



Transportation & the Built Environment: Promoting Healthy Communities

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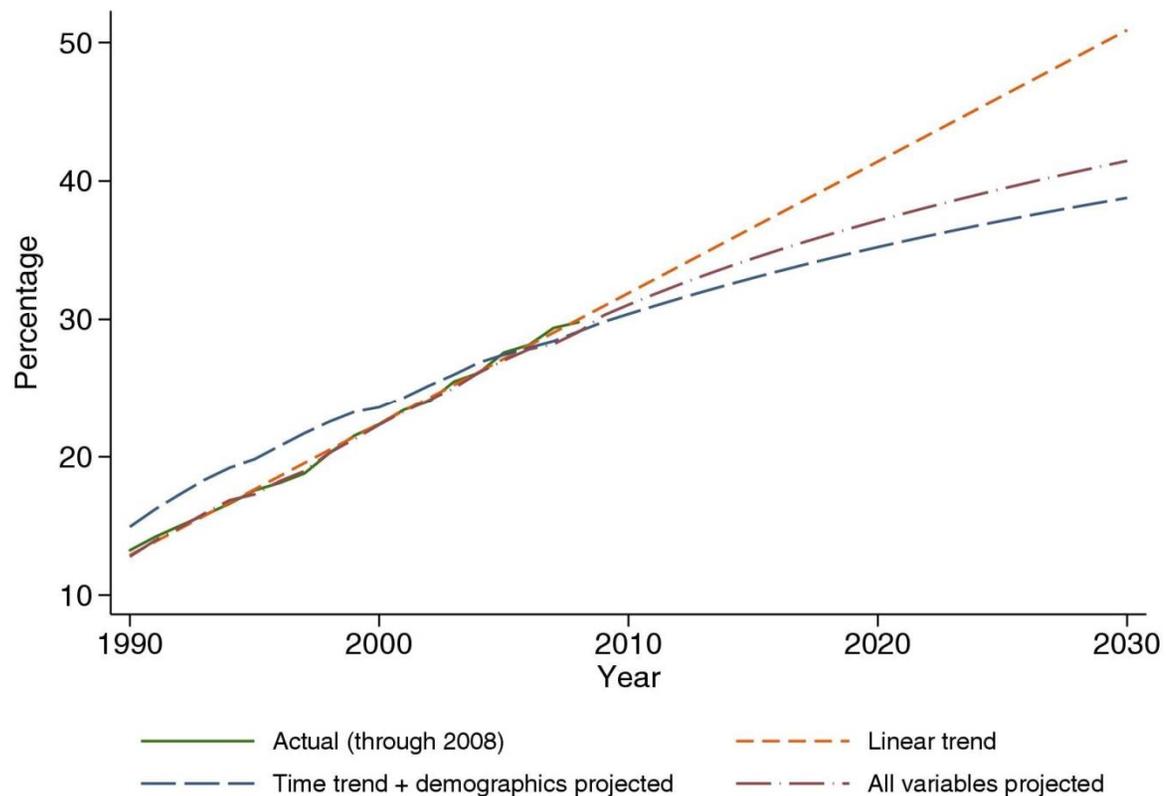
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Cincinnati, November 8, 2013

Outline

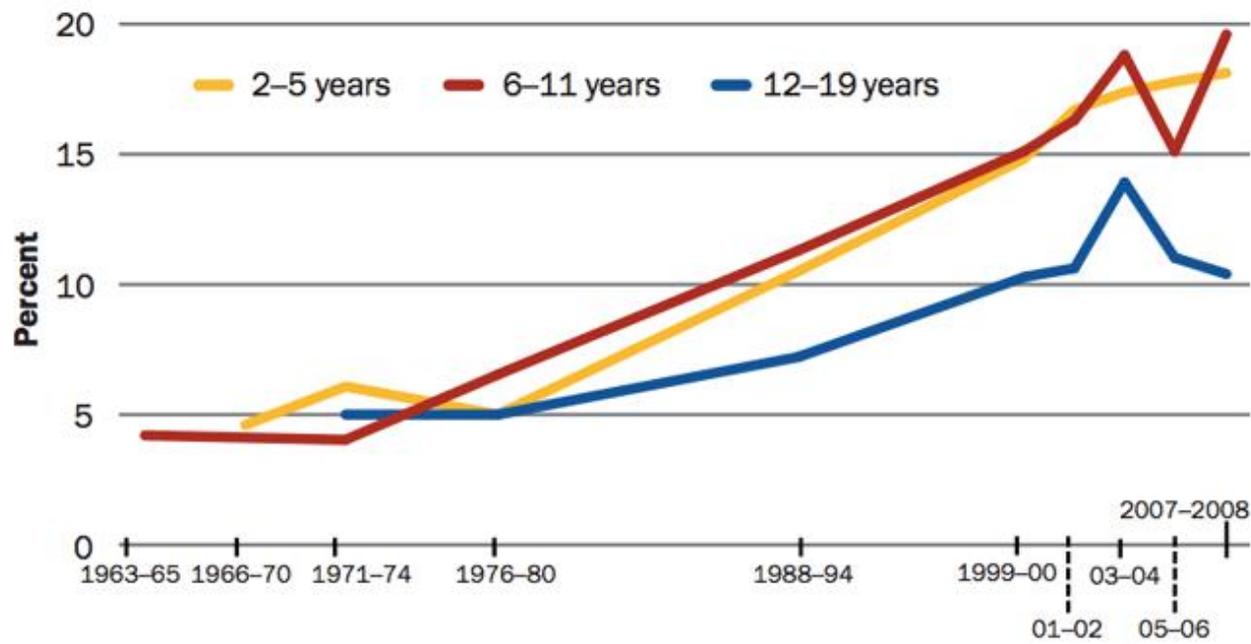
- Obesity and physical activity, national and state
- Causes
- What planning can do
- The %package+of walkability
- Incorporating health into planning decisions

Projected obesity



Source: Finkelstein et al, American Journal of Preventive Medicine 2012; 42:563-570 (DOI:10.1016/j.amepre.2011.10.026)

Also in children

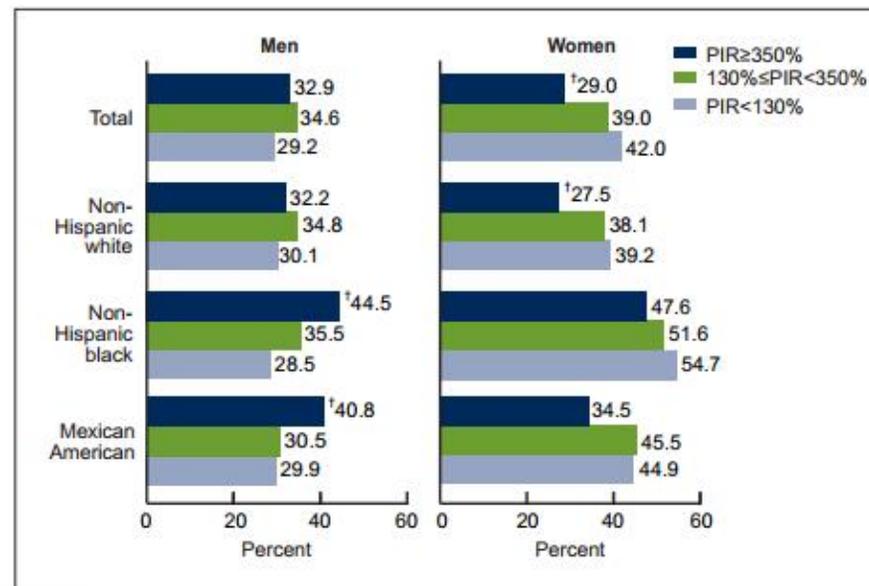


Source: Trust for America's Health, 2013

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By poverty ratio

- Higher for lower income black and Mexican American men



[†]Significant trend.

