RP-97-38

Preprint No. 970900

MANUSCRIPT

Title: **Bicycle Journey-To-Work: Travel Behavior Characteristics and Spatial Attributes**

Authors: Kevan R. Shafizadeh, Research Assistant
Univ. of Calif.-Davis, Dept. of Civil and Env. Engineering, Davis, CA 95616

Debbie A. Niemeier, Assistant Professor
Univ. of Calif.-Davis, Dept. of Civil and Env. Engineering, Davis, CA 95616

Transportation Research Board
76th Annual Meeting
January 12-16, 1997
Washington, D.C.

BICYCLE JOURNEY-TO-WORK: TRAVEL BEHAVIOR CHARACTERISTICS AND SPATIAL ATTRIBUTES

KEVAN SHAFIZADEH[1] AND DEBBIE NIEMEIER,[2] PH.D., P.E.

[1] *Research Assistant, University of California-Davis, Dept. of Civil and Env. Engineering*
[2] *Asst. Professor, University of California-Davis, Dept. of Civil and Env. Engineering, Davis, CA 95616*

ABSTRACT

This research explores the relationship between the demographic and spatial attributes of individuals making a weekday bicycle journey-to-work commute and their commute travel time. The research is conducted using data from a 1993 bicycle intercept survey distributed in Seattle, Washington, in which individual bicycle travel behavior characteristics were collected. The data includes socio-economic information, such as age, gender and income. The results indicate that three common factors associated with travel – age, gender, and income – may play unexpected roles in the length of bicycle commute travel times for the journey-to-work trips. This research also suggests that separated bicycle paths play an integral part of the overall bicycle transportation network. Statistical analysis has also shown that the cyclists traveling primarily on separated paths tend to make significantly longer trips.

Keywords: bicycle, commute, behavior, patterns, GIS

BICYCLE JOURNEY-TO-WORK: TRAVEL BEHAVIOR CHARACTERISTICS AND SPATIAL ATTRIBUTES

KEVAN SHAFIZADEH[1] AND DEBBIE NIEMEIER,[2] PH.D., P.E.

[1] *Research Assistant, University of California-Davis, Dept. of Civil and Env. Engineering*
[2] *Asst. Professor, University of California-Davis, Dept. of Civil and Env. Engineering, Davis, CA 95616*

INTRODUCTION

In 1991, Congress passed the Intermodal Surface Transportation Efficiency Act (ISTEA) mandating the implementation of multi-modal transportation planning which included assessment and integration of non-motorized forms of transportation. The Act represented the first major federal legislation to promote and encourage bicycling in the United States. While the implementation of ISTEA has dramatically enhanced bicycle funding opportunities and facilitated recognition of the bicycle as an integral part of the modern American transportation system (*1*), there remains an urgent need to better understand how to integrate and estimate bicycle travel in bicycle travel demand models.

In the post-ISTEA years, the volume of bicycle research in both developing countries (e.g., *2*) and in the United States, has increased dramatically. However, to a large extent, research in the U.S. has focused primarily on bicycle safety (e.g., *3*, *4*). Little of the past literature directly addresses issues associated with bicycle travel behavior in this country. There is a need for further study of the characteristics of the individual making the bicycle trip and the associated spatial attributes of the bicycle trip.

The purpose of this research is to examine travel behavior characteristics of individuals making journey-to-work bicycle trips. The research contributes to the literature by focusing on the variability associated with travel time, rather than the more commonly examined distance (e.g., *5*, *6*). Thus, the results can be expressed in terms of impedance and can be interpreted within the classical travel demand framework. By understanding the factors contributing to the variability of bicycle journey-to-work commute travel times, transportation officials can improve specification of bicycle travel demand models.

The paper begins with a discussion of previous research in bicycling travel behavior, focusing in particular on the journey-to-work trip. The second section describes the empirical setting for the data analysis. The third section presents study results and is followed by a summary and recommendations for future research.

