

# IMPACT OF THE BUILT ENVIRONMENT ON YOUTH PHYSICAL ACTIVITY AND OBESITY

Gregory J. Norman, PhD

Department of Family and Preventive Medicine  
University of California, San Diego

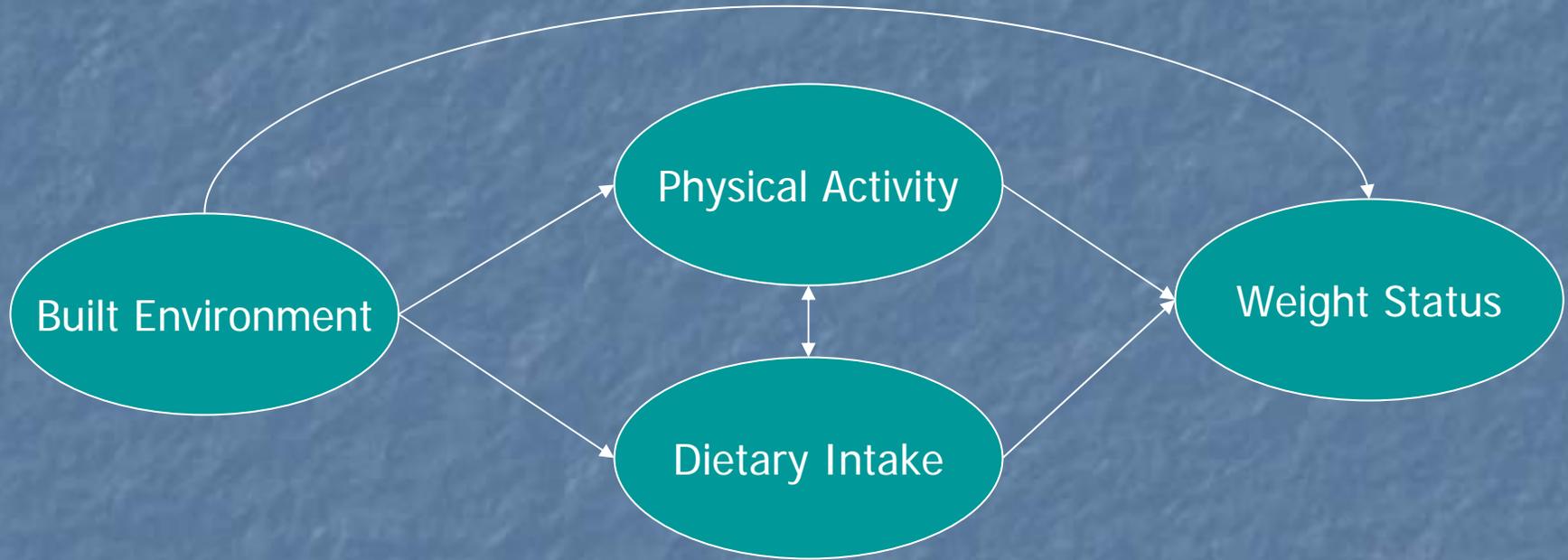
# What is the 'Built Environment'?

- Built Environment - Community Design
  - Land Use
  - Transportation system – connectivity
  - Design – aesthetic qualities
- Physical Environment = built + natural landscape

# How does the built environment affect weight status?



# Conceptual Model



# Built Environment and Diet



# Evidence for Adults

- Community design variables related to adult moderate activity levels (Frank et al., 2005).
- County sprawl index associated with minutes walked, obesity, and hypertension (Ewing et al., 2003).
- Transportation and recreational activity related to neighborhood aesthetics (Hoehner et al., 2005).

# Gathering Evidence for Youth

- Kligerman, M, Sallis, JF, Ryan, S, Frank, LD, & Nader, PR. *Association of neighborhood design and recreational environment variables with physical activity and body mass index in adolescents*
- Norman, GJ, Nutter, SK, Ryan, S, Sallis, JF, Calfas, KJ & Patrick, K. *Community design and recreational environment correlates of adolescent physical activity and body mass index*

# Common Methods

- Accelerometer measures of physical activity (worn for 7-day)
- Geographic Information Systems used to create environmental variables

