

bridging the gap

Research Informing Policies & Practices
for Healthy Youth

Are Supports for Active Transportation in Local Zoning Codes Associated with More Walkable Streets and Lower Rates of Adolescent Obesity?

Jamie F. Chriqui, PhD, MHS

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Acknowledgments

Co-Authors:

- Christopher Quinn
- Sandy Slater, PhD
- Emily Thrun, MUPP
- Dianne Barker, MHS
- Frank J. Chaloupka, PhD

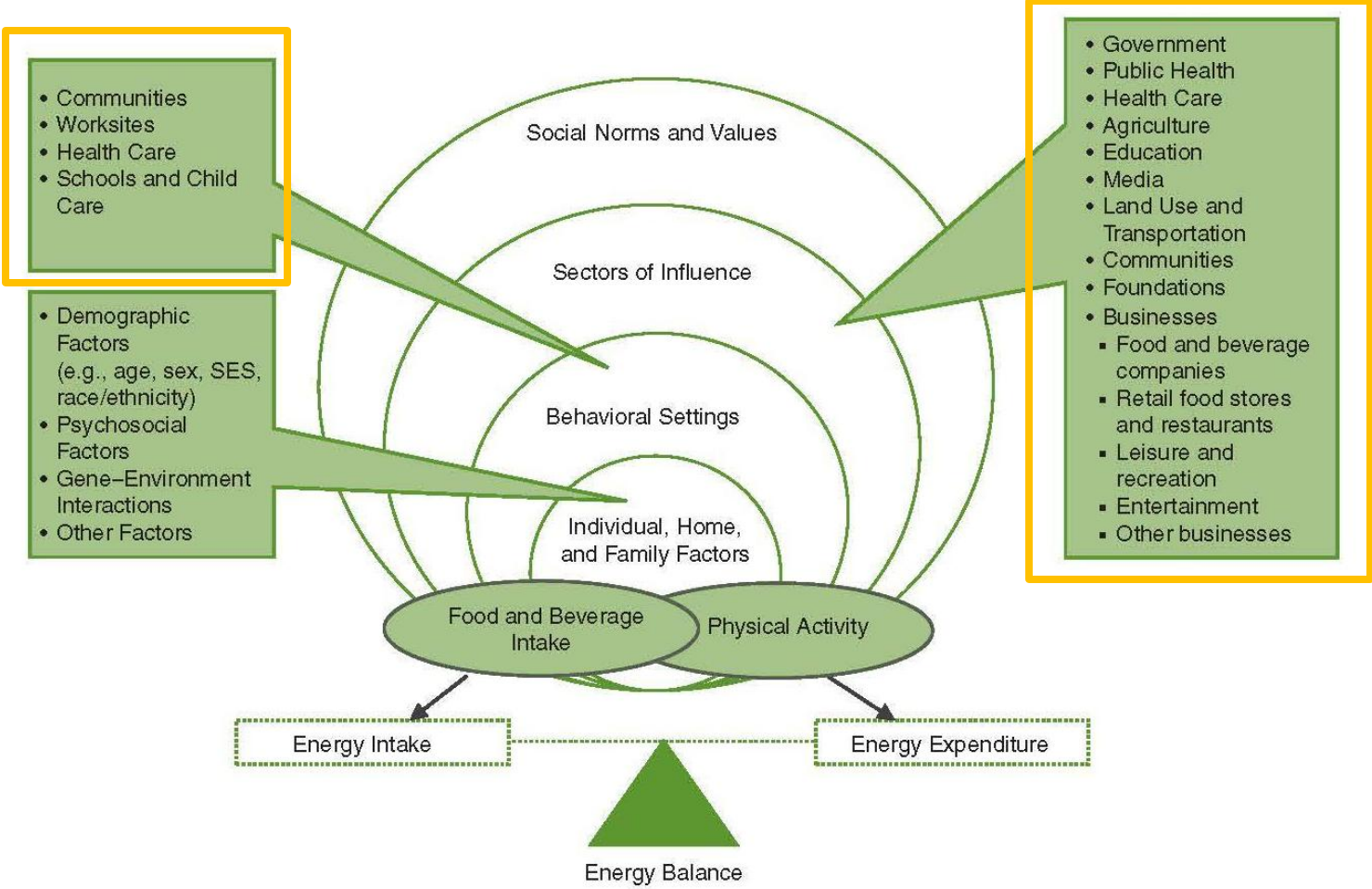
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Study Purpose

- To examine the influence of zoning and land use laws on:
 - community walkability
 - adolescent obesity

Factors influencing the physical environment, walkability, and obesity

Levels and Sectors of Influence on Obesity



5 SOLUTIONS FOR CHANGING OUR COMMUNITIES

INTEGRATE PHYSICAL ACTIVITY EVERY DAY IN EVERY WAY.