LITERATURE REVIEW

Individuals making a bicycle trip typically exhibit several common characteristics. Beginning with gender, previous research clearly suggests that men generally make more bicycle trips than women. For example, count data collected in Phoenix, Arizona indicated that men accounted for 75% of the observed cyclists (*7*). A more recent study, using the 1990 National Personal Transportation Survey (NPTS) data, shows that, on average, men make 72% of all total annual bicycle trips, while women make only 28% (*8*). These trends coincide with the findings summarized by Goldsmith in the FHWA National Bicycling and Walking Study, Case Study No. 1 (*9*). This first case study, based on ten separate surveys in cities around the country, revealed that in nine of the ten surveys male cyclists outnumbered female cyclists by an average of more than 25%. Goldsmith also notes that "the difference is even greater if we are specifically talking about bicycle commuting," adding, "the cause of this disparity is unknown, leaving room for speculation" (*9*, p. 14).

Like gender, age appears be highly correlated to bicycle usage. In general, cyclists tend to be younger than non-cyclists (*6*). According to Goldsmith, "a rather intuitive pattern emerges with respect to age and frequency of bicycling: it declines" (*9*, p. 15). However, as Goldsmith also points out, the number of individuals making bicycle trips, in general, is not linearly correlated with age:

> The decline is not necessarily steady from the age of 18; some evidence shows that cycling becomes more popular for those in their mid-twenties. Nonetheless, in all cases at least two-thirds of the cyclists were under the age of 45. (*9*, p. 15)

For the journey-to-work, these results are consistent with other research in which cyclists were found to be the youngest of all commuters when compared to other modes (*10*). Surveys administered in Capital Park, Maryland and Davis, California also find that 81% and 84%, respectively, of bicycle commuters were under age 36 (*11*, *5*).

Studies have also linked socio-demographic characteristics, such as income (and occupation as a proxy for income), with bicycle trip production. However, as Goldsmith acknowledges, income is more difficult to directly correlate with bicycle usage because the data may have some co-dependence with education or age. Utilizing an economic approach, Everett correlates bicycle demand to automobile demand by analyzing their associated travel costs in a utility maximization approach (*12*). He concluded that the bicycle can be competitive with the automobile only in those cases where the trip length is very short or the income of the commuter is very low. In England, Ashley and Banister used occupation and auto ownership as proxies for income and show that bicycle travel decreases as these variables increase (*13*). Similarly, a case study in Davis, California linked higher bicycle trip rates to occupations involving sales, clerical, and blue-collar employees than to those professions involving professional, technical, or managerial positions, regardless of age or commute distance (*5*). Finally, the 1990 NPTS indicated that as household income increases, the propensity to make a bicycle work trip decreases (*8*).

When examining the spatial attributes of the journey-to-work, most bicycle travel research focuses on travel distance, finding that distances vary based on geographic region and trip purpose. Generally, bicycle journey-to-work trips are longer than other utilitarian trip purposes (e.g., shopping trips) (*14*). Using 1990 NPTS data, the authors found journey-to-work trips averaged 3.5 kilometers (2.2 miles), while home-based shopping trips averaged 2.3 kilometers (1.4 miles) (*unpublished survey data tabulations*). Others have suggested that the average U.S. journey-to-work commute distance ranges from a little over three kilometers (two miles) to a maximum of approximately 8 kilometers (five miles) (*6*, *5*).

EMPIRICAL SETTING

This study is based on data collected from a 1993 bicycle intercept survey distributed to cyclists at four locations in Seattle, Washington:

- the intersection of Dexter and Mercer in the Seattle Central Business District (CBD);
- the intersection of NE 65th and the Burke-Gilman Trail (Burke-65th);
- Lake Washington Boulevard, south of downtown Kirkland; and
- the Centennial Trail in Spokane.

The surveys were distributed during two time periods: the weekday peak period and the weekend peak period. To capture weekday travel, surveys were distributed at the Seattle Central Business District (CBD) and Burke-65th locations during weekday morning (7:00 AM to 9:00 AM) and evening (4:00 PM to 6:00 PM) peak travel periods. To capture weekend travel, surveys were distributed at the Kirkland, Spokane, and Burke-65th locations during the weekend midday (10:00 AM to 4:00 PM) peak travel period.

