Motivations for Speeding

Volume III: Appendices

U.S. Department of Transportation
National Highway Traffic Safety Administration

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Suggested APA Format Citation:

Richard, C. M., Campbell, J. L., Lichty, M. G., Brown, J. L., Chrysler, S., Lee, J. D., Boyle, L., & Reagle, G. (2013, September). *Motivations for Speeding, Volume III: Appendices*. (Report No. DOT HS 811 819). Washington, DC: National Highway Traffic Safety Administration.

This report is accompanied by:

Richard, C. M., Campbell, J. L., Lichty, M. G., Brown, J. L., Chrysler, S., Lee, J. D., Boyle, L., & Reagle, G. (2012, August). *Motivations for Speeding, Volume I: Summary Report.* (Report No. DOT HS 811 658). Washington, DC: National Highway Traffic Safety Administration. Available at www.nhtsa.gov/staticfiles/nti/pdf/811658.pdf

Richard, C. M., Campbell, J. L., Lichty, M. G., Brown, J. L., Chrysler, S., Lee, J. D., Boyle, L., & Reagle, G. (2013, September) *Motivations for Speeding, Volume II: Findings Report*. (Report No. DOT HS 811 818). Washington, DC: National Highway Traffic Safety Administration. Available at www.nhtsa.gov/staticfiles/nti/pdf/811818.pdf

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT HS 811 819		

4. Title and Subtitle	5. Report Date
Motivations for Speeding, Volume III: Appendices	September 2013
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
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9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Battelle Memorial Institute 505 King Avenue Columbus, Ohio 43201-2696	11. Contract or Grant No. DTNH22-06-D-00040, Task#2

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
National Highway Traffic Safety Administration Office of Behavioral Safety Research 1200 New Jersey Avenue SE. Washington, DC 20590	FINAL REPORT August 2008 – December 2011
	14. Sponsoring Agency Code

15. Supplementary Notes

Geoffrey Collier (initial) and Randolph Atkins (final) were the Contracting Officer's Technical Representatives (COTRs).

16. Abstract

This is Volume III of a three-volume report. The report contains the results of a study that examined the speeding behavior of drivers in their own vehicles over the course of three to four weeks of naturalistic driving in urban (Seattle, WA) and rural (College Station, TX) settings. The purpose of this research was to (1) identify the reasons why drivers speed, (2) model the relative roles of situational, demographic, and personality factors in predicting travel speeds, (3) classify speeders, and (4) identify interventions/countermeasures and strategies for reducing speeding behaviors. Data collected from 164 drivers included 1-Hz recordings of vehicle position and speed using GPS receivers, responses to a battery of a personal inventory questionnaires, and daily driving logs that captured trip-specific situational factors. Vehicle speed and position data were combined with road network data containing validated posted speed information to identify speeding episodes. The descriptive analysis of speeding data provided evidence for different types of speeding behaviors among individual drivers including: (1) infrequent or incidental speeding, which may be unintentional (2) trip-specific situational speeding, (3) taking many trips with a small amount of speeding per trip (i.e., casual speeding), and (4) habitual or chronic speeding. Regression models were developed to identify predictors of "any" speeding (logistic regression) and amount of speeding (linear regressions). Significant predictors included demographic variables such as age and gender, situational factors such as time-of-day and day-of-week, and key personal inventory factors such as attitudes towards reckless driving. In addition, focus group discussions were conducted with a subset of study participants who were classified as "speeders" and "non-speeders" to identify key attitudes and beliefs towards speeding and the effectiveness of potential countermeasures.

17. Key Words	18. Distribution Statement
Speeding, Speed Selection, Free-flow Driving, Speeding Countermeasures, Unsafe Driving	Document is available from the National Technical Information Service www.ntis.gov

19 Security Classif. (of this report)	20. Security Classif. (of this page)	21 No. of Pages	22. Price
Unclassified	Unclassified	109	

Form DOT F 1700.7 (8/72) Reproduction of completed page authorized

Acknowledgements

The *Motivations for Speeding* project involved a collaborative effort among numerous contributors, and only the key researchers are formally included as Final Report authors. We specifically acknowledge the efforts and contributions of Diane Williams, Mark Tianow, Ashley Loving, Elizabeth Jackson, Ta Liu, and Dale Rhoda of Battelle, and of the following researchers at Texas Transportation Institute: Katie Connell, Laura Higgins, and Marshall Ward.

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Abbreviations and Acronyms

BB-Safety ..... Behavioral Beliefs related to Safety
BCB-Temptation ..... Behavioral and Control beliefs related to Temptation to Speed
CB-Opportunity ..... Control Beliefs related to Opportunity to Speed
CFCC ..... Census Feature Class Code
DBQ ..... Driver Behavior Questionnaire
DVRE ..... Driver, Vehicle, Roadway, and Environment
FAA ..... Federal Aviation Administration
FM ..... Farm to Market
GB ..... Gigabyte
GED ..... General Education/Equivalency Diploma
GIS ..... Geographic Information System
GPS ..... Global Positioning System
HOV ..... High Occupancy Vehicle
IRB ..... Institutional Review Board
IRB ..... Institutional Review Board
NCHRP ..... National Cooperative Highway Research Program
NHTSA ..... National Highway Traffic Safety Administration
NMEA ..... National Marine Electronics Association
OR ..... Odds Ratio
PS ..... Posted Speed
RMC ..... Recommended Minimum Communication
SD ..... Secure Digital
SOFN ..... Seattle Older Female Non-speeder
SOFS ..... Seattle Older Female Speeder
SOMN ..... Seattle Older Male Non-speeder
SOMS ..... Seattle Older Male Speeder
SUV ..... Sport Utility Vehicle
SYFN ..... Seattle Younger Female Non-speeder
SYFS ..... Seattle Younger Female Speeder
SYMN ..... Seattle Younger Male Non-speeder
SYMS ..... Seattle Younger Male Speeder
ToD ..... Time of Day

TOFN ..... Texas Older Female Non-speeder
TOFS ..... Texas Older Female Speeder
TOMN ..... Texas Older Male Non-speeder
TOMS ..... Texas Older Male Speeder
TPB ..... Theory of Planned Behavior
TXDOT ..... Texas Department of Transportation
TYFN ..... Texas Younger Female Non-speeder
TYFS ..... Texas Younger Female Speeder
TYMN ..... Texas Younger Male Non-speeder
TYMS ..... Texas Younger Male Speeder
UTC ..... Coordinated Universal Time
WAAS ..... Wide Area Augmentation System
WSDOT ..... Washington State Department of Transportation
ZKPQ ..... Zuckerman-Kuhlman Personality Questionnaire

Appendix A:
Description of Data Processing Activities

Geographic Information System (GIS) Map Development

The quality of the GIS maps was critical to the success of determining speeding behavior. Maps had to include accurate information—such as posted speed limits, referred to in this report as the posted speeds (PSs), and functional class—that was consistent across sites, and between jurisdictions within each site, in order to correctly identify locations in which speeding occurred. After defining a set of requirements that identified the type of GIS map information that would be needed to affect the analysis, GIS maps were acquired from the sources listed in Table A-1, and the maps associated with each site were combined to form master maps for the Seattle and Texas sites.

Table A-1. Data sources used to create the Seattle and Texas GIS maps

Jurisdiction	Seattle Site	Texas Site
State	WSDOT	TxDOT
County	Snohomish King Pierce	Brazos Burleson Grimes Leon Madison Robertson Washington
City	Bellevue Bothell Everett Kirkland Lynnwood Seattle Tacoma Tukwila	College Station

It was necessary to combine the data from multiple sources into one map for each site because the maps that were available for each of the jurisdictions in the two sites were not consistent with respect to the type of data available or the form in which the data were presented. For example, the county data in Texas included road class information in a form that was not meaningful in the context of the project and that was not consistent with the data in the Seattle site. Consequently, the functional class from the ESRI data was used to identify functional class on the Texas map. In addition, posted speed was not available from some jurisdictions, so data from multiple sources needed to be merged into one map in order to obtain the most complete set of data possible for each site.

Because all data sources provided geospatial location for the road segments, a base cartography was developed using the most complete data sources. Additional fields were created in the base map to hold the posted speed from each respective data source. The posted speeds often did not agree between two or more sources for a given road segment, so it was necessary to choose the posted speed that was most likely to be accurate as the posted speed for that road segment. A master field for posted speed was created and populated from the individual data sources according to a predetermined set of rules. The posted speeds were later validated to ensure accuracy (see the Data Validation section).

The Census Feature Class Code (CFCC) (Kinn, 2006) was chosen to represent the road functional class for all roads in the Seattle and Texas sites because this code was commonly available (in some form) in the GIS data sets for all counties in both sites. The CFCC contains very fine-grained detail about road type. In order to improve clarity in the analysis, several of the CFCC road classes were aggregated into larger subsets within each category of road type.

Every attempt was made to ensure as much consistency as possible between the maps in the Seattle and Texas sites. However, because of differences in the availability of the data as well as differences between the rural and urban cultures, there were some challenges that were unique to each site. The following sections describe these challenges.

Seattle GIS Maps

The biggest challenge to clearly discriminating travel on roads in Seattle was related to road density, particularly at complex freeway interchanges and on- and off-ramps. Because ramps occur frequently, and because they connect to roads that convey the heaviest travel densities, the potential exists for a large number of Global Positioning System (GPS)/GIS mismatches to occur. In order to reduce the impact of these errors on the two interstate freeways, and to guarantee that the posted speed was correct on those freeways, the posted speed was manually changed to 60 mph for all roads that contained “I-5” and “I-405” in the road name (e.g., “I-405 Ramp” and “I-5 expressway”). The posted speeds for I-5 in northernmost Snohomish County were changed to 70 mph to reflect the correct speed limit in that area. The original posted speeds were maintained in the GIS road database in order to facilitate validation and to keep a record of the changes. The road names were also changed to “I-5” and “I-405” respectively to prevent intermittent road name changes in the epoch data, which would have caused those epochs to be removed from the analysis.

The goal of these changes was to ensure that all epochs in which the vehicle traveled on one of these ramps included the posted speed associated with the freeway rather than the posted speed associated with the ramp. Any GPS points that were erroneously matched with ramps while actually traveling on the freeway were still associated with the correct posted speed and road name. It was not necessary to maintain posted speeds on ramps that were actually being traveled because speed behavior on ramps was not considered in the analysis; those epochs were discarded.

The same approach was applied to the I-5 expressway, which comprises physically separated, reversible-flow express lanes that parallel I-5 through the downtown corridor. Often it was

unclear whether drivers were driving on the freeway or on the expressway; however, the posted speed on both is 60 mph, so the two roads were treated commonly as “I-5.”

Texas GIS Maps

Data availability proved to be a considerable challenge to GIS map development for the Texas site. The GIS map included data from seven counties, plus data from Texas Department of Transportation (TXDOT) and from the City of College Station. However, posted speed data were available only from Brazos County, TXDOT, and the City of College Station; the Brazos County data included posted speed for only 35% of road segments. Strategies were employed for increasing the population of road segments with posted speeds as described in the Data Validation section below. Nonetheless, only 45% of the road segments in the Texas site had posted speed data in the final GIS map.

It should be noted that the data from ESRI, which is packaged with the ArcGIS software, included speed limit; however, these speeds were found to be incorrect for a large percentage of the roads that were examined during validation. Therefore, the ESRI speed limit data were not considered acceptable for use.

In addition to missing posted speed data, none of the data from the Texas jurisdictions included usable functional class data. To overcome this shortcoming, the CFCC data from the ESRI data set were used to provide this information for all counties in Texas.