STRENGTHEN SCHOOLS AS THE HEART OF HEALTH.



MARKET WHAT MATTERS FOR A HEALTHY LIFE.



ON THEIR OWN, ANY ONE OF THESE FIVE SOLUTIONS MIGHT HELP SPEED UP PROGRESS IN PREVENTING OBESITY, BUT TOGETHER, THEIR EFFECT WOULD BE REINFORCED, AMPLIFIED, AND MAXIMIZED.

ACTIVATE EMPLOYERS AND HEALTH CARE PROFESSIONALS.



MAKE HEALTHY FOODS AVAILABLE EVERYWHERE.

After a Systematic Review of the Scientific Literature, the Task Force on Community Preventive Services Recommends the Following Environmental and Policy Approaches to Increase Physical Activity

Environmental Policy Approach	Strategies
Enhanced School-based Physical Education	Increase # of minutes spent in MVPA
Community-Scale and Urban Design Land Use Policies	Mixed use, street connectivity, aesthetics and safety
Street-Scale Urban Design Land Use Policies	Roadway design standards, traffic calming, safe street crossings, street lighting
Transportation and Travel Design Policies and Practices	Facilitating walking, biking, public transportation use, reducing car use.

Walkable communities are associated with reduced odds of adolescent obesity and overweight

Walkable Communities and Adolescent Weight

Sandy J. Slater, MS, PhD, Lisa Nicholson, PhD, Jamie Chriqui, PhD, Dianne C. Barker, MHS, Frank J. Chaloupka, PhD, Lloyd D. Johnston, PhD

Background: Neighborhood design features have been associated with health outcomes, including the prevalence of obesity.

Purpose: This study examined the association between walkability and adolescent weight in a national sample of public secondary school students and the communities in which they live.

Methods: Data were collected through student surveys and community observations between February and August 2010, and analyses were conducted in Spring 2012. The sample size was 154 communities and 11,041 students. A community walkability index and measures of the prevalence of adolescent overweight and obesity were constructed. Multivariable analyses from a cross-sectional survey of a nationally representative sample of 8th-, 10th- and 12th-grade public school students in the U.S. were run.

Results: The odds of students being overweight (AOR 0.98, 95% CI=0.95, 0.99) or obese (AOR=0.97, 95% CI=0.95, 0.99) decreased if they lived in communities with higher walkability index scores.

Conclusions: Results suggest that living in more-walkable communities is associated with reduced prevalence of adolescent overweight and obesity. (Am J Prev Med 2013;44(2):164–168) © 2013 American Journal of Preventive Medicine

Background

Obesity is a problem in the U.S. and worsening. One third of U.S. children are at higher risk for serious health problems because of their weight.¹ Research has shown that part of the problem is caused by the neighborhoods in which we live, work, shop and play.² Although obesity rates have grown over time, active travel (e.g., walking or bicycling to school) by youth—one form of physical activity—has declined over the past several decades.^{3,4} Results of the National Household Travel Survey show that for trips of only 1–2 miles, Americans still drive 90% of the time.⁵

Physical activity is proven to have protective effects against both obesity and related health problems.⁶ Research has shown that the presence of sidewalks, public

transit, controlled intersection crossings, and mixed land use (a mix of residential, commercial, and recreational destinations) are associated with increased walking and lower prevalence of obesity.^{2,8–19} However, these studies examined only one or a few locations, and those that were conducted nationally relied on secondary environmental data sources rather than street-scale data collected directly from communities.^{2,8–19} The current study builds on existing evidence^{2,8–19} by examining the impact of community-level walkability on the prevalence of adolescent obesity using street data collected on the ground in a national sample of communities; to our knowledge, this is the first study to do this.

Methods

This study combined cross-sectional individual-level data collected in Spring 2010 from 8th-, 10th-, and 12th-grade public school students participating in the Monitoring the Future (MTF) survey.²⁰ In any given year, half the MTF schools are either in Year 1 or 2 of participation. Only the traditional public schools involved in Year 2 of MTF participation were included in this study (N = 154 schools, 11,041 students). Community-level environmental measures for the MTF school-enrollment zones, the area from which schools draw their student population (area, in square miles: median size = 39.8, range = 0.26–1517), were developed through the Community Obesity Measures Project (BTG-COMP), an ongoing, large-scale effort conducted by the Bridging the Gap research team. BTG-COMP identifies local policy and environmental factors that

From the Institute for Health Research and Policy (Slater, Nicholson, Chriqui, Chaloupka), the Department of Health Policy and Administration (Slater), the Department of Political Science (Chriqui), and the Department of Economics (Chaloupka), Chicago, Illinois; Barker Braxton Health Consultants, Inc. (Barker), Calabasas, California; and the Institute for Social Research (Johnston), University of Michigan, Ann Arbor, Michigan. Address correspondence to: Sandy J. Slater, MS, PhD, University of Illinois at Chicago, Institute for Health Research and Policy and Department of Health Policy & Administration, School of Public Health, 1747 W. Roosevelt Road, M/C. 275 Room 558, Chicago, IL 60608. E-mail: slater@uic.edu.