One thousand surveys were distributed at each survey location for the weekend and the weekday travel periods. In total, five thousand mailback surveys were distributed with an average response rate of approximately 34%. The intercept surveys were comprised of twenty six questions organized into three sections. The first section focused on the cyclist's current trip with questions about the trip origin and destination, trip purpose, and the types of roadway traveled (e.g., percentage of current trip taken on a separated bicycle path). The second section focused on the individual's riding habits. This section contained questions about the regularity of travel by bicycle, safety concerns, and perceived impediments to more frequent commuting. The final section gathered basic demographic data and included questions about age, gender, number of household members, and income. Additional survey details, as well as a copy of the survey instrument itself, can be found in the technical report prepared for the Washington State Transportation Commission (*15*).

This study specifically focuses on two locations, the CBD and the Burke-Gilman Trail, which were surveyed during the weekday peak periods (Figure 1). The CBD location is a painted bicycle lane serving mostly CBD-bound commuters, whereas the Burke-Gilman Trail is a separated bicycle path located away from automobile traffic. Approximately 31% of the surveys were returned from the Seattle CBD location and while 27% were from the Burke-65th location.

[Insert Figure 1 (Survey Locations) here.]

The journey-to-work commuters represent 80% of the total cyclists surveyed during the weekday peak period. Approximately 96% (N=298) of the Seattle CBD respondents returning surveys were making a work commute trip on the day of the survey while the remaining 4% (N=12) making a non-commute trip (e.g., school, shopping/personal business, social/recreational, or exercise/training). Roughly 57% (N=153) of those returning surveys at the Burke-65th location reported making a commute trip on the survey day, while 43% (N=116) reported a non-commute trip.

The problem of potential bias always exists in surveys, particularly those self-administered and returned by mail. Two important sources of potential bias exist in the data collection: during the survey distribution and during the survey self-administration and mailback. The first possible source of bias should be eliminated by the random selection of days and systematic distribution of the survey instrument; surveys were distributed to every third cyclist on randomly selected sunny days. However, it was noted during the survey distribution that individuals seriously training or exercising often failed to take an offered survey. Many of these cyclists indicated that they did not want the survey or that they would collect it on the return trip (which was often after the peak distribution time). This behavior might result in systematic error, resulting from the exclusion of a cycling subset.

The survey distribution locations might also contribute to potential bias. While surveys were originally distributed at five locations, only two of these locations distributed surveys during the work week. The commuter subset of cyclists was derived from these two survey locations (i.e., the Seattle CBD and Burke-65th). As a result, these locations might have captured a geographically smaller representation of the cyclists in this region than if data were taken from all five survey locations. Nonetheless, these two survey locations are very different in design and allow for a good comparison of different ridership characteristics and travel patterns.

The second major source of bias, associated with the types of individuals returning the surveys, is more difficult to discern. Generally, collected data are compared with outside sources to identify possible sources of bias. However, so few disaggregate data exist on cyclists by location, that clearly identifying possible bias from an outside source presents some difficulty. There is some potential that multiple surveys were taken by the same individual on both survey days. However, this is thought to be very minor in effect.

RESULTS

In previous work, Hulse and Shafizadeh showed that age and income, but not gender, were significant factors associated with the bicycle journey-to-work commute travel time (*16*). This research established that mean travel times tended to vary by income level; individuals reporting household incomes between $7,500 and $15,000 tended to have significantly shorter commute travel times than those respondents reporting higher incomes. Table 1 provides a summary of the distribution and mean commute times by income group.

[Insert Table 1 (Commute Travel Time By Income) here.]

The earlier research also indicated that the difference in average commute time between men and women was not statistically significant, but that age tended to be positively associated with bicycle commute travel times. In general, older respondents tended to report longer commute travel times.

This research extends previous findings by examining how each of these factors interacts with commute travel time when specific commuter subsets are identified. In particular, this analysis focuses on how commute travel times vary between those respondents with destinations into the CBD and those respondents with destinations out of the CBD. Additionally, the role that a separated bicycle path may play in travel time variability is examined and discussed.

