Neighborhood Factors and Physical Activity in African American Public Housing Residents

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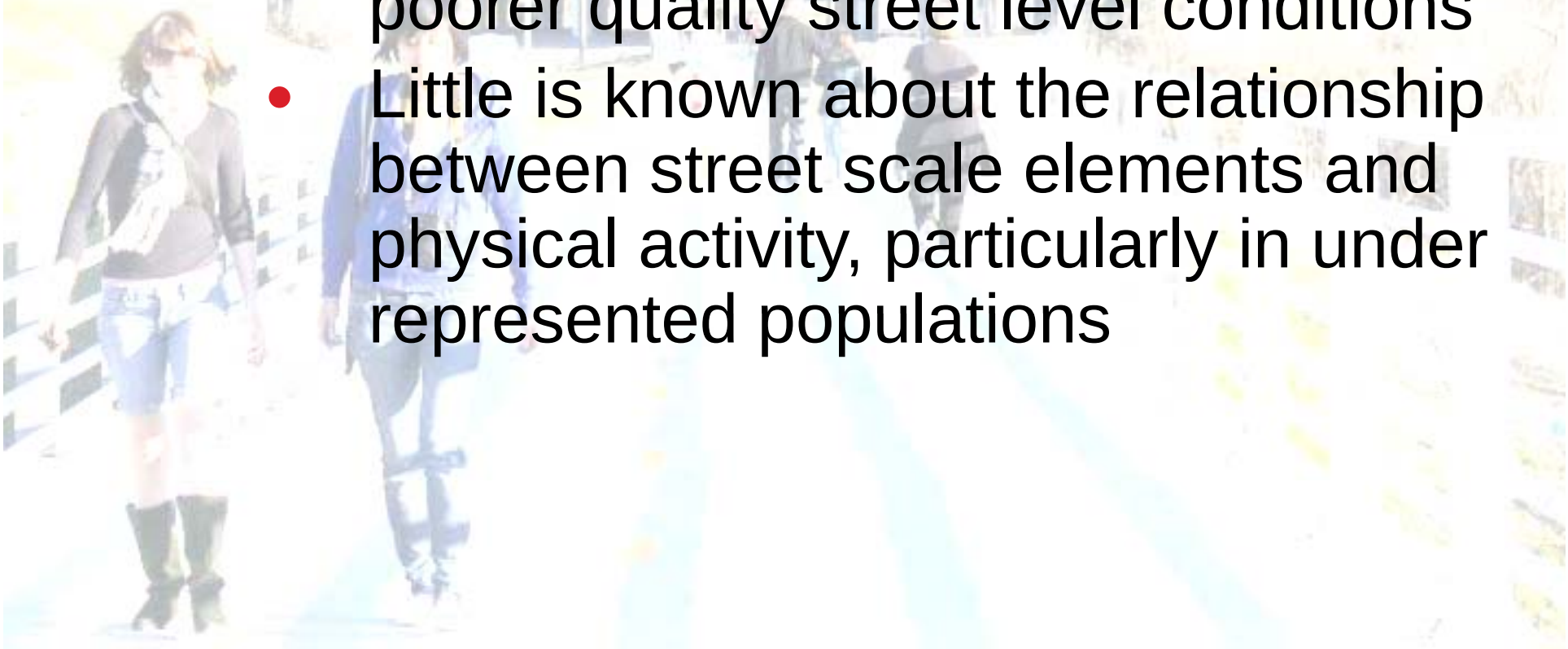
Background

- Physical activity often done on neighborhood streets
- Lower SES neighborhoods may have poorer quality street level conditions
- Little is known about the relationship between street scale elements and physical activity, particularly in under represented populations



Purpose

- To investigate the relationships between street scale, pedestrian features and physical activity among African American residents of low income public housing developments in Houston.