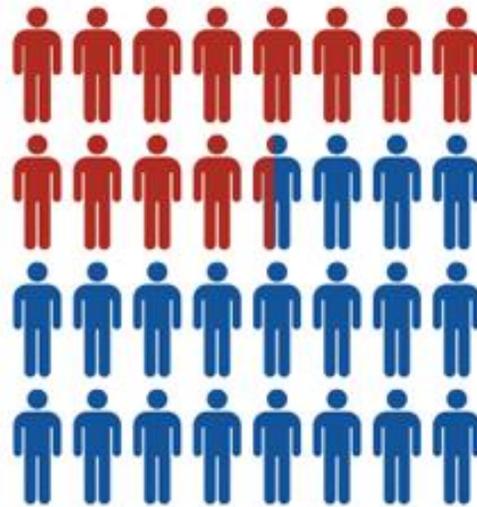
NOTES: PIR is poverty income ratio. Persons of other race and ethnicity included in total.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 2005–2008.

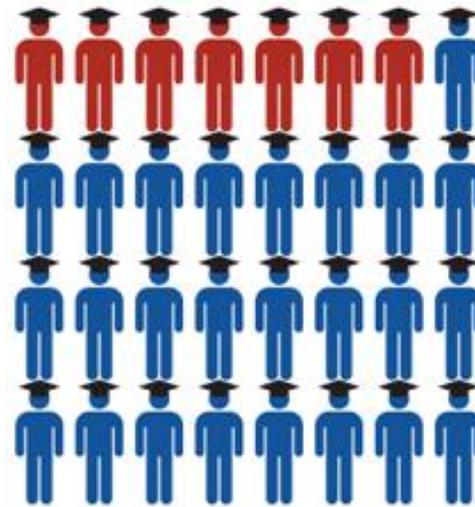
Source: Ogden et al 2010, NCHS Data Brief No. 50

By education

■ A



35.3% of adults with
no high school diploma
are obese



22.1% of adults who
graduated college or
technical college are obese

Source: Trust for America's Health, 2013

And OH?

	Rank	Percentage
Obesity, % adults (2012)	13	30.1
Diabetes, % adults (2012)	6	11.7
Physical Inactivity, % adults (2012)	11	25.3
Hypertension, % adults (2011)	15	32.7
Obesity, % high school students (2011)	10	14.7
Overweight or obese, % of 10-17 year olds (2011)	14	17.4

Source: <http://www.healthymamericans.org/states/?stateid=OH#section=1,year=2013,code=adultinactivity>

Obese high schoolers (2011)

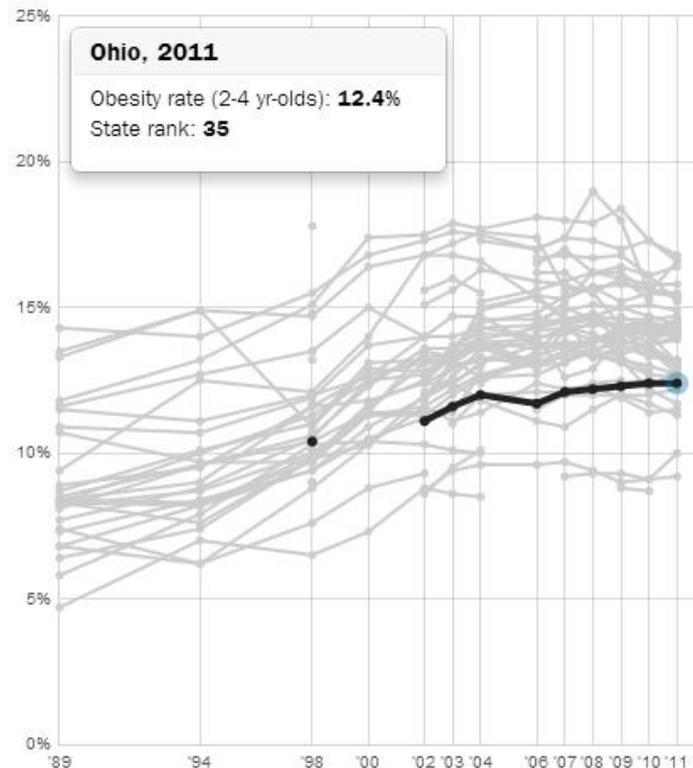
		Rate
	Alabama	17.0%
	Oklahoma	16.7%
	Kentucky	16.5%
	Louisiana	16.1%
	Mississippi	15.8%
	Texas	15.6%
	Tennessee	15.2%
	Arkansas	15.2%
	Georgia	15.0%
	Ohio	14.7%

Source: Trust for America's Health, 2013

OH ranks 35th in low income childhood obesity

Obesity Among 2- to 4-Year-Olds, 1989-2011

Low-Income Families



Source: Trust for America's Health, 2013

Why is obesity a concern?

- Metabolic syndrome
- Cardiovascular disease
- Endocrine disease
- Other
 - Cancer
 - Pulmonary disease
 - Musculoskeletal disease
 - Gastrointestinal and hepatic disorders

Outline

- Obesity and physical activity, national and state
- **Causes**
- What planning can do
- The %package+of walkability
- Incorporating health into planning decisions

What are the causes?

OP-ED COLUMNIST

Hard Truths About Our Soft Bodies

By FRANK BRUNI

Published: September 16, 2013 | 654 Comments

I was steering my cart through Costco the other day, wondering whether to waddle to the aisle where they sell cashews by the quarter-ton or to the one with thousand-piece packs of chicken thighs, when an epiphany pierced the fog of my gluttony.

[Enlarge This Image](#)



Earl Wilson/The New York Times
Frank Bruni

Actually, two epiphanies. The first? I needed to have kids, four or five or better yet a baker's dozen. Only then could I take full advantage of the savings around me.

The second? Costco as much as anything else is why the land of the free and the home of the brave is also the trough of the tub o' lard, our exceptionalism measurable by not only our G.D.P. but also our B.M.I. That's body mass index, and our bodies are indeed massive.

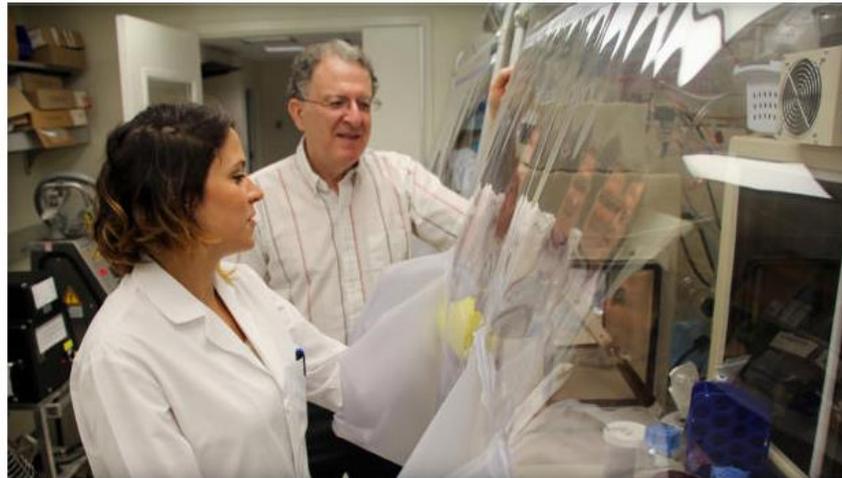
I don't blame Costco per se. I blame what it represents: an American obsession with size, with quantity, that manifests itself as surely in supermarkets and restaurants as it does

- FACEBOOK
- TWITTER
- GOOGLE+
- SAVE
- E-MAIL
- SHARE
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A small graphic with the text "Enough Said" in white on a green background, featuring a photo of a man and a woman.