GPS Data Cleaning

The GPS data were recorded in the data loggers as National Marine Electronics Association (NMEA) Recommended Minimum Communication (RMC) codes; each RMC record corresponds with one GPS location and contains date, time, location, speed, and heading information. The GPS data loggers were designed to create a new log file each time the power was cycled “on.” The data loggers were powered via a DC adapter plugged into the vehicle’s 12-volt power adapter (cigarette lighter adapter). The intent was to create a new log file each time the driver cycled the ignition “on” to start the vehicle. However, many of the vehicles had power adapters that were constantly active regardless of the state of the key or ignition; in these vehicles, the data loggers continuously logged data even when the vehicle was parked. To complicate matters, power fluctuations caused by voltage drops during starting, transient voltage spikes, and intermittent connections in the power adapter, caused most data loggers to erroneously create new trip files at times when the vehicle was in motion during a trip. Finally, some data records were incomplete or corrupted if the power to the data logger was interrupted while the record was being written to the memory card.

A two-fold strategy was applied to compensate for these power management problems: (1) all improperly formed NMEA RMC sentences were discarded and (2) all data files for a participant were concatenated into one long file in order to splice together trips that were incorrectly separated due to intermittent power problems. Two custom software tools were developed using Visual Basic.net to perform these functions. The first tool checked each NMEA RMC record to make sure that all fields in the record existed and were in the proper form. Any record that was

not complete or was malformed was discarded. The second tool concatenated all of the data files into one long file in order to correct trips that were incorrectly separated into multiple files due to power management problems. The output of the data-scrubbing and concatenation process was a single file per participant that included the cleaned NMEA RMC records for all of the trips the participant took, sequentially ordered with respect to time.

GIS/GPS Map Matching (Spatial Join)

After scrubbing, the GPS data were processed within the ArcGIS environment using a GIS/GPS integration script written in Python. The processing script performed the following functions:

- Partition the GPS data into trips.
- Remove the first and last half mile or 90 seconds of data from each trip.
- Convert the GPS data into ArcGIS shapefiles.
- Join the GPS data with the roadway centerlines in the GIS map.
- Create an attribute table database.
- Create a manifest that indicated trip start and end times.

Each of these functions is described below.

Partition the GPS Data into Trips

Because all of the driving data for a single participant was contained in one concatenated file after data cleaning, the data had to be parsed into trips. The post processing utility partitioned the data into trips using the following criteria:

- Vehicle was not moving for 10 minutes or longer. This criterion accounted for vehicles with power constantly applied to the data logger because the logger continuously recorded GPS points while the vehicle was parked.

  It should be noted that the vehicle was considered stationary when the reported speed was less than 3 mph because the GPS reported speeds of 0 to 3 mph when the vehicle was actually stationary, due to GPS error when stationary.

- Elapsed time between GPS records 10 minutes or longer. This criterion accounted for vehicles with power intermittently applied to the data logger because the concatenated files for these vehicles exhibited temporal discontinuities between trips.

A ten-minute threshold was considered reasonable for determining the start of a new trip in order to parallel the participants' trip log entries. Although somewhat arbitrary, this threshold allowed sufficient time for short-term stopping events, such as stopping at a light or dropping off children at school on the way to work, to elapse without creating a new trip. Participants were instructed during enrollment that they could aggregate multiple short trips, such as dropping off children at

school on the way to work, into one trip. However, stops that lasted more than ten minutes were considered likely to reflect actual new trips.

The GPS/GIS integration script produced an intermediate data file for each trip a participant took. These sequentially numbered files were used both in the final conversion of the data to ArcGIS shapefiles and to create the trip manifest described below.

Remove the First and Last Half Mile or 90 Seconds of Data

Institutional Review Board (IRB) requirements mandated that the data from either the first and last half-miles or the first and last 90 seconds (whichever is greater) of each trip be removed from the data in order to protect the participants' privacy. Removing this data ensured location anonymity at the start and destination of each trip. The GPS/GIS integration script performed this editing function.

Convert the GPS Data into ArcGIS Shapefiles

In order to import the GPS data into ArcGIS, the GPS data were converted from NMEA RMC format to ArcGIS shapefiles. The GPS/GIS integration script created one shapefile for each participant and populated its attribute table with the following data:

- Participant ID,
- Trip ID and trip file name (intermediate trip file),
- Date and time (Coordinated Universal Time (UTC) and local),
- Latitude and longitude,
- Vehicle speed, and
- Vehicle heading.

Join the GPS Data with the Roadway Centerlines in the GIS Map

The simplest way to associate GPS locations with roadways is to find the roadway that is geometrically closest to the GPS point. In ArcGIS, this function is performed using a spatial join. This method matches a majority of GPS points with the associated roadways; however, there is a high risk of potential GPS/GIS mismatches. Intersections and areas with dense roadway networks, such as complex freeway interchanges and on-ramps, are particularly vulnerable because the closest GPS point does not always lie directly on top of its associated road. The density and interconnection of these roads makes it highly likely that some GPS points will be closer to the connected or intersecting roads than to the actual road being driven.

Other, more sophisticated algorithms exist that are more robust in reducing erroneous matches when matching GPS points to the underlying roadway; however, we chose to use a spatial join rather than one of these map-matching methods in order to reduce cost and development time and to facilitate the project schedule. Strategies that we employed for correcting or compensating

for GPS matching errors are discussed in the Data Post-Processing and Data Validation sections below.

The spatial join produced a single shapefile for each participant that included an attribute table with the GPS data listed above and the GIS road data associated with the GPS location.

Create an Attribute Table Database

The ArcGIS shapefiles containing the joined GPS/GIS data are useful for performing geospatial analyses. However, data analysis using traditional descriptive and inferential statistical methods required that the data in the attribute tables be extracted in a form that can readily be used by statistical analysis tools. The GPS/GIS integration script performed this extraction and saved the attribute tables in dBASE IV format.

Create a Manifest that Indicated Trip Start and End Times

The GPS/GIS integration script created a single text file for each participant that included the following information derived from the GPS date and time stamps:

- Tracking ID – The participant ID number used in the participant tracking database, an Access database used to manage participants and track the GPS equipment.
- Trip File – The file name of the intermediate data file associated with each trip.
- Trip ID – A unique trip identifier coded with the tracking ID, trip date, and trip start time.
- Trip Date – The date at the start of the trip.
- Trip Starting Time – The time at the start of the trip.
- Trip Ending Time – The time at the end of the trip.

It should be noted that the GPS units output the time using the UTC, which is approximately equivalent to Greenwich Mean Time. The times entered in the manifest were converted to Pacific Time in Seattle and Central Time in Texas. All times were adjusted for either Daylight Savings Time or Standard Time during the respective seasons.

In summary, the final outputs of the GIS/GIS integration script included one ArcGIS shapefile with joined GPS/GIS data, one attribute table database, and one trip manifest for each participant.

Trip Manifest Processing

An Access database for holding trip information was created for each participant. Electronic versions of the trip logs were downloaded from SurveyMonkey and imported into a table in the database using a custom software tool to automate the importation process. The software tool also imported trip manifests that were generated by the GPS/GIS integration script into another table in the database. Using a custom form in the database, the trips in the trip log tables were

manually matched with the corresponding trips in the manifest tables in order to associate self-reported trips with the trips identified in the integrated GPS/GIS data.

Data Post-processing

A data post-processing software tool was developed using Visual Basic.Net in order to prepare the data for analysis. The post-processor performed the following operations:

- Parse the data into 30-sec epochs.
- Correct erroneous intermittent road changes.
- Repair road functional class for Pierce County and Texas data.
- Calculate epoch statistics.

Each of these functions is described below.

Parse the Data into 30-second Epochs

One of the primary purposes for post-processing the data was to parse each trip for a participant into 30-second epochs. The post-processor segmented the trips using the date and time stamps for each sequential GPS data point. A new epoch was created if the time stamp of a GPS data point was more than 30 seconds after the first GPS point in the epoch, regardless of the time stamp of the previous point. Therefore, all epochs started on 30-second boundaries. Epochs for which GPS data had been lost during data cleaning (due to power failures, corrupted data, etc.,) had fewer than 30 data points in the epoch. In addition, epochs that occurred at the end of a trip often had fewer than 30 data points. A field in the epoch database indicates the number of data points in the epoch.

Correct Erroneous Intermittent Road Changes

During the spatial join, some GPS data points were mapped to the wrong road in the GIS map because of proximity errors in which one (or more) data points were closer to an intersecting road than to the road upon which the participant was driving. Figure B-1 illustrates this phenomenon. In the figure, the vehicle is traveling on Mercer St., and the majority of points are joined to that street. However, the indicated GPS point is erroneously joined to Warren Ave N. because it is closest to that street.

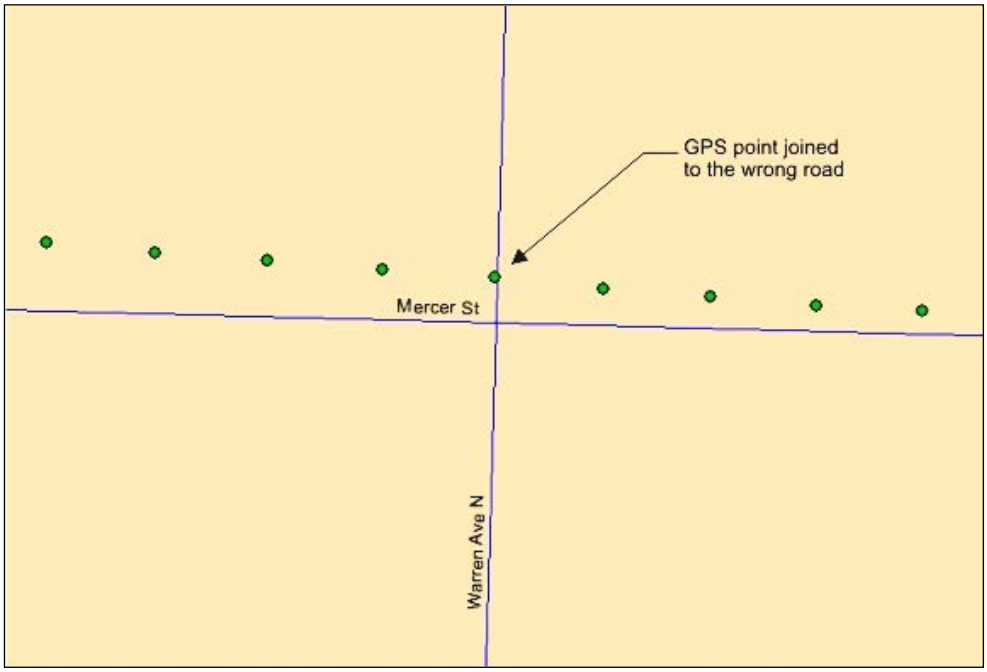


Figure A-1. Erroneous intermittent road changes.

The post processor corrected these errors by finding the running median road name within a window of five GPS points. At each time point, five GPS data points—the most current GPS data point, two preceding data points, and two following data points—were placed in a list and sorted. The current GPS data point was replaced with the central data point from the sorted list.

Repair Road Functional Class for Pierce County

The form of the CFCC in Pierce County was not consistent with the other counties in the project: it did not include the alphabetical prefix that indicates the feature class is a roadway. The post-processor prefixed an "A" to the numerical CFCC code for each GPS data point in Pierce County to ensure that the form was consistent throughout.

Calculate Epoch Statistics

The final function of the post-processor was to calculate a set of 135 variables that describe the characteristics of each 30-second epoch in a trip. These variables include participant demographic data, trip, and epoch identifiers, time and date of the epoch, trip duration, and numerous descriptive statistics that characterize the driving within the epoch. Several flags are also included that indicate status, quality, and validity of the data in the epoch.

The post processor produced five categories of data in the epoch database, as summarized in Table A-2.

Table A-2. Epoch statistics.

Field Type	Description
Identifier Fields	Participant ID and demographics; trip and epoch ID; county; road-related variables that identify name, class, and geospatial location.
Time Fields	Trip date and time, absolute and relative position of the epoch within the trip.
Kinematics Fields	Average, median, minimum, and maximum values for speed, acceleration, and deceleration; speed variability measures; change in speed, heading, and acceleration within the epoch and between previous and current epochs; posted speed variables.
Duration Fields	Trip and epoch durations; time (percent of GPS samples) driven above threshold speed; time on road
Status Fields	GIS manually validated, number of road name changes in epoch, average distance from GPS location to nearest road segment, worst-case source validity code from GIS map, number of non-credible acceleration, deceleration, and heading changes.