Physical activity opportunities in low socioeconomic status neighbourhoods

Increased availability of neighbourhood physical activity resources can help to promote physical activity among residents, even in very low socioeconomic status neighbourhoods.[1] Residents of low-income, government subsidised, public housing have extremely low rates of physical activity and high rates of obesity, in part driven by lack of neighbourhood physical activity resources.[2–4] Federal and State Policies governing features and amenities in public housing developments themselves can help to ameliorate this situation.[5] Contrasted here are one public housing development in a lower income neighbourhood (top; median household income = $9766) with frequently used physical activity resources located on the housing development property and one public housing development in a higher income neighbourhood (bottom; median household income = $70 833) with no physical activity resources on the property. Despite location in a much lower socioeconomic status neighbourhood, physical activity resources and opportunities for residents are significantly better compared to those in the higher socioeconomic status neighbourhood.

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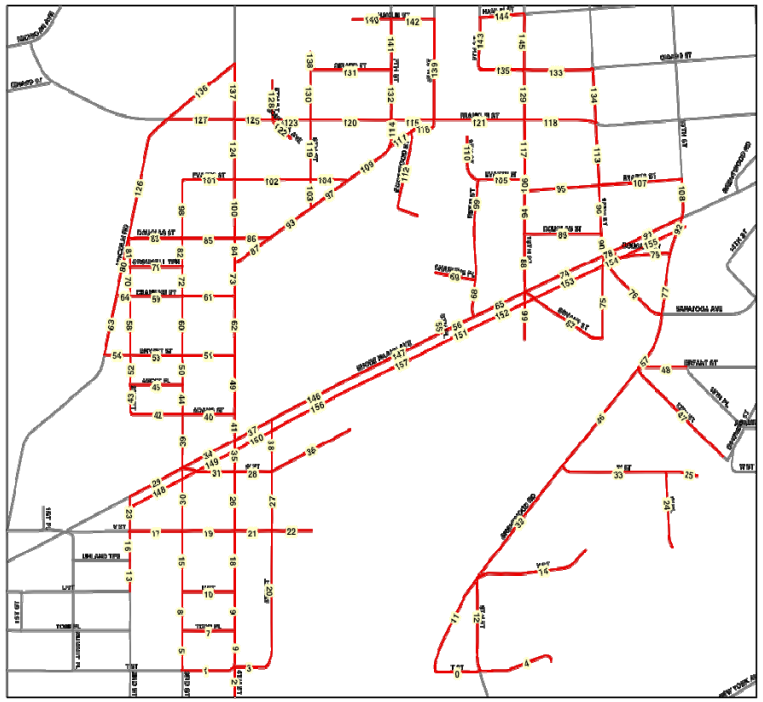
Figure 1 Physical activity resources in public housing in lowe neighbourhoods (top) and higher SES neighbourhoods (bottom).

Lee RE, Mama SK, Banda JA, Bryant LG, McAlexander KP. Physical Activity Opportunities in low Socioeconomic Status Neighborhoods. *Journal of Epidemiology and Community Health*; 2009; 63:1021

Neighborhood Assessments

- Every street segment (*N*=2,093) was assessed using the Pedestrian Environment Data Scan (PEDS; Clifton et al).



Assessor Name: _____ Date: _____ Time: _____

Participant ID : _____ Street segment ID: _____ Weather: _____

PEDS

0. Segment type
Low volume road 1
High volume road 2
Bike or Ped path - skip section C 3

A. Environment

1. Uses in Segment *(all that apply)*
Housing - Single Family Detached 1
Housing - Multi-Family 2
Housing - Mobile Homes 3
Office/Institutional 4
Restaurant/Café/Commercial 5
Industrial 6
Vacant/Undeveloped 7
Recreation 8
Surface parking lot 9
School 10
Areas of worship 11

2. Slope
Flat 1
Slight hill 2
Steep hill 3

3. Segment Intersections
Dead ends 1
Segment continues 2
Road ends, path continues 3

B. Pedestrian Facility *(skip if none present)*

4. Type(s) of pedestrian facility *(all that apply)*
Footpath (worn dirt path) 1
Paved Trail 2
Sidewalk 3
Pedestrian Street (closed to cars) 4
None (skip to section C) 5

The rest of the questions in section B refer to the best pedestrian facility selected above.