What are the causes?

Gut bacteria may be key to fighting obesity



Dr. Jeffrey Gordon and graduate student Vanessa Ridaura of Washington University in St. Louis examine samples of gut bacteria taken from fat or lean people. / AP

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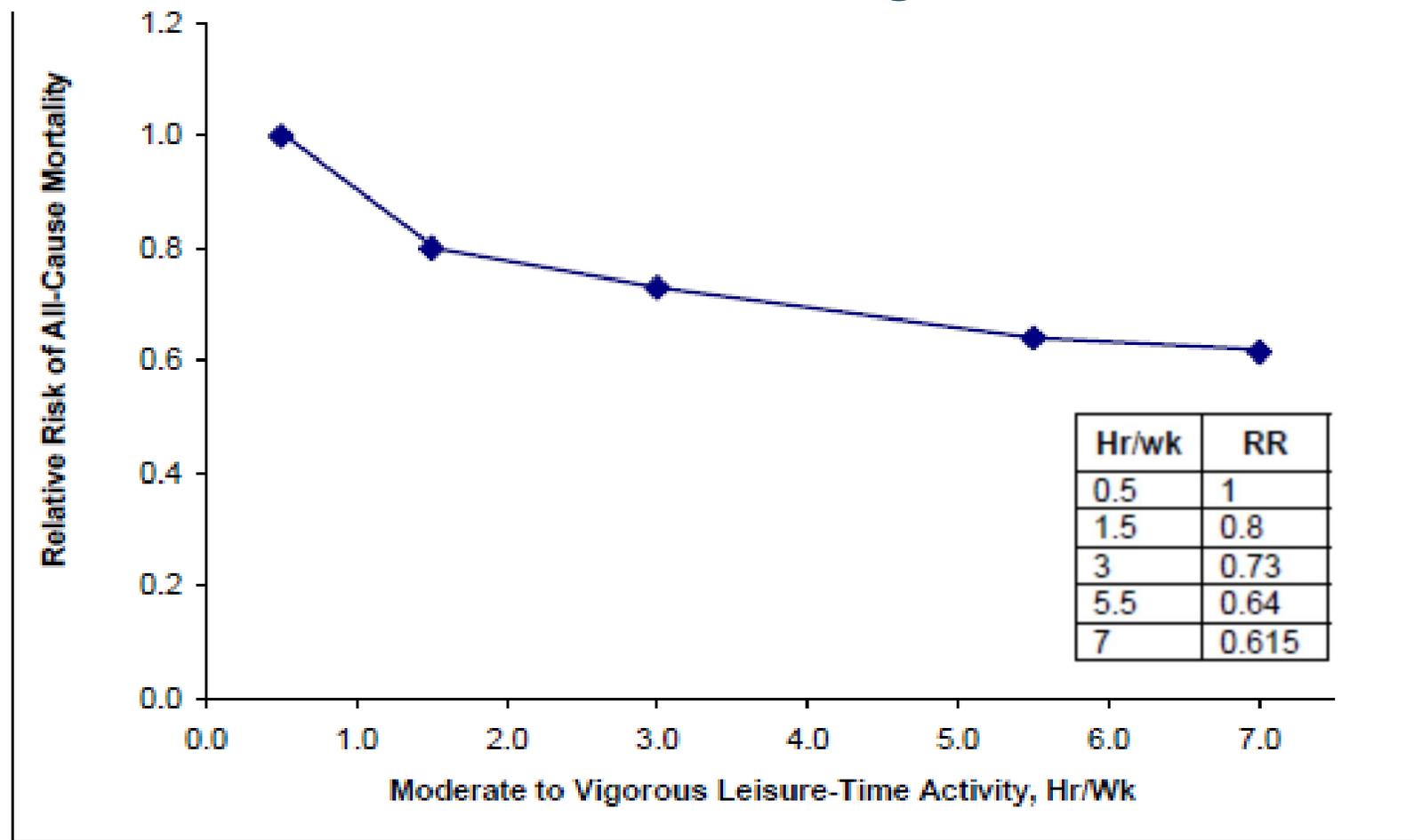
WASHINGTON | Different kinds of bacteria that live inside the gut can help spur obesity or protect against it, according to new research from scientists at Washington University in St. Louis.

They transplanted intestinal germs from fat or lean people into mice and watched the rodents change.

Physical activity and disease risk

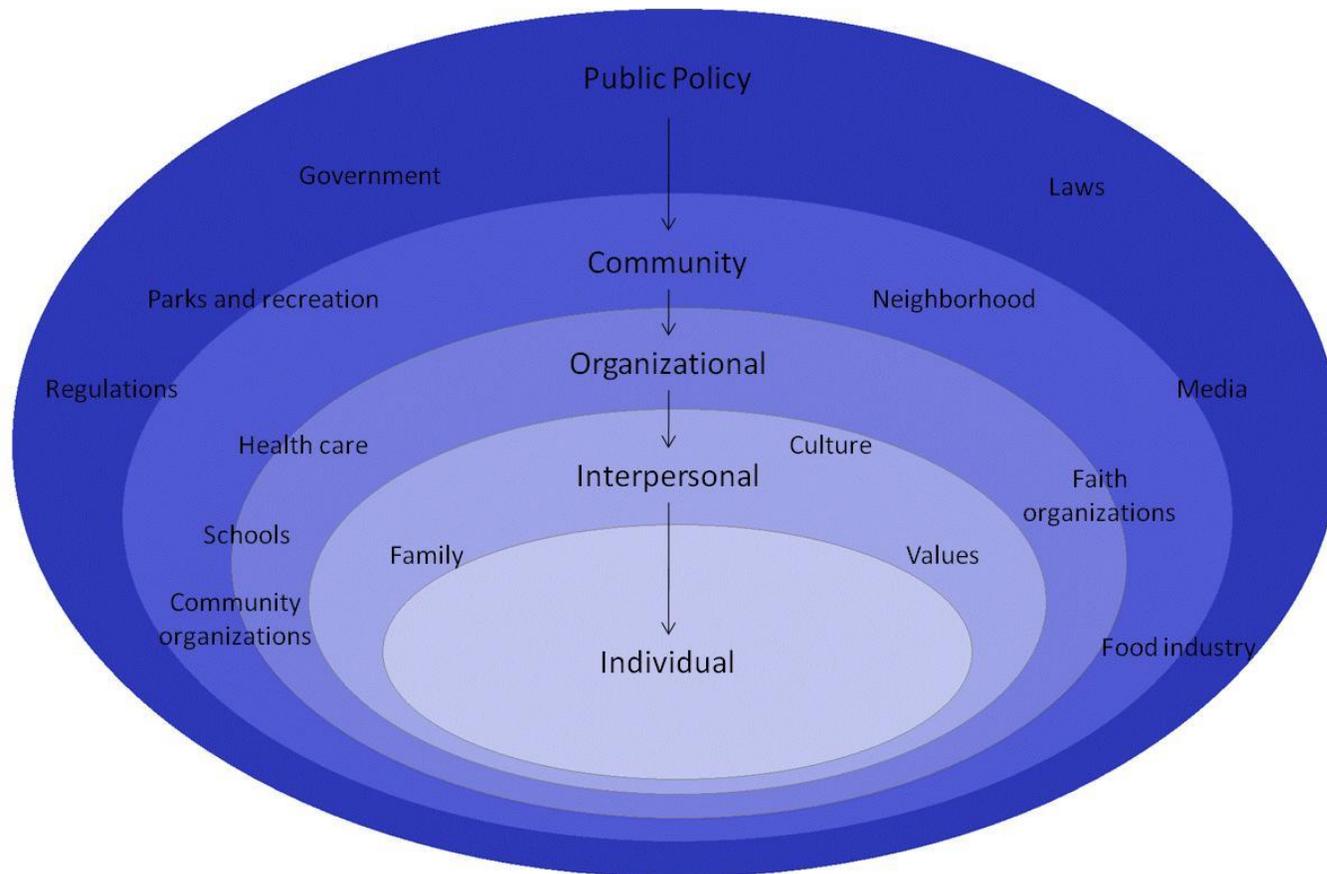
	Strength of association	Consistency	Temporal sequence	Biological plausibility	Dose-response
Cardiovascular disease	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Type 2 diabetes	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Overweight and obesity	✓✓	✓✓	✓	✓✓✓	✓
Breast cancer	✓✓	✓✓	✓✓✓	✓	✓
Prostate cancer	✓✓	✓	✓	✓	
Colon cancer	✓	✓✓	✓✓	✓	✓
Clinical depression	✓✓	✓	✓		✓
Cognitive impairment	✓	✓✓	✓		

