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Short and Sweet

Analysis of Shorter Trips Using National Personal Travel Survey Data

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This paper summarizes information on shorter trips, based on 2009 *National Household Travel Survey* (NHTS) data. A spreadsheet containing this analysis is at www.vtpi.org/NHTS_2009.xls.

The National Household Travel Survey

The *National Household Travel Survey* (NHTS) is a U.S. national survey of personal travel activity. Similar surveys were performed in 1983, 1990, 1995, 2001 and 2009. The NHTS website (http://nhts.ornl.gov) contains data and analysis.

Most travel surveys undercount shorter and non-motorized trips (Forsyth, Krizek and Weinstein Agrawal 2010; Weinstein and Schimek 2005) due to the following factors:

- Older surveys were designed primarily to provide data for traffic models, and so only counted peak-period trips between Traffic Analysis Zones (TAZs). They ignored shorter trips within TAZs, and off-peak trips.
- Many surveys ignore non-motorized links of trips that include motorized travel. For example, a *bike-bus-walk* trip is coded simply as a transit trip, and walking links between parked cars and destinations are not counted even if they are several blocks in length. For example, although only 7% of Canadian urban commutes are entirely by walking, about 20% include a walking link, and in German cities, although only 22% of trips are completely by walking, 70% include walking links (Litman 2003).
- Some travel surveys only count commute trips, and many ignore travel by children, and recreational travel.
- Survey participants often have trouble remembering and recording shorter trips.

The NHTS attempts to provide more comprehensive counts of short and non-motorized trips than most previous travel surveys. It counts each link of a trip from one location to another (for example, if a commuter stops to run an errand on the way to work, the survey counts two trips), and counts access links (such as biking to a train station or walking from a parked car to a destination). However, since respondents often underreport short trips, non-motorized modes share is likely to be somewhat greater than these statistics indicate.

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The 2009 NHTS reports significantly higher non-motorized travel mode share than most other travel data sets. For example, the 2000 U.S. Census indicates that only 2.8% of commuters walk and only 0.5% bicycle, since only trips entirely by these modes are counted. Table 1 compares walk mode share of various national travel surveys. The 2009 NHTS indicates about twice as much walking as in 1995, probably due to both actual changes in travel activity and more comprehensive non-motorized data collection.

Table 1 **Walk Mode Share By National Travel Surveys** (Hu 2004, Table 9)

	1990	1995	2001	2009
Walk Mode Share	7.2%	5.5%	8.6%	11.1%

The 2009 NHTS shows higher walking mode share than previous national surveys, which probably reflects a combination of actual changes in travel activity and more comprehensive data collection.

Weinstein and Schimek (2005) discuss problems obtaining reliable non-motorized information in conventional travel surveys, and summarize walking data in the U.S. 2001 NHTS. They found that about 10% of total measured trips involved non-motorized travel. The table below summarizes their walking trip data.

Table 2 **NHTS Walking Trip Attributes** (Weinstein and Schimek 2005)

Purpose	Frequency	Mean Distance	Median Distance	Mean Duration
	Percent	*Mile*	*Mile*	*Minutes*
Personal business/shopping/errands	48%	0.44	0.22	11.9
Recreation/exercise	20%	1.16	0.56	25.3
To transit	16%	N/A	N/A	19.6
To or from school	7%	0.62	0.33	13.3
To or from work	4%	0.78	0.25	14.1
Walk dog	3%	0.71	0.25	19.0
Other	2%	0.57	0.22	14.8
Total and Overall Averages	*100%*	*0.68*	*0.25*	*16.4*

This table summarizes the results of NPTS walking trip data. N/A = not available.

NHTS surveys indicate that average trip lengths have increased over time, from 8.68 miles in 1983 to 10.03 miles in 2001 (Hu 2004, Table 5), reflecting more motorized travel and land use sprawl. However, trip lengths are unlikely to continue growing due to changing transport and land use development trends (Litman 2006).