The first task undertaken in this analysis was the examination of the spatial variability associated with the reported journey-to-work origins and destinations. In Figure 2, the origins and destinations points for all three income groups are presented side-by-side. A large portion of individuals with incomes less than $35,000 were found to be slightly more likely to both begin and end their bicycle commute trips away from the CBD, regardless of survey location, and thus report shorter commute travel times. Conversely, the majority of the individuals in the higher income groups began their trip farthest away from the CBD, yet they also had destinations tightly clustered predominantly within the central business district of Seattle. As a result, individuals with higher incomes tended to report longer commute travel times than individuals with lower incomes. Thus, two different market segments of commuters may actually be present in the data.

[Insert Figure 2 (Travel Patterns by Income) here.]

Spatial analysis of the data with respect to age indicated that older respondents tended to make longer bicycle commute trips (in terms of time) than younger survey respondents. Similar to patterns associated with income, older individuals tended to begin their journey-to-work trip in the northern suburbs and travel to the CBD, while more younger individuals tend to begin their journey-to-work trip in the suburbs closer to the CBD. As might be expected, the destinations of individuals under age 30 also tend to cluster at the University of Washington.

[Insert Figure 3 (Travel Patterns by Age) here.]

A comparison of origin and destination points reveals similar travel-to-work patterns between men and women. As shown in Figure 4, the majority of men and women begin their journey-to-work from similarly dispersed locations within the suburbs and travel predominantly to the Seattle CBD. It should also be noted that a larger number of men (8.6%) travel to the University of Washington than women (3.4%).

[Insert Figure 4 (Travel Patterns by Gender) here.]

Statistical Analysis of Spatial Clusters: Inside the CBD vs. Outside the CBD

The results of the spatial analysis suggest that certain clusters of commuters may exist and possess identifiable characteristics. The relationship between commute travel time variability and age, gender, and income was investigated further using clustered data similar to the data shown in Figure 4. Two subsets of data were disaggregated to identify those respondents with journey-to-destinations inside the CBD and those respondents with journey-to-work destinations outside the CBD. Regressing commute travel time on age and income indicates that income plays a role in an individual's expected commute travel time, given the individual's destination.

For individuals with work destinations inside the CBD, income has a positive affect on travel time. For individuals with destinations outside the CBD, income has a negative affect, with smaller magnitude, on travel time. It is important to note that neither gender nor income is a particularly strong predictor of travel times for those respondents with destinations outside of the CBD. These models indicate that commute travel time decreases as income increases for suburb-to-suburb commuters, and travel time increases as income increases for suburb-to-CBD commuters. The models also indicate that, for suburb-to-CBD commuters, gender has a positive effect (i.e., women tend to have longer travel time commutes than men), while having a negative effect on suburb-to-suburb commuters (i.e., women's travel times tend to be less than men's travel times). These results are consistent with the travel time literature on gender (see *19* for a review) in which women's travel times were found to be a function of residence location and household responsibility. Additional analysis indicates that those respondents traveling into the CBD tended to have fewer children under age 6 (mean=0.01, se=0.08) on average than those traveling outside the CBD (mean=0.14, se=0.04), consistent with the household responsibility theory.

[Insert Table 2 (Commute Travel Time Regression) here.]

The Role of The Separated Bicycle Path and User Preference

As noted in the empirical setting, the survey locations differed in the types of predominant features. The Seattle CBD location serviced cyclists using a painted bicycle path and destined primarily for the CBD, while the Burke-65th survey location services cyclists on a separated bicycle path and destined for the CBD and the University of Washington. In previous research, it was found that cyclists surveyed on the separated bicycle path tended to report significantly longer commute travel times (*16*). This finding suggests that the separated bicycle path may serve a slightly different market segment than the on-street facility in the CBD.

The differences in reported travel times as a function of the distance to a separated bicycle path was also investigated. Spatial "buffers" of 0.4 kilometer (0.25 mile), 0.8 kilometer (0.50 mile) and 1.2 kilometer (0.75 mile) were generated around each separated bicycle path (Figure 5), and the reported trip origins contained within each of these buffers were identified. This analysis indicates that 24% of all journey-to-work respondents reported the survey day bicycle trip originating within 0.4 kilometer (0.25 mile) of a separated bicycle path. An additional 13 percentage points, or 37% of commuters, reported the current trip originating within 0.8 kilometer (0.50 mile) of a bicycle path. Over 53% of all journey-to-work respondents reported originating their bicycle trip within 1.2 kilometer (0.75 mile) from a separated bicycle path.