Physical activity and all-cause mortality



Source: PAGAC, 2008

Socio-ecologic framework



Source: Aytur et al 2008

Broadening the view...

- From individual-centered approaches to ecological approaches
 - 2002 National Survey of Pedestrian and Bicyclist Attitudes and Behaviors
 - Too busy or did not have the opportunity to walk
 - Perception of risk, danger, or crime
 - Perception of difficulty or inconvenience



Source: Pedbikeimages.org

Carolina Transportation Program



Source: Pedbikeimages.org

Carolina Transportation Program



Source: Pedbikeimages.org

Carolina Transportation Program

Outline

- Obesity and physical activity, national and state
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- **What planning can do**
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Transportation infrastructure

- Off-road trails and greenways
 - Living near trails and using trails, related to meeting activity guidelines, higher bicycling
 - For every \$1 invested in trails, return of \$2.94
 - Important for low income populations



Source: MoBikeFed. (July 27, 2009) IMG_1285. In Flickr. Creative Commons Copyright Attribution 2.0 Generic.



Source: <http://lavidaesloca.wordpress.com/category/cali/>

Transportation infrastructure

■ Bicycle lanes

- Across cities, 1% higher lanes related to 0.25%-0.3% higher bicycling to work
- On-road lanes reduce cyclist crash risk by 50%



Source: Burden, Dan. (July 8, 2009). Image Library. In *Pedestrian and Bicycle Information Center*.



Source: Gibbs, Margaret. (June 29, 2009). Image Library. In *Pedestrian and Bicycle Information Center*.

Transportation infrastructure

■ Sidewalks

- Review of 16 studies: Having sidewalks → 20 percent more likely to be physically active
- Study of 11,500 participants in 11 countries
 - Sidewalks in most streets, 47% more likely to meet physical activity guidelines



Source: Rodriguez, 2009

Transportation infrastructure

- Calming local traffic
 - High traffic deters from activity (across ages)
 - Crosswalks & traffic management around schools linked to more walking and less being driven to school



Source: Burden, Dan. (June 24, 2009). Image Library. In *Pedestrian and Bicycle Information Center*.



Source: Shaeffer, Larry. (June 10, 2009). Image Library. In *Pedestrian and Bicycle Information Center*.

Road diets



Source: Schneider 2009

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Road diets



Source: Schneider 2009

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Road diets



Source: Schneider 2009

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Transit

- Transit users
 - Nationwide, 29% of them are physically active > 30 minutes/day solely by walking to stops
 - Take 30% more steps and walk 8/min more/day than non users
 - Enjoy lifetime savings of \$5,500/person, or higher



Source: Moriza. (May 7, 2006). Rush to Happy Hour. In Flickr.

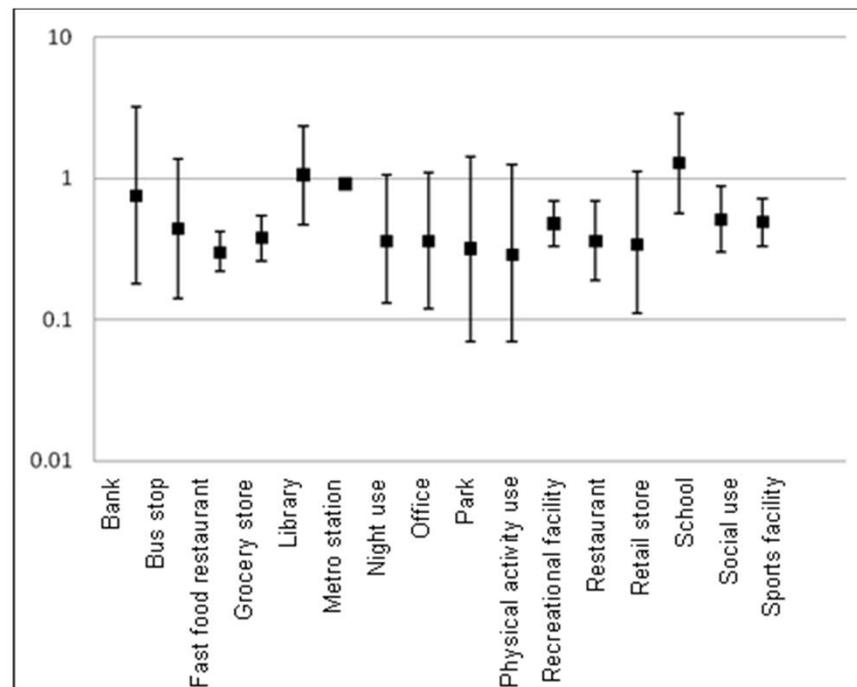


Source: Sandt, Laura. (April 15, 2009). Image Library. In Pedestrian and Bicycle Information Center.

