2014 Active Living Research Conference

Health Impacts of A Walkable Community

Design Research for Active Living

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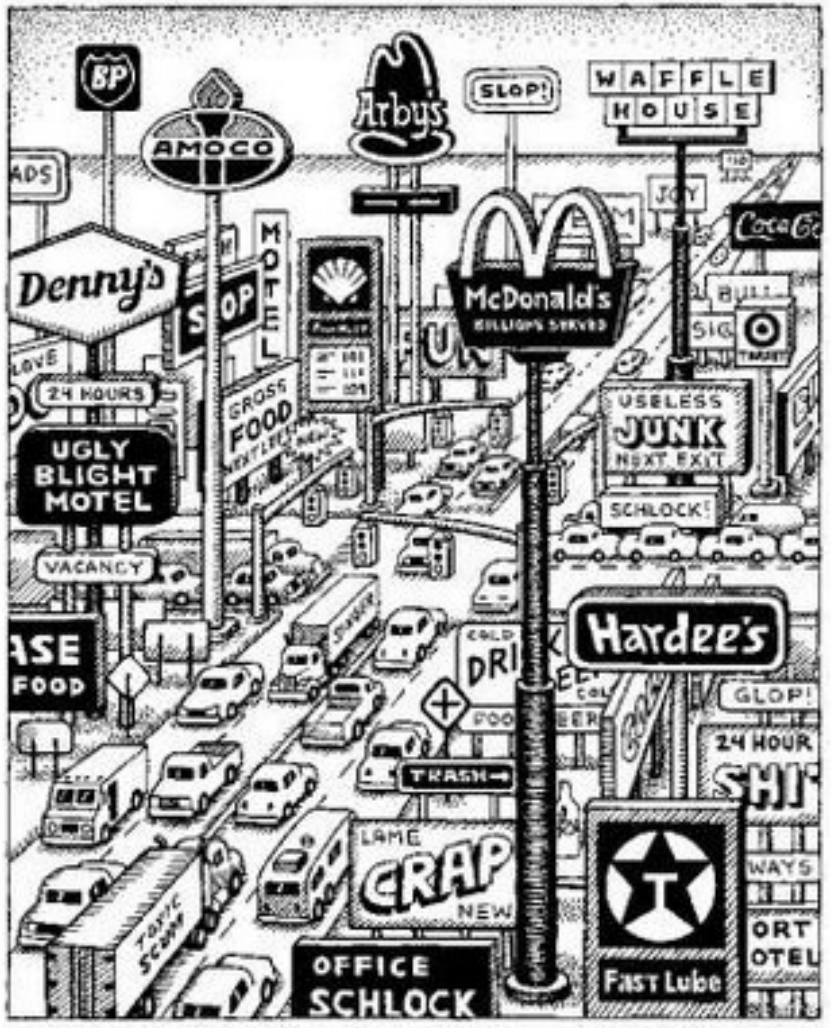
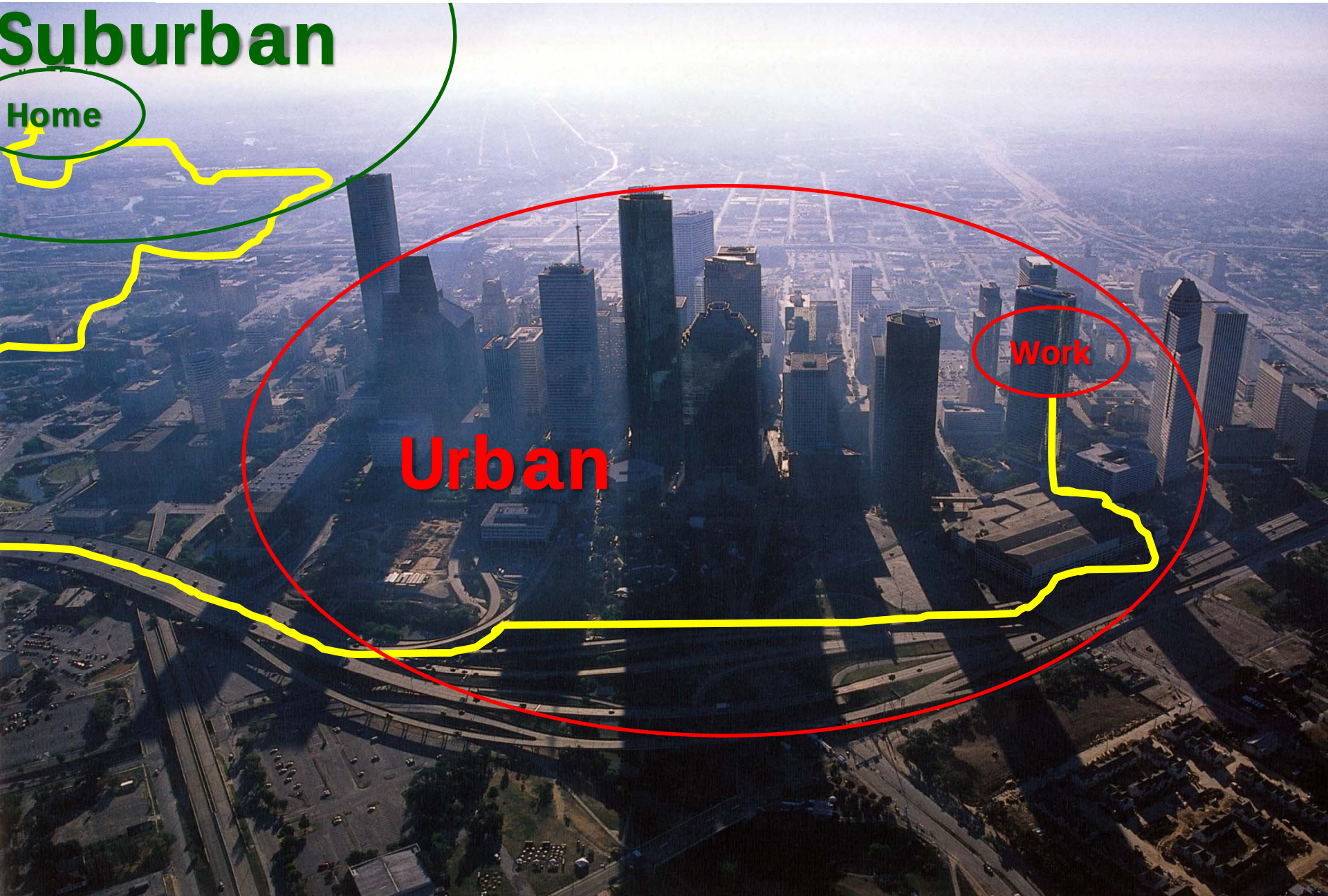
Contents

I INTRODUCTION

- **Dominance of automobile-centered development & corresponding problems**



Houston: We've got a problem!

