The Impact of Policy and Environmental Factors on Physical Activity and Weight Outcomes
Presentation will focus on:

Data Sources:
1. ImpacTeen original community-level data collections in communities around the MTF schools
2. Existing archival data sources:
   - Census data (TIGER files, demographic information)
   - Dun & Bradstreet business lists
   - Aerial Photographs
   - ESRI Street Maps
   - GNIS (Geographic Names Information Systems)
3. Results of Analyses using these data
4. Future data collection efforts and analysis
5. Resource document for researchers
Built Environment
Data Collection Efforts
ImpacTeen Data

ImpacTeen original community-level data collections in communities around the MTF schools
- 1999-2003; approximately 950 communities
- focused on alcohol, tobacco, and illicit drug use
- combination of observations and key informant surveys
- plans to resume with obesity focus in 2009

Catchment area, or community, was defined based on the school enrollment zone
- 70% defined using school district map
- 17% based on student home zip code
- 9% based on radius around the school
- 4% based on algorithm
Community Outdoor observations include presence of:

- **Sports areas** (baseball diamonds, basketball and tennis courts, soccer fields, etc.)
- **Parks and green spaces**
- **Public pools and beaches**
- **Bike paths/lanes**
- **Neighborhood gardens**
- **Attractive community spaces** (trees, flowers, shrubs)
- **Bike lanes on roads**
- **Curbs and sidewalks**
- **Street lighting around school and in neighborhood**
- **Traffic density around school and in neighborhood**
Area Deprivation measures include presence of:

- Homeless persons loitering on the street
- Bars on windows
- Dilapidated buildings, unkempt lawns
- Security barriers around residential and retail property
- Teens smoking or drinking
- Vandalism and/or graffiti
ArcGIS measures include:

- Population density per sq. mi. for the catchment area
- Housing density per sq. mi. for the catchment area
- Intersection density per sq. mi. for the catchment area
- Ratio of 4-way intersections per catchment area
- Ratio of higher road classes to local and neighborhood roads (measure of street safety)
Archival Data:
– Dun & Bradstreet MarketPlace Database
  • List of more than 14 million US businesses
  • Updated quarterly
    – More than 1,300 D&B staff
    – Yellow page directories
    – News and media sources
    – Government registries
    – Websites
    – Verified with telephone interviews
    – Variety of quality control procedures to avoid duplication, minimize errors, etc.
  • Accessed through licensed D&B MarketPlace software
Archival Data Cont’d:

– Dun & Bradstreet MarketPlace Database
  • Multiple criteria included
    – Standard Industry Classification codes
      » Primary and secondary codes reported
    – addresses
    – Contact information
    – Company size
    – More
  • Data matched to MTF surveys based on zip code of the MTF school and first quarter D&B data on outlets for that zip code
Archival Data Cont’d:

– Physical activity related outlets
  • At 4 digit SIC level, identified:
    – Physical fitness facilities
      » health clubs, spas and others featuring exercise and other physical fitness activities, both membership and non-membership
    – Membership sports and recreation clubs
      » Ice, court, country, golf, tennis, amateur sports, yacht, and recreation clubs
    – Dance studios, schools, and public dance halls

– Food store outlet density measures
  • Used 6 digit SIC codes to identify
    – Chain supermarkets, Non-chain supermarkets, Convenience stores, Grocery stores
Aerial Photographs

Example: Traffic Circle

Example: Water Barrier

Example: Neighborhood Park

Example: Bike Paths

Example: Sidewalks
Preliminary Results from the Food and Fitness Survey
Food and Fitness Survey Results

– Physical Education
  • 94.6% of schools reported that elementary students are required to take PE classes.
    – 14.9% of schools had PE daily
    – 19% offered PE 3 or 4 times a week
    – 60.4% only offered PE 1 or 2 times a week
    – Average length for a PE class was 39.3 minutes (students active for 75% of class time)

– Most commonly reported barriers to implementing or maintaining regular physical education classes were:
  • 24.7% indicated financial constraints/lack of staffing
  • 22.8% indicated inadequate indoor or outdoor facilities
  • 22.0% indicated competing demands for teaching other subject areas
Food and Fitness Survey Results

– Recess
  • 86% of the schools reported having recess 5 days per week.
    -average length was 27.8 minutes

– Walking/biking to School
  • On average 15.51% of students walk or bike to school.
    -28.2% of schools indicated that no children walk or bike to school.
    -27.5% of schools indicated that children were not allowed to bike to school.
    -21.9% of schools indicated that only children in certain grades were allowed to bike to school.
    -School too far away and traffic danger were the most often cited perceived barriers followed by lack of sidewalks and crossing guards.
Food and Fitness Survey Results

- No significant differences were found between public and private schools.

- Lower-SES (>30% free/reduced lunch) public schools were less likely to have daily recess and formal classroom instruction on PA.

- Lower-SES public schools were more likely to offer daily PE.