5. Path material *(all that apply)*
Asphalt 1
Concrete 2
Paving Bricks or Flat Stone 3
Gravel 4
Dirt or Sand 5

6. Path condition/maintenance
Poor (many bumps/cracks/holes) 1
Fair (some bumps/cracks/holes) 2
Good (very few bumps/cracks/holes) 3
Under Repair 4

7. Path obstructions *(all that apply)*
Poles or Signs 1
Parked Cars 2
Trees 3
Garbage Cans 4
Other 5
None 6

8. Buffers between road and path *(all that apply)*
Fence 1
Trees 2
Hedges 3
Landscape 4
Grass 5
None 6

9. Path Distance from Curb
At edge 1
< 5 feet 2
> 5 feet 3

10. Path Width
< 4 feet 1
Between 4 and 8 feet 2
> 8 feet 3

If no sidewalk,skip now to section C.

11. Curb cuts
None 1
1 to 4 2
> 4 3

12. Path completeness/continuity
Path is complete 1
Path is incomplete 2

13. Path connectivity to otherpaths
number of connections ____ 1

C. Road Attributes *(skip if no road is present/path only)*

14. Condition of road
Poor (many bumps/cracks/holes) 1
Fair (some bumps/cracks/holes) 2
Good (very few bumps/cracks/holes) 3
Under Repair 4

15. Number of travel lanes ____ 1

16. Posted regular speed limit
None posted 1
(mph): ____ 1

17. On-Street parking *(if pavement is unmarked and no cars are parked, look for no parking signs to verify 'none')*
Parallel 1
Diagonal 2
None 3

18. Off-street parking lot spaces

0-5	6-25	26+
1	2	3

19. Must you walk through a parking lot to get to most buildings?
Yes 1
No 2

20. Presence of med-hi volume driveways
< 2 1
2 to 4 2
> 4 3

21. Traffic control devices *(all that apply)*
Traffic light 1
Stop sign 2
Traffic circle 3
Speed humps/bumps 4
Mid-block island/chicanes/chokers 5
None 6

22. Crosswalks
None 1
1 to 2 2
3 to 4 3
> 4 4

23. Crossing Aids *(all that apply)*
Yield to Ped Paddles 1
Pedestrian Signal 2
Median/Traffic Island 3
Curb Extension 4
Overpass/Underpass 5
Pedestrian Crossing Warning Sign 6
Flashing Warning Light 7
Share the road warning sign 8
None

24. Bicycle facilities *(all that apply)*
Bicycle route signs 1
Striped bicycle lane designation 2
Visible bicycle parking facilities 3
Bicycle crossing warning 4
No bicycle facilities 5

D. Walking/Cycling Environment

25. Roadway/path lighting
Road-oriented lighting 1
Pedestrian-scale lighting 2
Other lighting 3
No lighting 4

26. Amenities *(all that apply)*
Public garbage cans 1
Benches 2
Water fountain 3
Street vendors/vending machines 4
No amenities 5

27. Check if any wayfinding aids present
No 1
Yes 2

28. Number of trees shading walking area
None 1
Some 2
Many/Dense 3

29. Degree of enclosure
No enclosure 1
Some enclosure 2
Highly enclosed 3

30. Powerlines along segment?
Low Voltage/Distribution Line 1
High Voltage/Transmission Line 2
None 3

31. Overall street cleanliness & building maintenance
Poor (much litter/graffiti/broken facilities) 1
Fair (some litter/graffiti/broken facilities) 2
Good (no litter/graffiti/broken facilities) 3

