

Explaining Gender Differences in Bicycle Behavior

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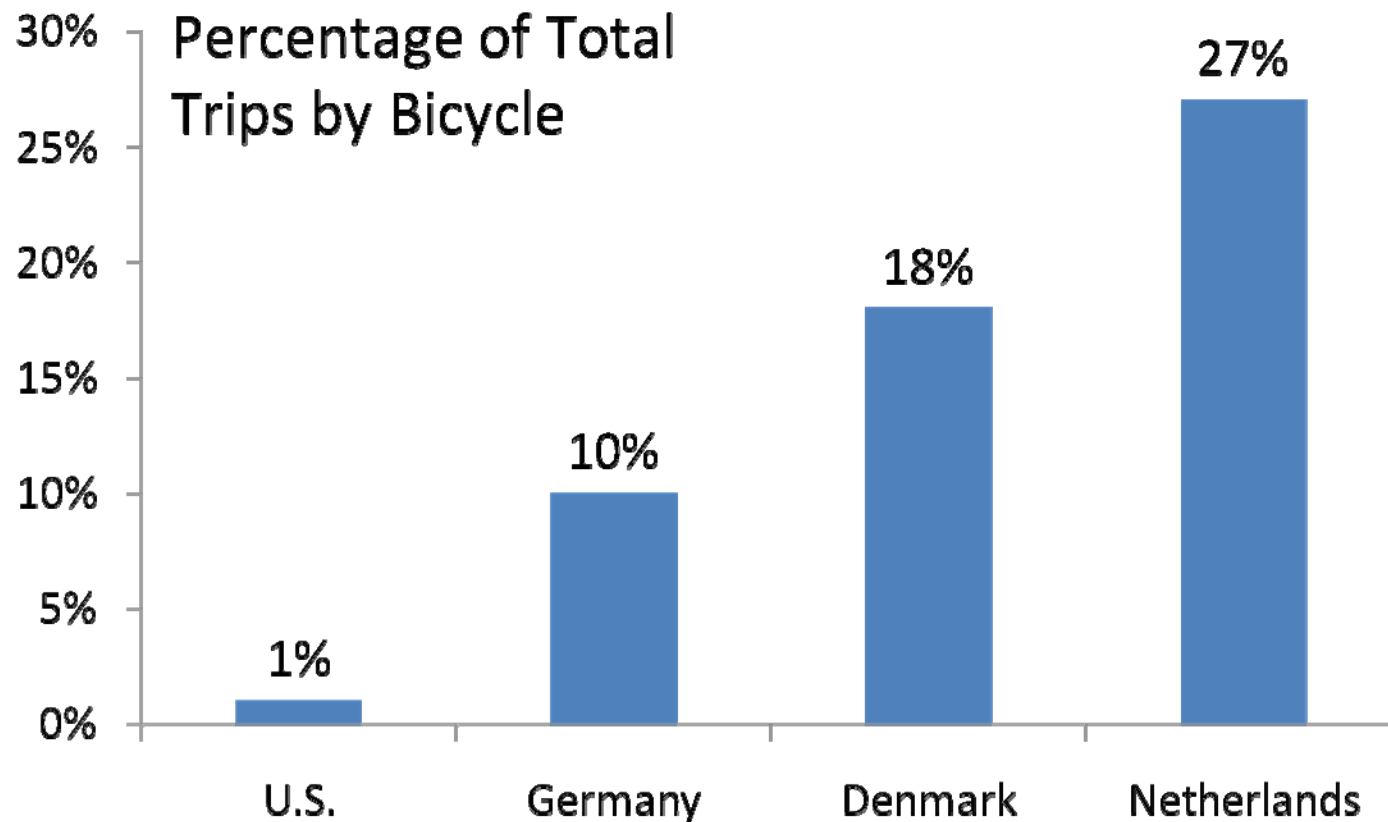


Motivation for Research: Female vs. Male Bicycle Trips

- 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.