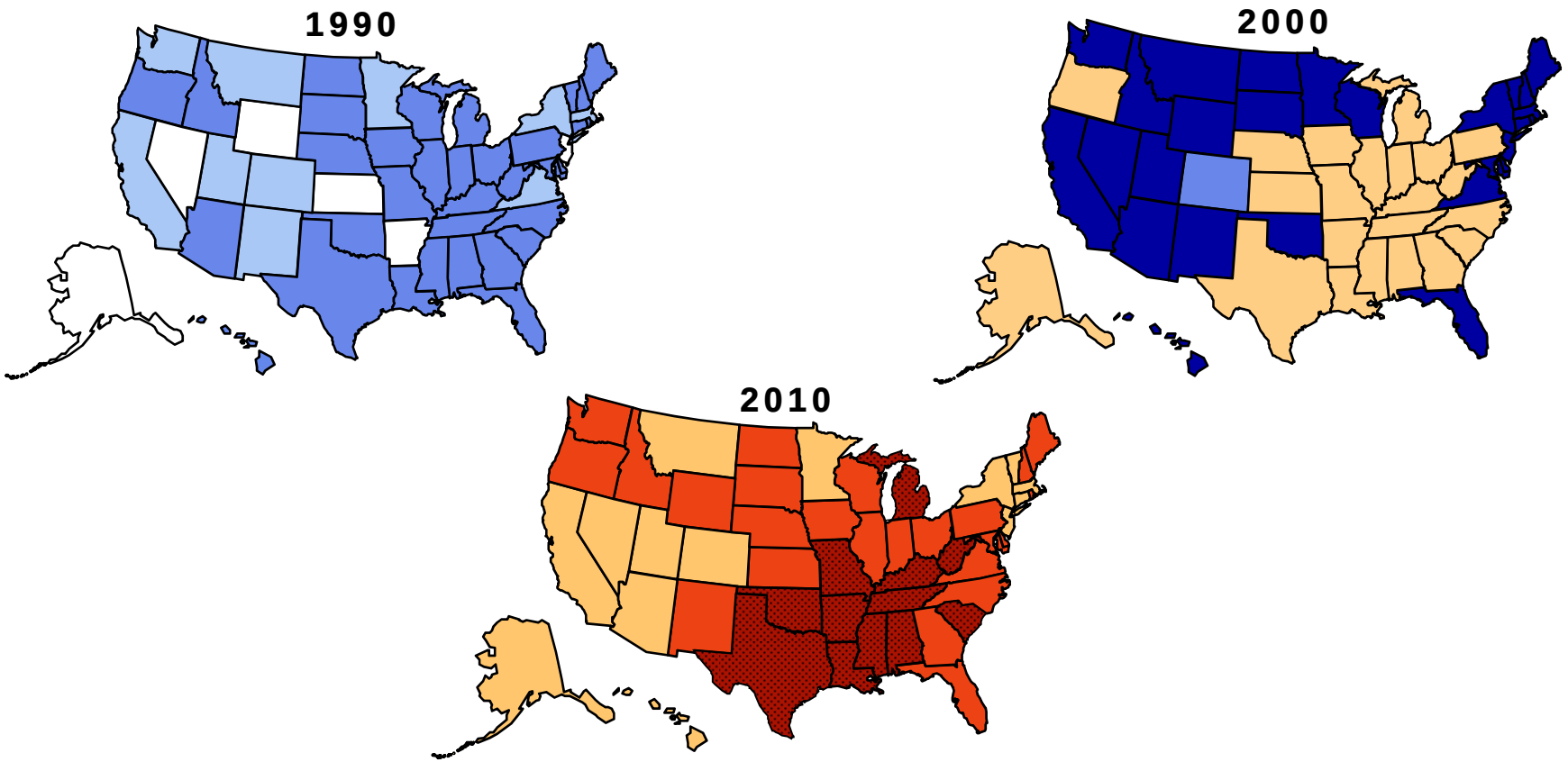


Houston: We've got a problem!

Obesity Trends* Among U.S. Adults

BRFSS, 1990, 2000, 2010

(*BMI ≥30, or about 30 lbs. overweight for 5'4" person)



Source: Behavioral Risk Factor Surveillance System, CDC.

Obesogenics - it's why you're fat

(http://hivehealthmedia.amplify.com/)

http://farrowpartnership.wordpress.com/

➢ New Trends in Design & Planning

- New Urbanism
- Smart growth
- Neo-traditional Development
- LEED-Neighborhood Development
- New York Active Design Guidelines

➢ Walkable community

- Mixed land uses
- Higher density
- Connected street networks with sufficient sidewalks & bike lanes
- Rich physical activity resources
- Other pedestrian-friendly designs

❖ EVIDENCE on Health Impacts of Walkable Communities

- **Physical health: Physical activity & obesity** (Substantial evidence available)
- **Social health: social interaction & neighborhood cohesion** (Limited yet promising evidence)

Mostly cross sectional studies &
Lack of intervention studies

Can DESIGN interventions really improve HEALTH?