32. Articulation in building designs
No buildings 0
Little or no articulation 1
Some articulation 2
Highly articulated 3

33. Building setbacks from path
No path 0
At edge of path 1
Within 20 feet of path 2
More than 20 feet from path 3

34. Building height (all that apply)
No buildings 0
1 story 1
2-5 stories 2
> 5 stories 3

35. Bus stops
Bus stop with shelter 1
Bus stop with bench 2
Bus stop with signage only 3
No bus stop 4

Subjective Assessment: Segment...
1=Strongly Agree 2= Agree,
3=Disagree, 4=Strongly Disagree
.....is attractive for walking. ____ 1
.....is attractive for cycling. ____ 1
.....feels safe for walking. ____ 1
.....feels safe for cycling. ____ 1

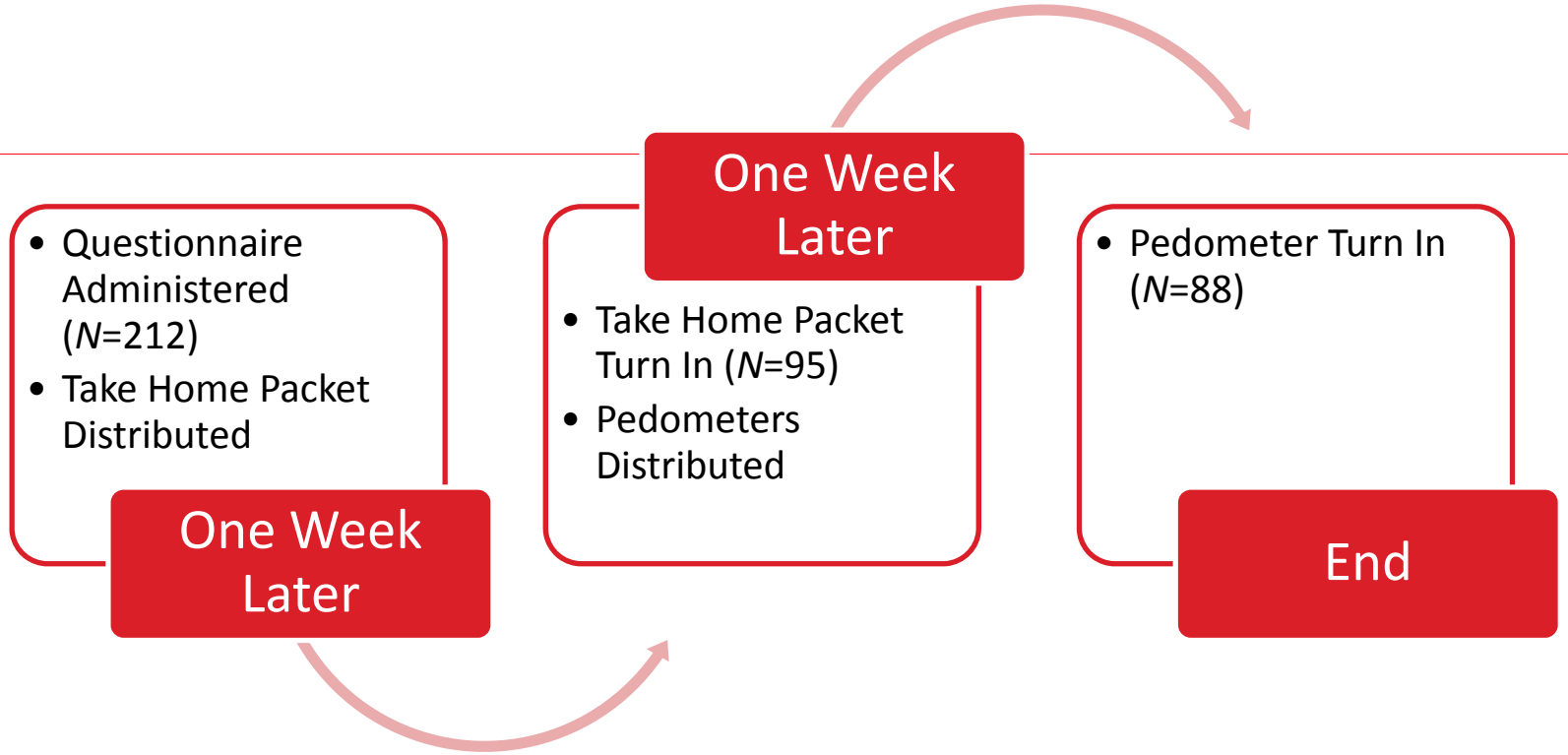
Kelly J. Clifton, PhD - National Center for Smart Growth - University of Maryland, College Park ; modified by Tracy E. McMillan, Ph.D., MPH - University of Texas at Austin; 2/27/07