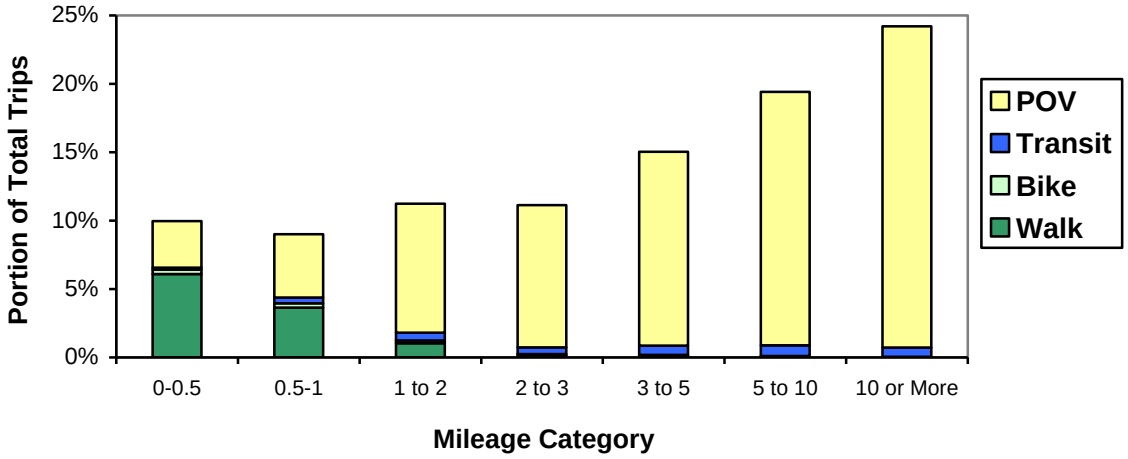
The NHTS indicates that (McGuckin 2011):

- Nearly half of driving age adults have access to a bicycle.
- More than half of adults with a bike use it in the summer months.
- Since 1990, children are making fewer bike trips, especially to school.
- As our society ages the average age of adult cyclists is also getting older.
- Nearly a quarter of bike trips by 16-30 year olds are commutes, and bike commuters are very loyal to their mode

NHTS Analysis Of Short Trips

For this analysis, trips were divided into seven mileage categories. Figure 1 illustrates the portion of total trips by each mileage category.

Figure 1 **Share of Trips By Mileage Category[1]**



This figure illustrates the share of total trips by mode and trip distance category. "POV" refers to Private Owned Vehicle, which includes cars, vans, SUVs, light trucks and motorcycles.

About 10% of trips are a half-mile or shorter, about 19% are a mile or less, and 41% are three miles or less. Walking and cycling represent a relatively large portion of shorter trips (Table 3). For example:

- Of the 10% of total trips a half-mile or shorter, 61% are by walking and 3.1% are by bike.
- Of the 19% of trips one mile or shorter, 51% are by walking and 3.3% are by bike.
- Of the 41% of trips three miles or shorter, 27% are walking and 3.1% are by bike.

Table 3 **Shorter Trip Mode Share**

Trip Distance	Portion of Total Trips	Walk	Bike	Transit	POV	Totals
0.5 or less	10%	61%	3.1%	1.5%	34%	100%
1.0 or less	19%	51%	3.3%	3.0%	42%	100%
3.0 or less	41%	27%	2.2%	3.9%	67%	100%

This table summarizes mode share of shorter trip distance categories.

Many of these shorter trips are links in longer trips, including a series of automobile trips to multiple destinations when running errands, walking to and from transit stops, and walking a few blocks to and from a parked car.

[1] For simplicity the analysis merged "Transit" and "Other Bus," and excludes "NR, DN, NA" (No Response, Don't Know and Not Appropriate), "Air" and "Other" categories since they are ambiguous and small in number, but these categories are in the source tables and could be incorporated if desired.

