

# Moderating Effect of the Environment on Adolescent Physical Activity Change (Progress Report)

---

Russ Jago, Ph.D.

Children's Nutrition Research Center

Baylor College of Medicine



# Aim

---

1. Assess relationships between observed environmental features and the physical activity levels of 210 Houston Boy Scouts.
  - To our knowledge this is the first study to report associations between directly observed environmental features and adolescent physical activity.

# Participants

---

- 210 male Boy Scouts aged 10-14 were recruited from 36 Boy Scout Troops within the greater Houston area.
- Participants ethnicity, highest education within the home (SES surrogate) and place of residence were obtained by self-report.
- Height and weight measured & BMI calculated.
- Participants were included if the scout wore a MTI accelerometer for at least 800 minutes between 6am and midnight for two of the three days.
- Physical activity was divided into minutes of sedentary, light and moderate to vigorous activity per day using the adolescent cutpoints developed by Puyau et al.

# Environment Assessment 1

---

- Each participants home address was geo-coded.
- A buffer with a radius of 400m was drawn around each participants home address.
- All of the segments (the section of road between two intersections) within the buffer were identified and assigned a unique ID number.
- Trained data collectors completed the SPACES instrument (Pikora et al) for every segment using PDA's.
- A random selection of 424 segments (6.5% of total) were independently coded by two data collectors.

# Statistics 1

---

- Items with little variance were dropped from further analysis.
- Percent agreement (mean 93%) and Cohens Kappa (all  $>0.39$ ,  $p<.001$ ) were calculated for the 424 segments that were double coded.
- Exploratory factor analysis using principal components was used to reduce items.
- Responses for factors were summed & used in further analyses.

# Statistics 2

---

- To take account of the clustered nature of the data three hierarchical models in which scouts were nested in troops & treated as a random effect were run.
- Dependent variables: Minutes of sedentary, light and moderate to vigorous activity per day.
- Independent variables: Factor Scores, BMI, age, parental education and ethnicity (Anglo-American / Other) and were treated as fixed effects.
- Non-significant environment terms were backward deleted.
- The level 1  $R^2$  (variance attributable to participants) and level 2  $R^2$  (variance attributable to troop) were also calculated.

# Ethnicity, Age, BMI & Physical Activity

---

	N	Mean	SD
Anglo-American	145	NA	NA
Other ethnic group	65	NA	
Age (yrs)	210	12.8	1.1
BMI (kg/m <sup>2</sup> )	210	21.1	4.8
Minutes of sedentary activity / day	210	917.3	51.9
Minutes of light activity / day	210	137.9	51.9
Minutes of moderate to vigorous activity /day	210	24.8	17.6

---

# Factor 1 – Walking & Cycling Ease

Item	Factor loading
Ease for cycling	.899
Ease for walking	.800
Number of Road lanes	.814
Attractiveness for cycling	.727
Presence of parking restrictions	-.572
Presence of destinations	-.724
Percent of variance explained	19.6%



# Factor 2 - Tidyness

Item	Factor loading
Verge maintenance	.954
Garden maintenance	.949
Cleanliness of road	.858
Percent of variance explained	11.6%

# Factor 3 – Sidewalk characteristics

---

Item	Factor loading
Footpath type	.711
Presence of streetlights	.547
Footpath material	.380
Average height of trees	-.558
Number of verge trees	-.778
Percent of variance explained	10.2%

# Factor 4 - Suburbia

Item	Factor loading
Driveway crossovers	.764
Surveillance	.742
# Parking spaces at destinations	.353
Similarity of buildings	.352
Footpath condition	-.443
Road condition	-.598
Percent of variance explained	7.3%

# Sedentary & light intensity results

---

Dependent variable	Significant predictors (p<.05)
Sedentary behavior	Sidewalk characteristics (negative) Age (positive) Ethnicity - Ref Anglo (negative) Parental Education - Ref GED (negative)
Light intensity activity	Sidewalk characteristics (positive) Age (negative) Parental Education - Ref GED (positive)

---

# Minutes of moderate to vigorous activity/day

Dep. Var	Independent Variables	Std Beta	T Statistic	Sig.	
Minutes of MVPA per day	Sidewalk Characteristics	.13	1.78	.076	
	Age	-.04	-.63	.530	
	BMI	-.15	-2.09	<b>.037</b>	
	Eth (Ref Anglo) Other	.02	0.31	.756	
	P.Ed.(Ref<GED)	Postgraduate	.13	1.25	.214
		College	.16	1.48	.141
		Some College	.21	1.62	.108
<b>Level 1 R<sup>2</sup> = .025</b>			<b>Level 2 R<sup>2</sup> = .027</b>		

# Summary

---

- Sidewalk characteristics were negatively associated with sedentary behavior and positively associated with light intensity physical activity among male adolescents.
- Models were accounting for a small amount of the variance 2.5 - 10%.
- The SPACES instrument can be reliably used but the number of items may need to be reduced for local settings.
- Currently evaluating the relationship between GIS derived variables and activity among the sample.

