

# Using NHTS 2001 and 2009 to Analyze Intrapersonal Variability in Travel Behavior

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**Purpose:** Trip-based statistics suggest only a small minority of Americans walk, cycle, or ride public transport. However, statistics on intrapersonal variability indicate longer time periods of observation capture more variability in personal travel. Our analysis of intrapersonal variability in travel behavior utilizes data from the **daily trip and person** data files of the NHTS 2001 and 2009. We use the data to identify recent trends in multimodality in the USA at the **day and week** levels. We distinguish: (1) **monomodal car users** who used a car for all trips; (2) **multimodal car users** who used a car and at least one other mode of transport; and (3) **walk, bicycle, public transport only users** who did not use a car. Our study makes a contribution by uniquely leveraging the NHTS 2001 and 2009 for the study of intrapersonal variability.

## Literature Review

- Three main types of data are used to study intrapersonal variability in travel behavior: (1) multi-week travel surveys; (2) weeklong travel surveys; and (3) one-day travel surveys with questions about travel during longer time periods. Most studies suggest that **survey periods of one week** tend to capture typical variability in everyday **habitual travel behavior**. Longer multi-week survey periods additionally capture occasional travel behavior.
  - Multi-week surveys tend to have comparatively small sample sizes. For example, the six week MobiDrive data set is based on 361 individuals in two German cities. Compared to single-day travel surveys, multiday data collection efforts face greater difficulty in **recruitment**, and suffer from a higher rate of **participant drop out**.
  - Intrapersonal variability can also be studied using data from single-day travel surveys that contain questions about habitual or occasional mode use. A limitation of this type of data is that reporting on travel behavior during the prior week is more prone to **recall error**, particularly for short trips, than data collected from travel diaries for a specific travel day.
- Sources: Axhausen et al. 2002; Block-Schachter 2009; Kuhnimhof et al. 2006; Nobis 2007; Schlich & Axhausen 2003; Schonfelder & Axhausen 2010.

Our analyses of intrapersonal variability in travel behavior at the day and week levels rely on the **NHTS trip and person files**.

We aggregated trip level data to the person level by counting the number of trips made by mode of transport for each respondent (i.e. collapsing trip counts by mode at the person level). We excluded trips by intercity rail and intercity bus, as well as air planes, in order to be consistent with the NHTS definition of public transport used for the weekly data.

The person file contains questions about the number of trips made by walking and cycling during the previous week and the number of trips by public transport in the past month. It also contains a question about the usual main commute mode. The only information about car use during the week was from the main mode for the usual commute and car use reported in the trip file for the assigned travel day.

We assigned each person to one of three modality groups for the day and week levels.

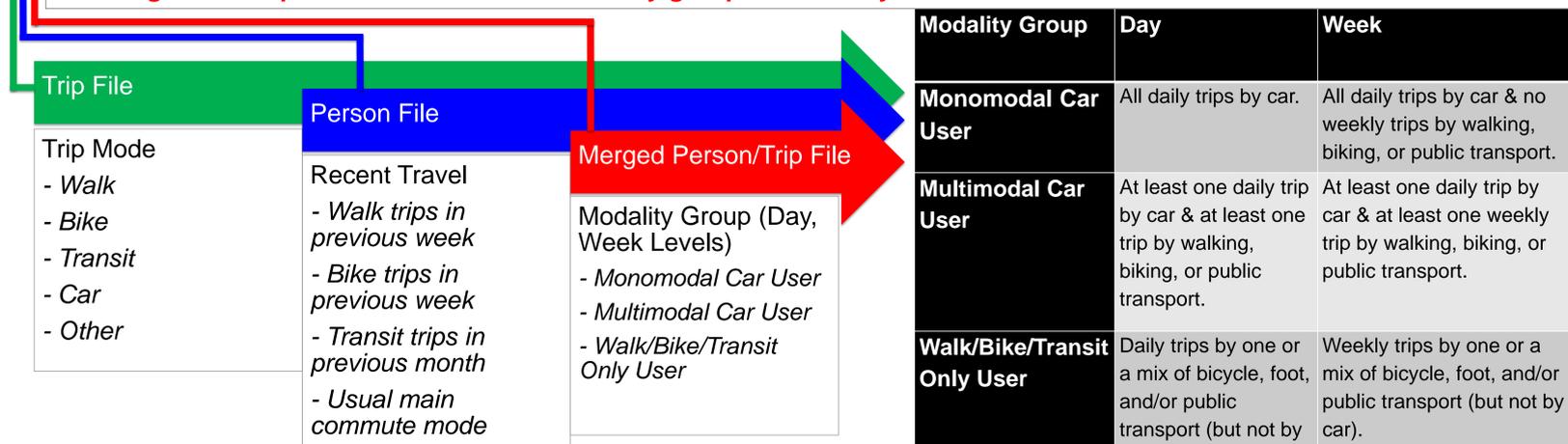


Figure 1. Summary of Aggregation Process of Trip and Person Files for Analysis of Intrapersonal Variability in Travel Behavior.