II STUDY DESIGN

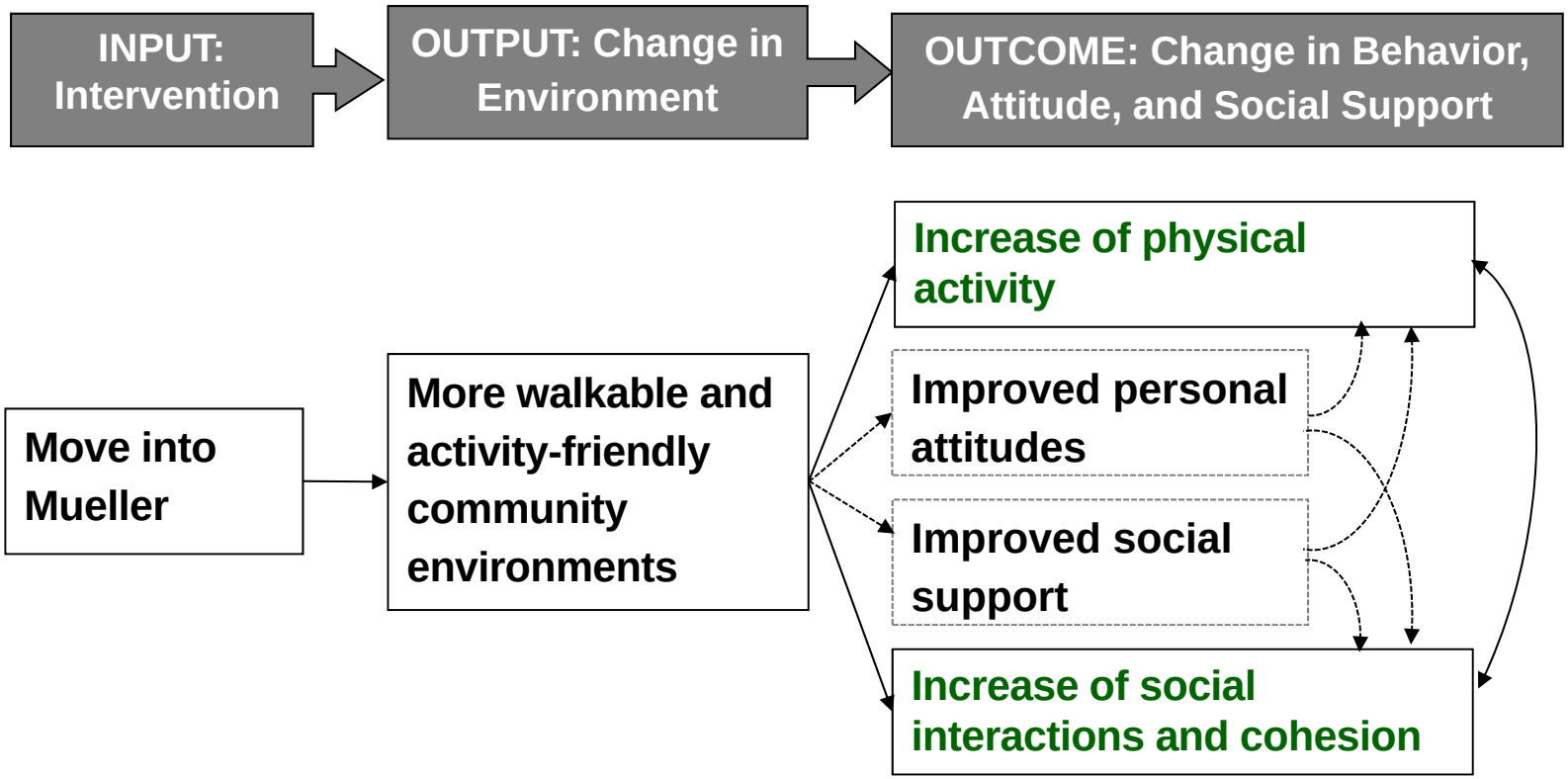
- **Case study of Mueller, Austin, TX** (LEED-ND certified, mixed-use & activity-friendly)
  - Did physical activities, social interactions & neighborhood cohesion increase?
  - If yes, how these behaviors changed in terms of types, locations & frequencies?
  - Did populations at higher risk of obesity have more increases in their physical & social activities?

Source: www.muelleraustin.com


Source: www.muelleraustin.com

❖ Conceptual framework

Mechanisms through which environmental changes influence physical activities, social interactions, & neighborhood cohesion



❖ Study Setting:

Activity-friendly Neighborhood Pattern

High density:
10,000 residents & 10,000 employees in 711 acres.

Mixed land uses:
civic buildings, institutions, offices, businesses, town center, parks, open spaces, and diverse housing within walkable distance