# Acknowledgments

---

## ➤ Funding

- ❑ Robert Wood Johnson Foundation (Environmental assessment)
- ❑ American Cancer Society (collection of MTI data)

## ➤ Collaborators

- ❑ Tom Baranowski Ph.D. (Co-Investigator)
- ❑ Issa Zakeri Ph.D. (Co-Investigator Statistics)
- ❑ Mike Harris M.U.P. (GIS programmer)

---

*Thanks for your attention!*



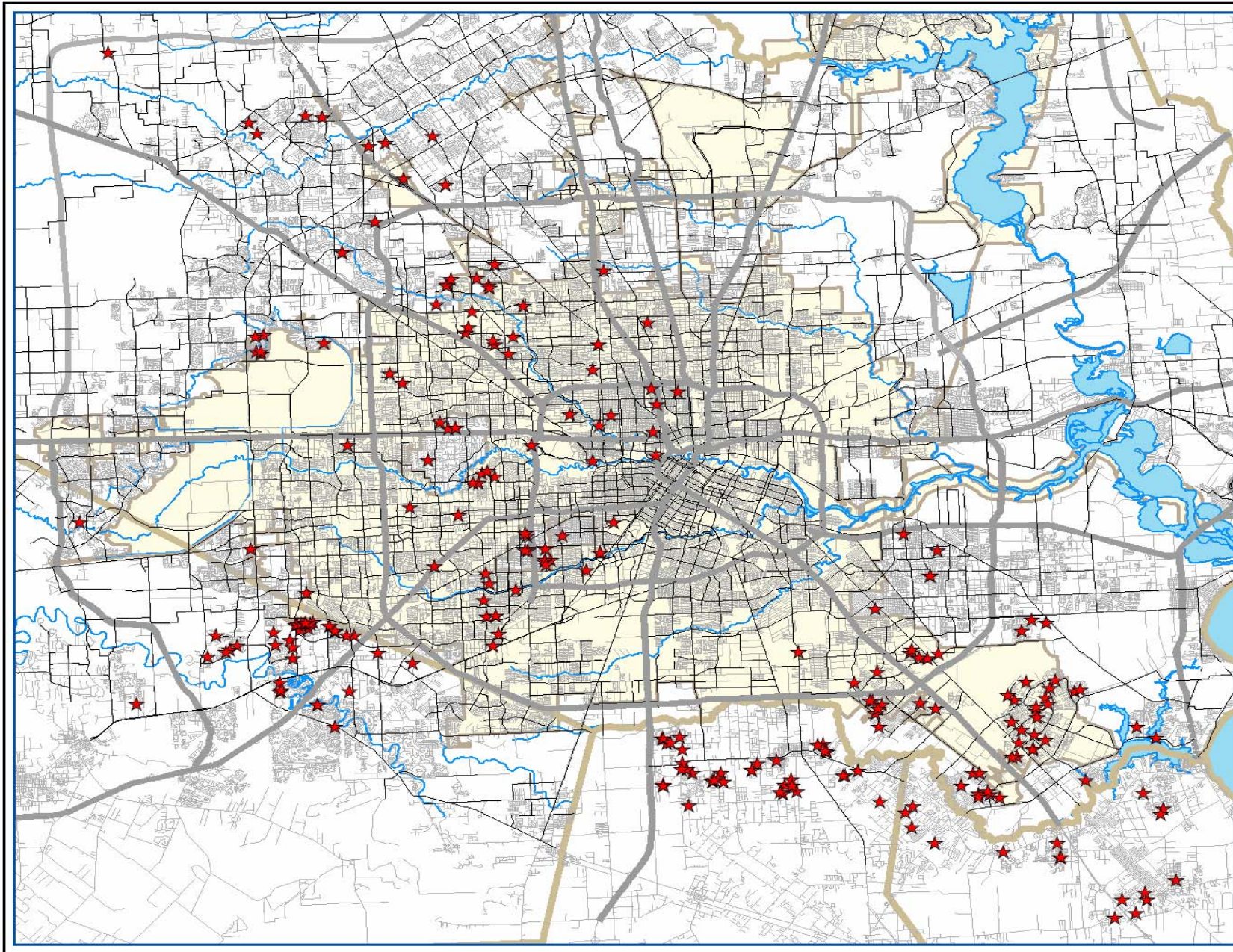
# Minutes of sedentary activity/day

Dep. Var	Independent Variables	Std Beta	T Statistic	Sig.
Minutes of Sedentary activity per day	Sidewalk Characteristics	-.19	-2.82	<b>.005</b>
	Age	.18	2.64	<b>.009</b>
	BMI	.06	1.02	.301
	Eth (Ref Anglo) Other	-.03	-0.50	<b>.615</b>
	P.Ed.(Ref<GED) Postgraduate	-.17	-1.92	.056
	College	-.25	-2.46	<b>.015</b>
	Some College	-.31	-2.42	<b>.016</b>
<b>ICC = .97</b>		<b>Level 1 R<sup>2</sup> = .08</b>		<b>Level 2 R<sup>2</sup> = .084</b>

# Minutes of light intensity activity/day

Dep. Var	Independent Variables	Std Beta	T Statistic	Sig.
Minutes of light activity per day	Sidewalk Characteristics	.20	2.93	<b>.003</b>
	Age	-.22	-3.23	<b>.001</b>
	BMI	-.03	-0.33	.708
	Eth (Ref Anglo) Other	.03	0.52	.602
	P.Ed.(Ref<GED) Postgraduate	.20	1.98	<b>.049</b>
	College	.26	2.58	<b>.010</b>
	Some College	.30	2.47	0.14
		<b>Level 1 R<sup>2</sup> = .09</b>	<b>Level 2 R<sup>2</sup> = .10</b>	

# Boy Scout Locations



**Legend**

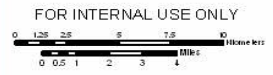
**Major Roads**

**TYPE**

- Interstates/Toll Roads
- Interstates/Toll Roads
- Major Roads
- Local Roads
- Rivers/Streams
- Lakes/Bays
- City of Houston City Limits
- County Limits
- bslocs



October 2004



Baylor College of Medicine  
Children's Nutrition Research Center