A set of variables was included in the epoch data set that provides information about drivers' speed profiles. These variables were used to record the percentage of time the vehicle was traveling above various thresholds relative to the posted speed. Two types of these variables were developed. The first describes the percentage of time in the epoch in which the vehicle traveled above an absolute threshold—for example, the percentage of time the travel speed was greater than 15 mph above the posted speed. The other type of variable captured the percentage of time in the epoch in which the vehicle traveled above a percentage of posted speed—for example, the percentage of time the travel speed was greater than 120% of the posted speed.

Figure B-2 illustrates how these variable sets describe the speed profile in a cumulative fashion. In this example, the percentage of time traveled above absolute posted speed thresholds are given in the variables. For example, TimeatPS_10mph refers to the percentage of time the vehicle traveled faster than 10 mph above the posted speed, while TimeatPS_M10mph indicates percentage time the vehicle traveled faster than 10 mph below the posted speed.

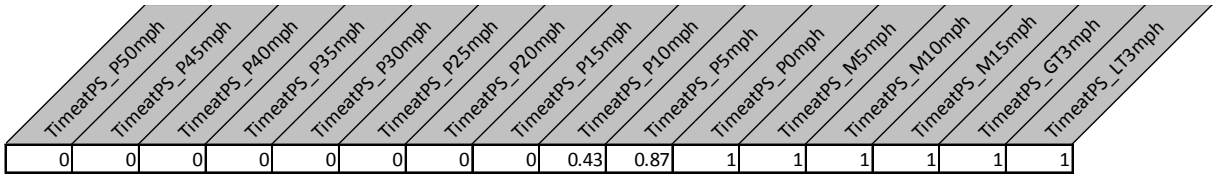


Figure A-2. Example of the time profile variables.

The numerical values associated with each variable indicate the count of GPS samples that exceed the respective threshold divided by the total number or GPS samples in the epoch. The figure illustrates the following:

- **All driving in the epoch occurred above the posted speed.** All variables with thresholds less than zero mph above the posted speed (TimeatPS_LT3mph to TimeatPS_P0mph) are one, indicating that all GPS data points in the epoch were driven at speeds above the posted speed.
- **The vehicle exceeded the posted speed by at least 5 mph 87% of the time.** The TimeatPS_P5mph indicates that 87% of the GPS data points in the epoch were driven at speeds of more than 5 mph above the posted speed.
- **The vehicle exceeded the posted speed by at least 10 mph 43% of the time.** The TimeatPS_P5mph indicates that that 43% of the GPS data points in the epoch were driven at speeds of more than 10 mph above the posted speed.
- **At no time did the vehicle exceed 15 mph over the speed limit.** All variables with thresholds greater than 10 mph above the posted speed (TimeatPS_P15mph to TimeatPS_P50mph) are zero, indicating that no GPS data points were driven at speeds of more than 15 mph above the posted speed.

These variables were used as part of the data filter criteria described below as well as in data analysis.

Post Processor Output

The final output of the post-processor was an Access database for each participant that contained the 135 fields of data for each epoch. All of the individual participant databases were merged into one large database for final analysis.

Appendix B:
Description of Data Validation Activities

A key requirement throughout all aspects of the project was that the data used in the data analyses must be of the highest possible quality in order to obtain reliable results and maintain high confidence in our conclusions. There were a number of data integrity challenges and checks used throughout our post-processing activities associated with: the GIS data, the GPS data, spatial joins, the development of epoch data sets, and validating the trip logs. Below, Tables B-1 through B-4 summarize the data integrity challenges that were associated with the GIS data, GPS data, spatial join, and epoch data. The final column in the table describes how we addressed these challenges to data quality.

GIS Data

The goal for GIS data validation was to ensure that the road segments upon which participants drove were associated with accurate posted speed and functional class information. Table B-1 summarizes the data integrity issues that were encountered in the project and describes the mitigations that were employed to address these errors and minimize their impact on the final data analysis. The table describes the following:

- Key data fields and sources.
- Missing data issues, including what data were affected, the cause of data loss, and the steps that were used to mitigate data loss.
- Data integrity issues, including what data were affected, the cause of data loss, and the steps that were used to mitigate data integrity.

Table B-1. GIS data integrity challenges and mitigations.

Key Data Fields	Source		
Road Name	County and State sources		Comments
Posted Speed	County and State sources.		Washington State Department of Transportation (WSDOT) posted speeds were used for state roads in place of county data (county data are retained).
Night Speed	Not currently used.		Represents lower nighttime speed on certain Texas roads.
Road Class	County and State sources.		Census Feature Class Code (CFCC) was used for both sites.
Other Data	(County, zip codes, shape info).		
Participant Code	Randomly generated.		Unique, random code for each participant protects anonymity.
Data Loss Issues	Data Affected	Cause and Magnitude	Data Fixes/Transforms
Missing Roadway Information	All GIS data for certain roads.	Data not available. Usually occurs on minor roads in Washington; affects a greater percentage of roads in Texas.	Blank data fields were changed to 0. Data missing posted speed were excluded from analysis.
No Posted Speed Data for Snohomish Co. Roads	All GIS data for Snohomish Co.	Data not available.	Avoided recruiting drivers that reside in this county. Used WSDOT data for state routes in Snohomish Co.
Data Integrity Issues	Data Affected	Cause and Magnitude	Data Fixes/Transforms
Inaccurate or Out-of-Date Roadway Data	Posted speed or functional class.	Data is different from what drivers encounter. Large (15+ mph) differences can be identified, but smaller differences cannot be easily found.	Posted speeds for I-5, I-405, and SR-520 (Seattle) were replaced with known posted speeds. Only used validated data in analysis.
Inaccurate County Data for WSDOT Roadways	All GIS county data for state roadways.	County GIS data set did not maintain accurate roadway data for state roads.	Combined WSDOT GIS data with County data.
Incompatible Data Fields across Merged Databases	All GIS data.	Individual jurisdictions have different data definitions and requirements for many of the types of data.	Included only the most common data fields—road name, posted speed, road class—in the final GIS map. Used CFCC from ESRI data in counties without functional class data. Excluded from analysis roads without posted speed or functional class data.

Our strategy for addressing data quality issues related to posted speed included two parts: (1) manually verifying posted speeds and (2) excluding from the analysis those roads for which there was insufficient traffic to warrant the time and effort required to perform validation. The process for validating posted speeds in Seattle and Texas included the following steps:

- **Generate a list of roads with excessive speeding.** A query in the epoch database was developed that listed roads on which at least one participant traveled at least 15 mph above the posted speed.

- **Identify the most heavily traveled roads with excessive speeding**. The list was sorted by frequency of travel; roads that had a high frequency of excessive speeding events were considered as potentially having incorrect posted speeds. These were targeted for validation, with other roads to be validated as time permitted.
- **Manually identify posted speed on those roads.** Two methods were used to identify posted speed on the most heavily traveled roads:
    1. In Texas, researchers drove an instrumented vehicle on the most heavily traveled roads in the Bryan–College Station area and captured the locations of the speed limit signs and their associated posted speeds using a GPS-based Dewetron event logger. Whenever experimenters encountered a posted speed sign, they created a log entry that included a textual description of the location and the posted speed. The Dewetron automatically assigned to the log entry the GPS coordinates of the instrumented vehicle at the time of the entry was logged. This activity was performed not only to validate existing posted speeds but also to increase the number of roads in the GIS database by identifying posted speeds for roads without posted speed.
    2. In Seattle, researchers used Google Street View to virtually "drive" on the most heavily traveled roads. Posted speed signs were located in the Street View images, their locations were noted, and location "pinpoints" for each sign were created and saved in KML format. The pinpoints were converted to ArcGIS shapefiles and imported into the GIS map to assist in locating the posted speed signs using ArcGIS. The list of target roads was also updated with the correct posted speed.
- **Edit the posted speeds on the GIS map**. The GIS maps for both Seattle and Texas were edited to reflect the results of the manually collected posted speeds. The original posted speeds for all road segments were copied to a separate attribute in the GIS database in order to retain a record of the original posted speed. The GIS map was then edited to correct the road segments that had incorrect or nonexistent posted speeds. All manually validated road segments were flagged to indicate that they had been validated, regardless of whether the posted speed was changed during editing. This flag was later used as a filtering criterion when preparing the data for final analysis; only those roads that were validated were used in the analysis.

GPS Data

The purpose of GPS validation was to ensure that the epochs used in the analysis included accurate GPS driving data. Table B-2 summarizes the GPS errors associated with the equipment chosen for the project and the countermeasures that were employed to address these errors and minimize their impact on the final data analysis. The table describes the following:

- Key data fields and sources.
- Missing data issues, including what data were affected, the cause of data loss, and the steps that were used to mitigate data loss.
- Data integrity issues, including what data were affected, the cause of data loss, and the steps that were used to mitigate data integrity.

Table B-2. GPS data integrity challenges and mitigations.

Key Data Fields	Source		Comments
Trip Number	GPS unit power-on creates a new, sequentially numbered file.		
Vehicle Position	GPS chip – Recorded in NMEA sentence.		Position error increases when vehicle speed < 3 mph.[1]
Vehicle Speed	Satellite signal differential.		Speed error increases when vehicle speed is < 3mph.
Heading	GPS chip – Recorded in NMEA sentence.		Heading error increases when vehicle speed is < 3mph.
Record Date/Time	Satellite time signal – UTC.		– Must be converted to local time. – Conversion must account for daylight or standard time.
Data Loss Issues	**Data Affected**	**Cause and Magnitude**	**Data Fixes/Transforms**
GPS Signal Loss	All data in a record.	Loss of signal from overpasses, tunnels, etc.	Unrecoverable—no data recorded for these conditions.
GPS Device Power Loss	All GPS data during that time.	Intermittent or sustained power loss affecting GPS data for the duration of the power loss.	Manifest script combines each separate trip file into a single file and parses them back into trips based on either of two criteria: (1) vehicle has stopped for > 10 min or (2) time between adjacent GPS points is > 10 min.
Data Integrity Issues	**Issue type and impacts on data quality**		**Data Fixes/Transforms**
Multipath Error	Vehicle position, speed, heading.	Multipath error causing position information to have incorrect value with large deviation from previous valid values. Affects small percentage of data.	Difficult to detect—can infer possible multipath by examining erratic speed, acceleration, and/or head changes. Not implemented.
Continuous Power to GPS Units	Trip number.	Continuous power in some vehicles means that vehicle ignition does not mark a new trip. Data are recorded as a single trip with long periods of inactivity between actual trips.	Manifest script parses continuous file into trips based on either of two criteria: (1) vehicle has stopped for > 10 min or (2) time between adjacent GPS points is > 10 min.
GPS Power Supply	Trip number.	Power surges/transients and intermittent power interruptions cause premature termination of files, and the second part of a trip to be improperly marked as the next new trip.	Manifest script combines each separate trip file into a single file and parses them back into trips based on either of two criteria: (1) vehicle has stopped for > 10 min or (2) time between adjacent GPS points is > 10 min.
Corruption of NMEA Sentences	Some data fields in a record.	Power or other issues can cause the GPS unit to log an incomplete or corrupt NMEA sentence, which as missing data fields. Typically, only one or a few seconds of records are lost. Most often occurs in the last record in the trip.	GPS data point is removed from the data set.
Translation of NMEA Sentences to Useable Data Fields	All data.	No impact – other than data transformation.	Redundant check of NMEA sentence during translation to ensure correct data format.

[1] The GPS intermittently reports erroneous speed, position, and heading when the vehicle is stationary. In this condition, the GPS may report travel speeds of up to 3 mph, and headings are unpredictable. To counteract these effects, a vehicle is considered stationary throughout the entire scope of data processing when the reported travel speed is 3 mph or less.

