Illuminating the Dark Horse of Transportation Options: Research, Results, and Tools for Bicycle Planning

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Dilemma: statistics are spotty and the literature appears to be heavily populated with advocacy.
Bicycling Oriented Projects

2. Bicycle and Pedestrian Safety in Minnesota
3. Refining Methods for Calculating Non-motorized travel (Access to Destinations)
4. Hennepin County Trail Survey Analysis
5. Lifestyle Analysis of Households Near Bicycling Trails
6. Bicycling Use and Proximity to Facilities
7. Stated Preference for Different Types of Bicycle Facilities
8. Home Value and Proximity to Bicycle Facilities
9. Changes in Bicycle Facility Construction and Changes in Use
10. Bicyclist Commuting Behavior (including putting GPS units on cyclists)
11. Understanding the Role of Discontinuities in Bicycling Behavior
12. Incorporating Active Living into Municipal Planning
1. What do we know of the cycling population?
2. Highlights from recent Twin Cities bicycling studies
   a. Do people who live near facilities bicycle more?
   b. Who uses facilities?
   c. How much are people willing to divert bicycle trips for facilities?
3. Reflections
National Household Travel Survey collected info on 5,184 bike trips (weights to 3,174,433,064 annual bike trips); U.S. population = 293,656,842;

Each person makes ~ 11 bicycle trips / year

But, 72.1% never rode a bicycle or had not done so during a 30-day period over the summer of 2002

Digging a bit deeper…
- 1% of adults bicycle on a given day,
- 5.3% on a given week,
- 16% on a given month,
- 29% in the summer, and
- 40% in a year
Frequency of Bicycle Use by Gender, Income, & Age (in millions)

<table>
<thead>
<tr>
<th>Trip Length</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 mile or less</td>
<td>38.6%</td>
</tr>
<tr>
<td>1 to 2 miles</td>
<td>18.5%</td>
</tr>
<tr>
<td>2 to 5 miles</td>
<td>23.8%</td>
</tr>
<tr>
<td>5 to 10 miles</td>
<td>11.8%</td>
</tr>
<tr>
<td>More than 10 miles</td>
<td>7.3%</td>
</tr>
</tbody>
</table>
1. Initial considerations
   - Family responsibility
   - Work requirements
   - Equipment
   - Preferences
   - Time
   - Awareness

If feasible

2. Trip barriers
   - Weather
   - Geography
   - Adequate facilities
   - Traffic

If overcome

3. Destination barriers
   - Storage
   - Showers
   - Employer support

If overcome

Decision to Bicycle
Question: Does having a bicycle lane/path close to home increase the propensity to complete a cycling trip?
86 cyclists (5.2%)
OFF-street bicycle path

ON-street bicycle path
Odds of bicycle use (and distance to trail)

Think of residents living different distances from a facility:
- < 400 m
- B/w 400 and 800 m
- B/w 800 and 1600 m
- > 1600 m

Only those with ON-STREET facilities < than 400 m had higher odds (3 x)

OFF-STREET facilities, insignificant.
Twin Cities Travel Survey

Please circle the number or letter that corresponds to the answer that best reflects your opinion, or write in the information requested. All individual responses will be confidential.

Q1. How close is your home to the NEAREST off-street bicycle trail (the Midtown Greenway)? (Circle one.)
   1. Less than ¼ mile (less than four football fields)
   2. Between ¼ and ½ mile (four to six football fields)
   3. Between ½ mile and ¾ mile
   4. Between ¾ mile and 1 mile
   5. More than 1 mile
   6. I know where the trail is, but don’t know how far it is from my home.
   7. I don’t know where this bicycle trail is located.

Q2. When was the MOST RECENT time that you rode a bicycle, with your home as the starting point, in the past 12 months? (Circle one.)

   1. In the past 30 days
   2. More than 30 days ago
   3. I did not ride a bicycle with my home as the starting point in the past 12 months

   a. Why did you choose NOT to ride a bicycle in the past 12 months? (Circle all that apply.)
      1. Don’t like to ride
      2. Don’t have a bike
      3. Don’t feel safe because of traffic
      4. Trails too hard to access
      5. Don’t have time
      6. Bike not in condition to ride
      7. Don’t know where trails are
      8. Too out of shape

NOW SKIP TO Q6 ON PAGE 2

Q3. On that MOST RECENT time, what was the PRIMARY purpose of your bicycle riding? (Circle one.)