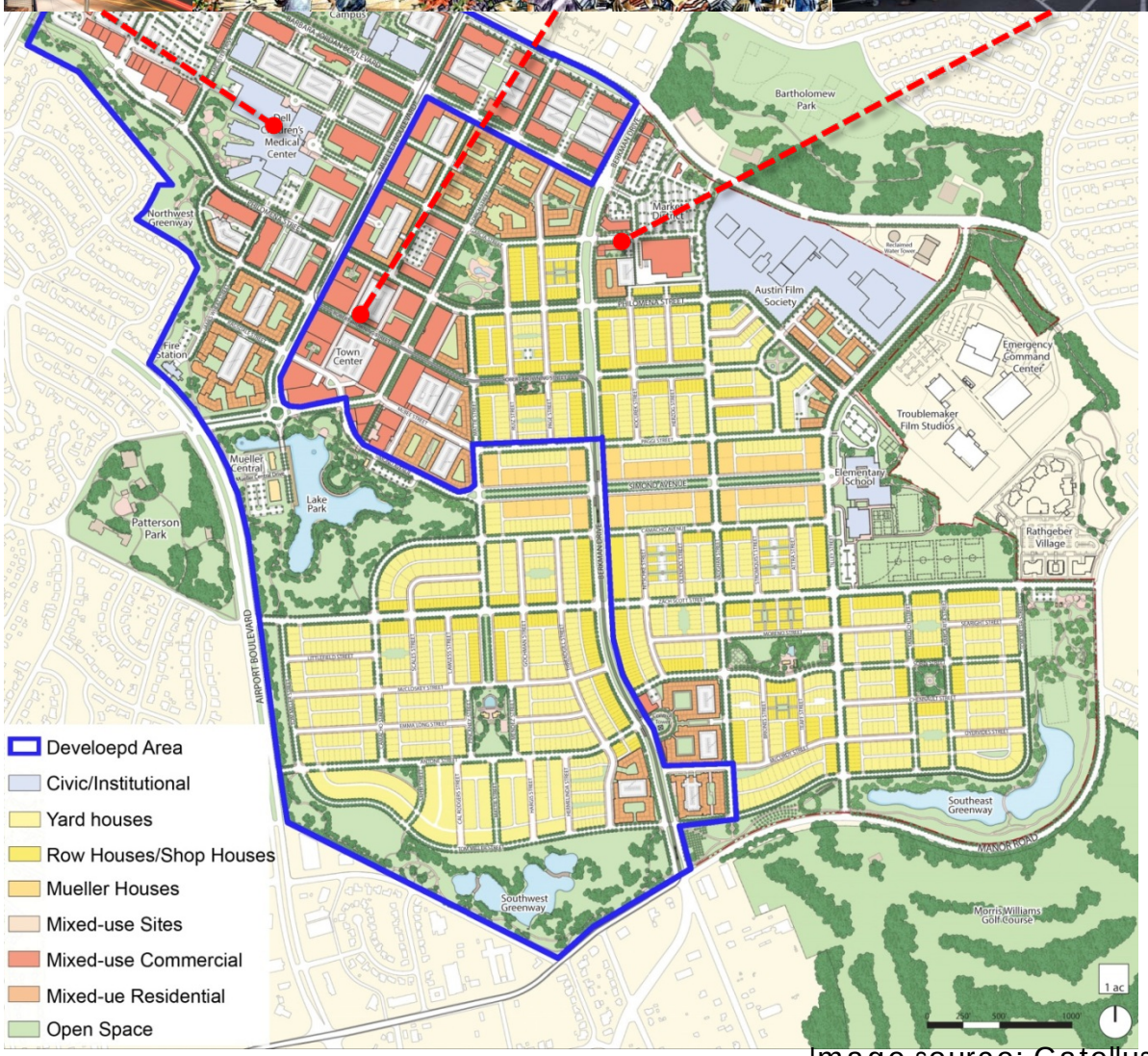


Image source: Catellus

Parks and open space:

- A park system of 140 acres
- 13 miles of hike/bike paths/lanes
- Easily accessible
- Well-connected
- Evenly distributed

Image source: Catellus

Streets:

- Grid-like, well-connected, & hierarchical streets
- Complete sidewalks
- Buffers between sidewalks & streets
- Traffic calming
- Rich greenery
- Good maintenance, visual quality & surveillance

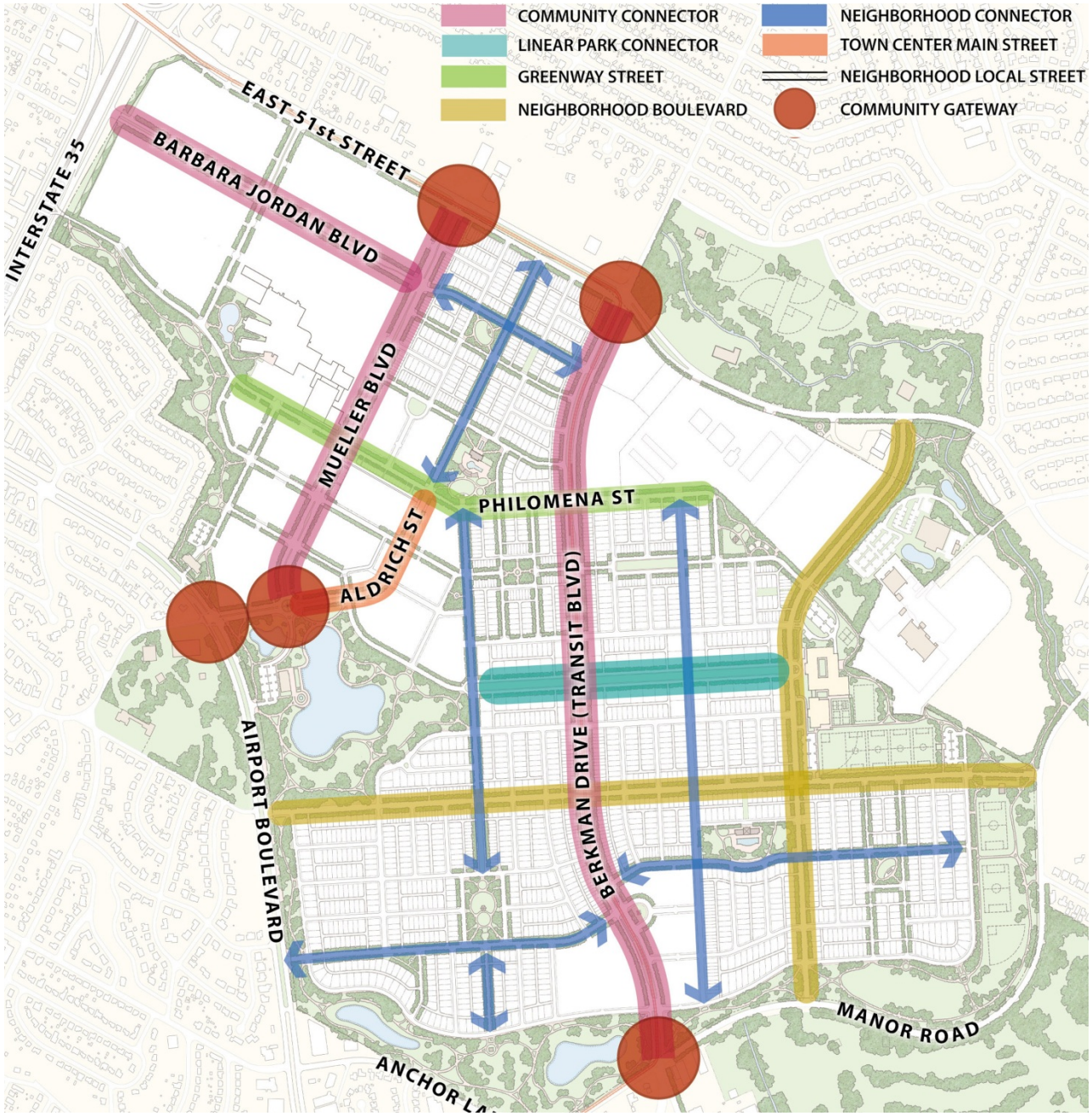


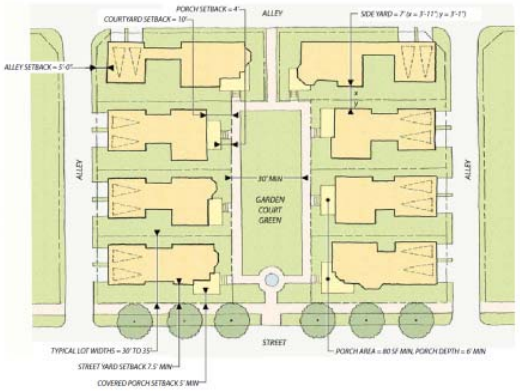
Image source: Catellus

❖ Study Setting: Activity-friendly Housing

Front porches & rear garages; garden courtyards; vertical mixed use (offices/shops at street level & living units above); mixed incomes; etc.

