]
Road length (miles)	0.38	[0.28,0.51]		0.43	[0.25,0.74]
Presence of PA facilities	0.28	[0.07,1.08]		1.53	[0.65,3.59]
Presence of parks	0.80	[0.64,1.01]		1.87	[1.51,2.31]
Presence of schools	1.69	[1.29,2.21]		2.14	[1.30,3.53]
# of food outlets	0.73	[0.67,0.80]		0.71	[0.60,0.83]
Presence of fast food outlets	1.77	[0.92,3.42]		0.75	[0.31,1.80]

‡ Adjusting for age, race, free/reduced lunch eligibility, measurement wave (1 or 2), weekend day, and home neighborhood characteristics

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Discussion

- Population density, schools positively associated with MVPA

- Motorized travel activity was identified as sedentary activity

- Context-sensitive findings
  - On average parks in San Diego 30% farther than in Minneapolis

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Discussion

Commercial Area

Food Outlet

Residential Area

HOME

Parks

School

Conclusions

- Some built environments around GPS/accelerometer points were consistently associated with MVPA
  - Site-specific factors may explain differences across study sites

- Contextualizing physical activity promises to clarify associations and better understand behaviors

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- Content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH

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