NEIGHBORHOOD FACTORS AND HEALTH AMONG RESIDENTS LIVING IN A MICROPOLITAN CITY IN IOWA

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University of Iowa, College of Public Health
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Outline

◦ Introduction
◦ Methods
  ◦ Data
  ◦ Statistical Methods
◦ Results
◦ Discussion
◦ Implications
INTRODUCTION
Perceptions and realities of the neighborhood environment have been shown to significantly impact health:

- Self-rated health
- BMI
- Dietary behaviors
- Physical activity
Self-Rated Health

- Physical and social disorder
  - Examples: noise; crowding; attachment to the neighborhood
- Social cohesion and capital
- Violence
- Walkability

(Diez Roux & Mair, 2010; Franzini, Caughy, Spears, & Esquer, 2005; Rohrer, Pierce, & Denison, 2004; Wen, Hawkley, & Cacioppo, 2006)
BMI

- Access to recreational facilities
- Walkability
  - Example: quality of sidewalks
- Physical disorder
- Density of fast food restaurants
- Availability of healthy foods


https://www.flickr.com/photos/beaumontpete/4800039961/
Dietary Behaviors

- Access and availability to supermarkets
  - Greater selection of healthy foods → increased food and vegetable consumption
  - Social disorder is also important
- Density of fast-food outlets
- Aesthetics

(Diez Roux & Mair, 2010; Keita, Casazza, Thomas, & Fernandez, 2011; Lopez, 2007; Larson et al., 2009; Litt et al., 2011; Zenk et al., 2009)

http://www.prweb.com/releases/2014/03/prweb11715139.htm
Physical Activity

- Environmental settings and resources
  - Examples: gyms; treadmills; sidewalks
- Walkability
- Social cohesion
- Aesthetics
- Safety

Gaps in Current Research

- Studies primarily conducted among neighborhoods in large, urban regions
  - Less is known about neighborhoods in smaller regions, which tend to be more dispersed and experience greater lack of resources
  - More research needed among residents living in neighborhoods in Micropolitan regions
    - Regions with greater than 10,000 but fewer than 50,000 residents

**Study Aim:**

*To explore the relationships between neighborhood perceptions, dietary behaviors, physical activity, obesity and general health in residents of an Iowa Micropolitan community*

(Liese, Weis, Pluto, Smith, & Lawson, 2007; Powell, Slater, Mirtcheva, Bao, & Chaloupka, 2007)
Proposed Model

Main Hypotheses
H1: PA, F/V, and Fast Food will have a direct effect on BMI
Proposed Model

Main Hypotheses

**H1**: PA, F/V, and Fast Food will have a direct effect on BMI

**H2**: BMI will have a direct effect on Health

**H3**: PA, F/V, and fast food will have direct and indirect effects on Health
Proposed Model

Main Hypotheses

**H1:** PA, F/V, and Fast Food will have a direct effect on BMI

**H2:** BMI will have a direct effect on Health

**H3:** PA, F/V, and fast food will have direct and indirect effects on Health

**H4:** Neighborhood perceptions will have direct effects on PA, F/V, and Fast Food

**H5:** Neighborhood perceptions will have direct and indirect effects on BMI and Health
METHODS
Data: Ottumwa Community Survey

- Location: Ottumwa, Iowa
- Year: 2013
- Method: Random digit dial phone survey
- Sample size: 1087
- Topics: Demographics, health behaviors, neighborhood perceptions

- Data was weighted for age, gender, and ethnicity
- Data was multiply imputed
Weighting

- Sample
  - 37% Male
  - 63% Female

- Ottumwa (From 2010 Census)
  - 48% Male
  - 52% Female
Weighting

- Unweighted sample

- Weighted
Weighting

- Final Sample

48% Male 52% Female
Weighting

◦ Original Sample
54% Not Employed 46% Employed

◦ Weighted Sample
44% Not Employed 56% Employed
Statistical Methods

- Data management in SAS 9.4
- Demographics in SAS 9.4
- Structural equation modeling (SEM) in Mplus Version 7
  - Each neighborhood scale tested separately
Factor Analysis
Structural Equation Modeling
Structural Equation Modeling

Stress → Eating → Health
Structural Equation Modeling

Diagram:
- Stress
- Eating
- Health

The diagram shows the relationship between stress, eating, and health in a structural equation modeling context.
Structural Equation Modeling
# Neighborhood Measures

<table>
<thead>
<tr>
<th><strong>Social Cohesion</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>People around here are willing to help their neighbors.</td>
<td></td>
</tr>
<tr>
<td>People in this neighborhood generally get along with each other.</td>
<td></td>
</tr>
<tr>
<td>People in this neighborhood share the same values.</td>
<td></td>
</tr>
<tr>
<td>People in this neighborhood can be trusted.</td>
<td></td>
</tr>
</tbody>
</table>

Would you say....