# Neighborhood Buffer

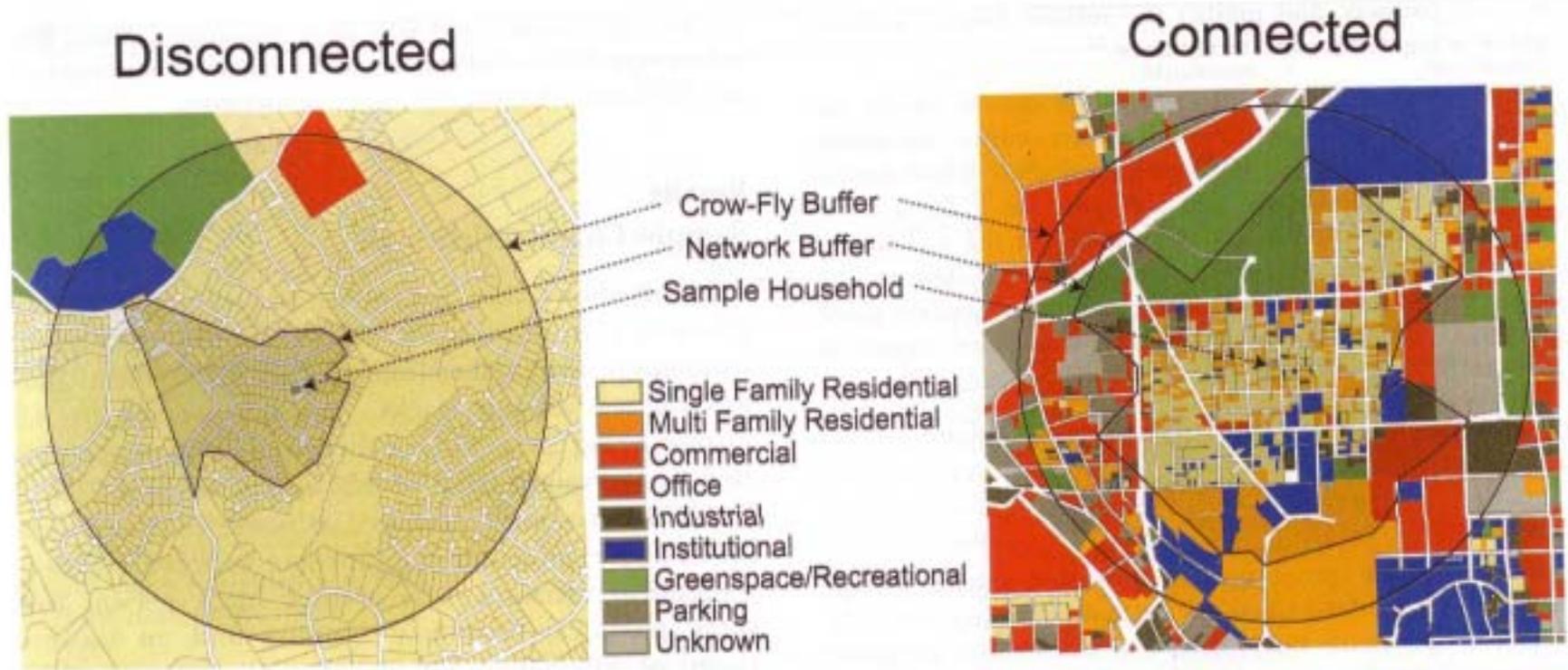


Figure 1. Disconnected and connected community environments.

# Walkability Index

- How walkable is a neighborhood?
  - Land use mix
  - Retail floor area ratio (retail density)
  - Intersection density
  - Residential density

# Study 1

- Cross-sectional design
- San Diego County
- 98 participants (mean age 16.3)
- .5 mile buffer

# Variables

- Physical Activity
  - Minutes of moderate to vigorous activity
- BMI (weight to height ratio)
- Built Environment (12 variable)

# Results

- Walkability index related to physical activity
  - $r = .29$  ( $p = .004$ )
  - Adjusting for gender and ethnicity (beta = .278, partial correlation = .268)
- No relationships found for BMI

# Study 2

- Cross-sectional design
- San Diego County
- 799 participants (425 girls, 374 boys, 11-15, mean age 12.8, 43% ethnic minority)
- 1 mile buffer

# Variables

- Physical Activity
  - Minutes of moderate to vigorous activity
- BMI percentile (age and gender normed)
- Built Environment
  - Residential density, intersection density, Retail-FAR, Land use mix, Walkability index
  - # private recreation facilities, # schools, # parks

# Results

## Physical Activity\*

### Girls

	<u>Beta</u>	<u>p-value</u>
Number of private rec facilities	.110	.016
Intersection density	-.127	.006

### Boys

Retail floor area ratio	.135	.007
-------------------------	------	------

## Weight Status

No relationships found for BMI

\* Multiple regression models controlling for age, ethnicity (non-white), highest household education level.

# Summary

- Some evidence that built environment related to youth physical activity
- Variables explained small amounts of variance in physical activity
- Inverse relationship between girls' activity levels and street connectivity
- No evidence of relationship between built environment and weight status

# Study Limitations

- Cross-sectional designs
- Did not separate transportation activity from leisure activity
- Relatively wide age range of adolescents
- Limited variation of environments

# Implications

- Studies represent early investigations of a complex issue
- Further refinement of measures needed
- Only looked at proximity of environment factors
- Need to consider other environment factor
- Need to consider relationship between built environment and perceived environment