The largest challenges to GPS data quality were related to the power management issues described in the GPS Data Cleaning section above. A small percentage of GPS NMEA records were corrupted or truncated because of transient power interruptions that occurred while the data logger was writing the records to the memory card. The GPS Data Cleaning software utility was used to validate each NMEA sentence by examining each data field in the sentence. The entire GPS record was discarded if any data field was missing or if the data within the field did not conform to expected values or format. Numeric values were tested to make sure they were within the range of possible or reasonable values, and the time and date fields were validated against the expected format. Finally, the record's checksum was calculated and verified against the stated checksum at the end of the NMEA sentence.

The final concatenated file was also checked to make sure the individual GPS log files were complete in the concatenated file. The concatenated files for a random sample of participants were manually examined and the lines where one log file ended and a new one began were located. These lines were manually compared to the last and first lines from the original log files respectively to make sure that they existed and were complete in the concatenated file. In a select number of concatenated files, the locations of GPS records that were removed because of corrupt or incomplete data were validated to make sure those records were not included in the concatenated files.

Multipath errors were found to affect none of the epochs for which speeding of more than 15 mph over the speed limit was observed. That is, all epochs that were affected by multipath errors were filtered out of the data by other filter criteria. Therefore, no attempt was made to correct or compensate for multipath errors.

Spatial Join

The spatial join is a standard routine found in ArcGIS that was used to match GPS coordinates with the nearest road segment from the road network database. Table B-3 summarizes the data integrity challenges related to the spatial join and the steps we took to compensate for them.

Table B-3. Data integrity challenges and mitigations related to spatial join.

Key Data Fields	Source		Comments
Distance from Roadway	Perpendicular between GPS vehicle coordinate nearest point of joined roadway.		
Local Time	UTC converted to local time.		
Data Loss Issues	Data Affected	Cause and Magnitude	Data Fixes/Transforms
First and Last Half Mile or 90 Sec of Travel Deleted	All driving data during in those time-periods.	IRB confidentiality requirement. Participants that driver shorter trips are disproportionately affected.	Unrecoverable. Short trips (less than 1 mile or 180 sec) are discarded.
Data Integrity Issues	Issue type and impacts on data quality		Data Fixes/Transforms
GPS Coordinates Matched to Incorrect Roadway	Roadway data.	Errors in GPS position and/or GIS map geometry. GPS points closer to ramps, express lanes, etc. parallel to the roadway than to the actual road centerline.	Posted speeds for Ramps, express lanes, etc. on I-5, I-405, SR-520, and I-90 replaced with the speed limit of the freeway/highway at the corresponding location. Non-roadway functional classes removed from GIS data set.
Conversion of UTC Code to Local Time	Time data.	Potential errors related to 12am transition, and adjustment required for DST.	Time correction algorithm implemented for both 12 am transitions and DST.

One of the chief challenges associated with the spatial join was related to road density on Seattle freeways, particularly in proximity to on- and off-ramps and the I-5 express lanes. Our strategy for addressing these challenges was to treat these ramps and expressway the same as the freeway by assigning the freeway posted speed to the ramp and changing the name of the ramp to the same name as the freeway. This treatment did not complicate analysis during actual travel on ramps because travel on ramps was excluded from the analysis.

Another challenge to data quality was related to the inclusion of non-roadway functional classes in the maps. The county maps in the Seattle area included railways, pedestrian stairs, and pedestrian trails/walkways. Many GPS points were erroneously joined to these alignments when they occurred near drivable streets. To correct these errors, the Seattle map was edited to remove all alignments that were not drivable roads, and the GPS data were re-joined with the map.

Some driving occurred on roads that were outside the designated driving areas for both the Seattle and Texas sites. In addition, some driving occurred in parking lots, alleys, or other roads that did not exist on the GIS maps. Because the spatial join merges a GPS point to the closest road, these extraneous points were incorrectly matched to roads that were sometimes miles away from the GPS point. These extraneous GPS points were ignored during the spatial join if they were more than 100 feet from any road in the map. The resulting records contained null values for posted speed and road class, and they were therefore excluded from the analysis.

Epoch Data Set

The epoch data set was used as the basis data for the analysis. Table B-4 summarizes the data integrity challenges related to the epoch data set and the mitigations we employed to assure high quality in the analysis data.

Table B-4. Epoch data integrity challenges and mitigations

Key Data Fields	Source		Comments
Identifier Fields	Data processing—GPS trips and participant identifiers.		
Time Fields	GPS date and time.		
Kinematics Fields	Acceleration/deceleration, speed, heading range, etc.		
Duration Fields	Seconds driven below individual speed thresholds.		
Status Fields	Flags to indicate data integrity.		
Data Loss Issues	Data Affected	Cause and Magnitude	Data Fixes/Transforms
None			
Data Integrity Issues	Issue type and impacts on data quality		Data Fixes/Transforms
Errors in Statistical Calculations			Independent verification of calculations using MS Excel.
Contamination of Epoch Data from Mismatched Road Data			Only epochs with homogeneous road name used in the analysis in Seattle. Used modal posted speed to reduce sensitivity to transient errors in mismatch. Removed epochs with “Ramp” in the modal road name in Seattle.

Aggregation of the GPS/GIS data set into epochs resulted in 135 data fields in the epoch data set, which included statistical calculations, time/date conversions from UTC to local time, and calculation of status flags that indicated the validity of various aspects of the epoch data records. In order to ensure that these calculations produced consistent, accurate results, an independent verification of all calculations was performed in Microsoft Excel using random subsets of time-series data. The calculations in the post-processing tool were duplicated in Excel for each variable, and the results compared with the results from the post processor.

The time series data were generated during post processing by copying the data from each NMEA record to a comma delimited file. Random samples of the resultant time-series data were validated by manually comparing the data in each field against the raw NMEA codes in the corresponding GPS data files.

An epoch can contain inaccuracies if one or more GPS data samples in the epoch are incorrectly matched with the roadway. Typically, the road name changes briefly for one or a few GPS samples and then reverts to the original road name. In order to avoid this type of contamination in the epoch data, all epochs that contained more than one road name (after filtering for road name “flipping”) in the Seattle site were excluded from the analysis during data filtering (see Final Data Filtering below).

Trip Log Validation

Completed trip-log data from all participants were manually verified for accuracy. All online entries provided by participants were checked against any hardcopy versions. Any hardcopy entries that were not entered online were entered by the researchers. If there was a mismatch between the hardcopy and online versions of the same trip, the hardcopy version was typically used as the correct version since it was most likely to be completed sooner after the trip was taken (the instructions for entering the online information was to do them at the end of each day). The exceptions were obvious typographic errors in the hardcopy versions (e.g., date out of range).

Appendix C:
Personal Inventory Questions

Driving Study Start-up Questionnaire

Participant ID Number: _____

Driving Behavior Questionnaire

As part of your participation in this study, you are being asked to complete a set of questionnaires. These questionnaires should 15 to 25 minutes to complete and cover several topics, including

- Demographic information
- Travel behavior
- General driving behavior
- “Risky” driving events and actions
- General interests and preference

Some of the questions cover traffic violations or “risky” driving behaviors. We are asking these questions because they are things that some or most people do while driving. We ask that you try to provide honest and thoughtful responses to these questions to help us gain a better understanding of driver behavior. Please note that your answers will be kept STRICTLY CONFIDENTIAL and ANONYMOUS and they will not be connected with any of your personal or identifying information. However, if you do not want to answer a specific question, you are not required to do so.

The questionnaire is divided into separate sections, and some sections have special instructions for answering. Please read these instructions carefully.

Demographic Information

Age: _____

Sex

○ Male
○ Female

What is your household income?

○ Under $15,000
○ $15,000 - $29,999
○ $30,000 - $44,999
○ $45,000 - $59,999
○ $60,000 - $74,999
○ $75,000 - $89,999
○ $90,000+

What is the highest level of education that you obtained?

○ Did not complete high school
○ High School/GED Diploma
○ Associate Degree
○ Bachelors Degree
○ Masters Degree
○ Doctorate Degree
○ Other

What is your marital status?

○ Single, never married
○ Single, divorced
○ Single, widowed, widower
○ Separated
○ Married

Do you have children?

○ No
○ One or more living with you most of the time
○ One or more not living with you most of the time

How many miles do you drive each week?

○ Less than 50
○ 50 - 100
○ 100 - 200
○ 200 - 300
○ More than 300

What is the year, make, and of the vehicle you will be driving in this study?

Year _____

Make _____

Model _____

Travel Behavior Questions

INSTRUCTIONS: The questions below require you to describe aspects about your travel planning and how you select your driving route. For each item you are asked to indicate how often, if at all, each situation or event applies to you. Base your judgments on what you remember of your own driving over the past year.

1) How often do you check traffic conditions before you drive somewhere?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

2) During familiar trips (e.g., driving to work), how often do you change your travel route *prior to departing* to avoid congestion?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

3) During familiar trips (e.g., driving to work), how often do you change your travel route *part way through your trip* to avoid congestion?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

4) When driving somewhere you have never been before, how often do you change your travel route *part way through your trip* to avoid congestion?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

5) How often do you drive faster to make up for time lost due to traffic congestion?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

6) How often to do leave early if you have to be somewhere at a specific time (e.g., work or an appointment)?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

Manchester Driver Behavior Questionnaire

INSTRUCTIONS: The questionnaire below requires you to judge the frequency of your own driving actions, errors, and violations. For each item you are asked to indicate how often, if at all, this kind of thing has happened to you. Base your judgments on what you remember of your own driving *over the past year*.

1) How often do you ever attempt to drive away from traffic lights in the wrong gear?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

2) How often do you ever become impatient with a slow driver in the fast lane and pass on the right?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

3) How often do you ever drive especially close to a car in front as a signal to the driver to go faster or get out of the way?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

4) How often do you ever attempt to pass someone that you hadn't noticed was trying to make a left turn?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

5) How often do you ever forget where you left your car in a parking lot?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

6) How often do you ever turn on one thing, such as your headlights, when you mean to switch on something else, such as the windshield wipers?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

7) How often do you ever realize that you have no clear recollection of the road along which you have just been traveling?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

8) How often do you ever stay in a lane that you know will be closed ahead, and then at the last minute force your way into the lane that is open?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

9) How often do you ever cross an intersection knowing that the traffic light has already changed from yellow to red?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

10) How often do you ever fail to notice that pedestrians are crossing when turning onto a side street from a main road?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

11) When angered by another driver's behavior, how often do you ever catch up to them with the intention of giving him/her "a piece of your mind?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

12) How often do you ever misread the signs and turn the wrong direction on a one-way street?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

13) How often do you ever pull out far enough onto a road that you block traffic until you can complete a turn or get across?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

14) How often do you ever disregard the speed limits late at night or early in the morning?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

15) When turning right, how often do you ever nearly hit a bicyclist who is riding along side of you?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

16) When attempting to turn onto a main road, how often do you pay such close attention to traffic on the road you are entering that you nearly hit the car in front of you that is also waiting to turn?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

17) How often do you ever drive even though you realize you might be over the legal blood alcohol limit?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

18) How often do you ever become angered by a certain type of driver, and indicate your hostility in whatever way you can?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

19) How often do you ever underestimate the speed of an oncoming vehicle when attempting to pass a vehicle in your own lane?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

20) How often do you ever hit something when backing up that you had not previously seen?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

21) While intending to drive to destination A, how often do you ever you 'wake up' to find yourself on a road to destination B, perhaps because destination B is a more common destination?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

22) How often do you ever get into the wrong lane approaching an intersection?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

23) How often do you honk your horn or make an obscene gesture to indicate your annoyance at another driver?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

24) How often do you ever miss “yield” signs, and narrowly avoid colliding with other traffic that has the right of way?

Never	Hardly Ever	Occasionally	Quite Often	Frequently	Nearly All the Time
○	○	○	○	○	○

25) How often do you ever fail to check your mirrors before pulling out, changing lanes, merging, etc?

Never	Hardly Ever	Occasionally	Quite Often	Frequently	Nearly All the Time
○	○	○	○	○	○

26) How often do you ever get involved in 'races' with other drivers on a roadway or from a stop light?