Land uses

■ Mixing (most) land uses is fine

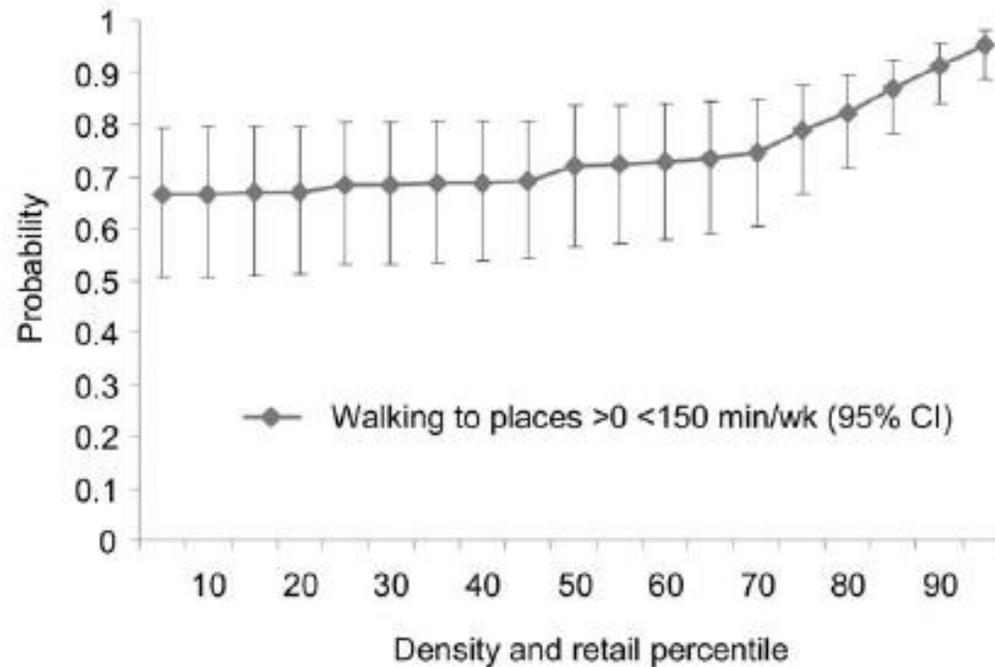
Odds ratio of walking for transport for <150 minutes/week versus not walking for each additional mile to .



Source: Rodriguez et al, 2010

Density

Probability of walking to places relative to no walking by percentile of neighborhood density and retail (Baltimore, Chicago, New York City, Forsyth County, and LA)



Source: Rodriguez et al, 2009

Outline

- Obesity and physical activity, national and state
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- **The package of walkability**
- Incorporating health into planning decisions

Micro features

- Quality of sidewalks
- Pedestrian supports
 - Crosswalks, lights, wayfinding
- Trees/foliage
- Lighting
- Benches
- Cleanliness
- Safety

Other example



Condiciones actuales: Metro a superficie y desarrollo urbano centrado en el automóvil

Urban Advantage

+ mixed uses and transitional densities

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Urban Advantage

+ low density TOD residential uses
fronting street, foliage, improved
sidewalks, parking ã

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Urban Advantage

+ ped island, lighting, trees, high density residential development

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Urban Advantage

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Where would you prefer to walk?



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Urban Advantage

New urbanist neighborhood: Southern Village

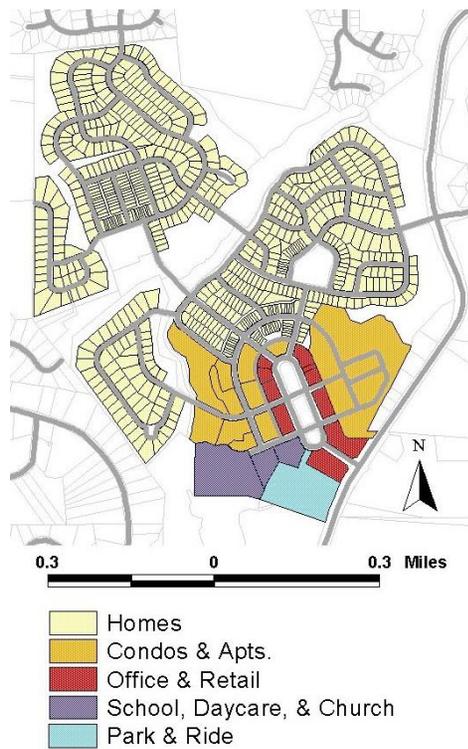
- Late 1990s, greenfield project
- Characteristic new urbanist attributes
 - Physical design
 - Street connectedness; sidewalks
 - Service Alleyways
 - Lot sizes
 - Uses
 - Mixed uses
 - Variety of residential uses

Comparison neighborhoods

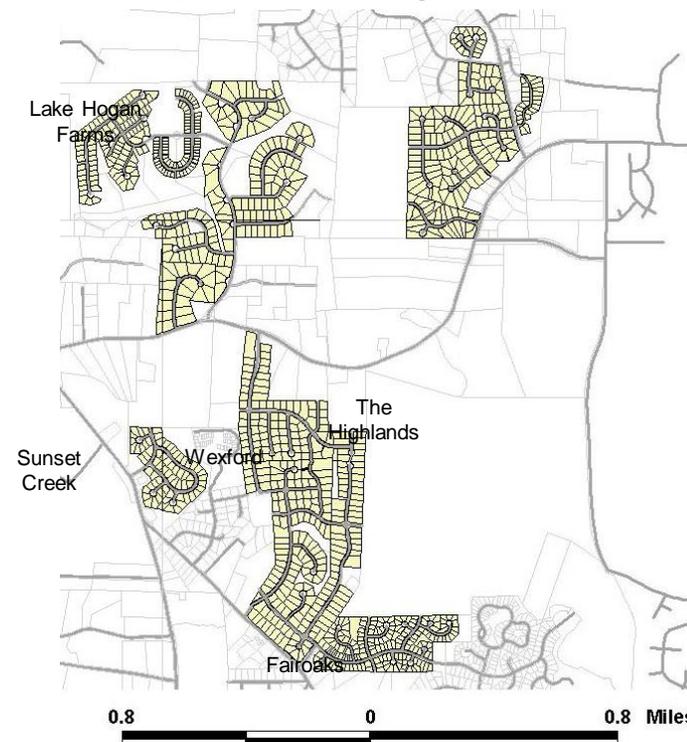
- Accessibility
 - Transit service
- Development attributes
 - Gross tract area
 - Size (housing units)
 - Age
 - Land values
- Function (streets, traffic, walk/bike)
- Safety (lighting, surveillance, crosswalks)
- Aesthetics (setbacks, porches)
- Land use mix
- Facilities (parks, benches, bike parking)

Study neighborhoods

New urbanist



Comparison neighborhoods



Source: Khattak et, 2007

Comparison —study areas

	New urbanist	Conventional suburban
Average assessed housing value*	\$301,787	\$303,357
Average resident age (US 2000 Census)	33	31
Gross housing density (units/acre)	2.15	1.59
Net single-family dwelling density (units/acre)*	6.12	2.61
Street layout and connectivity		
Connectedness (# of 3 or 4-way intersections/area)	0.248	0.108
Number of cul-de-sacs or dead ends	2	56
Average block face length (ft)	2,080	5,648
Median block face length (ft)	1,209	3,419
Mixed land uses		
Commercial space (square ft)**	>200,000	0
Jobs in neighborhood**	430	0

What we measured

■ Survey contents

- Socio-demographics
- Travel patterns (trips taken, duration, length, travel mode)
- Attitudes and preferences for environment
- Physical activity (BRFSS 2001 module)
 - Location (at home, in the neighborhood but not at home, or outside of the neighborhood)