[Insert Figure 5 (Origins Within Buffers) here.]

The importance of the separated bicycle path was further investigated in relation to other trip attributes and demographic characteristics, however, there does not appear to be any clear trends in terms of travel time. Within the 0.4 kilometer (0.25 mile) buffer, the mean commute travel time is approximately 29 minutes; exclusively within the 0.8 kilometer (0.50 mile) buffer, the mean commute travel time increases to approximately 35 minutes; exclusively within the 1.2 kilometer (0.75 mile) buffer, the mean commute travel time decreases to approximately 31 minutes. While one could hypothesize that the reported bicycle commute travel time would increase as proximity to the bicycle path increases, this was not shown to be the case. Instead, the data suggest that an approximate 0.8 to 1.2 kilometer (0.50 to 0.75 mile) "bikeshed" may exist around a separated bicycle path. Within this bikeshed, between 24% and 53% of all respondents report a trip origin. This finding could indicate that a boundary exist within which individuals will access the bicycle path and outside of which individuals will take more direct route. As Table 3 illustrates, mean commute travel time appears to peak between the 0.8 kilometer (0.50 mile) buffer and the 1.2 kilometer (0.75 mile) buffer, suggesting that individuals within the bikeshed may be willing to travel slightly longer to access the separated bicycle path. However, this is highly speculative and in need of additional research.

[Insert Table 3 (Summary Statistics of Separated Bicycle Path Buffers) here.]

Additional analysis also indicates that clear distinctions in respondent use of and preference for separated bicycle paths. The respondents located outside of the bikeshed reported spending over half (53.7%) of their bicycle trip in vehicle lanes without any bicycle provisions.

While one might expect that respondents originating within the bikeshed would report spending the majority of their current trip on a separated bicycle path, it was found that their time is relatively evenly distributed among separated (33.2%), designated (27.4%), and undesignated (37.1%) bicycle facilities. Given that the separated bicycle paths do not exist in the CBD, one could speculate that respondents within the bikeshed prefer and attempt to use separated bicycle paths as much as possible in locations where the infrastructure exists.

Respondents were also asked to indicate what they would do if the most direct route to their destination required them to bicycle in a "vehicle lane with medium volume traffic and speeds of 35 mph." In general, the majority of respondents would choose to bicycle in the vehicle lane. However, fewer individuals originating within the bikeshed (47.7%) would prefer to bicycle in the vehicle lane than respondents outside of the bikeshed (57.2%). At the same time, more individuals originating within the bikeshed (44.0%) would prefer to switch routes than respondents outside of the bikeshed (39.9%). It is also important to note that a larger number of the respondents within the bikeshed (8.3%) would choose not to bicycle to the destination than the respondents outside of the bikeshed (1.4%). These results could suggest that some respondents would rather bicycle longer distances on a bicycle path, rather than bicycling shorter distances on the street with some vehicular traffic. Furthermore, some respondents would rather not make the trip at all when faced with bicycling on the street with some vehicular traffic.

[Insert Table 4 Summary of Commuter Preferences) here.]

CONCLUSION

Using data collected in Seattle, this research examines bicycle market segments, defined by the reported origin and destination information. The relationship between standard demographic characteristics and journey-to-work travel times is quantified. This research begins to identify factors associated with the bicycle journey-to-work commute travel time. The findings include:

- Higher income respondents tended to report longer commuter travel times.
- Younger commuters may be *less* willing to make longer commutes than older commuters.
- Travel times tend to be similar among men and women – although the levels of bicycle usage remain quite different.
- Commute travel time decreases as income increases for suburb-to-suburb commuters, and travel time increases as income increases for suburb-to-CBD commuters.
- Gender has a positive effect on the travel time for suburb-to-CBD commuters, while having a negative effect on the travel time for suburb-to-suburb commuters.
- Some respondents would rather bicycle longer distances on a bicycle path than bicycle shorter distances on the street with some vehicular traffic.