Never	Hardly Ever	Occasionally	Quite Often	Frequently	Nearly All the Time
○	○	○	○	○	○

27) How often do you ever brake too quickly on a slippery road or steer the wrong way into a skid?

Never	Hardly Ever	Occasionally	Quite Often	Frequently	Nearly All the Time
○	○	○	○	○	○

CARDS Driver Behavior Questionnaire

INSTRUCTIONS: People feel differently about how safe or how dangerous different types of driving behaviors are and factors such as time of day, road conditions, and congestion affect the way people drive. The following set of questions asks about specific driving activities or events that you may have engaged in during the past *3 months*. Please estimate how frequently you think they occurred.

1) In the past 3 months while driving, how often did you . . .

Drive when sleepy and find it hard to keep your eyes open?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

2) In the past 3 months while driving, how often did you . . .

Take risks while driving because it's fun, such as driving fast on curves or "getting air"?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

3) In the past 3 months while driving, how often did you . . .

Not yield the right of way?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

4) In the past 3 months while driving, how often did you . . .

Make a U-turn where the sign said not too?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

5) In the past 3 months while driving, how often did you . . .

Take more risks because you were in a hurry?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

6) In the past 3 months while driving, how often did you . . .

Drive at your normal speed during bad driving conditions such as road construction, rain, ice, or snow?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

7) In the past 3 months while driving, how often did you . . .

Accelerate when a traffic light turns yellow?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

8) In the past 3 months while driving, how often did you . . .

Drive to reduce tension?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

9) In the past 3 months while driving, how often did you . . .

Do other things while driving, like use cell phone, eat or drink, put on makeup, read things, or smoke cigarettes?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

10) In the past 3 months while driving, how often did you . . .

Drive 10-20 mph over limit?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

11) In the past 3 months while driving, how often did you . . .

Drive more than 20 mph over limit?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

12) In the past 3 months while driving, how often did you . . .

Not yield to pedestrians?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

13) In the past 3 months while driving, how often did you . . .

Drive without wearing a safety belt?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

14) In the past 3 months while driving, how often did you . . .

Turn without signaling?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

15) In the past 3 months while driving, how often did you . . .

Pass where visibility was obscured?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

16) In the past 3 months while driving, how often did you . . .

Not make a full stop at stop sign?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

17) In the past 3 months while driving, how often did you . . .

Cut in front of another driver?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

18) In the past 3 months while driving, how often did you . . .

Use the shoulder to pass in heavy traffic?

○ Never ○ Hardly Ever ○ Occasionally ○ Quite Often ○ Frequently ○ Nearly All the Time

Zuckerman Interest and Preference Questionnaire

INSTRUCTIONS: Please complete the following questions. There are no right or wrong answers, everyone is an individual, just respond to the statement. For each statement, choose either true or false. If you do not like either choice, mark the choice you dislike the least.

1. I like to have new and exciting experiences and sensations even if they are a little frightening.
   ○ True ○ False

2. I like doing things just for the thrill of it.
   ○ True ○ False

3. I sometimes do "crazy" things just for fun.
   ○ True ○ False

4. I sometimes like to do things that are a little frightening.
   ○ True ○ False

5. I enjoy getting into new situations where you can't predict how things will turn out.
   ○ True ○ False

6. I'll try anything once.
   ○ True ○ False

7. I prefer friends who are excitingly unpredictable.
   ○ True ○ False

8. I like "wild" uninhibited parties.
   ○ True ○ False

9. I would like the kind of life where one is on the move and traveling a lot, with lots of change and excitement.
   ○ True ○ False

10. I am an impulsive person.

○ True ○ False

11. I like to explore a strange city or section of town by myself, even if it means getting lost.

○ True ○ False

12. I would like to take off on a trip with no preplanned or definite routes or timetables.

○ True ○ False

13. Before I begin a complicated job, I make careful plans.

○ True ○ False

14. I very seldom spend much time on the details of planning ahead.

○ True ○ False

15. I tend to begin a new job without much advance planning on how I will do it.

○ True ○ False

16. I usually think about what I am going to do before doing it.

○ True ○ False

17. I often do things on impulse.

○ True ○ False

18. I often get so carried away by new and exciting things and ideas that I never think of possible complications.

○ True ○ False

19. I tend to change interests frequently.

○ True ○ False

Driving Study Close-out Questionnaire

Participant ID Number: _____

Travel Speed Questionnaire

One of the topics that we are investigating in this study has to do with the factors that affect driver's travel speed choices. The following questions ask about your beliefs and attitudes towards speed selection.

We ask that you try to provide honest and thoughtful responses to these questions to help us gain a better understanding of driver behavior. Please note that your answers will be kept STRICTLY CONFIDENTIAL and ANONYMOUS and they will not be associated with any personal or identifying information.

***IMPORTANT**: Most of the questions refer to driving within or near the speed limit. You should take this to mean the posted speed for a roadway, plus or minus a few miles per hour. Although it is generally recognized that drivers can go 5-10 mph faster than the posted speed limit and not have to worry about getting a speeding ticket, for the purpose of this questionnaire please answer the questions using the posted speed plus or minus a few mph as the reference point.*

To what extent do you agree or disagree with the following statements about driving within or near the posted speed limit?

Driving within or near the speed limit…

Puts pedestrians at less risk

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Driving within or near the speed limit…

Reduces my chances of an accident

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Driving within or near the speed limit…

Makes it difficult to keep up with traffic

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Driving within or near the speed limit…

Uses less fuel

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Driving within or near the speed limit…

Annoys other drivers

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Driving within or near the speed limit…

Holds up traffic

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Driving within or near the speed limit…

Takes me longer to reach my destination

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Driving within or near the speed limit…

Makes me feel annoyed

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Driving within or near the speed limit…

Makes me feel relaxed

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Driving within or near the speed limit…

Makes me feel bored

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Driving within or near the speed limit…

Makes me feel safer

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Driving within or near the speed limit…

Makes it easier to detect hazards

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Driving within or near the speed limit…

Makes me feel more in control of my vehicle

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

While driving in the next three months, how likely/unlikely is it that you would drive within or near the speed limit under the following circumstances?

Driving when late/in a rush

Very Unlikely	Unlikely	Somewhat Unlikely	Neither	Somewhat Likely	Likely	Very Likely
1	2	3	4	5	6	7

Driving when others are exceeding the speed limit

Very Unlikely	Unlikely	Somewhat Unlikely	Neither	Somewhat Likely	Likely	Very Likely
1	2	3	4	5	6	7

Driving in traffic calmed areas (e.g., with small roundabouts, speed bumps, special warning signs, etc)

Very Unlikely	Unlikely	Somewhat Unlikely	Neither	Somewhat Likely	Likely	Very Likely
1	2	3	4	5	6	7

Driving in a fast/powerful car

Very Unlikely	Unlikely	Somewhat Unlikely	Neither	Somewhat Likely	Likely	Very Likely
1	2	3	4	5	6	7

Driving when carrying passengers who want you to drive fast

Very Unlikely	Unlikely	Somewhat Unlikely	Neither	Somewhat Likely	Likely	Very Likely
1	2	3	4	5	6	7

While driving in the next three months, how likely/unlikely is it that you would drive within or near the speed limit under the following circumstances? …[continued]

Driving when carrying passengers who want you to drive slow

Very Unlikely	Unlikely	Somewhat Unlikely	Neither	Somewhat Likely	Likely	Very Likely
1	2	3	4	5	6	7

Driving when many pedestrians are around

Very Unlikely	Unlikely	Somewhat Unlikely	Neither	Somewhat Likely	Likely	Very Likely
1	2	3	4	5	6	7

Driving on quiet roads in the day

Very Unlikely	Unlikely	Somewhat Unlikely	Neither	Somewhat Likely	Likely	Very Likely
1	2	3	4	5	6	7

Driving on quiet roads at night

Very Unlikely	Unlikely	Somewhat Unlikely	Neither	Somewhat Likely	Likely	Very Likely
1	2	3	4	5	6	7

While driving in the next three months, how likely/unlikely is it that you would drive within or near the speed limit under the following circumstances? …[continued]

Driving when the speed limit is clearly signed

Very Unlikely	Unlikely	Somewhat Unlikely	Neither	Somewhat Likely	Likely	Very Likely
1	2	3	4	5	6	7

Driving on long straight roads

Very Unlikely	Unlikely	Somewhat Unlikely	Neither	Somewhat Likely	Likely	Very Likely
1	2	3	4	5	6	7

Driving in areas where there are speed cameras

Very Unlikely	Unlikely	Somewhat Unlikely	Neither	Somewhat Likely	Likely	Very Likely
1	2	3	4	5	6	7

The following questions ask about how people that are important to you would influence your driving behavior. The words "important people" should be taken to mean the family members, friends, peers, or others that have the greatest influence on the choices you will make in the next three months.

People who are important to me disagree/agree that I should keep within or near the speed limit while driving in the next 3 months.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

People who are important to me would disapprove/approve of my keeping within or near the speed limit while driving in the next 3 months.

Strongly Disapprove	Disapprove	Somewhat Disapprove	Neutral	Somewhat Approve	Approve	Strongly Approve
1	2	3	4	5	6	7

People who are important to me think that I should not/should keep within or near the speed limit while driving in the next 3 months.

Absolutely Should Not	Should Not	Somewhat Should Not	Neutral	Somewhat Should	Should	Absolutely Should
1	2	3	4	5	6	7

How much do you think that the following groups of people will influence whether or not you drive within or near the posted speed limit in the three months?

Friends of the same sex

Not at All	Very Little	A Little	Moderately So	Quite a Bit	Very Much	Extremely So
1	2	3	4	5	6	7

Friend of the opposite sex

Not at All	Very Little	A Little	Moderately So	Quite a Bit	Very Much	Extremely So
1	2	3	4	5	6	7

Parents/children

Not at All	Very Little	A Little	Moderately So	Quite a Bit	Very Much	Extremely So
1	2	3	4	5	6	7

Spouse/partner

Not at All	Very Little	A Little	Moderately So	Quite a Bit	Very Much	Extremely So
1	2	3	4	5	6	7

The police

Not at All	Very Little	A Little	Moderately So	Quite a Bit	Very Much	Extremely So
1	2	3	4	5	6	7

Most other drivers on the road

Not at All	Very Little	A Little	Moderately So	Quite a Bit	Very Much	Extremely So
1	2	3	4	5	6	7

While driving in the next three months, to what extent do you think that driving within or near the speed limit is within your control?

I believe that I have the ability to keep within or near the speed limit while driving in the next 3 months (I definitely do not-I definitely do).

Definitely Do Not	Probably Do Not	Somewhat Do Not	Unsure	Somewhat Do	Probably Do	Definitely Do
1	2	3	4	5	6	7

If it were entirely up to me, I am confident that I would be able to keep within or near the speed limit while driving in the next 3 months (strongly disagree-strongly agree).

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

If I kept within or near the speed limit while driving it would be . . . (very difficult-very easy).

Very Difficult	Difficult	Somewhat Difficult	Neutral	Somewhat Easy	Easy	Very Easy
1	2	3	4	5	6	7

How much do you want to keep within or near the speed limit while driving in the next 3 months (not at all-very much)?

Not at All	Very Little	A Little	Moderately So	Quite a Bit	Very Much	Extremely So
1	2	3	4	5	6	7

How likely or unlikely is it that you will keep within or near the speed limit while driving in the next 3 months (very unlikely-very likely)?

Very Unlikely	Unlikely	Somewhat Unlikely	Neutral	Somewhat Likely	Likely	Very Likely
1	2	3	4	5	6	7

The following set of questions refer to how fast you would typically drive on different types of roads. Each question has an example of the type of road that goes with the question, but it can also be any other similar road that you are familiar with.

