Community Design and Physical Activity – What do we know?
And what DON’T we know?

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University of California Davis
Our vision is active Americans in healthy communities.

Providing leadership in promoting environments that offer choices for Active Living, a lifestyle that easily integrates physical activity into daily routines.
Outline

• Definitions and Model
• Adults and physical activity
• Children and physical activity
• Trade-offs
• Conclusions
1. Definitions

- Physical Activity
- Community Design
- Conceptual Model
### Physical Activity Types

<table>
<thead>
<tr>
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<th>Walk/Bike for travel</th>
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- **Walk/Bike for travel**
- **Walk/bike/ run for exercise**
- **Stationary physical activity**
## Physical Activity Types

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<td>Home</td>
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<tr>
<td>Street</td>
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<tr>
<td>Neighborhood</td>
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# Physical Activity Types

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<tr>
<th>Participants</th>
<th>Walk/Bike for travel</th>
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<tbody>
<tr>
<td>Parents alone</td>
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<tr>
<td>Children alone</td>
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<tr>
<td>Parents &amp; Children</td>
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</tbody>
</table>
Community Design = Built Environment

- Land use – what activities where
- Transportation system – how linked
- Design – aesthetic features
Community Design
= Physical Environment

- Land use – what activities where
- Transportation system – how linked
- Design – aesthetic features
- Natural landscape – trees, grass, etc.
- Human use – other people
Conceptual Model

- Intraperisonal Level
- Interpersonal Level
- Environmental Level

Physical Activity
Conceptual Model

Intrapersonal Level

Parents

Children

Environmental Level

Physical Activity
2. Adults and Physical Activity

- Travel behavior research
- Physical activity research
Overlapping Concerns

Travel Behavior

Motorized travel

Walking and biking to destinations

Walking and biking + other exercise

Physical Activity
Differing Motivations

Travel Behavior

Motorized travel

Walking and biking to destinations

Walking and biking + other exercise

Physical Activity
## Differences by Field

<table>
<thead>
<tr>
<th></th>
<th>Travel Behavior Research</th>
<th>Physical Activity Research</th>
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<tbody>
<tr>
<td><strong>Theory</strong></td>
<td>Utility-maximizing framework</td>
<td>Ecological framework</td>
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<tr>
<td><strong>Data</strong></td>
<td>Diary surveys</td>
<td>Accelerometers, self-reports</td>
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<tr>
<td><strong>Design</strong></td>
<td>Cross-sectional</td>
<td>Interventions or cross-sectional</td>
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</table>
TRB-IOM Review*

- 22 Travel behavior studies
- 28 Physical activity studies
- Cross-sectional = “Least Suitable”

Travel Behavior Findings

• Walking and biking are higher in traditional/transit/walkable neighborhoods
• Walking and biking are lower in suburban/automobile neighborhoods
Travel Behavior Findings

- Population density is positively correlated with walking and/or biking
- Distance to the nearest destination is negatively correlated with walking/biking
- Accessibility is positively correlated with walking/biking
- Design variables are largely insignificant
Physical Activity Findings

• Accessibility is positively correlated with total physical activity
• Distance to trail or bikeway is negatively correlated with use of facility
• Reported presence of sidewalks are positively correlated with walking
• Perceived neighborhood aesthetics are positively correlated with walking
Assumed Causality

Walkable Environment → Walking Levels

Access to Gym → Exercise Levels
Possible Causality

Preference for Walking → Walkable Environment → Walking Levels

Preference for Exercise → Access to Gym/Park → Exercise Levels
Possible Causality

Preference for Walking → Walkable Environment → Walking Levels

Preference for Exercise → Access to Gym → Exercise Levels
What Don’t We Know?

• To what degree does “self-selection” explain the observed correlations between community design and physical activity?