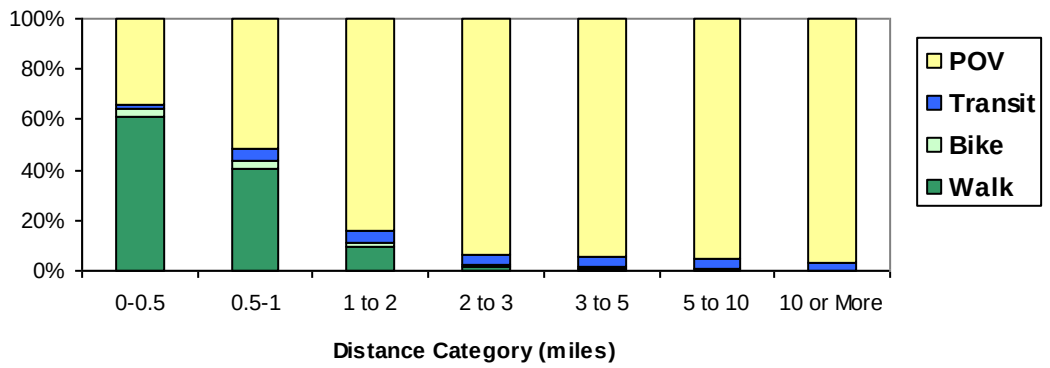
Table 4 **Mode Share By Mileage Category**

Mileage Category	*Portion of Total*	Walk	Bike	Transit	POV
0-0.5	*10%*	61%	3.1%	1.5%	34%
0.5-1	*9%*	40%	3.5%	4.7%	51%
1 to 2	*11%*	9.2%	1.8%	5.0%	84%
2 to 3	*11%*	1.6%	0.7%	4.4%	93%
3 to 5	*15%*	0.7%	0.5%	4.5%	94%
5 to 10	*19%*	0.3%	0.3%	4.0%	95%
10 or More	*24%*	0.1%	0.1%	2.8%	97%
Portion of Total Trips	*100%*	*11.1%*	*1.1%*	*3.8%*	*84%*
Portion of Total Travel Distance	*100%*	*1.1%*	*0.3%*	*3.4%*	*95%*
Portion of Total Travel Time	*100%*	*8.7%*	*1.0%*	*7.3%*	*81%*

This table summarizes mode share by mileage category. In this analysis, "Transit" includes local bus and train, intercity bus and school bus travel, which are often counted separately.

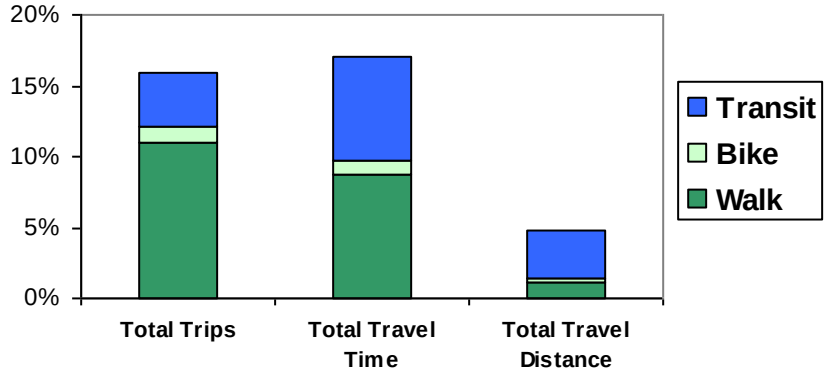
Table 4 and Figure 2 summarize the mode shares of all mileage categories. The bottom section of Table 4 compares mode share by total trips, travel distance and travel time. Walking and cycling represent a larger portion of trips and travel time than distance, and transit represents a relatively large portion of total travel time, as illustrated in Figure 3.

Figure 2 **Mode Share By Mileage Category**



This figure illustrates mode share of various trip distance categories.