On a sunny day with no traffic ahead of you, at what speed would you typically be driving on the following types of roads: (write in your chosen speed)

Suburban residential road with a *25* mph posted speed limit: _____

Main (arterial) road with 2 travel lanes in each direction in a built-up/developed area with a *35* mph posted speed limit: _____

Main (arterial) road with 2-3 travel lanes in each direction in a built-up/developed area with a *45* mph posted speed limit (like the 522, Aurora Ave. etc): _____

Interstate freeway, such as the I-5 or I-405 with a *60* mph posted speed limit: _____

Note: *For the Texas driving location, the last four questions above were replaced with the questions on the following pages.*

Neighborhood Road with a 30 mph posted speed limit_____

Main city road with 2 travel lanes with a posted speed limit of 45 mph (Ex: Wellborn Road) _____

County Road serving farms, ranches and homes with a posted speed limit of 45 mph _____

4-Lane Highway without a median and a posted speed limit of 70 mph (Ex: sections of FM 1179 or SH30) _____

4-Lane Highway with a median and a posted speed limit of 70 mph (Ex: SH 21 from Bryan to Caldwell) _____

2-Lane Highway with a 70 mph speed limit (Ex: SH 21 from Kurten to Madisonville or FM 60 to Snook) _____

4-Lane Highway with 2-way left turn lane and a posted speed limit of 70 mph _____

Appendix D: Personal Inventory Responses

The tables have a consistent structure to make them easier to understand. Also, the question response scales are provided below the table to facilitate interpretation of the summary results. Each table row includes a summary of the question text and the average volume of the question responses within each demographic group. The questions about attitudes, beliefs, and social norms regarding speeding are included at the end of the Texas results section in a segment used to compare the attitudes between the two locations.

Seattle – General Travel Questions

The average responses to the general travel questions included in the personal inventory are included in Table D-1 below.

Table D-1. Seattle – Responses to the travel questions from the Personal Inventory.

Q#	Survey Question	Older Females	Older Males	Younger Females	Younger Males
Q11	How often do you check traffic conditions before you drive somewhere?	3.10	2.58	2.50	2.73
Q12	During familiar trips (e.g., driving to work), how often do you change your travel route prior to departing to avoid congestion?	2.76	2.58	2.70	3.18
Q13	During familiar trips (e.g., driving to work), how often do you change your travel route part way through your trip to avoid congestion?	3.29	2.92	3.20	3.23
Q14	When driving somewhere you have never been before, how often do you change your travel route part way through your trip to avoid congestion?	2.24	2.46	2.00	2.29
Q15	How often do you drive faster to make up for time lost due to traffic congestion?	3.38	3.33	3.90	3.82
Q16	How often to do leave early if you have to be somewhere at a specific time (e.g., work or an appointment)?	4.52	4.50	3.90	4.23

Scale:	*Never (1)*	*Hardly Ever (2)*	*Occasionally (3)*	*Quite Often (4)*	*Frequently (5)*	*Nearly all the time (6)*

Seattle – Driver Behavior Questionnaire (DBQ) Questions

The average responses to the DBQ questions included in the personal inventory are included in Table D-2 below.

Table D-2. Seattle – Responses to the DBQ questions from the Personal Inventory.

Q#	Survey Question	Older Females	Older Males	Younger Females	Younger Males
Q17	How often do you ever attempt to drive away from traffic lights in the wrong gear?	1.14	1.42	1.16	1.33
Q18	How often do you become impatient with a slow driver in the fast lane and pass on the right?	3.05	3.13	3.55	3.86
Q19	How often do you drive especially close to a car in front as a signal to the driver to go faster or get out of the way?	2.10	2.21	2.20	2.48
Q20	How often do you attempt to pass someone that you hadn't noticed was trying to make a left turn?	1.48	1.63	2.35	2.05
Q21	How often do you forget where you left your car in a parking lot?	2.52	2.29	2.25	1.73
Q22	How often do you turn on one thing, such as your headlights, when you mean to switch on something else, such as the windshield wipers?	2.10	1.79	1.55	1.36
Q23	How often do you realize that you have no clear recollection of the road along which you have just been traveling?	2.38	2.21	2.11	1.95
Q24	How often do you stay in a lane that you know will be closed ahead, and then at the last minute force your way into the lane that is open?	2.48	2.08	2.70	2.64
Q25	How often do you cross an intersection knowing that the traffic light has already changed from yellow to red?	1.76	1.79	1.95	2.09
Q26	How often do you fail to notice that pedestrians are crossing when turning onto a side street from a main road?	1.95	1.83	2.15	2.09
Q27	When angered by another driver's behavior, how often do you catch up to them with the intention of giving him/her “a piece of your mind?	1.40	1.57	1.35	1.82
Q28	How often do you misread signs and turn the wrong way on a one-way street?	1.35	1.58	1.35	1.32
Q29	How often do you pull out far enough onto a road that you block traffic until you can complete a turn or get across?	1.50	1.67	1.84	1.52
Q30	How often do you disregard the speed limits late at night or early in the morning?	2.19	3.00	3.00	3.23
Q31	When turning right, how often do you nearly hit a bicyclist who is riding along side of you?	1.10	1.46	1.35	1.32
Q32	When attempting to turn onto a main road, how often do you pay such close attention to traffic on the road you are entering that you nearly hit the car in front of you that is also waiting to turn?	1.24	1.65	1.95	1.55
Q33	How often do you drive even though you realize you might be over the legal blood alcohol limit?	1.29	1.29	1.45	1.27
Q34	How often do you become angered by a certain type of driver, and indicate your hostility in whatever way you can?	1.62	2.29	1.47	1.82
Q35	How often do you underestimate the speed of an oncoming vehicle when attempting to pass a vehicle in your own lane?	1.67	1.63	1.70	1.64
Q36	How often do you hit something when backing up that you had not seen?	1.62	1.54	1.50	1.36
Q37	While intending to drive to destination A, how often do you 'wake up' to find yourself on a road to destination B?	2.05	1.92	1.80	1.64
Q38	How often do you get into the wrong lane approaching an intersection?	1.71	1.75	1.55	1.86
Q39	How often do you honk your horn or make an obscene gesture to indicate your annoyance at another driver?	1.86	2.13	1.63	2.05
Q40	How often do you miss “yield” signs, and narrowly avoid colliding with other traffic that has the right of way?	1.43	1.46	1.35	1.23
Q41	How often do you fail to check your mirrors before pulling out, changing lanes, merging, etc?	1.71	1.67	1.80	1.45
Q42	How often do you get involved in 'races' with other drivers on a roadway or from a stop light?	1.00	1.17	1.35	1.59
Q43	How often do you brake too quickly on a slippery road or steer the wrong way into a skid?	1.43	1.58	1.60	1.59

Scale:	*Never (1)*	*Hardly Ever (2)*	*Occasionally (3)*	*Quite Often (4)*	*Frequently (5)*	*Nearly all the time (6)*

Seattle – Risk Questions

The average responses to the risk questions included in the personal inventory are included in Table D-3 below.

Table D-3. Seattle – Responses to the risk questions from the Personal Inventory.

Q#	Survey Question	Older Females	Older Males	Younger Females	Younger Males
	In the past 3 months while driving, how often did you…				
Q44	Drive when sleepy and find it hard to keep your eyes open?	1.52	2.08	2.25	2.14
Q45	Take risks while driving because it's fun, such as driving fast on curves or "getting air"?	1.14	1.54	1.65	2.05
Q46	Not yield the right of way?	1.52	1.58	1.68	1.64
Q47	Make a U-turn where the sign said not too?	1.38	1.48	1.65	1.68
Q48	Take more risks because you were in a hurry?	2.10	2.33	2.74	2.91
Q49	Drive at your normal speed during bad driving conditions such as road construction, rain, ice, or snow?	2.24	2.46	2.70	2.91
Q50	Accelerate when a traffic light turns yellow?	2.52	2.71	3.45	3.18
Q51	Drive to reduce tension?	1.24	1.88	1.60	1.95
Q52	Do other things while driving, like use cell phone, eat or drink, put on makeup, read things, or smoke?	3.90	3.92	4.42	3.91
Q53	Drive 10-20 mph over limit?	2.48	2.58	3.30	3.36
Q54	Drive more than 20 mph over limit?	1.29	1.48	1.40	1.95
Q55	Not yield to pedestrians?	1.50	1.39	1.68	1.62
Q56	Drive without wearing a safety belt?	1.00	1.30	1.60	1.18
Q57	Turn without signaling?	1.57	2.04	1.95	2.09
Q58	Pass where visibility was obscured?	1.00	1.39	1.55	1.19
Q59	Not make a full stop at stop sign?	2.05	2.42	2.95	3.32
Q60	Cut in front of another driver?	1.52	1.83	2.15	2.32
Q61	Use the shoulder to pass in heavy traffic?	1.15	1.13	1.20	1.23

Scale:	*Never (1)*	*Hardly Ever (2)*	*Occasionally (3)*	*Quite Often (4)*	*Frequently (5)*	*Nearly all the time (6)*

Seattle – Sensation-Seeking/Impulsivity Questions

The average responses to the sensation-seeking/impulsivity questions included in the personal inventory are included in Table D-4 below.

Table D-4. Seattle – Responses to the sensation-seeking/impulsivity questions from the Personal Inventory.

Q#	Survey Question	Older Females	Older Males	Younger Females	Younger Males
Q62	I like to have new and exciting experiences and sensations even if they are a little frightening.	1.57	1.46	1.35	1.29
Q63	I like doing things just for the thrill of it.	1.81	1.58	1.40	1.48
Q64	I sometimes do "crazy" things just for fun.	1.90	1.63	1.50	1.45
Q65	I sometimes like to do things that are a little frightening.	1.71	1.42	1.30	1.36
Q66	I enjoy getting into new situations where you can't predict how things will turn out.	1.71	1.58	1.55	1.45
Q67	I'll try anything once.	1.76	1.63	1.50	1.73
Q68	I prefer friends who are excitingly unpredictable.	1.76	1.79	1.60	1.41
Q69	I like "wild" uninhibited parties.	1.86	1.88	1.85	1.76
Q70	I would like the kind of life where one is on the move and traveling a lot, with lots of change and excitement.	1.52	1.50	1.30	1.32
Q71	I am an impulsive person.	1.76	1.79	1.65	1.68
Q72	I like to explore a strange city or section of town by myself, even if it means getting lost.	1.29	1.38	1.60	1.38
Q73	I would like to take off on a trip with no preplanned or definite routes or timetables.	1.33	1.29	1.30	1.41
Q74	Before I begin a complicated job, I make careful plans.	1.19	1.13	1.05	1.00
Q75	I very seldom spend much time on the details of planning ahead.	1.86	1.88	1.90	1.73
Q76	I tend to begin a new job without much advance planning on how I will do it.	1.81	1.92	1.79	2.00
Q77	I usually think about what I am going to do before doing it.	1.10	1.00	1.10	1.09
Q78	I often do things on impulse.	1.76	1.78	1.60	1.73
Q79	I often get so carried away by new and exciting things and ideas that I never think of possible complications.	1.86	1.83	1.75	1.77
Q80	I tend to change interests frequently.	1.67	1.71	1.70	1.64
Z_{ss}	Sensation seeking subscale score (0-1, as a proportion of responses given)	0.26	0.39	0.52	0.53
Z_{imp}	Impulsivity subscale score (0-1, as a proportion of responses given)	0.44	0.43	0.46	0.46

Scale:	*True (1)*	*False (2)*

Seattle – Speeding Beliefs, Attitudes, and Social Norms Questions

The average responses to the speeding beliefs, attitudes, and social norms questions included in the personal inventory are included in Table D-5 below.

Table D-5. Seattle – Responses to the speeding beliefs, attitudes, and social norms questions from the Personal Inventory.