   1. To get to work or school
   2. For exercise
   3. To go to the store or run an errand
   4. Other (please specify) ___________________________________________________________________

Q4. On that MOST RECENT time, did you MOSTLY use: (Circle one.)
Greenway
[Sample #1]
Luce Line
[Sample #3]
Percentage of Sample Using Trail of Interest in Last Year

\[ y = 0.6698e^{-0.0622x} \]

\[ R^2 = 0.7144 \]
Sample 1: Percentage Using Trail of Interest (Greenway) in Last Year

\[ y = 0.4333e^{0.0005x} \]

\[ R^2 = 1E-05 \]
Sample 2: Percentage Using Trails of Interest (SW LRT & Cedar Lake) In Last Year

\[ y = 0.7359e^{-0.0966x} \]

\[ R^2 = 0.688 \]
Sample 3: Percentage Using Trails of Interest (SW LRT & Luce Line) In Last Year

\[ y = 0.8327e^{-0.0827x} \]

\[ R^2 = 0.8983 \]
Question:
Who is using the existing trail system?
HENNEPIN COUNTY -- TRAIL USER SURVEY

Hennepin County is conducting a survey of the users of several recreation trails. The purpose of this survey is to gain a better understanding of the users of the trail system and their impressions of various aspects of the trails. We appreciate your taking the time to answer these questions. ALL RESPONSES WILL BE KEPT IN STRICT CONFIDENTIALITY.

1. How many times will you use the trail system today? ________

Now, thinking ONLY about your CURRENT use of the trail today:

2. At what time did you start using the trail system? _____ : _____ am / pm

3. And how long do you expect to use the trail system? _____ hours _____ minutes

4. How many miles do you plan to go on the trail system? ________ miles

5. What is your current activity on the trail? Please mark only ONE response:
   - Biking
   - Walking
   - Running
   - Wheelchair Use
   - Skating
   - Other ________________

6. Where did you begin your current journey today? (For example, if you are biking, from what location did you start your bike ride; if you are walking, from what location did you start your walk?)
   Please identify street address, nearest intersection, or trailhead name.
   ______________________________________________________
   ______________________________________________________

7. And what is your destination today? (Where will you be ending your bike ride, walk, skate, etc.?)
   - Check box if you will be ending at the same place you started.
   - Otherwise, please identify street address, nearest intersection, or trailhead name.
# Trail Survey Demographics

<table>
<thead>
<tr>
<th></th>
<th>Combined</th>
<th>Greenway</th>
<th>Western Suburban</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trail intercept</td>
<td>Resident Location</td>
<td>Population (census)</td>
</tr>
<tr>
<td>Total</td>
<td>3,127*</td>
<td>1,193</td>
<td>160,302</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>62.7%</td>
<td>60.4%</td>
<td>50.9%</td>
</tr>
<tr>
<td>Female</td>
<td>37.3%</td>
<td>39.6%</td>
<td>49.1%</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>94.8%</td>
<td>89.9%</td>
<td>60.1%</td>
</tr>
<tr>
<td>AA/Black</td>
<td>1.6%</td>
<td>5.8%</td>
<td>14.8%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1.2%</td>
<td>1.7%</td>
<td>13.1%</td>
</tr>
<tr>
<td>Asian</td>
<td>1.8%</td>
<td>1.7%</td>
<td>4.9%</td>
</tr>
<tr>
<td>American Indian</td>
<td>0.5%</td>
<td>0.8%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Native Hawaiian/PI</td>
<td>0.2%</td>
<td>0.3%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Other</td>
<td>n/a**</td>
<td>n/a**</td>
<td>3.8%</td>
</tr>
<tr>
<td>Mean Age</td>
<td>43.1</td>
<td>40.9</td>
<td>33.7</td>
</tr>
</tbody>
</table>