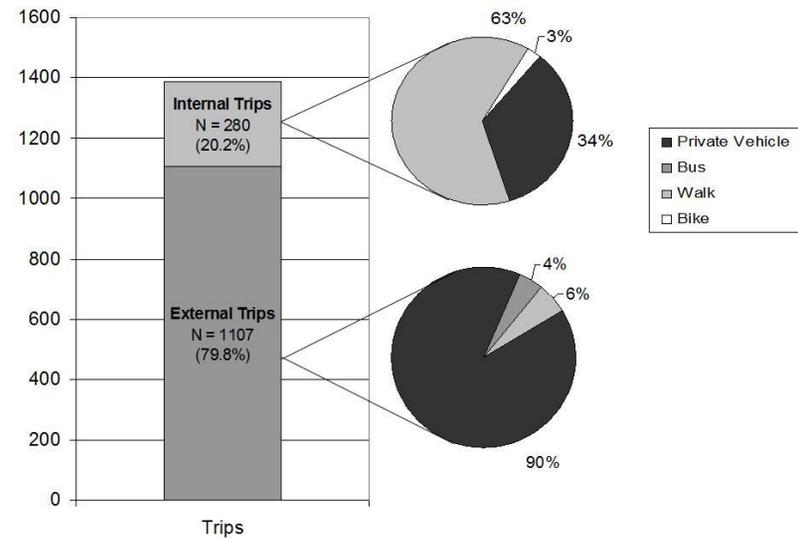
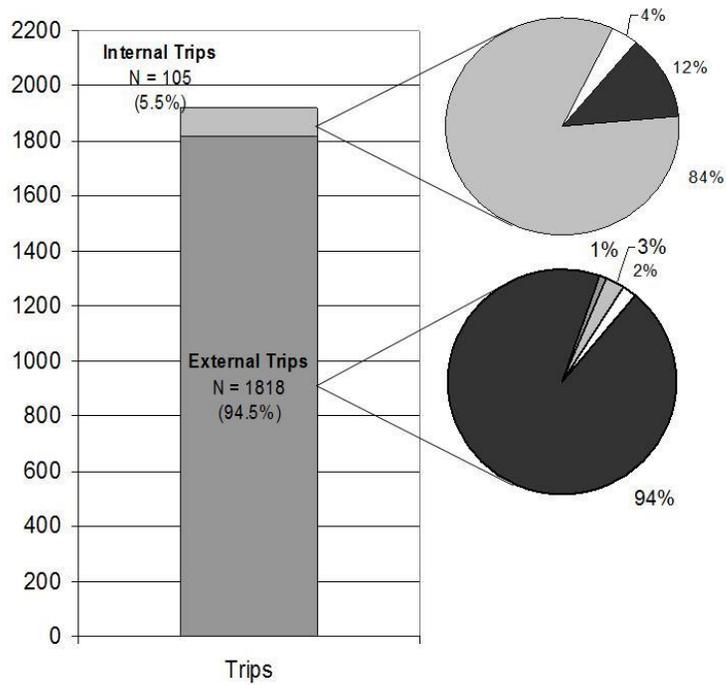
Outcomes

- PA responses
 - Total MVPA time
 - Meet-not meet PA recommendations
 - Meet-insufficient-inactive
 - The above by location
- Travel diary
 - Frequency of PA trips
 - Duration of PA trips

Results

- No statistically significant differences in PA between neighborhoods
 - Differences in where PA occurs
 - For new urbanist heads of household, in-neighborhood
 - For conventional neighborhood heads, within home

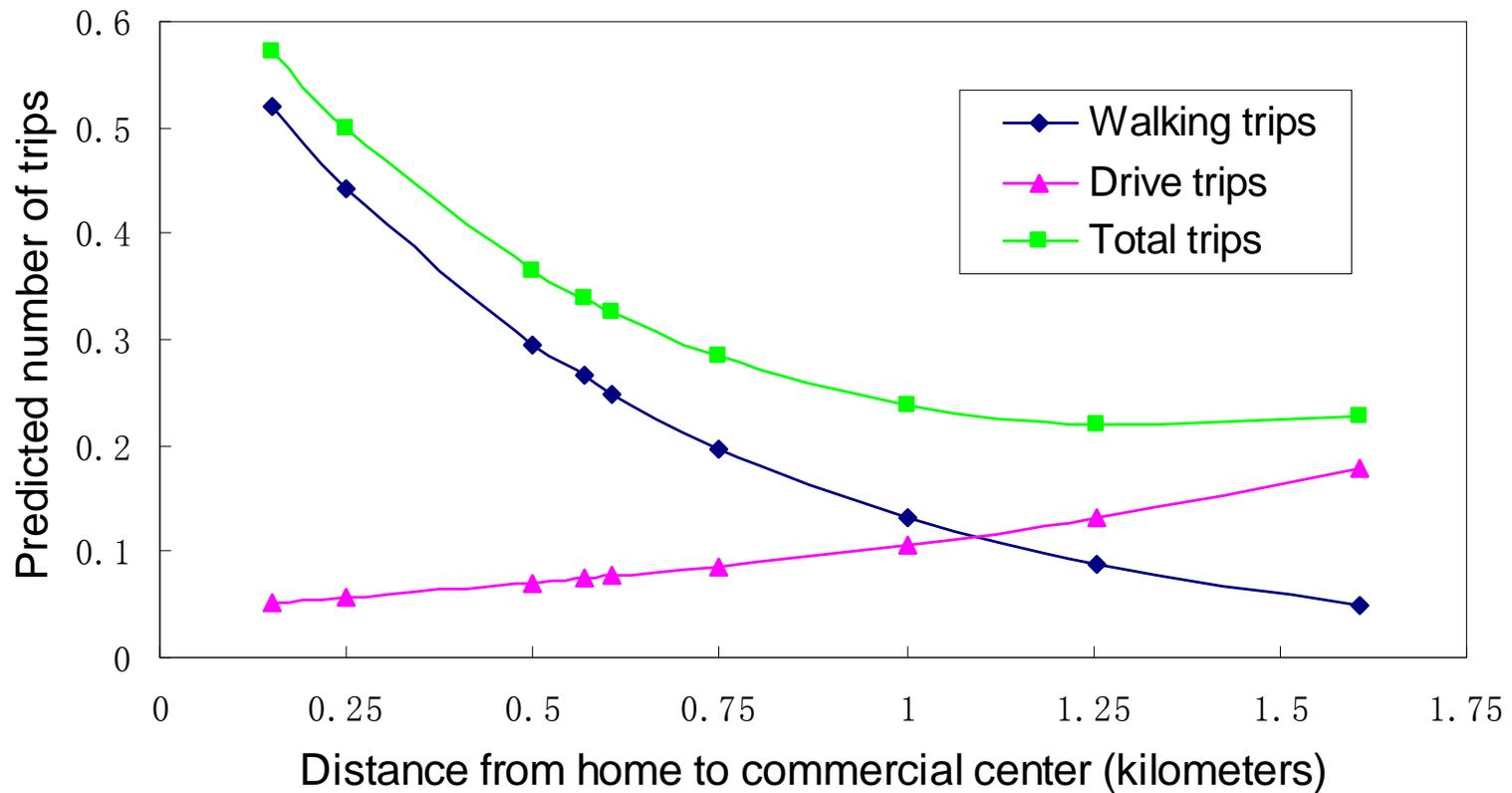
Results



Discussion

- Trip diary provides additional insights
 - More, and longer-duration, utilitarian PA trips in new urbanist
 - No differences in number or duration of recreational trips
- Results consistent
 - When data for all household members are used
 - For multi-family residents
- Overall location matters most!