- Higher-SES public schools had greater parental interest in improving physical activity practices.
Associations between Availability and Community Characteristics
Public Physical Activity Opportunities and Community Characteristics

ImpacTeen Community Observation Data
- 2002/03 data on sports areas, parks/green spaces, playgrounds, public pools & beaches, bike paths/lanes; overall index (409 communities)

- Census data on community characteristics (race/ethnicity, income, poverty, urbanization)

- Found fewer physical-activity related settings in communities with lower income levels and higher percentages of African Americans

Source: Powell, Slater and Chaloupka, *Evidence Based Preventive Medicine, 2004*
Commercial Physical Activity Opportunities and Community Characteristics

Business List Data

• Dun & Bradstreet 2000 zip code level data on variety of paid physical activity related outlets
  • physical fitness facilities, memberships sports and recreation clubs, and dance studios/schools/halls (28,050 zip codes)
• Census data on zip code population characteristics
  • race/ethnicity, income, poverty, urbanization

• Found fewer paid physical-activity related settings in communities with lower income levels and higher percentages of African Americans and (for some settings) Hispanics

Associations between Availability and Youth Behavior and Weight Outcomes
Physical Activity Opportunities and Youth Behavior

• Dun & Bradstreet zip code level data on paid physical activity related outlets
  – physical fitness facilities, memberships sports and recreation clubs, and dance studios/schools/halls

• MTF data on student reports of physical activity, height and weight (1997-2003)
  - frequency of participation in sports, athletics, and exercise; BMI, and indicator for overweight

Physical Activity Opportunities and Youth Behavior

• Find that:
  – youth in communities with greater availability of paid physical activity related outlets more likely to report frequent physical activity (exercise and sports participation)
  – Some differences by gender (greater impact on girls) and grade (greater impact on 12th graders)
    • Increasing number of outlets from low end (1 facility) to high end (8 facilities) associated with 6.6% increase in frequent physical activity and 9.0% increase in frequent vigorous exercise among 12th grade girls
    • Comparable change associated with 6.4% increase in frequent vigorous exercise among 12th grade boys

Physical Activity Opportunities and Youth Behavior

• Related findings
  – Youth in communities with greater availability have lower BMI and are less likely to be overweight

  • Small effect – one more outlet per 10,000 population reduces probability of overweight by $\frac{1}{2}$ percentage point (about 5 percent reduction)

Source: Bridging the Gap, unpublished data
Physical Activity Supports and Youth Behavior

• Built Environment Measures
  – area deprivation scale, outdoor PA settings scale, commercial PA facilities, student perception of safety, local sprawl index, street safety

• MTF data on student reports of physical activity, height and weight (2001-2003)
  – frequency of vigorous exercise; participation in sports, athletics, and exercise; indicator for overweight, and BMI

Physical Activity Supports and Youth Behavior

• Find that:
  – Higher levels of area deprivation were significantly associated with reduced PA participation and higher prevalence of overweight and BMI.

  – Presence of bike paths was significantly associated with lower prevalence of overweight and BMI.

  – Greater numbers of commercial PA facilities were significantly associated with increased vigorous exercise and PA participation.

Physical Activity Supports and Youth Behavior

• Find that:

  – Students’ perception of feeling unsafe going to and from school was significantly associated with decreased vigorous exercise.

  – More compact neighborhoods were associated with reduced PA participation and lower prevalence of overweight and BMI.

Physical Activity Supports and Youth Behavior

• Gender differences showed:
  
  – Higher levels of area deprivation were significantly associated with reduced female PA participation.

  – Greater numbers of commercial PA facilities were significantly associated with increased female PA participation.

  – More compact neighborhoods were associated with reduced BMI scores for males.

Physical Activity Supports and Youth Behavior

Results of Predicted Probability Models

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Vigorous Exercise</th>
<th>PA Participation</th>
<th>Overweight</th>
<th>BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area Deprivation=0</td>
<td></td>
<td>+1.4%</td>
<td>-10.2%</td>
<td>-1.0%</td>
</tr>
<tr>
<td>Bike Paths =1</td>
<td></td>
<td></td>
<td>-9.5%</td>
<td>-1.0%</td>
</tr>
<tr>
<td>Commercial PA Facilities=8</td>
<td>+1.5%</td>
<td>+2.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial PA Facilities=16</td>
<td>+6.3%</td>
<td>+8.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Perception of Safety=0</td>
<td>+4.4%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Sprawl Index=80</td>
<td></td>
<td>+3.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Sprawl Index=125</td>
<td></td>
<td></td>
<td>-11.8%</td>
<td>-1.1%</td>
</tr>
<tr>
<td>Local Sprawl Index=175</td>
<td></td>
<td></td>
<td>-33.7%</td>
<td>-3.3%</td>
</tr>
<tr>
<td>Total Effect</td>
<td>10.9%</td>
<td>14.9%</td>
<td>-44.7%</td>
<td>-4.2%</td>
</tr>
</tbody>
</table>

Limitations

- Potential measurement error in self-reported PA and weight outcomes
  - Some evidence of under-reporting; other studies find mostly accurate
- Limited measures of physical activity
- Measurement error in observation and outlet density measures matched by school not student location
- Cross-sectional data can’t establish causality
2009 ImpacTeen Community Observations

Results of these analyses will help inform the development of observation instruments for upcoming data collection.

Plan to collect information on:

- Availability of and access to physical activity settings and food outlets.
- Specific attributes and overall condition of commercial and outdoor physical activity settings.
- Presence of sidewalks, traffic calming measures, mixed-land use, street connectivity, traffic density, street lights, area deprivation.
- User cost for paid physical activity settings.
- Availability of and access to restaurants and food stores.
- Prices for food products in stores and restaurants.
- Retail marketing of food products.
ImpacTeen Resource for Researchers

“An Assessment of Environmental Influences Associated with Overweight and Obesity: An Inventory of Existing Surveillance Systems”
Purpose of the paper:

- Identifies existing national data sources for use in obesity-related research including:
  - Data sources that contain individual level measures
  - Contextual data sources

- Provides a summary of the database and whether it contains information on:
  - BMI
  - Nutrition
  - Physical activity
  - Geocode

- Provides a discussion about the challenges researchers must consider when using these data, such as issues related to weaknesses in the measures, data linkage, data comparability, and missing information.