Comments: _____ E_____ P_____

Individual Assessments

- Interviewer administered questionnaire
- International Physical Activity Questionnaire (short form)
- One week pedometer protocol

Flow of Individual Assessments



Analyses

- Descriptive Statistics
- Extensive Bivariable Associations
  - PEDS variables interrelationships
  - PEDS, co-variates and outcomes
- Regression Models
  - Ecologic aggregate analyses
  - Separate by gender
  - Adjusted for age and neighborhood density
  - Bivariable analyses informed models

Participant Characteristics

	Women (*N*=139)	Men (*N*=77)
Age	43.29	43.79
BMI (kg/m^2)*	33.0	28.3
Systolic BP	120 mmHg	123 mmHg
Diastolic BP	74 mmHg	74 mmHg
Heart Rate (bts/min)	76.1	73.5

Physical Activity Outcomes (by gender)

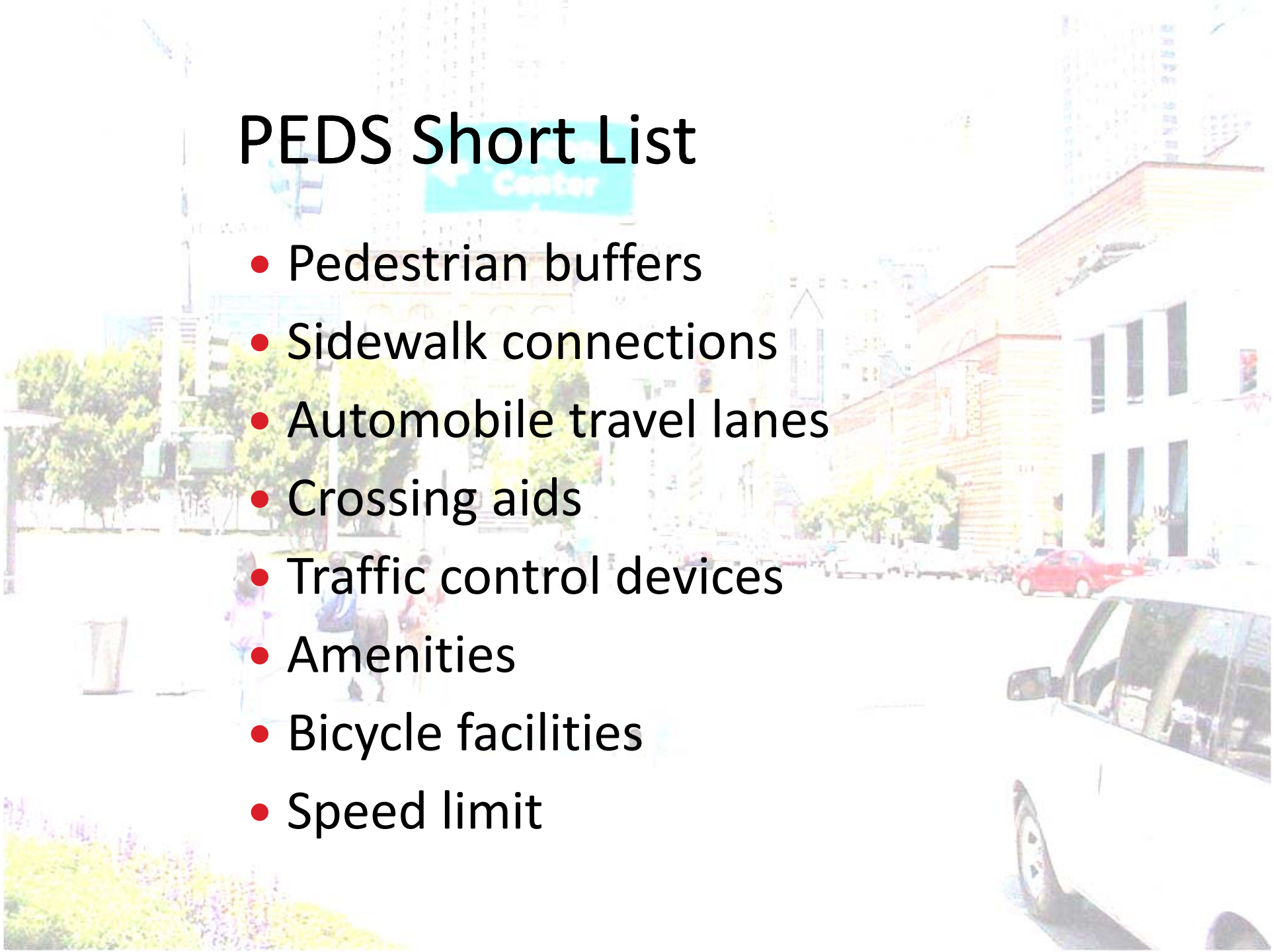
	Women	Men
Vigorous Intensity*	1,955	2,896
Moderate Intensity*	733	1,309
Walking*	1,080	1,376
Total Physical Activity*	3,768	5,581
Pedometer Steps	29,792	33,786
Pedometer Calories	1,209	1,463