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- The odds of students being overweight (AOR 0.98, 95% CI 0.95, 0.99) or obese (AOR 0.97, 95% CI 0.95, 0.99) decreased if they lived in more walkable communities.
- Source: Slater et al., AJPM 2013

Zoning as a Tool to Influence the Active Living Environment

Zoning and its relationship to public health

- Zoning, subdivision regulation, and building codes are exercises of the states' police powers under the 10th Amendment
- Zoning authority granted to county and municipal governments by states to promote the health, safety, morals, and general welfare of their citizenry
- Traditional, Euclidian zoning establishes land use zones/districts based on use and density
 - The protection of public health lies at the heart of zoning –zoning offers a regulatory scheme to address public health problems caused by urbanization (Schilling and Linton, Am. J. Prev. Med. (2005))



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Zoning and Land Use Laws as Strategies to Support Active Living-oriented Environments

- Zoning/land use laws can include provisions for structural improvements to increase opportunities for physical activity such as provisions requiring:
 - Sidewalks
 - Bicycle infrastructure (lanes, parking, signage)
 - Trails
 - Open space/parks
 - Mixed use
 - Street connectivity

City of Evanston Zoning

Village of Wilmette

Zoning as a tool for facilitating community walkability

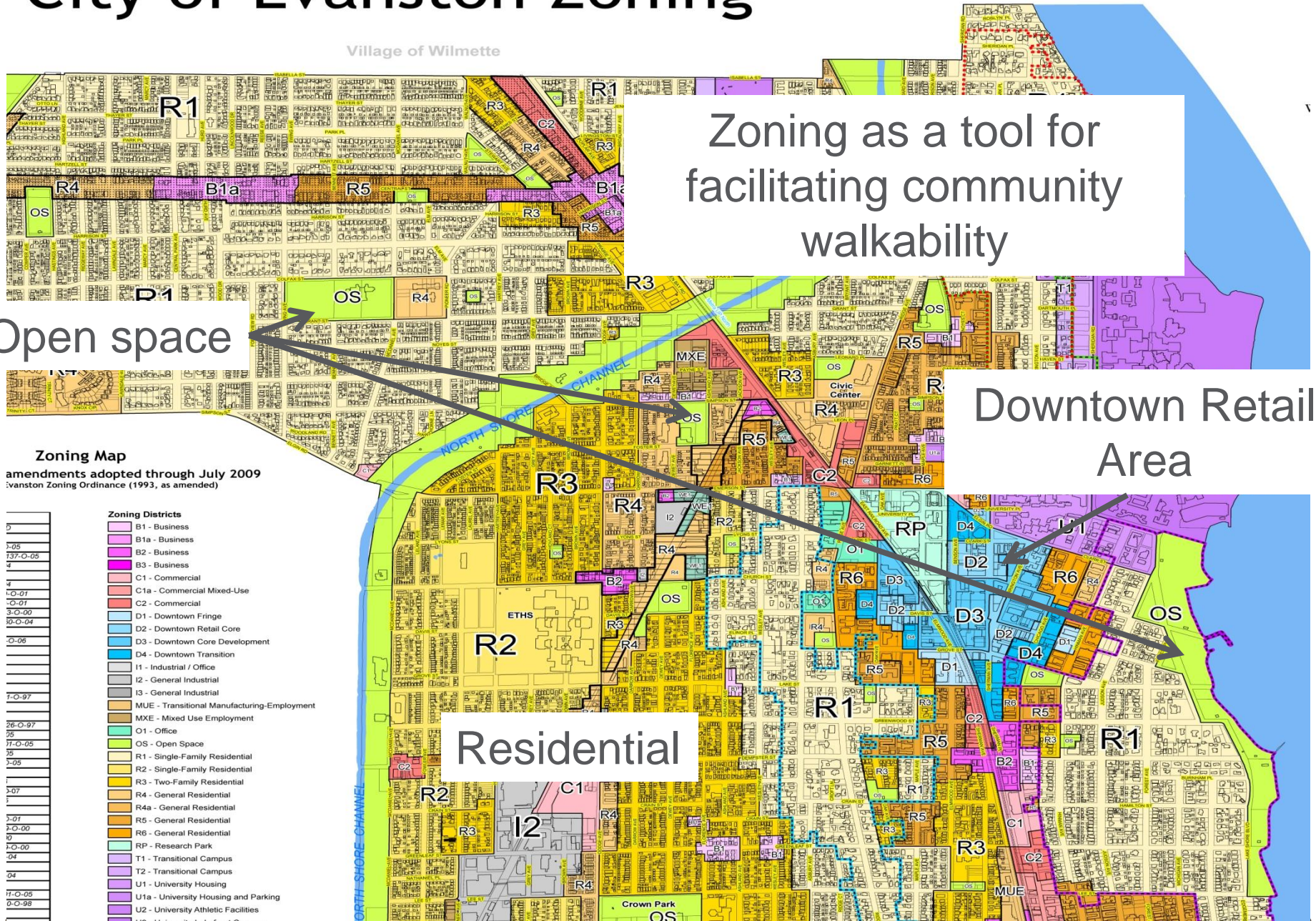
Open space

Downtown Retail Area

Residential

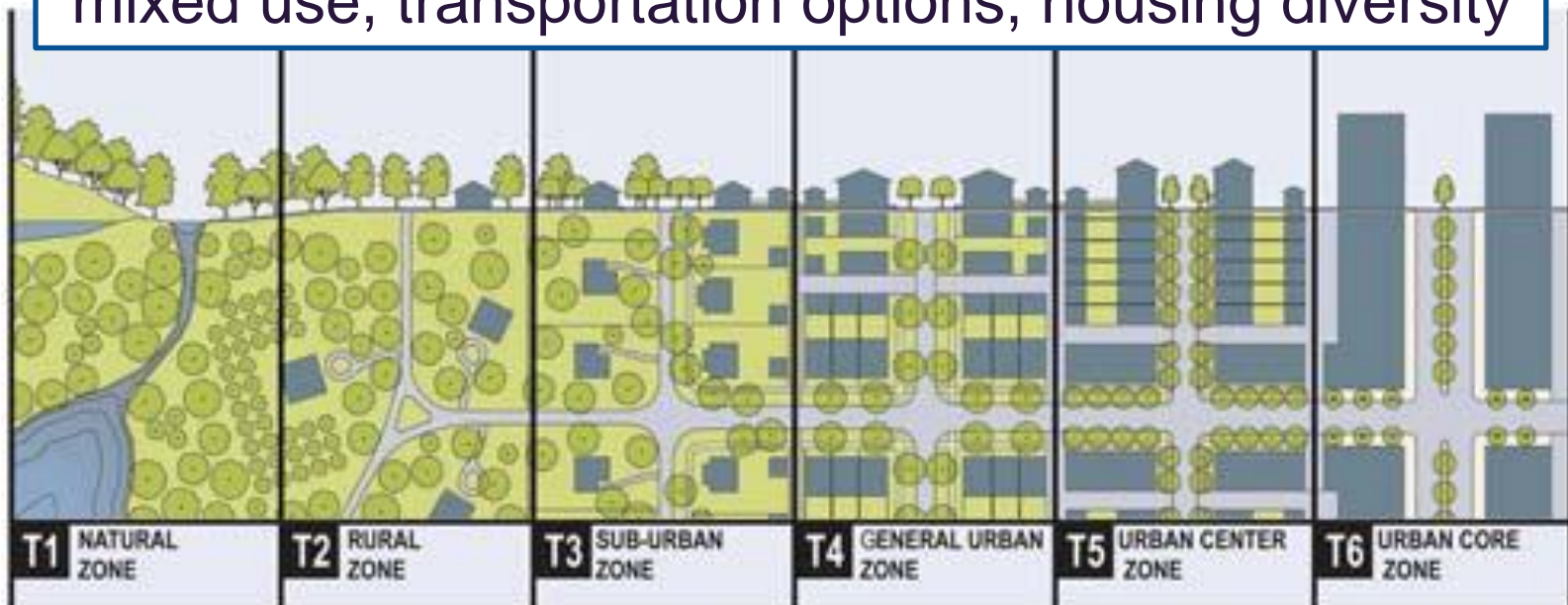
Zoning Map
amendments adopted through July 2009
Evanston Zoning Ordinance (1993, as amended)

Year	Zoning Districts
0	B1 - Business
1-05	B1a - Business
137-O-05	B2 - Business
4	B3 - Business
1-O-01	C1 - Commercial
0-01	C1a - Commercial Mixed-Use
3-O-00	C2 - Commercial
02-O-04	D1 - Downtown Fringe
0-06	D2 - Downtown Retail Core
	D3 - Downtown Core Development
	D4 - Downtown Transition
1-O-97	I1 - Industrial / Office
	I2 - General Industrial
	I3 - General Industrial
26-O-97	MUE - Transitional Manufacturing-Employment
25	MXE - Mixed Use Employment
11-O-05	O1 - Office
0-05	OS - Open Space
	R1 - Single-Family Residential
	R2 - Single-Family Residential
	R3 - Two-Family Residential
	R4 - General Residential
	R4a - General Residential
	R5 - General Residential
	R6 - General Residential
	RP - Research Park
	T1 - Transitional Campus
	T2 - Transitional Campus
11-O-05	U1 - University Housing
0-O-98	U1a - University Housing and Parking
	U2 - University Athletic Facilities