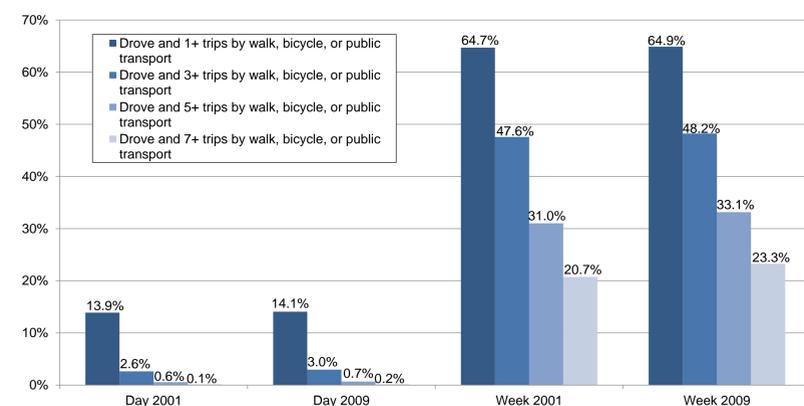


Figure 2. Trend in Share of Multimodal Car Users by Different Intensity Cut-Off Values at Day and Week Levels in the U.S., 2001-2009.

In 2009, at the week level 48.2% reported car use in combination with at least 3 trips without a car—compared to 64.9% who used a car and made at least 1 trip by an alternative to the car. Only 23.3% of multimodal car users reported car use in combination with 7 or more trips by another mode of transportation during the week. At the week level the population shares of multimodal car users increased more significantly between 2001 and 2009 for those making 5+ and 7+ walk, bicycle, and/or public transport trips (~+2%) than for those making 1+ or 3+ trips by those modes.

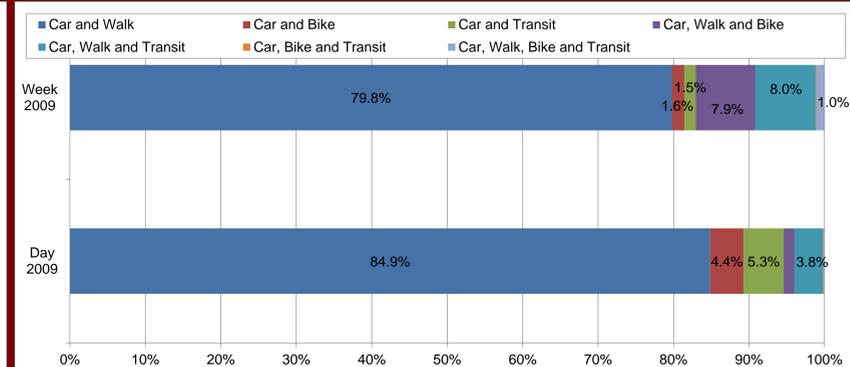


Figure 3. Combinations of Modes of Transportation Used by Multimodal Car Users at Day and Week Levels in 2009.

In 2009, the vast majority of multimodal car users reported walking as their only non-automobile mode of transportation at day (84.9%), and week (79.8%) levels. The use of three different modes of transportation was more common during the week (17.1%) than the day (5.4%). At the week level, 7.9% of respondents used a car, walked, and cycled, and 8.0% combined car use, walking, and public transportation. Only 1.0% of respondents reported the use of all four modes during a typical week.

## Results

This poster focuses on the methods applied to perform an analysis of intrapersonal variability in travel behavior using the NHTS. Only 28% of Americans solely rely on a car during the week, and **the majority of Americans are multimodal car users** who drive and make at least one weekly walk, bike, or public transport trip. About one in four American car users make at least 7 trips by walking, cycling, or public transport during the week. The study of intrapersonal variability in travel behavior could be improved by more and better weekly travel data for the U.S. population.

**Future versions of the NHTS** could include specific questions about **weekly car and public transport use**. In addition, a multi-day or weeklong subsample would improve upon self-reporting of weekly travel through reduced recall error and provide higher quality data about habitual travel behavior. More information could be collected about trip purposes for weekly travel, and trip purpose categories could further distinguish recreational and utilitarian categories to allow for better analysis of the impact of trip purpose on multimodality. Please cite as: Buehler, R. and A. Hamre. "The Multimodal Majority? Walking, Cycling, and Public Transportation Use Among American Adults," *Transportation*. Forthcoming.