Future research is still needed in many aspects of bicycle and non-motorized travel. To accommodate the growing numbers of cyclists in this country, increased bicycle planning, funding, coordination, and evaluation efforts are needed at all levels. Specific research is needed to understand route choice and the effects of terrain. As noted, research is also clearly needed to understand the effects of distance and proximity to bicycle paths on bicycle travel behavior.

Above all, increased data collection and research is needed to assist transportation planners in promoting the bicycle as a viable mode of transportation.

ACKNOWLEDGEMENTS

The authors would like to thank Professor G. Scott Rutherford for assisting in the collection of survey data. The project was partially funded by the Washington State Transportation Commission, through the Innovations Unit, Olympia, Washington.

REFERENCES

1. Ferguson, E. and D.I. Montgomery. Statewide Bicycle Planning in the United States. In *Transportation Research Record, 1396,* TRB, National Research Council, Washington, D.C., 1993, pp. 37-43.
2. Tanaboriboon, Y. and G. Ying. Characteristics Of Bicycle Users in Shanghai, China. In *Transportation Research Record, 1396,* TRB, National Research Council, Washington, D.C., 1993, pp. 22-29.
3. Epperson, B. Demographic and Economic Characteristics of Bicycles Involved in Bicycle-Motor Vehicle Accidents. In *Transportation Research Record, 1502,* TRB, National Research Council, Washington, D.C., 1995, pp. 58-64.
4. Hunter, W.W., W.E. Pein, and J.C. Stutts. Bicycle-Motor Vehicle Crash Types: The Early 1990s. In *Transportation Research Record, 1502,* TRB, National Research Council, Washington, D.C., 1995, pp. 64-74.
5. Lott, D., T. Tardiff, and. D. Lott. Bicycle Transportation For Downtown Work Trips: A Case Study in Davis, California. In *Transportation Research Record, 629,* TRB, National Research Council, Washington, D.C., 1977, pp. 40-46.
6. Deakin, E.A. *Utilitarian Cycling: A Case Study of the Bay Area and Assessment of the Market for Commute Cycling.* Report UCB-ITS-RR-85-9. Institute of Transportation Studies, Berkeley. Berkeley, California. 1985.
7. Cynecki, M.J., G. Perry, and G. Frangos. A Study of Bicyclist Characteristics in Phoenix, Arizona. In *Transportation Research Record, 1405,* TRB, National Research Council, Washington, D.C., 1993, pp. 28-34.

8. Niemeier, D.A. and G.S. Rutherford. *Non-Motorized Transportation, 1990 NTPS Special Report.* Report FHWA-PL-94-019. FWHA, U.S. Department of Transportation, 1994.

9. Goldsmith, S.A.. *National Bicycling and Walking Study, Case Study #1: Reasons Why Bicycling and Walking Are Not Being Used More Extensively as Travel Modes.* Report FHWA-PD-92-041. FWHA, U.S. Department of Transportation, 1992.

10. Moran, K. *Bicycle Transportation for Energy Conservation.* Report DOT-P-80-092, U.S. Department of Transportation, 1980.

11. Maryland National Capital Park and Planning Commission. *Bikeways Survey.* Riverdale, MD, 1974.

12. Everett, M.D. Commuter Demand For Bicycle Transportation In The United States. *Traffic Quarterly*, Vol. 28, No. 4, October 1974, pp. 585-601.

13. Ashley, C.A. and C. Banister. Cycling to Work from Wards in a Metropolitan Area, 1. Factors Influencing Cycling to Work. *Traffic Engineering & Control*, Vol. 30, No. 6, June 1989, pp. 297-302.

14. Kaplan, J.A. *Characteristics of The Regular Adult Bicycle User*. Springfield, VA., 1975.

15. Niemeier, D., G.S. Rutherford, and J.M. Ishimaru. *An Analysis of Bicyclist Survey Responses From The Puget Sound Area and Spokane.* Report 95.4. Washington State Transportation Commission, Innovations Unit. Olympia, Washington, June 1995.

16. Hulse, L.K. and K.R. Shafizadeh, Bicycle Travel-To-Work Patterns. *Proceedings, Tenth National Conference for Undergraduate Research,* Vol. 2, R.D. Yearout (Ed.)., Asheville, North Carolina, 1996, pp. 1162-1166.