New Urbanist/Transect Zoning

Transect zones provide for more walkable streets, mixed use, transportation options, housing diversity



Source: transect.org

Study Methods

Data Sources—Zoning Data

- 309 secondary school catchments nationwide in 2010 and 2011 (154 in 2010 and 155 in 2011)
 - Required and encouraged provisions
 - Markers of walking/biking overall, crosswalks, bike lanes, bike parking, trails/paths, and Complete Streets/context-sensitive design
 - Trained coders (all with MUPP or master's level MUPP grad students)
 - Reliability conducted on pilot sample using 2009 data and yielded >90% percent agreement\ul> - Reliability coding is conducted each year when new coders join and independent coding does not occur until 95% or better % agreement

Data Sources—Street Segment Data

- Street segment: Two, facing sides of a street block
- Segments proportionately divided into 3 sampling strata based on street type:
 1. Streets within 2-mile buffer of catchment school
 2. Residential streets
 3. Arterial streets
- Random sample of street segments for each catchment
 - Based on proportion of population aged 0-17 associated with nearest census block to the street segment and overall proportion of street segments in each strata
- Street segment data weighted to account for probability of selection

Data Sources—Street Segment Audit Tool

BTG-COMP • STREET SEGMENT OBSERVATION FORM • 2010				SITE ID: _____			
SEGMENT ID :				COMPLETION CODE			
ADDRESS RANGE:				COMPLETED — CODE MODE <input type="radio"/>			
				PARTIALLY COMPLETED — CODE MODE AND DISP <input type="radio"/>			
				NOT STARTED — CODE MODE AND DISP <input type="radio"/>			
				NOT ELIGIBLE — CODE DISPOSITION <input type="radio"/>			
				NOT ELIGIBLE — No such segment/address <input type="radio"/>			
				MODE OF COMPLETION — CODES 01, 02 ONLY			
DATE _____, 2010				Completed by Walking <input type="radio"/>			
START TIME _____ AM				Completed by Driving <input type="radio"/>			
END TIME _____ AM				Completed by Walking and Driving <input type="radio"/>			
STAFF 1 _____							
STAFF 2 _____							
STREET ADVERTISING				DISPOSITION CODE — CODES 02, 03 ONLY			
Segment has relevant ads and Section E is filled out <input type="radio"/>				Temporarily not accessible <input type="radio"/>			
Segment has no ads at all — NO SECTION E <input type="radio"/>				Not safe <input type="radio"/>			
Segment has other, irrelevant ads — NO SECTION E <input type="radio"/>				Asked to leave <input type="radio"/>			
NOTES:				Ran out of time <input type="radio"/>			
				Other (SPECIFY): <input type="radio"/>			
A. LAND USES							
A1. Scan both sides of the street for presence of:		NO	YES, ONE SIDE	YES, BOTH SIDES	A3. Natural Features		NO YES
a. Housing — Single family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	a. Large body of water - lake, river, ocean	<input type="radio"/>	<input type="radio"/>
b. Housing — Multifamily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	b. Small body of water - pond, stream	<input type="radio"/>	<input type="radio"/>
c. Housing — Mobile homes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	c. Mountain or canyon	<input type="radio"/>	<input type="radio"/>
d. Public/Civic	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	A4. Physical Activity Venues		NO YES
e. Office/Professional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	a. Indoor commercial PA facility	<input type="radio"/>	<input type="radio"/>
f. Institutional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	b. Park with exercise/sport facilities/equip	<input type="radio"/>	<input type="radio"/>
g. Service	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	c. Park with sign, no equipment	<input type="radio"/>	<input type="radio"/>
h. Retail	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	d. Stand-alone playing court	<input type="radio"/>	<input type="radio"/>
i. Industrial/Manufacturing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	e. Stand-alone playing field	<input type="radio"/>	<input type="radio"/>
j. Recreation/Leisure/Fitness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	f. School /school yard (K through University)	<input type="radio"/>	<input type="radio"/>
k. Public Parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	g. Golf Course	<input type="radio"/>	<input type="radio"/>
l. Public Space	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	h. Beach	<input type="radio"/>	<input type="radio"/>
m. Agricultural	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	i. Outdoor pool	<input type="radio"/>	<input type="radio"/>
n. Undeveloped	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	j. Off-road trail	<input type="radio"/>	<input type="radio"/>
o. Vacant Building or Lot	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	A5. Do any buildings have...?		NO YES
p. Other, describe below	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	a. Bars on windows	<input type="radio"/>	<input type="radio"/>
A2. Parking facilities		NO	YES		b. Broken/boarded up windows	<input type="radio"/>	<input type="radio"/>
a. On-street angled or parallel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		c. Graffiti/tagging	<input type="radio"/>	<input type="radio"/>
b. Small lot (30 or fewer spaces)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		d. Yard debris	<input type="radio"/>	<input type="radio"/>
c. Medium to large lot/garage/structure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		DESCRIBE A1p:		