Yard houses

Garden courts



Row houses

Shop houses

Mueller houses

Apartments in mixed-use buildings

Image source: Catellus

❖ Mueller's environment represents a departure from typical community developments in City of Austin

Features	City of Austin Mean (Standard deviation)	Mueller
Population density (persons/acre)	6.8 (3.7)	14
Land use mix	0.45 (0.24) (range: 0-1)	10,000 employees; 100,000 residents; 366,000 square feet of retail space
Street connectivity (intersections/100 acres)	19.7 (11.3)	66
Sidewalk coverage (%)	23.7 (13.7)	Close to 100
Parks & open space coverage (%)	8.9 (9.6)	20 (each household has green space within 600 feet)

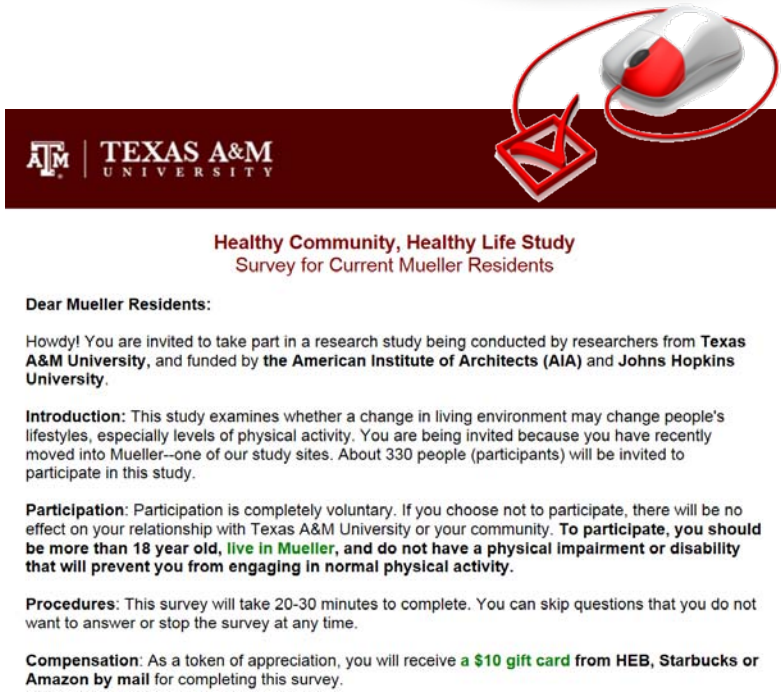
❖ Mueller's Population is representative of the Austin population

Features	City of Austin	Mueller
Hispanic or Latino (of any race)	31.4%	35.1%
White (one race)	68.3%	71.4%
Under the age of 18	22.1%	21.9%
Mean household income	$68,659	$66,923



III METHODS

- **Focus group (n=13):**
  - Content analysis
  - Results used to inform questionnaire development
- **Online survey (n=229) with a pilot test (n=6):**
  - Recruitment: online & mail invitations
  - *T* test to analyze pre-post move differences



IV RESULTS & DISCUSSIONS

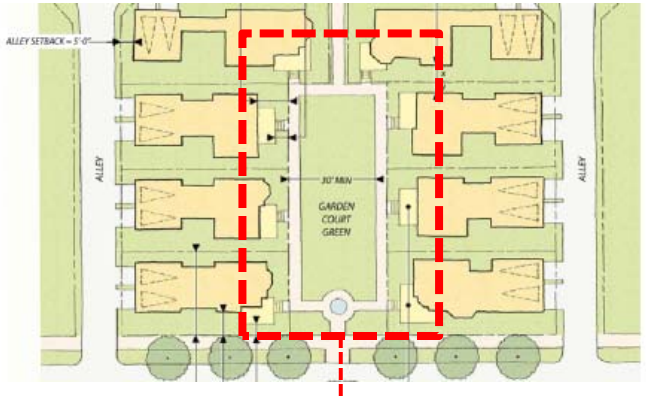
❖ Focus Group Results

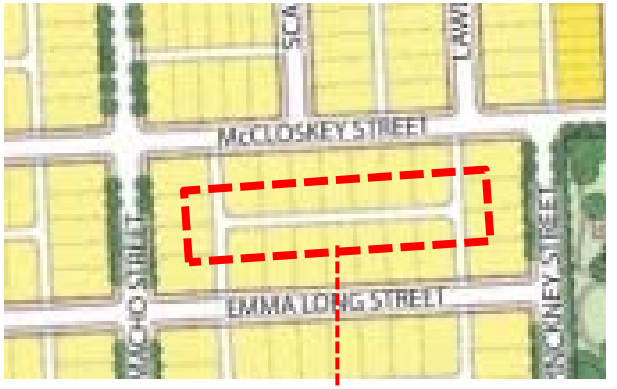
➢ **Physical & social activities increased among most participants.**

- "Walking 2 times more"
- "No driving in Mueller rule"
- "$1,200 saving in gas per year!"
- "Sun city with diversity"

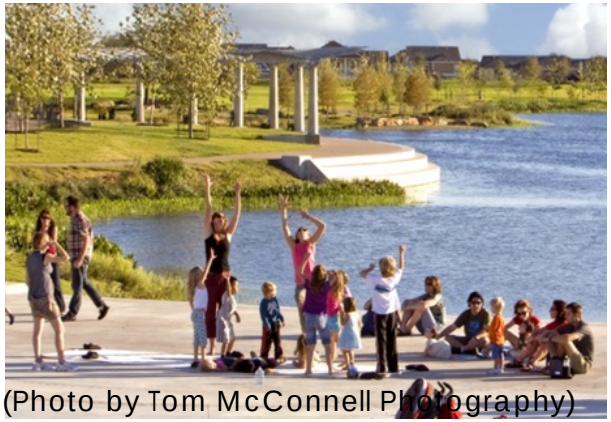
➢ **Supportive environmental features:**
Sidewalks, parks and open spaces, bike routes, diverse destinations, communal facilities (e.g., mailboxes), front porches, and back alleys

Supportive environmental features:



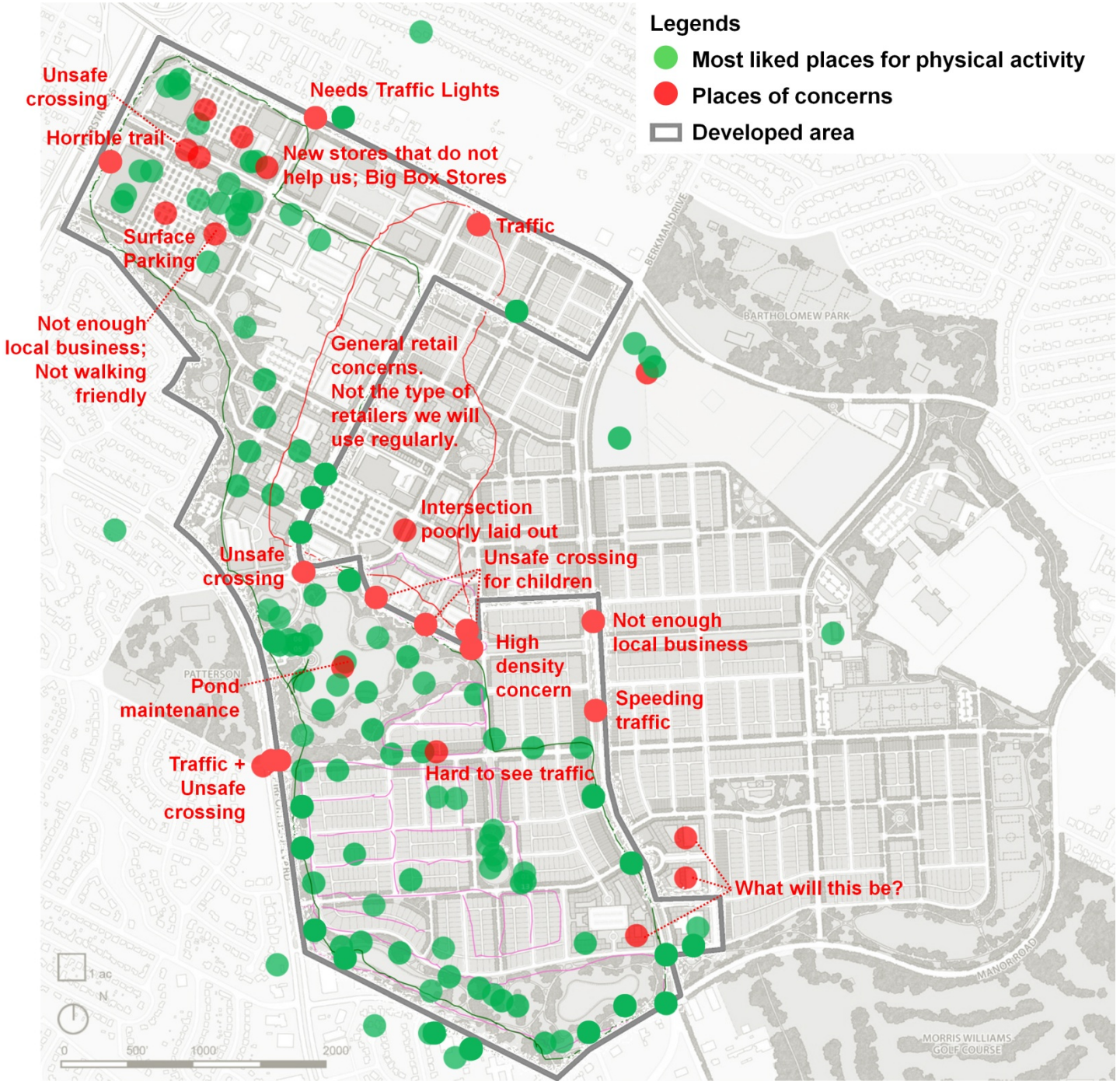


(Photo by Tom McConnell Photography)



(Photo by Tom McConnell Photography)