Walking to commercial center



Source: Shay, 2009

Blue Ridge Corridor HIA

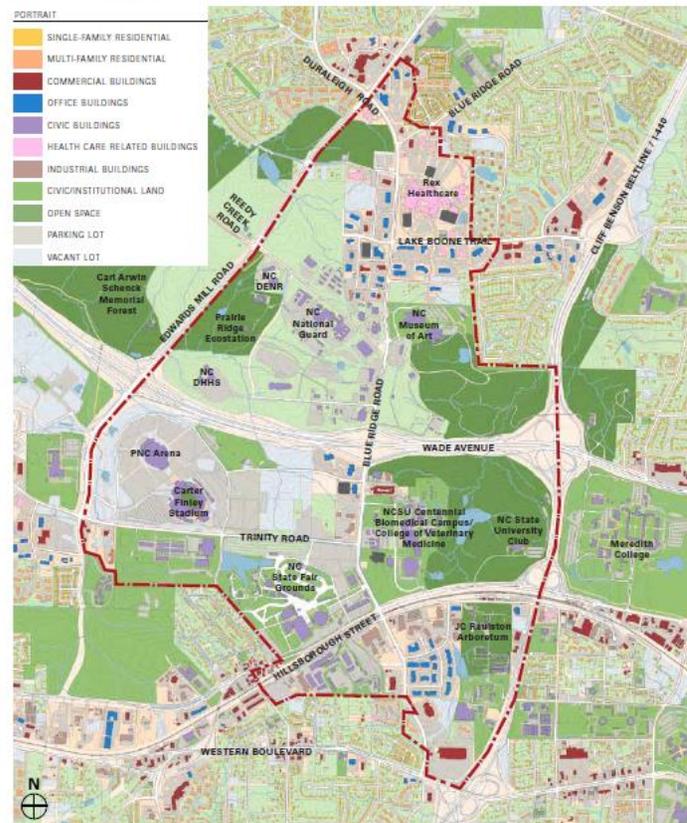


Source: Google maps

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Blue Ridge Corridor HIA

EXISTING CONDITIONS

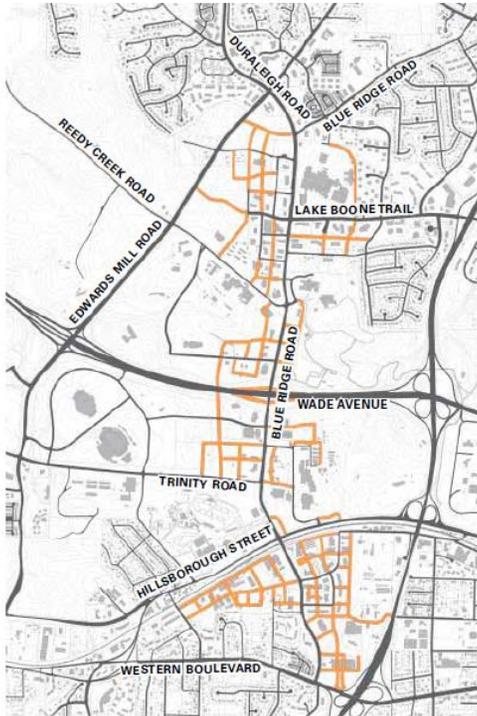


Source: Blue Ridge Road District Study, 2012

Conditions

- Congestion at major intersections
- Lack of sidewalks, crosswalks, bike lanes
- Lack of bus services /transit
- State land uses (> 70%)
 - NCDOT Motor Fleet Management Division garage, vehicle yard
- Aesthetics and streetscaping missing

Districts



Source: UDA, 2012



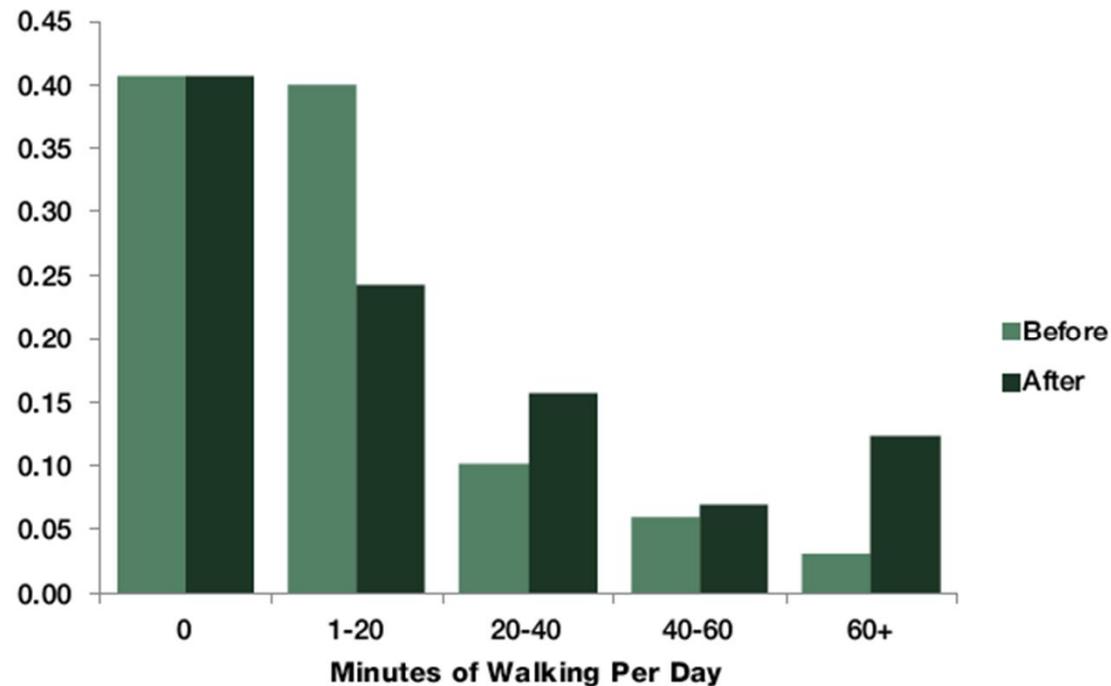
Proposed Blue Ridge Road Along the Arts District
Blue Ridge Road District Study

Theme 5: Create Distinct Districts



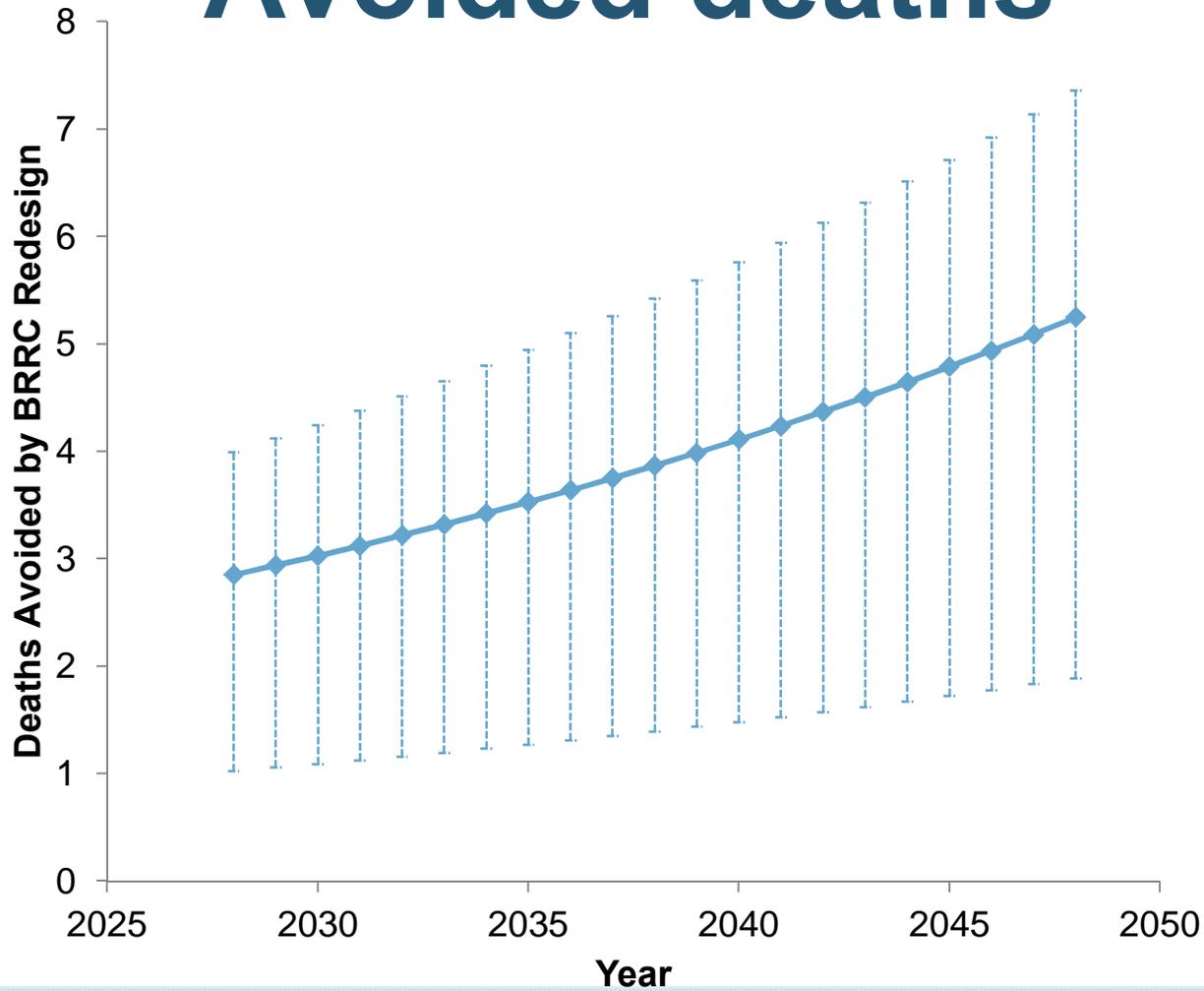
Design Principles
Blue Ridge Road District Study