- Strongly agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree
Neighborhood Measures

<table>
<thead>
<tr>
<th>Aesthetics</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is a lot of trash and litter on the street in my neighborhood.</td>
</tr>
<tr>
<td>There is a lot of noise in my neighborhood.</td>
</tr>
<tr>
<td>In my neighborhood, the buildings and homes are well-maintained.</td>
</tr>
<tr>
<td>The buildings and houses in my neighborhood are interesting.</td>
</tr>
<tr>
<td>My neighborhood is attractive.</td>
</tr>
<tr>
<td>There are interesting things to do in my neighborhood.</td>
</tr>
</tbody>
</table>

Would you say....
Strongly agree, Agree, Neither Agree nor Disagree, Disagree, Strongly Disagree
# Neighborhood Measures

<table>
<thead>
<tr>
<th>Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel safe walking in my neighborhood, day or night.</td>
</tr>
<tr>
<td>Violence is not a problem in my neighborhood.</td>
</tr>
<tr>
<td>My neighborhood is safe from crime.</td>
</tr>
</tbody>
</table>

Would you say....
Strongly agree, Agree, Neither Agree nor Disagree, Disagree, Strongly Disagree
Neighborhood Measures

<table>
<thead>
<tr>
<th>Walkability</th>
</tr>
</thead>
<tbody>
<tr>
<td>My neighborhood offers many opportunities to be physically active.</td>
</tr>
<tr>
<td>Local sports clubs and other facilities in my neighborhood offer many opportunities to get exercise.</td>
</tr>
<tr>
<td>It is pleasant to walk in my neighborhood.</td>
</tr>
<tr>
<td>The trees in my neighborhood provide enough shade.</td>
</tr>
<tr>
<td>In my neighborhood, it is easy to walk places</td>
</tr>
<tr>
<td>I often see other people walking in my neighborhood.</td>
</tr>
<tr>
<td>I often see other people exercising, such as jogging, biking, and playing sports, in my neighborhood</td>
</tr>
</tbody>
</table>

Would you say….
Strongly agree, Agree, Neither Agree nor Disagree, Disagree, Strongly Disagree
Neighborhood Measures

<table>
<thead>
<tr>
<th>Food Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A large selection of fresh fruits and vegetables is available in my neighborhood.</td>
</tr>
<tr>
<td>The fresh fruits and vegetables in my neighborhood are of high quality.</td>
</tr>
<tr>
<td>A large selection of low-fat products is available in my neighborhood.</td>
</tr>
</tbody>
</table>

Would you say….  
Strongly agree, Agree, Neither Agree nor Disagree, Disagree, Strongly Disagree
# Neighborhood Measures

<table>
<thead>
<tr>
<th>Violence</th>
</tr>
</thead>
<tbody>
<tr>
<td>A fight in your neighborhood in which a weapon was used.</td>
</tr>
<tr>
<td>Gang fights in your neighborhood.</td>
</tr>
<tr>
<td>A sexual assault or rape in your neighborhood.</td>
</tr>
<tr>
<td>A robbery or mugging in your neighborhood.</td>
</tr>
<tr>
<td>Hard drug use in your neighborhood. (heroin, meth, coke, crack, etc.)</td>
</tr>
</tbody>
</table>

Did this occur….
Often, Sometimes, Rarely, Never
RESULTS
Descriptive Statistics

<table>
<thead>
<tr>
<th>Demographics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>52.28%</td>
</tr>
<tr>
<td>Children in household</td>
<td>38.14%</td>
</tr>
<tr>
<td>Latino</td>
<td>8.52%</td>
</tr>
<tr>
<td>Average Age</td>
<td>48.21</td>
</tr>
<tr>
<td>Graduated high school</td>
<td>87.22%</td>
</tr>
<tr>
<td>In poverty</td>
<td>33.04%</td>
</tr>
</tbody>
</table>
## Descriptive Statistics