- **Places of concerns are mostly traffic related.**

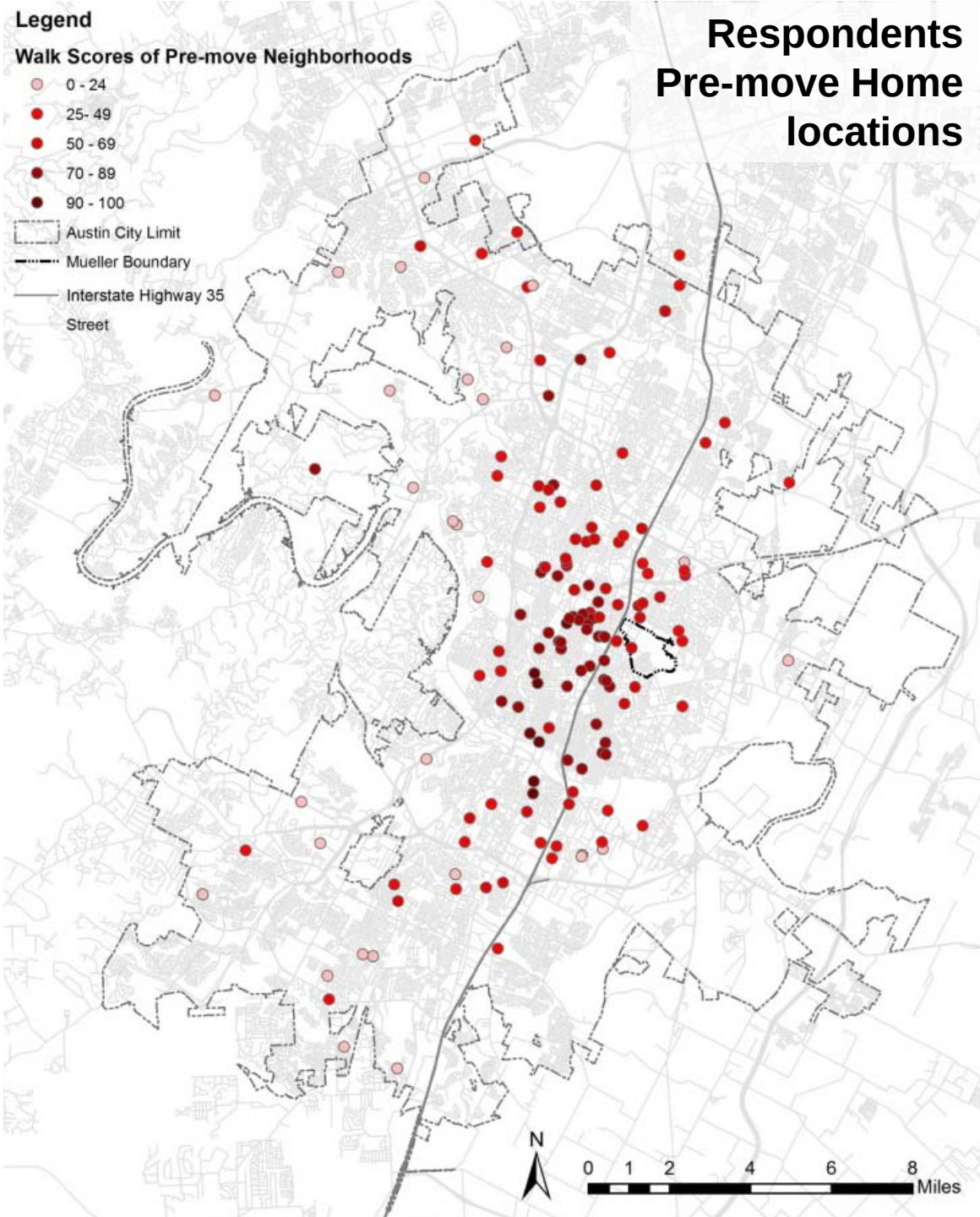


❖ Survey Results

- Total sample (N=229)
  ⇩
- **Sub-sample** (those moving to Mueller from other Austin neighborhood) (N = 167)
  ⇩

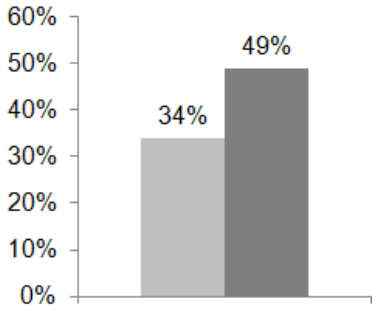
Sub-groups comparison by

- pre-move neighborhood's walk score;
- pre-move PA level



❖ Survey Results: Highlights

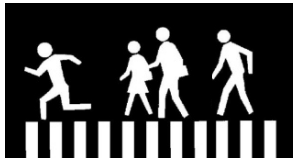
- **Increased physical activities**, with more residents meeting public health guidelines .



- **Reduced travel in a private car.**
- **Increased social interactions & neighborhood cohesion.**

- **High-risk populations (previously inactive or lived in less-walkable neighborhoods)** had more increases in their physical and social activities, compared to their lower-risk counterparts.

❖ Pre-post Differences in Physical Activity & Driving (N=229)

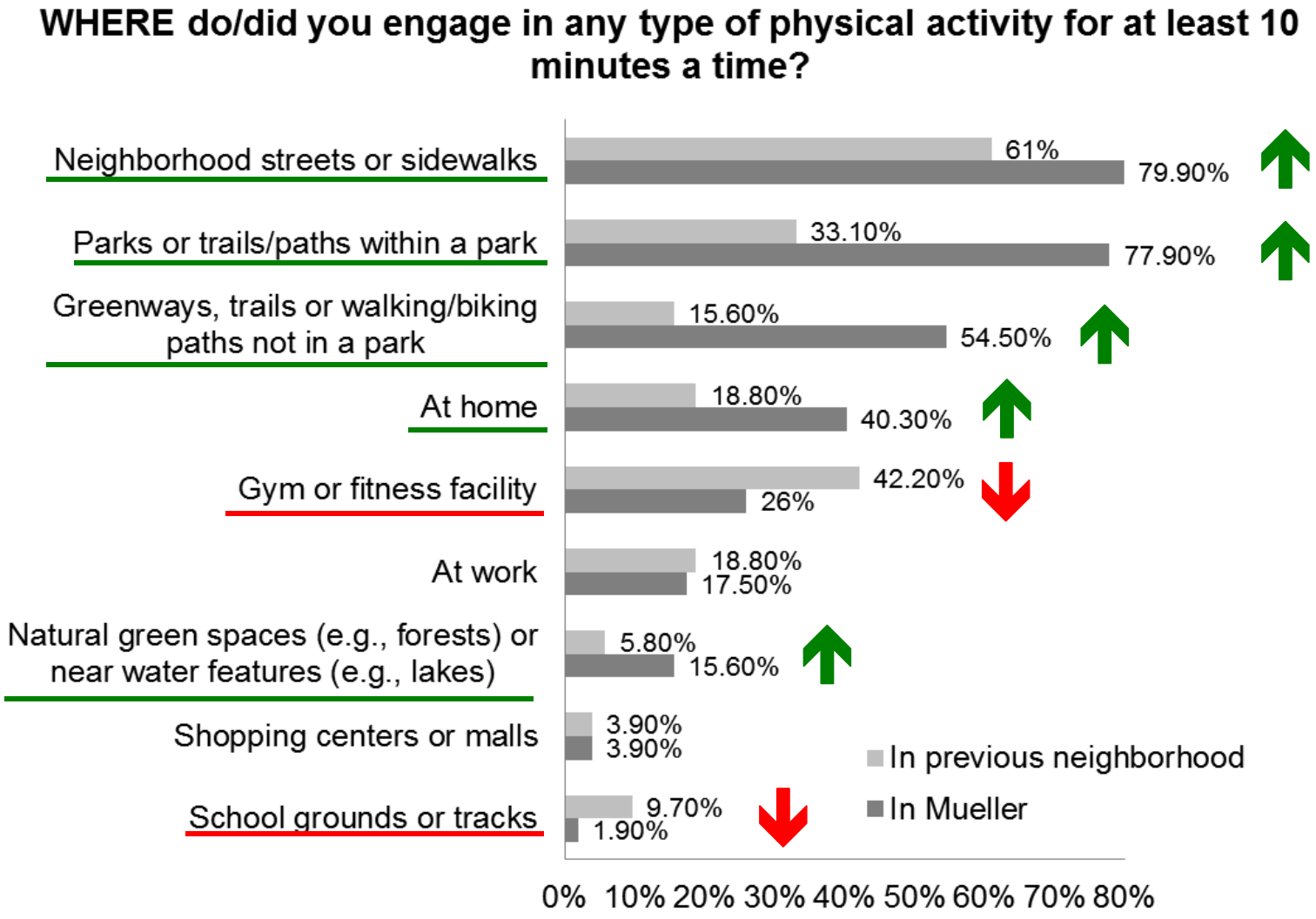


Outcome variables	Post-move Mean (SD)	Pre-move Mean (SD)	Mean difference (post – pre)	
Days with 30+ min. of PA	4.3 (1.7)	3.6 (1.9)	0.7***	days/ week
Total walking	139.5 (114.9)	99.2 (106.3)	40.3***	min./ week
Walking in neighborhood				
Total bicycling				
Time traveling in a private car	179.3 (128.7)	263.5 (193.3)	–84.2***	min./ week

Close to the physical activity level recommended by public health guidelines.