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B. TRAFFIC AND PEDESTRIANS							
B1. Street Type				B6. Intersection and crossing			
Through-street	<input type="radio"/>			a. Traffic light	<input type="radio"/>	NO	YES
Dead end or cul-de-sac with pedestrian thru-way	<input type="radio"/>			b. Pedestrian signal at traffic light	<input type="radio"/>	<input type="radio"/>	
Dead end or cul-de-sac without thru-way	<input type="radio"/>			c. Stop sign	<input type="radio"/>	<input type="radio"/>	
B2. Number of lanes of vehicular traffic				C. SIGNAGE			
_____				d. Marked crosswalk <input type="radio"/>			
B3. Traffic features				NO	YES		
a. Traffic circle/roundabout/rotary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	C1. Signage			
b. Speed hump/table	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	a. Bicycle crossing	<input type="radio"/>	NO	YES
c. Median with traffic island	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	b. Other bicycle-related signage	<input type="radio"/>	<input type="radio"/>	
d. Curb extension/bulb-out	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	c. Pedestrian crossing	<input type="radio"/>	<input type="radio"/>	
B4. Designated bike lanes				NO	ONE SIDE	BOTH SIDES	
a. Designated by lines or reflectors*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	C2. Special speed limit (00 IF NONE)			
b. Designated by physical barrier*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	_____			
B5. Is/Are there any...?				NO	ONE SIDE	BOTH SIDES	
a. Street shoulders*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	D. AMENITIES AND LITTER			
b. Curbs*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	D1. Aesthetics			
c. Street or sidewalk lighting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	a. Neighborhood or community sign	<input type="radio"/>	NO	YES
d. Sidewalks (IF NO, SKIP 1-5)*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	b. Garden, flower bed, planter	<input type="radio"/>	<input type="radio"/>	
1. Street and sidewalk buffer*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	c. Art, statue, or monument	<input type="radio"/>	<input type="radio"/>	
2. Continuous sidewalks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	D2. Amenities			
3. Sidewalk continuous at both ends between segments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	a. Public trash can	<input type="radio"/>	NO	YES
4. Curb cuts or ramps missing at crossing points	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	b. Street dispenser/vending machine	<input type="radio"/>	<input type="radio"/>	
5. Sidewalk shade*	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	c. Bench or other seating	<input type="radio"/>	<input type="radio"/>	
NOTES:				D3. Transit facilities			
				a. Bus stop <input type="radio"/>			
				b. Light rail or trolley stop <input type="radio"/>			
				c. Bench or covered shelter at transit <input type="radio"/>			
				D4. How much garbage/litter is on the street segment?			
				NONE	A LITTLE	SOME	A LOT
				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Measure Development: Zoning Indices

- Zoning Required Walkability/Bikeability Index (0-6)
 - Σ of required policy markers
 - walkability+crosswalks+bike lanes+bike parking+trails+complete streets/context sensitive design
 - Required scores included: mix of required and encouraged provisions; all districts/zones required
- Zoning Encouraged Walkability/Bikeability Index (0-6)
 - Σ of encouraged only policy markers (same markers as above but encouraged rather than required)
- Both indices weighted for the population in the jurisdictions overlapping each catchment

Measure Development: Community Walkability Index

- Street Segment Walkability/Bikeability Index (0-16)
 - Comprised of 10 variables from the street observation form
 - Σ mean value of each of the following across segments within a catchment:
 - Items ranging from 0-2 (not present, one side of street, or both sides)
 - Sidewalks (SW), SW buffers, SW/street lighting, continuous SW in the segment, continuous SW between segments, SW shade
 - Items ranging from 0-1 (any presence)
 - Marked crosswalk, bike lanes, bike parking, off-road trail
 - Note: modifies Slater et al 2013 index by adding in bike/trail items

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Analytic Methods:

Zoning → Community Walkability

- Multivariate analyses:
 - Generalized Linear Models with gamma distribution and log link
 - All models clustered on site, controlling for race/ethnicity, region, urbanicity, population density or sprawl, and median household income, year
 - N=308/309 catchments
- Analyses conducted with STATA v. 12 using svy commands to account for survey design with sampling weights