Q#	Survey Question	Older Females	Older Males	Younger Females	Younger Males
Q81	Driving within or near the speed limit, *puts pedestrians at less risk*	5.71	5.21	5.50	5.41
Q82	Driving within or near the speed limit, *reduces my chances of an accident*	5.90	5.48	5.45	5.50
Q83	Driving within or near the speed limit, m*akes it difficult to keep up with traffic*	5.10	4.92	4.60	5.36
Q84	Driving within or near the speed limit, *uses less fuel*	5.86	5.38	4.89	5.18
Q85	Driving within or near the speed limit, *annoys other drivers*	5.25	4.46	5.00	5.68
Q86	Driving within or near the speed limit, *holds up traffic*	4.43	4.42	4.50	4.86
Q87	Driving within or near the speed limit, *takes me longer to reach my destination*	4.57	4.46	5.42	5.55
Q88	Driving within or near the speed limit, *makes me feel annoyed*	4.00	3.25	4.65	4.50
Q89	Driving within or near the speed limit, *makes, me feel relaxed*	4.15	4.00	3.58	3.64
Q90	Driving within or near the speed limit, *makes, me feel bored*	3.57	3.21	4.16	4.55
Q91	Driving within or near the speed limit, *makes, me feel safer*	5.00	5.08	4.75	4.00
Q92	Driving within or near the speed limit, *makes it easier to detect hazards*	5.81	5.58	4.95	5.00
Q93	Driving within or near the speed limit, *makes me feel more in control of my vehicle*	5.05	4.79	4.90	4.36
	While driving in the next three months, how likely/unlikely is it that you would drive within or near the speed limit under the following circumstances?				
Q94	Driving when late/in a rush	3.48	4.13	2.85	2.14
Q95	Driving when others are exceeding the speed limit	3.29	3.92	3.00	3.09
Q96	Driving in traffic calmed areas (e.g., with small roundabouts, speed bumps, special warning signs, etc)	6.38	5.83	5.63	5.41
Q97	Driving in a fast/powerful car	4.29	3.96	3.80	3.32
Q98	Driving when carrying passengers who want you to drive fast	4.16	4.00	3.35	3.55
Q99	Driving when carrying passengers who want you to drive slow	5.10	5.17	4.90	5.23
Q100	Driving when many pedestrians are around	6.52	5.87	5.79	6.00
Q101	Driving on quiet roads in the day	5.05	4.67	4.20	3.45
Q102	Driving on quiet roads at night	5.38	5.17	3.90	3.68
Q103	Driving when the speed limit is clearly signed	5.16	5.30	4.55	4.05
Q104	Driving on long straight roads	4.29	3.92	3.30	3.05
Q105	Driving in areas where there are speed cameras	6.52	5.88	6.15	6.27

Scale:	*Most Negative Option (1)*	*(2)*	*(3)*	*Neutral (4)*	*(5)*	*(6)*	*Most Affirmative/Positive Option (7)*

Seattle – Responses to the speeding beliefs, attitudes, and social norms questions – Continued.

Q#	Survey Question	Older Females	Older Males	Younger Females	Younger Males
Q106	People who are important to me disagree/agree that I should keep within or near the speed limit while driving in the next 3 months.	5.48	5.50	5.50	4.95
Q107	People who are important to me would disapprove/approve of my keeping within or near the speed limit while driving in the next 3 months.	5.43	5.42	5.30	4.86
Q108	People who are important to me think that I should not/should keep within or near the speed limit while driving in the next 3 months.	5.52	5.17	5.25	5.27
	How much do you think that the following groups of people will influence whether or not you drive within or near the posted speed limit in the next three months?				
Q109	Friends of the same sex	2.38	2.58	2.85	2.14
Q110	Friends of the opposite sex	2.10	2.88	2.70	3.00
Q111	Parents/children	4.29	4.33	4.55	4.55
Q112	Spouse/partner	3.57	4.33	3.33	4.23
Q113	The police	5.76	5.25	6.00	6.23
Q114	Most other drivers on the road	3.76	3.38	3.55	3.73
Q115	I believe that I have the ability to keep within or near the speed limit while driving in the next 3 months (I definitely do not-I definitely do).	6.43	6.04	6.00	6.36
Q116	If it were entirely up to me, I am confident that I would be able to keep within or near the speed limit while driving in the next 3 months.	5.43	5.42	5.15	4.36
Q117	If I kept within or near the speed limit while driving it would be . . .	4.14	4.83	3.95	3.82
Q118	How much do you want to keep within or near the speed limit while driving in the next 3 months?	4.62	4.42	3.90	3.55
Q119	How likely or unlikely is it that you will keep within or near the speed limit while driving in the next 3 months?	4.86	4.58	3.70	3.45
	On a sunny day with no traffic ahead of you, at what speed would you typically be driving on the following types of roads?				
Q120	Suburban residential road with a 25 mph posted speed limit:	26.55	26.02	27.65	29.55
Q121	Main (arterial) road with 2 travel lanes in each direction in a built-up/developed area with a 35 mph posted speed limit:	38.83	38.29	40.53	41.45
Q122	Main (arterial) road with 2-3 travel lanes in each direction in a built-up/developed area with a 45 mph posted speed limit (like the 522, Aurora Ave. etc):	47.00	46.31	49.15	49.93
Q123	Interstate freeway, such as the I-5 or I-405 with a 60 mph posted speed limit:	65.10	64.65	67.58	68.09

Scale:	*Most Negative Option (1)*	*(2)*	*(3)*	*Neutral (4)*	*(5)*	*(6)*	*Most Affirmative/Positive Option (7)*

Texas – General Travel Questions

The average responses to the general travel questions included in the personal inventory are included in Table D-6 below.

Table D-6. Texas – Responses to the travel questions from the Personal Inventory.

Q#	Survey Question	Older Females	Older Males	Younger Females	Younger Males
Q11	How often do you check traffic conditions before you drive somewhere?	2.42	3.50	1.62	1.55
Q12	During familiar trips (e.g., driving to work), how often do you change your travel route prior to departing to avoid congestion?	2.26	3.00	2.19	2.10
Q13	During familiar trips (e.g., driving to work), how often do you change your travel route part way through your trip to avoid congestion?	2.74	2.94	2.57	3.30
Q14	When driving somewhere you have never been before, how often do you change your travel route part way through your trip to avoid congestion?	2.16	2.31	2.05	2.30
Q15	How often do you drive faster to make up for time lost due to traffic congestion?	2.79	3.00	3.86	3.79
Q16	How often to do leave early if you have to be somewhere at a specific time (e.g., work or an appointment)?	4.37	4.75	4.81	4.55

Scale:	*Never (1)*	*Hardly Ever (2)*	*Occasionally (3)*	*Quite Often (4)*	*Frequently (5)*	*Nearly all the time (6)*

Texas – DBQ Questions

The average responses to the DBQ questions included in the personal inventory are included in Table D-7 below.

Table D-7. Texas – Responses to the DBQ questions from the Personal Inventory.

Q#	Survey Question	Older Females	Older Males	Younger Females	Younger Males
Q17	How often do you ever attempt to drive away from traffic lights in the wrong gear?	1.05	1.38	1.24	1.20
Q18	How often do you become impatient with a slow driver in the fast lane and pass on the right?	2.58	3.13	4.00	3.60
Q19	How often do you drive especially close to a car in front as a signal to the driver to go faster or get out of the way?	1.74	2.31	3.19	2.65
Q20	How often do you attempt to pass someone that you hadn't noticed was trying to make a left turn?	1.21	1.50	2.29	1.80
Q21	How often do you forget where you left your car in a parking lot?	2.00	2.00	3.33	2.45
Q22	How often do you turn on one thing, such as your headlights, when you mean to switch on something else, such as the windshield wipers?	1.74	1.69	2.33	1.65
Q23	How often do you realize that you have no clear recollection of the road along which you have just been traveling?	2.26	2.38	2.81	2.42
Q24	How often do you stay in a lane that you know will be closed ahead, and then at the last minute force your way into the lane that is open?	1.53	1.75	2.38	2.35
Q25	How often do you cross an intersection knowing that the traffic light has already changed from yellow to red?	1.63	1.56	1.67	1.74
Q26	How often do you fail to notice that pedestrians are crossing when turning onto a side street from a main road?	1.47	1.81	2.00	1.40
Q27	When angered by another driver's behavior, how often do you catch up to them with the intention of giving him/her “a piece of your mind?	1.21	1.56	1.62	1.65
Q28	How often do you misread the signs and turn the wrong direction on a one-way street?	1.16	1.69	1.62	1.45
Q29	How often do you pull out far enough onto a road that you block traffic until you can complete a turn or get across?	1.58	1.50	2.19	1.80
Q30	How often do you disregard the speed limits late at night or early in the morning?	2.00	2.31	3.10	2.95
Q31	When turning right, how often do you nearly hit a bicyclist who is riding along side of you?	1.26	1.19	1.48	1.30
Q32	When attempting to turn onto a main road, how often do you pay such close attention to traffic on the road you are entering that you nearly hit the car in front of you that is also waiting to turn?	1.47	1.69	2.14	1.45
Q33	How often do you drive even though you realize you might be over the legal blood alcohol limit?	1.16	1.50	1.43	1.65
Q34	How often do you become angered by a certain type of driver, and indicate your hostility in whatever way you can?	1.58	2.00	2.00	2.15
Q35	How often do you underestimate the speed of an oncoming vehicle when attempting to pass a vehicle in your own lane?	1.63	1.94	2.10	1.65
Q36	How often do you hit something when backing up that you had not previously seen?	1.42	1.38	1.48	1.25
Q37	While intending to drive to destination A, how often do you 'wake up' to find yourself on a road to destination B, perhaps because destination B is a more common destination?	1.68	1.93	2.19	2.20
Q38	How often do you get into the wrong lane approaching an intersection?	1.68	1.88	2.19	2.20
Q39	How often do you honk your horn or make an obscene gesture to indicate your annoyance at another driver?	1.68	1.94	2.05	1.80
Q40	How often do you miss “yield” signs, and narrowly avoid colliding with other traffic that has the right of way?	1.37	1.44	1.86	1.40
Q41	How often do you fail to check your mirrors before pulling out, changing lanes, merging, etc?	1.58	1.67	2.57	1.65
Q42	How often do you get involved in 'races' with other drivers on a roadway or from a stop light?	1.11	1.50	1.52	1.60
Q43	How often do you brake too quickly on a slippery road or steer the wrong way into a skid?	1.59	1.56	1.71	1.80

Scale:	*Never (1)*	*Hardly Ever (2)*	*Occasionally (3)*	*Quite Often (4)*	*Frequently (5)*	*Nearly all the time (6)*

Texas – Risk Questions

The average responses to the risk questions included in the personal inventory are included in Table D-8 below.

Table D-8. Texas – Responses to the risk questions from the Personal Inventory.

Q#	Survey Question	Older Females	Older Males	Younger Females	Younger Males
	In the past 3 months while driving, how often did you...				
Q44	Drive when sleepy and find it hard to keep your eyes open?	2.26	1.94	2.71	2.20
Q45	Take risks while driving because it's fun, such as driving fast on curves or "getting air"?	1.16	1.19	1.55	1.65
Q46	Not yield the right of way?	1.26	1.31	1.71	1.45
Q47	Make a U-turn where the sign said not too?	1.06	1.13	2.05	1.95
Q48	Take more risks because you were in a hurry?	2.05	2.06	3.00	3.00
Q49	Drive at your normal speed during bad driving conditions such as road construction, rain, ice, or snow?	2.11	2.69	2.67	2.75
Q50	Accelerate when a traffic light turns yellow?	2.47	2.63	3.81	3.95
Q51	Drive to reduce tension?	1.26	1.31	1.71	1.95
Q52	Do other things while driving, like use cell phone, eat or drink, put on makeup, read things, or smoke cigarettes?	3.95	3.88	5.00	4.55
Q53	Drive 10-20 mph over limit?	1.84	2.13	2.62	2.70
Q54	Drive more than 20 mph over limit?	1.16	1.44	1.48	1.50
Q55	Not yield to pedestrians?	1.11	1.19	1.48	1.45
Q56	Drive without wearing a safety belt?	1.21	1.00	1.35	1.50
Q57	Turn without signaling?	1.84	2.06	2.43	2.10
Q58	Pass where visibility was obscured?	1.16	1.33	1.95	1.50
Q59	Not make a full stop at stop sign?	1.84	2.13	3.05	2.80
Q60	Cut in front of another driver?	1.63	1.63	2.67	2.15
Q61	Use the shoulder to pass in heavy traffic?	1.11	1.38	1.24	1.30

Scale:	*Never (1)*	*Hardly Ever (2)*	*Occasionally (3)*	*Quite Often (4)*	*Frequently (5)*	*Nearly all the time (6)*

Texas – Sensation-Seeking/Impulsivity Questions

The average responses to the sensation-seeking/impulsivity questions included in the personal inventory are included in Table D-9 below.