<table>
<thead>
<tr>
<th>Variables of Interest</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 150 Minutes of PA per week</td>
<td>49.23%</td>
</tr>
<tr>
<td>Overweight (BMI 25 to 29.9) or Obese (BMI 30 or above)</td>
<td>67.69%</td>
</tr>
<tr>
<td>Eat fast food in a typical week</td>
<td>77.61%</td>
</tr>
<tr>
<td>Average # of F/V per day</td>
<td>3.03</td>
</tr>
<tr>
<td>Reported excellent, very good, good health</td>
<td>77.49%</td>
</tr>
</tbody>
</table>
Health Behaviors

Demographics:
- Gender
- Children
- Ethnicity
- Age
- Education
- Poverty

Fruit & Veggie Consumption
Eating Fast Food
Getting 150 Minutes of PA

BMI
PA
BMI
Health

Good Self-Rated Health

RMSEA   CFI   F/V   FF   PA   BMI   Health
0.105   0.762 0.02   0.13 0.14 0.08 0.26
Social Cohesion

Demographics:
- Gender
- Children
- Ethnicity
- Age
- Education
- Poverty

<table>
<thead>
<tr>
<th>Social Cohesion</th>
<th>Fruit &amp; Veggie Consumption</th>
<th>Eating Fast Food</th>
<th>Getting 150 Minutes of PA</th>
<th>BMI</th>
<th>Good Self-Rated Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMSEA</td>
<td>0.058</td>
<td></td>
<td></td>
<td>0.951</td>
<td>0.03</td>
</tr>
<tr>
<td>CFI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.13</td>
</tr>
<tr>
<td>F/V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.15</td>
</tr>
<tr>
<td>FF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.08</td>
</tr>
<tr>
<td>PA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.27</td>
</tr>
<tr>
<td>BMI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</table>
Aesthetics

Demographics:
- Gender
- Children
- Ethnicity
- Age
- Education
- Poverty

RMSEA | CFI | F/V | FF | PA | BMI | Health
-----|-----|-----|----|----|-----|------
0.061 | 0.918 | 0.03 | 0.13 | 0.15 | 0.08 | 0.27
**Food Environment**

- **Food Environ.**
- **Fruit & Veggie Consumption**
- **Eating Fast Food**
- **Getting 150 Minutes of PA**
- **BMI**
- **Good Self-Rated Health**

**Demographics:**
- Gender
- Children
- Ethnicity
- Age
- Education
- Poverty

**Model Parameters:**

<table>
<thead>
<tr>
<th>RMSEA</th>
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<th>PA</th>
<th>BMI</th>
<th>Health</th>
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<tbody>
<tr>
<td>0.042</td>
<td>0.997</td>
<td>0.04</td>
<td>0.15</td>
<td>0.18</td>
<td>0.08</td>
<td>0.28</td>
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</table>
Safety

Demographics:
Gender
Children
Ethnicity
Age
Education
Poverty

Safety
Fruit & Veggie Consumption
Eating Fast Food
Getting 150 Minutes of PA
BMI
Good Self-Rated Health

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Getting 150 Minutes of PA
Good Self-Rated Health
Fruit & Veggie Consumption
Eating Fast Food
BMI
Walkability
PA
BMI
Demographics:
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<tr>
<td></td>
<td>0.058</td>
<td>0.942</td>
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<td>0.08</td>
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Walkability

Fruit & Veggie Consumption

Eating Fast Food

Getting 150 Minutes of PA

BMI

Good Self-Rated Health

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Demographics:
Gender
Children
Ethnicity
Age
Education
Poverty
Violence

Fruit & Veggie Consumption

Eating Fast Food

BMI

Getting 150 Minutes of PA

Good Self-Rated Health

Demographics:
Gender  Children  Ethnicity  Age  Education  Poverty

<table>
<thead>
<tr>
<th>RMSEA</th>
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<tbody>
<tr>
<td>0.052</td>
<td>0.944</td>
<td>0.02</td>
<td>0.15</td>
<td>0.15</td>
<td>0.09</td>
<td>0.27</td>
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</table>
## Model Fit and $R^2$

<table>
<thead>
<tr>
<th>Model</th>
<th>RMSEA</th>
<th>CFI</th>
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<tbody>
<tr>
<td>Structural</td>
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<td>0.762</td>
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</tr>
<tr>
<td>Aesthetics</td>
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<td>0.13</td>
<td>0.15</td>
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<td>0.27</td>
</tr>
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<td>Food Environ.</td>
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<td><strong>0.09</strong></td>
<td>0.27</td>
</tr>
</tbody>
</table>
DISCUSSION & IMPLICATIONS
## Direct Effects