Measure Development: Adolescent Obesity

- BMI calculated from self-reported height and weight data obtained from 8th, 10th, and 12th grade students (N=11,041 students) enrolled in the 154 secondary school catchments where the policy and street segment data were obtained for the 2010 sample
 - University of Michigan's Monitoring the Future Schools/Students
- BMI calculated using the 2000 CDC Growth Chart for children and teens
- Obesity was classified as BMI \geq 95th percentile

Analytic Methods:

Zoning → Walkability → Adolescent Obesity

- PRELIMINARY ANALYSES: Multivariate binary mediation analysis with sobel test for mediation effects
 - Dependent variable: obesity
 - Independent variable: zoning walkability/bikeability index
 - Mediation variable: community walkability/bikeability index
- Controlled for sprawl, student perceived neighborhood safety, school catchment race/ethnicity, catchment parental education, grade, gender, catchment neighborhood disorder index, catchment median household income
- Analyses conducted with STATA v. 12 with bootstrapped standard errors (500x)

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Results: Zoning → Community Walkability

Summary Statistics: Zoning Indices and Community Walkability/Bikeability Index

Measure	Range	Mean	Std. Error	95% CI	
				Low	High
Zoning Walkability/Bikeability Indices					
Zoning Required	0-6	1.93	0.08	1.77	2.08
Zoning Encouraged	0-6	1.06	0.05	0.95	1.16
Community Walkability/Bikeability Index					
Community Index	0-12.12 (Max: 16)	3.47	0.15	3.17	3.77

Summary Statistics: Catchment Controls— Continuous Measures

Variable	Mean	Std. Error of Mean
% Hispanic/Latino population in catchment	12.44	1.05
% non-Hispanic white population in catchment	71.78	1.47
% non-Hispanic black population in catchment	9.26	0.83
Sprawl index	0.00416	0.00569
Median household income (dollars)	57398.88	1282.95
Total catchment population	26699.32	1209.83

Summary Statistics: Catchment Controls— Dichotomous Measures

Variable	n (N=309)	%
Urban (Ref)	61	19.74
Suburban	134	43.37
Rural	114	36.89
West (Ref)	58	18.77
Northeast	67	21.68
Midwest	77	24.92
South	107	34.63
Lowest income tertile	101	32.69
Middle income tertile	105	33.98
Highest income tertile (Ref)	103	33.33

Association between Zoning and Community Walkability/Bikeability

Predictors	Mean Ratio	Mean Ratio
Zoning index-required provisions	1.23***	1.22***
Zoning index-encouraged provisions	1.14*	1.12+
Suburban	0.89	0.89
Rural	0.31***	0.32***
% non-Hispanic Black	1.01**	1.01**
% Hispanic	1.01*	1.01
Med. Household Inc. Low	0.84	0.84+
Northeast	0.78	0.78
Midwest	1.07	1.05
South	0.56***	0.56***
2011	1.26*	1.20+
Population Density	1.00	--
Sprawl	--	1.23**
Constant	2.01**	2.33***

Results: Zoning → Community
Walkability/Bikeability → Obesity

Summary Statistics--1

Variable	Mean	Std. Dev.
Zoning required index (0-6)	2.09	1.55
Community index (0-16)	3.46	3.06
Probability obese	0.12	0.33
Perception neighborhood safety	0.10	0.07
Disorder scale	0.37	0.25
Sprawl index	-0.02	0.89
8 th grade	0.39	0.49
10 th grade	0.45	0.50
12 th grade	0.16	0.37

Summary Statistics--2

Variable	Mean	Std. Dev.
% white	0.61	0.49
% black	0.09	0.29
% Hispanic	0.18	0.38
% mixed race	0.12	0.34
Median household income low	0.41	0.49
Median household income high	0.59	0.49
% male	0.48	0.50
Parents >=college education	0.71	0.45

Binary Mediation Results

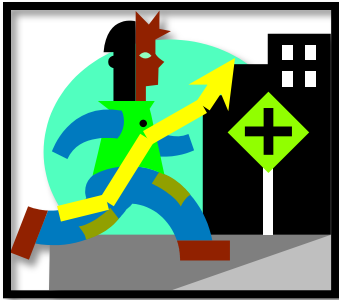
Variable	Community Walkability/Bikeability		
	Coeff.	95% CI	
Zoning	0.54	0.51	0.57
Comm. walk.	--	--	--
Nghbrhd safety	1.63	0.93	2.33
Disorder index	1.81	1.59	2.04
Sprawl	1.17	1.12	1.22
10 th grade	0.01	-0.08	0.11
12 th grade	-0.22	-0.34	-0.09
% Black	0.01	-0.14	0.16
% Hispanic	0.70	0.57	0.83
% Other race	0.57	0.44	0.70
Med HH Inc Low	-1.92	-2.02	-1.82
Male	0.39	-0.04	0.12
Parent Ed Coll	0.30	0.21	0.40
Constant	2.05	1.90	2.07

