Explaining Gender Differences in Bicycle Behavior

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Motivation for Research: Female vs. Male Bicycle Trips

• In the U.S. men make over twice as many bicycle trips as women

• Imbalance is not a global phenomenon
  – Women and men make almost the same number of bicycle trips in the Netherlands, Denmark, Germany (Pucher 2008).
Motivation for Research: Low Bicycling Rates in U.S.

Research Question

• What explains gender differences in bicycling in the U.S.?
  – Are men and women affected by different factors?
  – Are they affected by the same factors but to different degrees or in different ways?
Conceptual Basis: Ecological Model

Individual factors: preferences, attitudes, experience, comfort...

Social-environment factors: bicycle culture...

Physical-environment factors: bicycle infrastructure, land use mix...

Bicycling: yes/no, frequency, distance, purpose, etc.
Previous Research: Perceived Safety and Comfort Levels

- Women more likely than men to prefer to bicycle separated from vehicular traffic
- Preferred by both advanced and novice female cyclists
  - U.S., Australia, Germany, the Netherlands, and Denmark
Previous Research: Household Responsibilities

- Women make more trips for household and family support activities than men
- Percentage of total bicycle trips for shopping:
  - U.S. – 5%
  - Germany, the Netherlands, and Denmark – 20-25%

2006 Davis Bicycle Behavior Survey

• Davis and 5 comparison cities
• On-line survey, with letters to recruit and postcards as reminders
  – 10,000 addresses (>20% not good)
  – 12.6% response rate
  – 965 responses
• Phone survey May 2008 in Davis
  – To assess non-response bias
  – Non-significant difference from original on-line survey
## Selection of Cities

<table>
<thead>
<tr>
<th></th>
<th>Infrastructure</th>
<th>Culture</th>
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<tbody>
<tr>
<td>Davis</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Chico</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Woodland</td>
<td>+</td>
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<td>Turlock</td>
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<tr>
<td>Boulder</td>
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<td>Eugene</td>
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</table>
Analysis Overview

- Sub-sample of bicycle owners
  - n = 272 for female, n = 385 for male
- Dependent binary variable
  - 1 = “Bicycled in the last 7 days”
  - 0 = “Did not bicycle in the last 7 days”
- Binary logistic regression to estimate models

37% of women versus 43% of men bicycled in the last 7 days (p=0.063)
Modeling Sequence

• Gender-specific models
  – All potential factors
• Pooled model
  – Significant factors from gender specific models
• Pooled model with interaction terms
  – Start with ‘best’ pooled model and add significant interaction terms from gender-specific models
<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Coef</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Constant</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Individual factors: Socio-demographics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education Level</td>
<td>+0.241</td>
<td>1.272</td>
</tr>
<tr>
<td>Home Ownership</td>
<td>-0.681</td>
<td>0.506</td>
</tr>
<tr>
<td>Limit on Biking</td>
<td>-1.379</td>
<td>0.252</td>
</tr>
<tr>
<td>Child/Children Assistance</td>
<td>0.744</td>
<td>2.105</td>
</tr>
<tr>
<td><strong>Individual factors: Attitudes</strong></td>
<td></td>
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<tr>
<td>Like Biking</td>
<td>1.370</td>
<td>3.935</td>
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<tr>
<td>Like Transit</td>
<td>-0.488</td>
<td>0.614</td>
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<tr>
<td>Good Health</td>
<td>0.265</td>
<td>1.304</td>
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<tr>
<td>Biking Comfort_female</td>
<td>1.952</td>
<td>7.046</td>
</tr>
<tr>
<td>Need Car_female</td>
<td>-0.537</td>
<td>0.585</td>
</tr>
<tr>
<td>Biked in Youth_male</td>
<td>1.637</td>
<td>5.138</td>
</tr>
<tr>
<td>Self Selection_male</td>
<td>0.844</td>
<td>2.326</td>
</tr>
<tr>
<td><strong>Social Environment</strong></td>
<td></td>
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<tr>
<td>Bikers Poor</td>
<td>-0.320</td>
<td>0.726</td>
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<td><strong>Physical Environment</strong></td>
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<td>Safe Destinations</td>
<td>0.321</td>
<td>1.379</td>
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<tr>
<td>Transit Access_male</td>
<td>1.046</td>
<td>2.847</td>
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<tr>
<td><strong>Valid N</strong></td>
<td>590</td>
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<tr>
<td><strong>Pseudo R^2</strong></td>
<td>0.327</td>
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<tr>
<td><strong>Model Chi-square</strong></td>
<td>577.599</td>
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Comfort on Bicycle Facilities ~ Female

- Highest OR of all variables for women
  - Higher the level of comfort the more women were apt to bicycle
- Men experienced approximately as much discomfort on average as women on facilities not separated from heavier traffic
  - Men more likely to report that they would ride on them anyway.
Biked in Youth ~ Male

- Highest OR of all variables for men
- Social influences could be involved:
  - Previous research shows that:
    - Boys are more active than girls
    - Boys are allowed by their parents to roam farther, geographically speaking, than girls
  - Findings suggest that girls may be more restricted in their bicycling than boys
    - Less bicycling for girls means childhood experience less of a factor for women
Need Car ~Female

- Women who agreed that they need a car were less likely to bicycle
- Variable does not differentiate between what car is needed for:
  - Could be associated with household responsibilities and use of vehicle for convenience
    - Women in two working parent families make many more stops for pick-up, drop-off, and errands
Transit Access ~ Male

- Agreement with statement: “There is bus or train service within a 5 minute walk of home”
  - Male respondents more likely to bicycle
- Perhaps serving as a proxy for a set of neighborhood characteristics
  - Denser neighborhoods with more destinations within bicycling distance might also have better transit service.
- College towns...
Self-Selection ~ Male

- Importance of “a good community for bicycling” when choosing where to live.
- Significant for men but not for women likely tied to higher levels of bicycling for men.
  - High levels of bicycling for women in Davis is more about the environment.
The 4 E’s

<table>
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Sensitivity to gender differences
Thanks!

Questions? slhandy@ucdavis.edu