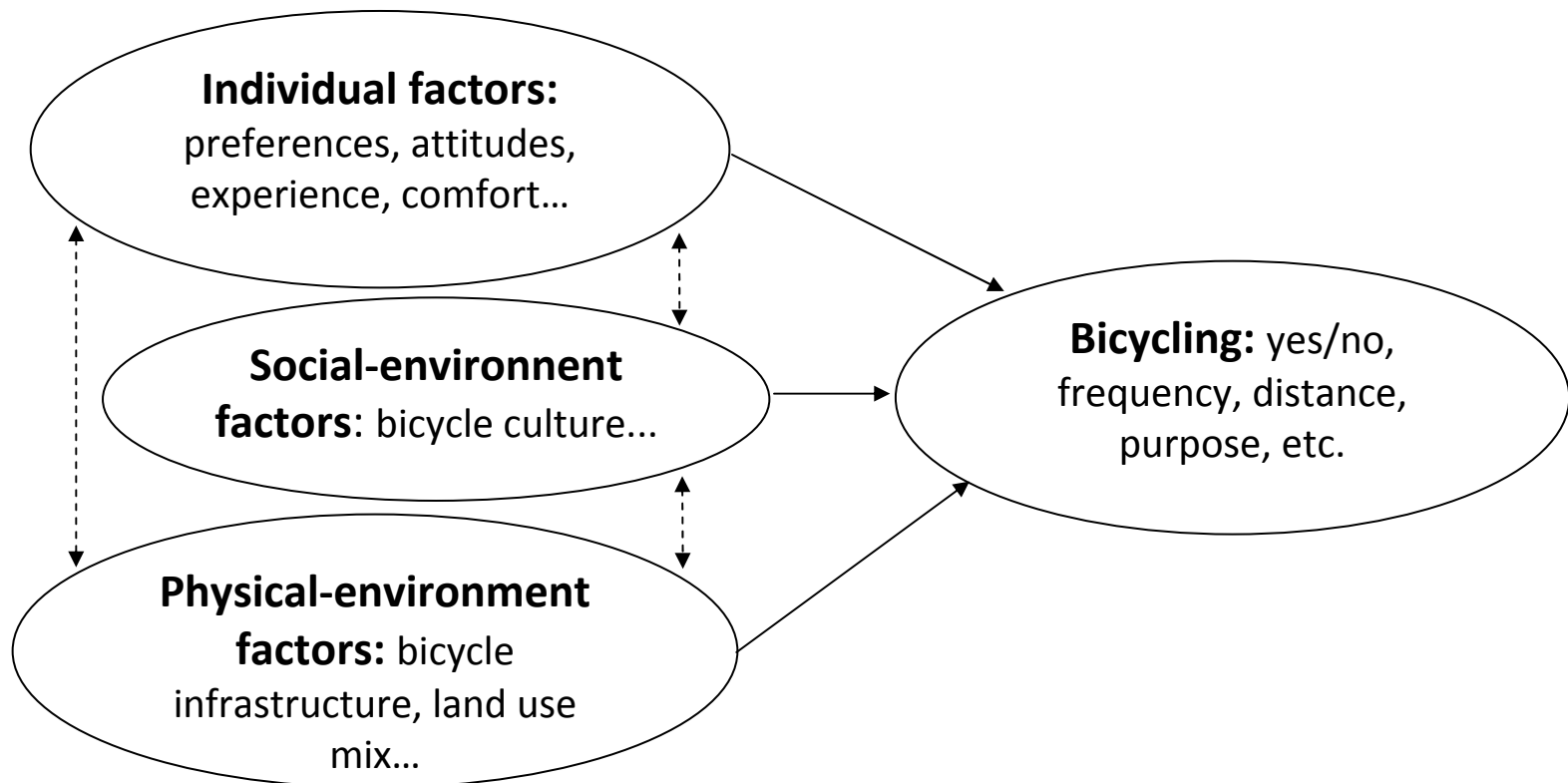


Research Question

- 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



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%



Photo: <http://www.bikesatwork.com/hauling-cargo-by-bike/hpv-cargo-capacity.html>

2006 Davis Bicycle Behavior Survey

- Davis and 5 comparison cities
- On-line survey, with letters to recruit and postcards as reminders
 - July – September 2006
 - 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