Binary Mediation Results

Variable	Community Walkability			Obesity		
	Coeff.	95% CI		Coeff.	95% CI	
Zoning	0.54	0.51	0.57	-0.002	-0.007	0.003
Comm walk/bik	--	--	--	-0.003	-0.007	-0.001
Nghbrhd safety	1.63	0.93	2.33	0.10	-0.005	0.196
Disorder index	1.81	1.59	2.04	0.03	-0.007	0.058
Sprawl	1.17	1.12	1.22	0.003	-0.004	0.011
10 th grade	0.01	-0.08	0.11	0.009	-0.004	0.023
12 th grade	-0.22	-0.34	-0.09	0.007	-0.011	0.025
% Black	0.01	-0.14	0.16	0.04	0.024	0.066
% Hispanic	0.70	0.57	0.83	0.02	0.005	0.042
% Other race	0.57	0.44	0.70	0.01	-0.007	0.031
Med HH Inc Low	-1.92	-2.02	-1.82	0.03	0.014	0.046
Male	0.39	-0.04	0.12	0.05	0.042	0.066
Parent Ed Coll	0.30	0.21	0.40	-0.03	-0.041	-0.013
Constant	2.05	1.90	2.07	0.08	0.062	0.107

Summary, Next Steps, and Contacts

Influence of more active living-oriented zoning codes on community walkability/bikeability and adolescent obesity

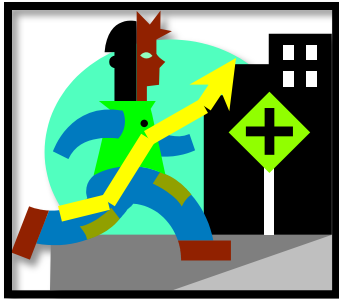


Active living oriented zoning: **more** walkable/bikeable community

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Through **more** walkable/bikeable community...



...active living-oriented zoning is associated with **lower** adolescent obesity



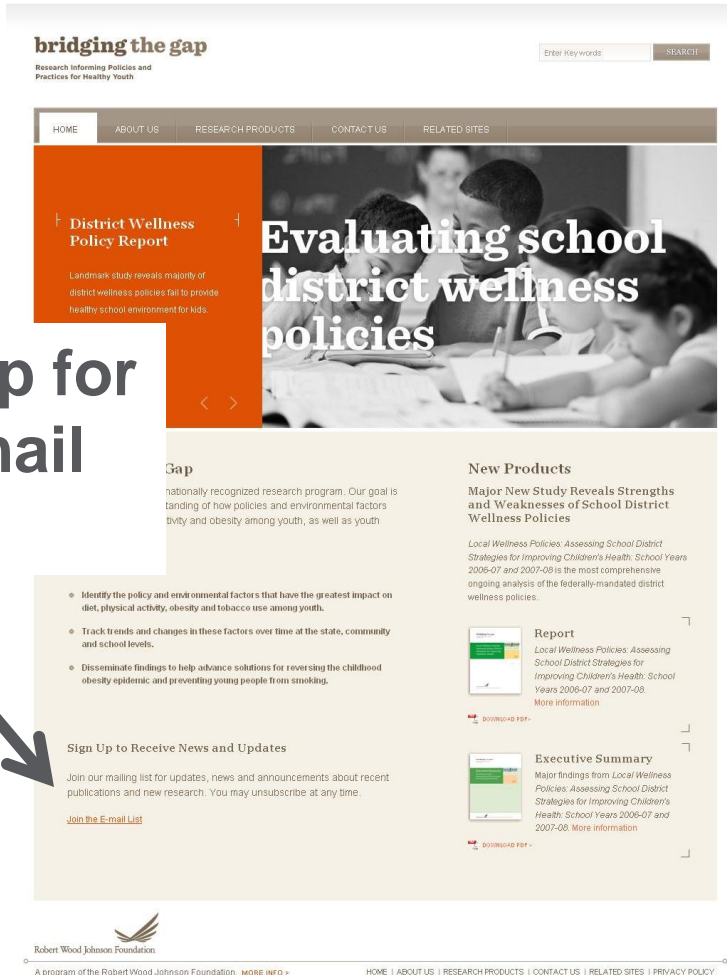
Summary

- “If you zone for it, they will come”
 - More active living-oriented zoning associated with more walkable/bikeable communities
 - **Preliminary analyses suggest that through more walkable/bikeable communities, more active living-oriented zoning provisions are associated with lower adolescent obesity**
 - Opportunities exist for communities to revise their zoning/land use laws to be more active living-oriented during their next revision

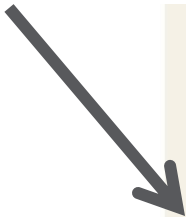
Next Steps

- Add additional years of data (2010-2012) for both sets of analyses
- Rerun mediation models with complex survey weights

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