Effects of the Nice Ride 2011 System Expansion and Weather on Physical Activity Levels
Outline

- Background: What is Nice Ride?
- Study Goals & Research Question
- Methodology
- Results
- Implications for Practice
Background

What is bike sharing?

- Pricing model encourages short, one-way trips
- Bikes are available on demand, 24/7 throughout the entire season
- Nice Ride stations placed throughout the city by three criteria:
  - Key Destinations
  - Everyday Use
  - Equity
Nice Ride MN

- Started in 2010 with grants from Bike Walk Twin Cities and Blue Cross Blue Shield
- Previous studies have shown that Nice Ride serves a range of transportation needs (commuting and non-work) as well as recreation.

Photo: niceridemn.org
Background on Bicycling and Health

Background on Bicycling and Health

Background on Bicycling and Health

Research Question

- Research Question: What role can bike sharing play in providing opportunities for physical activity?
- Focus on 2011 Nice Ride season to measure effects of system expansion on existing user behavior
2011 Season Statistics

- Number of stations nearly doubled over 2011 season (from 64 to 116 stations)
- 217,530 trips, a 123% increase from the 2010 season.
- Total duration of 70,619 hours, or an average of about 20 minutes for each trip.

*If we assume these bikes are traveling at 12 miles per hour, NiceRide bicyclists traveled 859,313 miles in the 2011 season.*
2011 Season System Expansion
Hypothesis

Did expanding the Nice Ride system enable existing users to increase their levels of activity, either by increasing their trip frequency or taking longer trips?
Sample: Data was filtered to include monthly and annual subscribers who were members in both the 2010 and 2011 seasons.
Methodology

- Modeling technique: Linear Regression
- Dependent Variables: Physical Activity Indicators
  - Number of trips made on any given day
  - Cumulative trip duration on any given day
  - Number of people achieving 30 minutes of physical activity (as per CDC recommendation) via Nice Ride trips on any given day
Methodology
Methodology

- System Growth Variables
  - Number of Stations
  - Network Area

Legend:
- Start of Season
- Season Midpoint
- End of Season
- Nice Ride Station
- Bike Lane
- Highway
- Off-street Trail
- Arterial
- Local Street
- Water

Schoner & Galagedera, University of Minnesota
22 January 2013
UTM 1983
Methodology

- Controlled for weather effects: temperature, cloud cover, and thunder
- Controlled for seasonality (month)
Example Equation:

\[
\text{# of people achieving 30 minutes on day } i = f(\text{network size, weather, season})
\]
Results

- Results are largely similar across all three of the activity indicators evaluated. *Focus on 30 minute benchmark*
Results

DV: Frequency Meeting 30 Minutes

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>P-Value</th>
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</thead>
<tbody>
<tr>
<td>Network Area</td>
<td>0.178</td>
<td>0.430</td>
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<tr>
<td>Average Temperature</td>
<td>0.230</td>
<td>0.000</td>
</tr>
<tr>
<td>Thunder</td>
<td>-3.601</td>
<td>0.002</td>
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<tr>
<td>Sky Cover</td>
<td>-0.815</td>
<td>0.000</td>
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</table>

All months had negative coefficients (relative to June).
Discussion

Weather variables dramatically increased $R^2$

<table>
<thead>
<tr>
<th></th>
<th>Network Area</th>
<th>+ Weather</th>
<th>+ Season</th>
</tr>
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<tbody>
<tr>
<td>$R^2$</td>
<td>0.0024</td>
<td>0.4082</td>
<td>0.4509</td>
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After controlling for weather and seasonal effects, the coefficients on network size are positive but not significant.
Implications

- People can be unpredictable and comfort-driven
- Bicycling cannot stand alone as a year-round solution
Limitations

“Boundary Effect”
Stations become increasingly out of reach for the system’s first and central users.
Limitations

- Applicable data only from 2011 season
- Sampling selection
  - Only looked at “early adopter” subscribers
  - System expansion obviously enabled new users to join (not part of this study)
Future Study

- Positive, insignificant coefficients on network size across all models tested indicate opportunity
- Low to moderate $R^2$ values signify that there are many other factors contributing to people’s use of the Nice Ride network
- Control variables to consider: proximity to destinations, socio-economic atmospheres, construction, and transportation infrastructure
Ask us questions!

Acknowledgements:
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