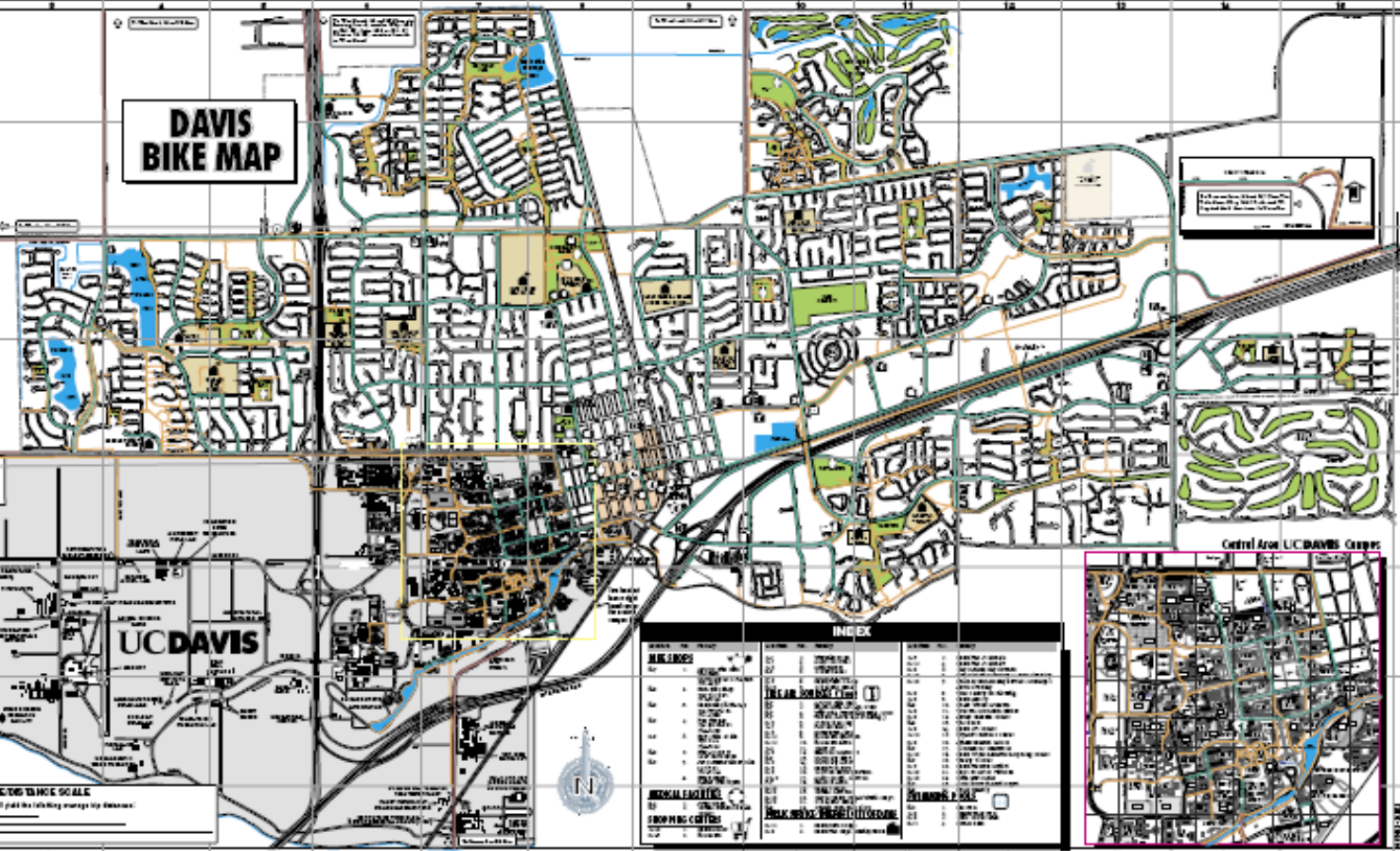
DAVIS BIKE MAP

SYMBOLS LEGEND

- Public Rental Garage
- Public Transit Station
- Shopping Center
- Tri-Center
- Market/Office
- Tri-Center
- City Plaza
- Public Plaza
- City Plaza
- Public Plaza
- City Plaza
- Public Plaza

ROUTE GUIDE

Green Routes are highly scenic and suitable for leisure riding. They are marked with a green line and a green bicycle icon. Orange Routes are suitable for commuting and are marked with an orange line and an orange bicycle icon. Blue Routes are suitable for commuting and are marked with a blue line and a blue bicycle icon. Red Routes are suitable for commuting and are marked with a red line and a red bicycle icon.



UC DAVIS

INDEX

ADDRESS OR POINT OF INTEREST	ADDRESS OR POINT OF INTEREST	ADDRESS OR POINT OF INTEREST	ADDRESS OR POINT OF INTEREST
1000	1100	1200	1300
1400	1500	1600	1700
1800	1900	2000	2100
2200	2300	2400	2500
2600	2700	2800	2900
3000	3100	3200	3300
3400	3500	3600	3700
3800	3900	4000	4100
4200	4300	4400	4500
4600	4700	4800	4900
5000	5100	5200	5300
5400	5500	5600	5700
5800	5900	6000	6100
6200	6300	6400	6500
6600	6700	6800	6900
7000	7100	7200	7300
7400	7500	7600	7700
7800	7900	8000	8100
8200	8300	8400	8500
8600	8700	8800	8900
9000	9100	9200	9300
9400	9500	9600	9700
9800	9900	10000	10100



CYCLIST'S TIME/Distance SCALE

Estimate of time required to travel 100 miles by bicycle.

10 mph	10 hours
15 mph	6.7 hours
20 mph	5 hours
25 mph	4 hours
30 mph	3.3 hours
35 mph	2.9 hours
40 mph	2.5 hours
45 mph	2.2 hours
50 mph	2 hours

Selection of Cities

	Infrastructure	Culture
Davis	+	+
Chico	-	+
Woodland	+	-
Turlock	-	-
Boulder	+	+
Eugene	+	+

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



Female
Model

Male
Model

Pooled
Model

Pooled Model w/
Interaction Terms

Pooled Model
w/ Interaction
Terms

Variable Name	Coef	OR
Constant		
<i>Individual factors: Socio-demographics</i>		
Education Level	+0.241	1.272
Home Ownership	-0.681	0.506
Limit on Biking	-1.379	0.252
Child/Children Assistance	0.744	2.105
<i>Individual factors: Attitudes</i>		
Like Biking	1.370	3.935
Like Transit	-0.488	0.614
Good Health	0.265	1.304
Biking Comfort_female	1.952	7.046
Need Car_female	-0.537	0.585
Biked in Youth_male	1.637	5.138
Self Selection_male	0.844	2.326
<i>Social Environment</i>		
Bikers Poor	-0.320	0.726
<i>Physical Environment</i>		
Safe Destinations	0.321	1.379
Transit Access_male	1.046	2.847
Valid N	590	
Pseudo R ²	0.327	
Model Chi-square	577.599	

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

Engineering	
Education	
Encouragement	
Enforcement	

Sensitivity to gender differences



Thanks!

Questions? slhandy@ucdavis.edu