* Total N for survey. Not all respondents answered every demographic question.
** Multiple responses accepted for race.
Question: How much are people willing to divert trips for facilities?
## Variation in Additional Distance Traveled by Trip Purpose

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Mean</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>2.8 km (1.7 mi)</td>
<td>1.1 km (0.7 mi)</td>
</tr>
<tr>
<td>Work/School Commute</td>
<td>2.1 km *</td>
<td>1.0 km</td>
</tr>
<tr>
<td>Shopping</td>
<td>3.0 km *</td>
<td>1.0 km</td>
</tr>
<tr>
<td>Recreational</td>
<td>3.8 km *</td>
<td>2.0 km</td>
</tr>
</tbody>
</table>

* Difference of means (ANOVA) is significant to the .10 level
Cycling Environments Compared in Stated Preference Study

Off Road  Bike Lane, No Parking  Bike Lane with Parking

No Bike Lane, No Parking  No Bike Lane with Parking
Imagine you commute to work by bicycle. If route 1 and route 2 are the only available options for your commute and your travel time on each route is as given below each video, which route would you use?

**Route 1**

40 Minutes

**Route 2**

20 Minutes

Your Choice

1

2

Next

Travel Time for Route 1 gets longer or shorter based on selection.
Assuming a 20 minute commute…

On-street bicycle lane
= 16.3 min ($3.26)

Not having a parking facility
= 8.9 min ($1.78)

Off-road improvement
= 5.2 min ($1.04)
# Incidence & Type of Benefits

**Beneficiary**  
- **To the User (direct)**  
  - **Mobility**  
    - enhanced conditions  
    - shorter travel distance  
  - **Health**  
    - increased physical activity  
    - decreased health care costs  
  - **Safety**  
    - decreased accidents  
    - increased comfort  
  - **Externalities**  
    - decreased congestion  
    - reduced pollution  
  - **Livability**  
    - proximity to recreational amenities  
    - increased open space  
  - **Fiscal**  
    - increased economic activity  
    - decreased taxes  

- **To the Community (indirect)**  
  - **Health**  
    - increased physical activity  
    - decreased health care costs  
  - **Safety**  
    - decreased accidents  
    - increased comfort  
  - **Externalities**  
    - decreased congestion  
    - reduced pollution  
  - **Livability**  
    - proximity to recreational amenities  
    - increased open space  
  - **Fiscal**  
    - increased economic activity  
    - decreased taxes
How much do bicycle facilities cost? Can we quantify their benefits? In what cases do estimates of benefits outweigh costs?

If your community is considering building a new bicycle facility you can use this tool to estimate costs, the demand in terms of new cyclists, and measured economic benefits (e.g., time savings, increased livability, decreased health costs, a more enjoyable ride, decreased pollution).

[Click to start the COSTS-DEMANDS-BENEFITS analysis tool] or [click to visit the bicyclopedia]

http://www.bicyclinginfo.org/bikecost/
Acknowledgements

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Minnesota Obesity Prevention Center
Blue Cross – Blue Shield of Minnesota
Center for Urban and Regional Affairs
Midwest Regional University Transportation Center
1. Myriad reasons why people **DO NOT** cycle (the built environment is just one).
2. All bicycle facilities are **NOT CREATED EQUAL**.
3. Different facilities have **VARIED APPEAL** for varied populations in varied cultures across varied settings.
4. Enhanced facilities are likely to be appreciated by **ONLY a FEW** (but this could change).
5. Identifying **TARGET MARKETS** is **DIFFICULT**.
6. Preferences, lifestyles, and attitudes **TRUMP ALL ELSE**.
Intensive & Extensive Margins

Frequent Participants

6% Really appreciate bicycle facilities

NON – Frequent Participants

94% Do not care or are opposed to them
Potential markets?

We know:
Cyclists have a higher propensity to be:
• Male
• White
• higher income
• between 18 and 44

But OTHER opportune markets exist:
• Under 16
• Generally unlicensed
• Elderly
• Lower income

2005 U.S. Population = 293,656,842
2005 Licensed Drivers = 198,888,912
% of U.S. population UNLICENSED = 32% (95 mill)
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