*Women demonstrated higher measured BMI and reported significantly less vigorous, moderate, walking and total PA on the IPAQ compared to men ($p<.01$). IPAQ outcomes presented in MET—minutes.

Moscone Center
HOWARD
TOW-AWAY LANE MUST TURN LEFT
SKY

PEDS Short List

- Pedestrian buffers
- Sidewalk connections
- Automobile travel lanes
- Crossing aids
- Traffic control devices
- Amenities
- Bicycle facilities
- Speed limit

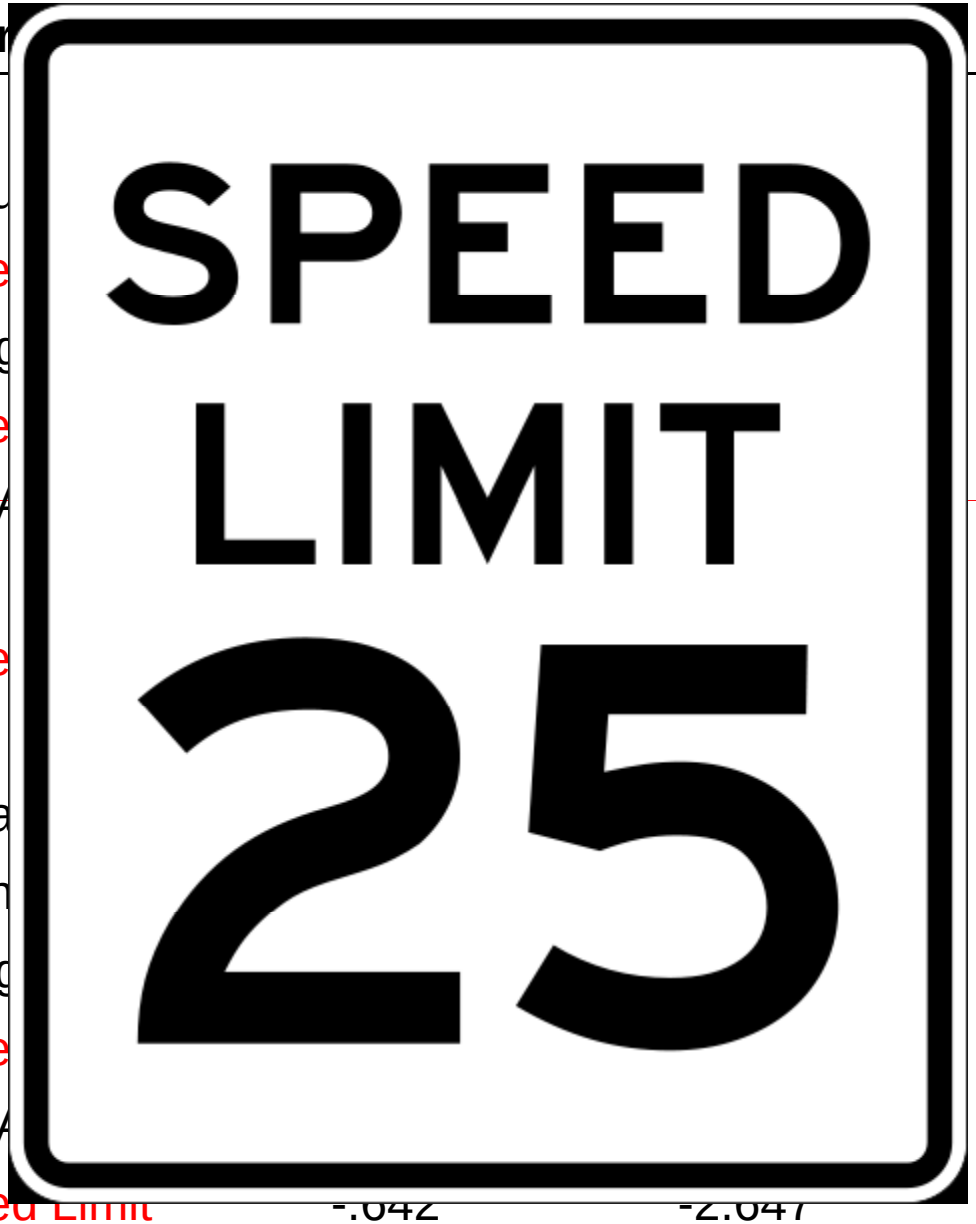


Bivariable Associations

	Vigorous	Moderate	Walking	Total	Steps	Calories
Buffers	-.389	-.578	-.077	-.388	-.253	-.336
Connections	-.405	-.588	.224	-.313	-.379	-.357
Travel lanes	-.433	-.356	-.538	-.488	-.042	-.158
Crossing aids	-.410	-.491	-.380	-.465	-.038	-.105
Traffic control devices	-.402	-.533	-.139	-.402	.003	-.099
Amenities	-.286	-.321	-.358	-.346	.352	.261
Bicycle facilities	-.412	-.484	-.438	-.481	.257	.115
Speed limit	-.702	-.446	-.846	-.750	-.455	-.450

Predictor Variables	Beta	t	Sig.
Women			
Vigorous PA			
Speed Limit	-.765	-3.761	.004
Walking			
Speed Limit	-.797	-4.174	.002
Total PA			
Total density	.358	2.085	.067
Speed Limit	-.703	-4.087	.003
Men			
Moderate PA			
Connections	-.744	-3.519	.006
Walking			
Speed Limit	-.799	-4.199	.002
Total PA			
Speed Limit	-.642	-2.647	.024

Predictor			Sig.
Women			
Vigorou			
Spee			.004
Walking			
Spee			.002
Total PA			
Total			.067
Spee			.003
Men			
Modera			
Conn			.006
Walking			
Spee			.002
Total PA			
Speed Limit	-.042	-2.047	.024



Conclusions

- Neighborhood street scale elements influence resident physical activity
- Lower speed limits are most closely linked with physical activity
- Some evidence for gender specific sensitivity to street scale elements
- Future research
  - Replicate these findings
  - Understand how to strike a balance in promoting physical activity in both women and men

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