17. Turner, T. and D. Niemeier. Differences in Gender Travel Patterns: A Critical Review and New Evidence, *Transportation*, forthcoming.

TABLE 1. Mean Commute Travel Time (In Minutes) By Income

Income	No. of Cases	Mean (S.E.)[a,b]
Less Than $7,500	9	45.60 (9.33)[c]
$7,500 to $14,999	28	25.33 (2.53)
$15,000 to $24,999	33	29.73 (2.82)
$25,000 to $34,999	72	32.14 (1.74)
$35,000 to $49,999	94	35.68 (2.03)
$50,000 to $69,999	94	34.42 (1.72)
$70,000 and Up	91	37.87 (1.80)

From Hulse & Shafizadeh, 1996.

[a] Mean with standard error (S.E.)

[b] F-Ratio: 3.2.

[c] For exploratory purposes only due to small sample size

TABLE 2. Regression of Commute Time (In Minutes) Using Destination Data

Variable	B	S.E. B	T-Stat[c]
Individuals With Destinations Within the CBD[a]			
Gender	4.96	2.62	1.89
Income	1.51	0.82	1.84
Intercept	23.78	4.63	5.14
Individuals With Destinations Outside of the CBD[b]			
Variable	**B**	**S.E. B**	**T-Stat[c]**
Gender	-3.53	3.26	-1.08
Income	-0.63	0.85	-0.76
Intercept	37.36	4.37	8.55

[a] R Square: 0.04; Adjusted R Square: 0.03. (For exploratory purposes only.)
[b] R Square: 0.01; Adjusted R Square: 0.01. (For exploratory purposes only.)
[c] Two-tailed test.

TABLE 3. Summary Statistics for Separated Bicycle Path Buffer Characteristics

	Buffer		
Location	**0.4 Kilometer[a]**	**0.8 Kilometer[a]**	**1.2 Kilometer[a]**
Count (Cum. %)	73 (24.3%)	40 (37.7%)	47 (53.2%)
Location Distribution			
Seattle CBD (%)	57.5	75.0	72.3
Burke-65th (%)	42.5	25.0	27.7
Mean Commute Travel Time (S.E.)[b]	28.9 minutes (1.4)	35.0 minutes (3.0)	30.9 minutes (2.1)
Mean No. Trips Per Week (S.E.)[b]	7.5 (0.4)	5.8 (0.5)	6.3 (0.5)
Mean Age (S.E.)[b]	37.0 (1.5)	32.3 (1.1)	34.9 (1.4)
Mean HH Income (S.E.)[b,c]	$28,150 ($6,000)	$20,300 ($6,800)	$31,450 ($6,600)
Mean HH Vehicles (S.E.)[b,c]	1.8 (0.2)	1.1 (0.4)	1.6 (0.1)
Mean HH Size (S.E.)[b,c]	2.1 (0.2)	1.7 (0.4)	2.3 (0.3)
Gender Distribution			
Male (%)	72.6	60.0	61.7
Female (%)	26.0	40.0	38.3

[a]. 1 km = 0.6 mi

[b]. Mean with standard error (S.E.)

"Bikeshed" Boundary

TABLE 4. Commuter Travel Preferences

	Within 0.8 Kilometer (0.50 Mile) Buffer (N = 112)	Outside 1.2 Kilometer (0.75 Mile) Buffer (N = 143)
Bicycle Infrastructure.	**Mean (S.E.)[a]**	**Mean (S.E.)[a]**
Percent of Current Trip Made on:		
Separated Bicycle Path (%)	33.16 (3.51)	19.22 (2.50)
Designated Bicycle Route or Lane (%)	27.44 (3.63)	24.81 (2.60)
Vehicle Lane or No Bicycle Provisions (%)	37.11 (2.84)	53.27 (1.6)
Route Preference.		
If The Most Direct Route Required Bicycling In Vehicular Traffic, Percent of Respondents Who Would:		
Switch Routes (%)	44.0	39.9
Bicycle in the Vehicle Lane (%)	47.7	57.2
Not Bicycle to That Destination (%)	8.3	1.4

[a]. Mean with standard error (S.E.)

"Bikeshed" Boundary

LIST OF TABLES AND FIGURES