Figure 3 **Portion of Total Trips, Travel Time and Travel Distance**



Walking, cycling and transit represent a much larger portion of trips and travel time than distance.

Comprehensive Analysis of Non-Motorized Travel

Special surveys can provide more detailed information on non-motorized travel. The *National Survey of Bicyclist and Pedestrian Attitudes and Behavior* (Gallup 2008), indicates that about half of walking and cycling trips are purely recreational and about half are for transport, and only about 5% are for commuting, so for each non-motorized commute trip there are about nine other utilitarian non-motorized trips, and about ten non-motorized recreational trips (McGuckin 2011). The new *Pedestrian and Bicycling Survey* (PABS) is designed to provide more comprehensive and standard information on non-motorized travel (Forsyth, Krizek and Agrawal 2010).

Travel data (including census commute mode share data) ignore walking and cycling links of motorized trips. If instead of asking, "What portion of trips *only* involve walking," we ask, "What portion of trips involves *some* walking," walking and cycling mode share would be much higher. For example, although only 7% of Canadian urban commutes are entirely by walking, about three times as many involve a walking link (Table 5). Similarly, in Germany only 22% of trips are completely by walking, but 70% include some walking (Brog, Erl and James 2003).

Table 2 **Commute Trips By Mode** (Statistics Canada 1992)

	Car Only	Walking All or Part	Transit All or Part
Winnipeg	73%	16%	15%
Vancouver	72%	20%	12%
Calgary	72%	21%	12%
Canada	69%	22%	10%
Toronto	61%	24%	20%
Ottawa	60%	33%	16%
Average	*68%*	*23%*	*14%*

Although only 7% of urban commutes are entirely by walking, about 23% involve a walking link.

Similarly, conventional traffic surveys tend to ignore many types of pedestrian activity. For example, they often ignore people who are sitting or waiting on sidewalks, skaters and skateboarders, and people walking from cars or buses to buildings (Haze 2000). Some newer travel surveys attempt to record all nonmotorized travel (although participants often have trouble recording short walking trips, so they still tend to be undercounted). One study found that the actual number of nonmotorized trips is six times greater than indicated by conventional surveys (Rietveld 2000).

Key Conclusions

- Conventional travel surveys tend to undercount shorter trips and non-motorized trips, due to the way travel statistics are defined and collected.
- A significant portion of total personal travel consists of shorter trips. According to the NHTS about 10% of reported trips are a half-mile or less, about 19% are a mile or less, and 41% are three miles or less. Since shorter trips tend to be undercounted, the actual share of short trips is probably higher than these figures indicate.
- According to the NHTS about 12% of total trips are by non-motorized modes, about twice the values reported by most travel surveys. More than half of trips of a mile or less, and nearly a third of trips of three miles or less, are by walking or bicycling.
- Because walking, cycling and public transit are relative slow modes they represent much larger shares of *trips* and *travel time* than *travel distance*.
- About half of walking and cycling trips are purely recreational, about half are utilitarian, and only about 5% are for commuting, so for each non-motorized commute trip there are probably about nine other utilitarian non-motorized trips, plus about ten recreational trips.
- Shorter and non-motorized travel tends to be more common:
    - In urban areas.
    - By people who cannot drive due to age (such as teenagers), poverty or disabilities.
    - In conjunction with public transit travel.
- People drive for many trips that are short enough for walking and cycling, partly because they are links in a multi-trip chain and partly due to barriers to non-motorized travel. The portion of short trips by non-motorized modes can be increased by improved sidewalks and paths, better crosswalks, bike lanes, traffic calming and traffic speed controls, bicycle parking, and improved traffic education and enforcement.
- Walking and cycling travel increases with more compact and mixed land use development, which locates more destinations within walking and cycling distance.
- Improved travel survey methods, such as the *Pedestrian and Bicycling Survey* (PABS) are now available to better account for non-motorized travel.

Acknowledgement

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