*: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$

➢ Locations of Physical Activity Before & After the move



❖ Pre-post Differences in Social Interactions & Cohesion (N=229)

Outcome variables	Post-move Mean (SD)	Pre-move Mean (SD)	Mean difference (post – pre)	
Social interaction				
Say hello to a neighbor.	20.6 (9.1)	10.8 (9.5)	9.8***	days /month
Stop & talk with a neighbor.	13.1 (9.0)	5.9 (7.5)	7.2***	days/ month
Socialize with a neighbor at your/neighbor's home or somewhere else.	4.9 (5.8)	2.0 (4.3)	2.9***	days/ month
Seek help or advice, borrow things from, or exchange favors with a neighbor.	4.0 (5.1)	1.5 (2.5)	2.5***	days/ month
Neighborhood cohesion				
My neighbors could be counted on to help in case of need.	4.4 (0.9)	2.4 (8.3)	2.0**	out of 5
My neighborhood is a close-knit neighborhood.	4.3 (0.9)	1.0 (11.6)	3.3**	out of 5

*: p<0.05; **: p<0.01: ***: p<0.001.

T test results for pre-post differences in physical activities

Variables	Mean pre-post differences (Post-move value – pre-move value) for survey respondents moving to Mueller from Austin					
	Full sample (N=167)	Subgroups by pre-move neighborhood's walkabiltiy			Subgroups by pre-move PA	
		High (N=35)	Medium (N=72)	Low (N=42)	Inactive (N=116)	Active (N=51)
Physical activities						
Days/week with 30+ minutes of physical activities	0.7***	0.0	0.8**	1.0***	1.3***	-0.8**
Bicycling (minutes/week)	16.0***	4.1	12.8**	28.0**	18.4***	10.3
Walking (minutes/week)	40.3***	22.3	39.9**	48.3**	54.1***	8.2
Walking in community (minutes/week)	42.2***	5.7	49.4***	57.1**	54.9***	12.7
Traveling in private car (minutes/week)	-68.6***	-3.6	-65.9**	-83.3**	-87.4***	-28.0

***: $p < 0.001$; **: $0.001 < p < 0.01$; *: $0.01 < p < 0.05$

T test results for pre-post differences in social activities & neighborhood cohesion

Variables	Mean pre-post differences (Post-move value – pre-move value) for survey respondents moving to Mueller from Austin					
	Full sample (N=167)	Subgroups by pre-move neighborhood's walkability[b]			Subgroups by pre-move PA	
		High (N=35)	Medium (N=72)	Low (N=42)	Inactive (N=116)	Active (N=51)
Social interactions (days/month)						
Say hello to neighbors	10.3***	8.7***	11.4***	10.0***	11.1***	8.3***
Stop and talk to neighbors	7.8***	6.6***	8.5***	7.1***	8.0***	7.5***
Socialize with neighbors	2.8***	3.1*	2.7***	3.1***	2.6***	3.2***
Seek help from and exchange favor with neighbors	2.6***	2.7*	2.8***	2.7***	2.8***	2.1**
Neighborhood cohesion (5-pt scale)						
Neighbors can be counted to help in case of need.	1.5***	1.3***	1.6***	1.6***	1.7***	1.2***
This is a close-knit neighborhood.	2.6***	1.5***	2.1***	4.4	2.1***	3.6

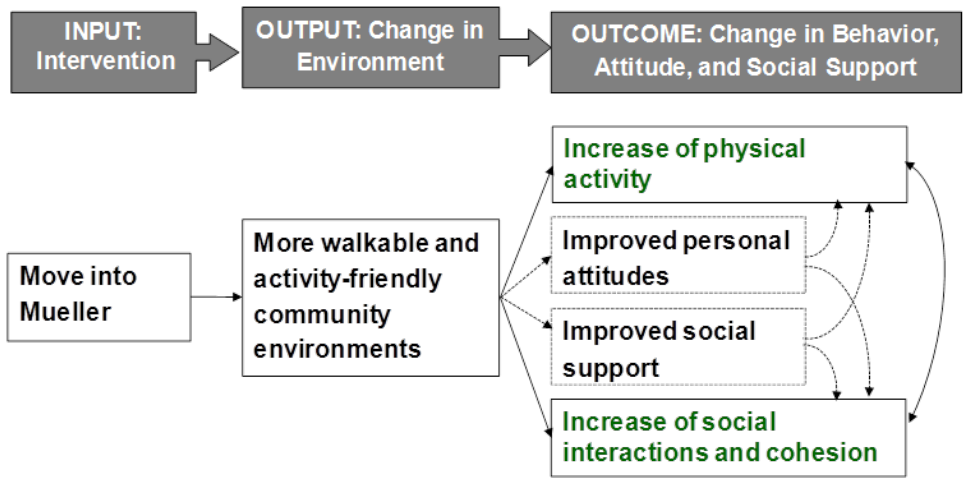
***: $p < 0.001$; **: $0.001 < p < 0.01$; *: $0.01 < p < 0.05$

❖ Limitations:

- ➢ Small & somewhat biased sample
- ➢ Potential recall errors
- ➢ Self-selection issue
- ➢ Did not control for confounding factors

❖ Next step:

- ➢ SEM to test the full model & understand impacts of specific design elements



❖Discussion

- **Evidence for the health impacts** of providing walkable communities on promoting residents' physical activities, social interactions, & neighborhood cohesion.
- Such health impacts should be considered in the **policy making** process.

Thank you! Questions?

Design Research for Active Living
TEXAS A&M UNIVERSITY

Acknowledgement:

- This project is supported by the Decade of Design Grant from the American Institute of Architects (AIA) and the Clinton Global Initiative.
- The authors thank Mueller's residents, designers and developers, and City of Austin's staff for their support.

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