Health impact assessment



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Avoided deaths



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Outline

- Obesity and physical activity, national and state
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- What planning can do
- The %package+of walkability
- **Incorporating health into planning decisions**

Safety

- As the number of cyclists and walkers increase, crash risk decreases
 - Doubling cyclists decreases personal risk by 66% (Elvik, 2009; Jacobsen, 2003)
 - Reproduced at intersection, city, and national levels

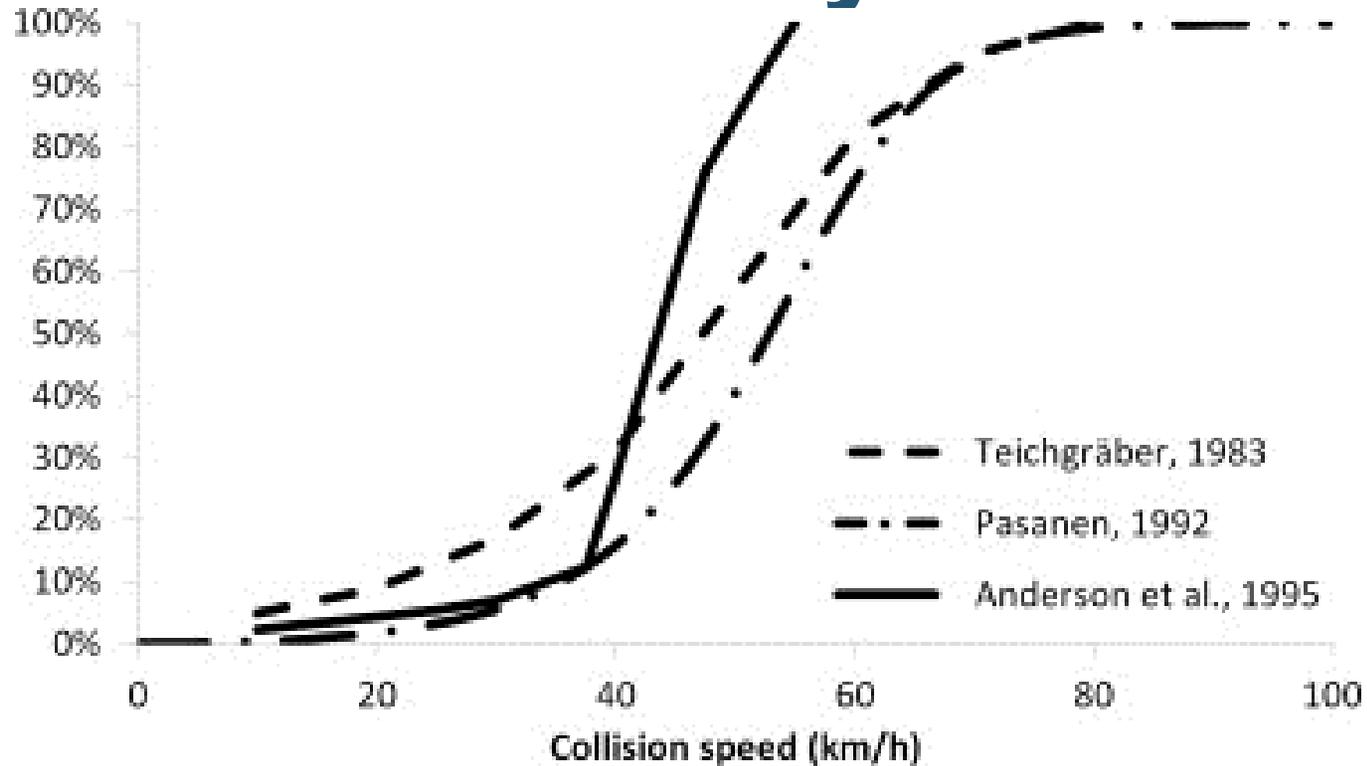


Source: Burden, Dan. (May 26, 2009). Image Library. In *Pedestrian and Bicycle Information Center*.



Source: Payton_Chung. (September 4, 2007) Bicycle boulevard 1. In *Flickr*.

Safety



Höskuldur R.G. Kröyer , Thomas Jonsson , András Várhelyi

Relative fatality risk curve to describe the effect of change in the impact speed on fatality risk of pedestrians struck by a motor vehicle

Accident Analysis & Prevention null 2013 null

<http://dx.doi.org/10.1016/j.aap.2013.09.007>

Air quality

- US vehicle emissions



- Contribute to 70,000 deaths/yr nationwide;
- Contributes to climate change
- Pollute more for shorter trips, on a per-mile basis, than longer trips

Source: AAA, US Census surveys

Land consumption

- Impervious surface cover decreases
 - Heat island
 - Water quality and quantity
- Allows for local greenspace/farmland preservation
- Mental health implications

Personal financial benefits

■ Personal finance

- The cost of operating a sedan for one year is approximately \$7,834
- Ownership of one motor vehicle accounts for more than 18 percent of a typical household's income
- Non-motorized transportation is affordable

Source: AAA, US Census surveys

Social justice: transportation

- Non-motorized transportation options provide choice, especially for lower income households
 - Households with an annual income of less than \$25,000 are nine times more likely to have no car than households with incomes of greater than \$25,000
- While 12 % of population is African-American, they make up 20 % of pedestrian fatalities

Source: NHTS 2001; Pucher and Renne

In conclusion

- Consistent evidence emerging about importance of built environment for health
- Transportation plays a role in providing opportunities or barriers for activity
 - Work remains on equity matters
- Bridging multiple actors
 - Health, schools, transportation, community design, parks and recreation, environment, community and economic development, social justice

Acknowledgements

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- Blue Cross Blue Shield Foundation of NC
- North Carolina DOT