<table>
<thead>
<tr>
<th>NBHD Item</th>
<th>F/V</th>
<th>FF</th>
<th>PA</th>
<th>BMI</th>
<th>Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohesion</td>
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<td></td>
<td></td>
<td>X</td>
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<tr>
<td>Aesthetics</td>
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<tr>
<td><strong>Food Environ.</strong></td>
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<td>X</td>
<td></td>
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<tr>
<td>Safety</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walkability</td>
<td>X</td>
<td></td>
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<td>X</td>
<td></td>
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<tr>
<td>Violence</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Indirect Effects

Full Mediation

- Food Environ.
- Physical Activity
- BMI
- Walkability
- Physical Activity
- Self-Rated Health

Partial Mediation

- PA
- BMI
- Food Environ.
- Physical Activity
- Self-Rated Health
- Walkability
- Physical Activity
- BMI
Implications: Social Cohesion

- Association between social cohesion and self-rated health consistent with literature
- Also associated with F/V
- No association between social cohesion and physical activity found
- Neighborhood social cohesion is important to consider when developing interventions to:
  - Improve fruit and vegetable consumption
  - Improve self-rated health
Implications: Aesthetics

- Association between aesthetics and F/V consistent with other studies
- No association between aesthetics and PA found
- Neighborhood aesthetics is important to consider when developing interventions to:
  - Improve fruit and vegetable consumption
Implications: Food Environment

- Consistent with other studies, food environment was associated with dietary behaviors and BMI
- Also associated with PA and self-rated health
- Neighborhood food environment is important to consider when developing interventions to:
  - Improve fruit and vegetable consumption
  - Improve self-rated health
  - Increase physical activity levels
  - Reduce fast food consumption
  - Decrease BMI
- Strong point of intervention

http://cdn1.sph.harvard.edu/wpcontent/uploads/sites/56/2012/10/preventing_obesity-food_environment.jpg
Implications: Safety

- Association between safety and fruit and vegetable consumption
- No association between safety and PA found
- Neighborhood safety may be important to consider when developing interventions to:
  - Improve fruit and vegetable consumption
Implications: Walkability

- Associations between walkability and BMI, PA, self-rated health is mostly consistent with literature
- Also associated with F/V
- Neighborhood walkability is important to consider when developing interventions to:
  - Improve fruit and vegetable consumption
  - Increase physical activity
  - Improve self-rated health
  - Reduce BMI
- Strong point of intervention
Implications: Violence

- Association between violence and self-rated health consistent with literature
- Also associated with FF
- Neighborhood violence is important to consider when developing interventions to:
  - Reduce fast food consumption
  - Improve self-rated health

Final Implications

- Neighborhood perceptions play an important role in health behaviors and outcomes in Micropolitan regions.
- Imperative to assess the physical and social environment of these neighborhoods.
- Food environment in particular a potentially strong point of intervention.

Future research could explore relationships that warrant further clarification (i.e., walkability and BMI; influence of food environment).
# Strengths and Limitations

<table>
<thead>
<tr>
<th>Limitations</th>
<th>Strengths</th>
</tr>
</thead>
<tbody>
<tr>
<td>◦ Testing one neighborhood factor at a time</td>
<td>◦ Validated measures</td>
</tr>
<tr>
<td>◦ Self-report data</td>
<td>◦ Large sample size</td>
</tr>
<tr>
<td>◦ Cross-sectional</td>
<td></td>
</tr>
</tbody>
</table>
Acknowledgements

• This presentation was supported by Cooperative Agreement Number 1-U48DP001902-01 from the Centers for Disease Control and Prevention. The findings and conclusions in this report presentation are those of the author(s) and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

• Department of Community and Behavioral Health
  • Dr. Parker
  • Dr. Baquero
  • Dr. Daniel-Ulloa
References


References

## Multiple Imputation

<table>
<thead>
<tr>
<th>ID</th>
<th>Gender (1 = Female)</th>
<th>Fruits &amp; Veggies/Day</th>
<th>HS Grad (1 = Yes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>3.5</td>
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</tr>
<tr>
<td>2</td>
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<td>.</td>
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</tr>
<tr>
<td>3</td>
<td>1</td>
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<td>.</td>
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<tr>
<td>4</td>
<td>1</td>
<td>1.9</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
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<td>1</td>
</tr>
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<tr>
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### Multiple Imputation

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<th>Gender (1 = Female)</th>
<th>Fruits &amp; Veggies/Day</th>
<th>HS Grad (1 = Yes)</th>
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## Multiple Imputation- OCS Data

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<th>Imputation 4</th>
<th>Imputation 5</th>
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Final mean using imputed data: 1.2255 fruits per day