• Can community design do more than facilitate physical activity for motivated individuals? … change motivation? … change preferences?
3. Children and Physical Activity

- Traffic Safety Studies
- Physical Activity Studies
  - Cross-sectional
  - Interventions
  - Few that study the role of community design
Physical Activity - Neighborhood Safety

- Romero, et al. 2001: Perception of more neighborhood hazards positively associated with physical activity for 4th graders
- Molnar, et al. 2004: Lower neighborhood safety and social disorder associated with less physical activity
Physical Activity – Proximity to Playgrounds

• Sallis, et al. 1993: Proximity to playgrounds positively associated with physical activity for preschool children.

• Burdette and Whittaker, 2004: Proximity to playgrounds not associated with overweight for preschool children in low-income neighborhoods.
Traffic Safety

• Jacobsen, et al. 2000: Traffic speed is a key determinant of pedestrian injury risk for children
• Tester, et al. 2004: Speed humps were associated with lower odds of children being injured within their neighborhoods and being struck in front of their home
Safe Routes to School

- Staunton, et al., 2003: 64% increase in number of children walking and 114% increase in number of students biking in 7 schools in Marin County
- Boarnet, et al., 2004: Increases in the number of children walking or bicycling for five of nine schools in So. Cal.
- Cooper, et al. 2003: Boys who walk to school are more active than those who are driven
Physical Activity – Sallis, et al. Review*

• Time spent outdoors is positively associated with physical activity for children

• Opportunities to exercise are positively associated with physical activity for adolescents

What Don’t We Know?

• What kinds of community design are best for getting children and adolescents outside to exercise?
  – Backyards, front yards, streets, parks, community centers, etc.?
  – Differences by age and gender?
4. Compatibility?

Community design for parents = Community design for children
Some Really Preliminary New Evidence

• PIs: S. Handy and P. Mokhtarian
• Funders:
  – Caltrans – California Dept. of Transportation
  – Robert Wood Johnson Foundation
  – University of California Transportation Centers
## Selection of Neighborhoods

<table>
<thead>
<tr>
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<th>Suburban Neighborhood</th>
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<td>Large Metro Area</td>
<td>Mountain View Sac Midtown</td>
<td>Sunnyvale Sac Suburban</td>
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<tr>
<td>Stand-Alone City</td>
<td>Santa Rosa JC Modesto Central</td>
<td>Santa Rosa RV Modesto Fringe</td>
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Sacramento - Midtown

Approx. 1.6 miles across.
Sacramento - Suburban
Survey Implementation

• Mail-out, mail-back
• October-November 2003
• 8000 addresses initially
• 6746 valid addresses
• 1672 responses – about 200 per neighborhood
• 24.8% response rate
Physical Activity Measures

- Number of days in last 7 days that children living with respondent played outside somewhere in neighborhood other than backyard
- Number of days in last 7 days that respondent exercised somewhere in neighborhood hard enough to breathe somewhat harder than normal for at least 10 minutes
Physical Activity Measures

- Number of times in last 30 days that respondent walked or strolled around the neighborhood
- Number of times in last 30 days that respondent walked to a local store or shopping area
### Traditional vs. Suburban Neighborhoods

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What Don’t We Know?

• Is it possible that suburban neighborhoods really are better for promoting physical activity in kids?
• If so, to what degree does the increase in physical activity for kids make up for the decrease in physical activity for their parents?
• And what forms of community design can effectively encourage physical activity for parents and kids alike?
Rethinking the Grid

• The Housing Zone, 2004: The new new urbanism – hybrids
• Southworth and Ben-Joseph, 2004: “…much can be said in favor of the cul-de-sac street as a pattern for neighborhood space”
• Canada Mortgage and Housing Corporation, 2003: The Fused Grid

5. Conclusions

• Given all that we don’t know, we can’t say that changes in community design will lead to increases in physical activity.
5. Conclusions

- Given what we do know, we can say that changes in community design will increase the opportunities for physical activity:
  - Slow speeds and low traffic streets
  - Parks, shops, etc. within walking distance
5. Conclusions

• In carrying out recommendations, be conscious of potential trade-offs between what is most effective for adults and what is most effective for children.
Community Design for Physical Activity