Table D-9. Texas – Responses to the sensation-seeking/impulsivity questions from the Personal Inventory.

Q#	Survey Question	Older Females	Older Males	Younger Females	Younger Males
Q62	I like to have new and exciting experiences and sensations even if they are a little frightening.	1.53	1.38	1.33	1.15
Q63	I like doing things just for the thrill of it.	1.74	1.69	1.33	1.35
Q64	I sometimes do "crazy" things just for fun.	1.74	1.69	1.62	1.20
Q65	I sometimes like to do things that are a little frightening.	1.63	1.44	1.38	1.10
Q66	I enjoy getting into new situations where you can't predict how things will turn out.	1.89	1.75	1.67	1.35
Q67	I'll try anything once.	1.74	1.80	1.48	1.50
Q68	I prefer friends who are excitingly unpredictable.	1.89	1.88	1.57	1.45
Q69	I like "wild" uninhibited parties.	1.84	2.00	1.95	1.65
Q70	I would like the kind of life where one is on the move and traveling a lot, with lots of change and excitement.	1.63	1.69	1.62	1.50
Q71	I am an impulsive person.	1.68	1.69	1.57	1.55
Q72	I like to explore a strange city or section of town by myself, even if it means getting lost.	1.63	1.75	1.62	1.55
Q73	I would like to take off on a trip with no preplanned or definite routes or timetables.	1.53	1.38	1.38	1.35
Q74	Before I begin a complicated job, I make careful plans.	1.16	1.25	1.24	1.20
Q75	I very seldom spend much time on the details of planning ahead.	1.74	2.00	1.90	1.85
Q76	I tend to begin a new job without much advance planning on how I will do it.	1.84	1.88	1.81	1.80
Q77	I usually think about what I am going to do before doing it.	1.05	1.00	1.14	1.15
Q78	I often do things on impulse.	1.67	1.87	1.62	1.60
Q79	I often get so carried away by new and exciting things and ideas that I never think of possible complications.	1.79	2.00	1.71	1.60
Q80	I tend to change interests frequently.	1.84	1.88	1.43	1.55
Z_{ss}	Sensation seeking subscale score (0-1, as a proportion of responses given)	1.53	1.38	1.33	1.15
Z_{imp}	Impulsivity subscale score (0-1, as a proportion of responses given)	1.74	1.69	1.33	1.35

Scale:	*True (1)*	*False (2)*

Texas – Speeding Beliefs, Attitudes, and Social Norms Questions

The average responses to the speeding beliefs, attitudes, and social norms questions included in the personal inventory are included in Table D-10 below.

Table D-10. Texas – Responses to the speeding beliefs, attitudes, and social norms questions from the Personal Inventory.

Q#	Survey Question	Older Females	Older Males	Younger Females	Younger Males
Q81	Driving within or near the speed limit, *puts pedestrians at less risk*	5.37	5.31	5.15	5.40
Q82	Driving within or near the speed limit, *reduces my chances of an accident*	5.74	5.56	5.38	5.90
Q83	Driving within or near the speed limit, m*akes it difficult to keep up with traffic*	4.11	5.00	4.29	5.05
Q84	Driving within or near the speed limit, *uses less fuel*	5.11	5.13	4.43	5.55
Q85	Driving within or near the speed limit, *annoys other drivers*	4.21	5.25	4.19	4.85
Q86	Driving within or near the speed limit, *holds up traffic*	3.11	4.25	3.75	3.95
Q87	Driving within or near the speed limit, *takes me longer to reach my destination*	3.21	4.13	4.71	4.75
Q88	Driving within or near the speed limit, *makes me feel annoyed*	2.42	3.56	4.14	3.95
Q89	Driving within or near the speed limit, *makes, me feel relaxed*	5.42	4.25	4.05	4.58
Q90	Driving within or near the speed limit, *makes, me feel bored*	2.53	3.63	4.05	4.63
Q91	Driving within or near the speed limit, *makes, me feel safer*	5.47	4.75	5.33	5.05
Q92	Driving within or near the speed limit, *makes it easier to detect hazards*	5.63	5.25	5.63	5.55
Q93	Driving within or near the speed limit, *makes me feel more in control of my vehicle*	6.00	5.31	5.24	5.35
	While driving in the next three months, how likely/unlikely is it that you would drive within or near the speed limit under the following circumstances?				
Q94	Driving when late/in a rush	5.21	3.56	3.33	3.10
Q95	Driving when others are exceeding the speed limit	4.89	3.81	3.21	3.00
Q96	Driving in traffic calmed areas (e.g., with small roundabouts, speed bumps, special warning signs, etc)	6.16	6.13	5.38	5.30
Q97	Driving in a fast/powerful car	5.16	4.31	3.10	3.00
Q98	Driving when carrying passengers who want you to drive fast	5.00	4.40	3.43	4.35
Q99	Driving when carrying passengers who want you to drive slow	5.33	5.00	5.60	5.10
Q100	Driving when many pedestrians are around	6.32	5.88	6.10	5.60
Q101	Driving on quiet roads in the day	5.63	4.19	4.00	4.21
Q102	Driving on quiet roads at night	6.16	4.69	4.62	4.50
Q103	Driving when the speed limit is clearly signed	6.05	4.63	4.48	4.70
Q104	Driving on long straight roads	5.37	3.69	3.14	3.15
Q105	Driving in areas where there are speed cameras	6.58	6.13	6.33	5.68

Scale:	*Most Negative Option (1)*	*(2)*	*(3)*	*Neutral (4)*	*(5)*	*(6)*	*Most Affirmative/Positive Option (7)*

Texas – Responses to the speeding beliefs, attitudes, and social norms questions – Continued.

Q#	Survey Question	Older Females	Older Males	Younger Females	Younger Males
Q106	People who are important to me disagree/agree that I should keep within or near the speed limit while driving in the next 3 months.	6.21	5.44	6.05	5.45
Q107	People who are important to me would disapprove/approve of my keeping within or near the speed limit while driving in the next 3 months.	6.22	5.44	5.90	5.65
Q108	People who are important to me think that I should not/should keep within or near the speed limit while driving in the next 3 months.	6.22	5.44	6.14	5.55
	How much do you think that the following groups of people will influence whether or not you drive within or near the posted speed limit in the next three months?				
Q109	Friends of the same sex	2.26	2.44	2.52	3.15
Q110	Friends of the opposite sex	2.32	2.38	2.86	3.25
Q111	Parents/children	4.63	4.31	4.62	4.50
Q112	Spouse/partner	3.63	4.56	3.86	4.10
Q113	The police	6.16	5.69	6.29	6.00
Q114	Most other drivers on the road	2.74	3.19	4.24	3.80
Q115	I believe that I have the ability to keep within or near the speed limit while driving in the next 3 months (I definitely do not-I definitely do).	6.37	6.31	6.45	6.63
Q116	If it were entirely up to me, I am confident that I would be able to keep within or near the speed limit while driving in the next 3 months.	5.95	5.63	5.10	5.75
Q117	If I kept within or near the speed limit while driving it would be . . .	5.89	4.75	4.33	4.25
Q118	How much do you want to keep within or near the speed limit while driving in the next 3 months?	6.11	4.50	4.67	3.75
Q119	How likely or unlikely is it that you will keep within or near the speed limit while driving in the next 3 months?	6.00	5.00	4.48	3.75
	On a sunny day with no traffic ahead of you, at what speed would you typically be driving on the following types of roads?				
Q120	Neighborhood Road with a 30 mph posted speed limit:	30.34	31.25	35.05	33.15
Q121	Main city road with 2 travel lanes with a posted speed limit of 45 mph (Ex: Wellborn Road):	44.53	46.25	48.43	46.90
Q122	County Road serving farms, ranches and homes with a posted speed limit of 45 mph:	47.58	50.69	52.95	52.42
Q123	4-Lane Highway without a median and a posted speed limit of 70 mph (Ex: sections of FM 1179 or SH30):	69.53	71.88	73.93	73.70
Q124	4-Lane Highway with a median and a posted speed limit of 70 mph (Ex: SH 21 from Bryan to Caldwell):	71.03	73.00	75.14	76.03
Q125	2-Lane Highway with a 70 mph speed limit (Ex: SH 21 from Kurten to Madisonville or FM 60 to Snook):	70.13	72.06	73.83	72.13
Q126	4-Lane Highway with 2-way left turn lane and a posted speed limit of 70 mph:	69.42	72.41	74.36	72.93

Scale:	*Most Negative Option (1)*	*(2)*	*(3)*	*Neutral (4)*	*(5)*	*(6)*	*Most Affirmative/Positive Option (7)*

Appendix E:
Factor Analysis

One objective of the current study was to examine the extent to which speeding behavior could be predicted by driver responses to personal inventory questions. Personal inventory variables were collected using multiple written question instruments, which yielded a large number of question items that could be included in the regression models (see Appendix C for complete survey instruments). To simplify the analysis examining the relationship between personal inventory items and speeding behavior, we conducted factor analyses on the participant's personal inventory question responses. Using this approach, we were able to reduce a large number of individual variables into a small set of "factors" representing groups of similar/related variables. Individual items "load" onto factors based on how strongly they are related.

Factor analyses were conducted separately for the primary question instruments related to speeding behavior, including the Driver Behavior Questionnaire (DBQ), CARDS Driver Behavior Questionnaire, and Theory of Planned Behavior (TPB). Analyses were run for Seattle and Texas separately. Questions that directly asked about driver speeding behavior were excluded from the analyses, since they were basically the same as the dependent measure in the regression analyses (i.e., occurrence and frequency of speeding).

Since a factor analysis may result in many factors, two methods were used to determine the number of factors to retain. First, a parallel analysis was conducted. This analysis computes a correlation matrix based on a random dataset with equal numbers of variables and observations to our data. When eigenvalues of this random dataset exceed that of the factor from the true data set, it indicates that these factors are "random noise" and should not be retained (http://www.ats.ucla.edu/stat/stata/faq/parallel.htm). Second, we examined the recommended number of retained factors and checked for interpretability. In some cases, we relied on iterated principle axes to control for how many factors were created. If these factors were more intuitive than the recommended parallel analysis, they were used instead. The varimax orthogonal rotation demonstrates the weights for each factor and the correlation between the variables and the factor. These factor scores were then saved and used as variables in both logistic and linear models in lieu of individual personality inventory questions.

The factor analysis results for each set of personal inventory items are discussed in separate sections below. Each of the factor tables is color-coded by factor. Items are associated with the factor for which they have the highest absolute loading. The CARDS results are not color-coded, since all of the significant questions were associated with the same factor.

Driver Behavior Questions

The DBQ is a survey instrument that measures self-reported occurrence of specific driving activities related to three subscales: errors, violations, and inattention/lapses (Reason, Manstead, Stradling, Baxter, & Campbell, 1990). Errors refer to failures of planned actions to achieve intended consequences, violations refer to deliberate contravention of some regulated or socially-accepted code of behavior, and lapses refer to unwitting deviations of actions from intention.

These aberrant behaviors represent different ways in which drivers can intentionally or unintentionally partake in unsafe driving actions.

There is variation across studies in how items are categorized among the three types of driving activities. The items included in the current personal inventory included eight items from each type based on a factor analysis conducted on the original DBQ items (Aberg & Rimmo, 1998); however, the categories assigned to some items were different from the original DBQ category designations (Reason et al., 1990). Also, three additional items pertaining to violation were included from a study that investigated violations in more detail (Parker, West, Stradling, & Manstead, 1995).

The factor analysis results in both Seattle and Texas did not clearly replicate previous analyses using the errors/violation/lapse framework. While violation items loaded together in both locations, the error and lapse items were intermixed. Also, the most interpretable factor solution in Texas had four factors rather than three. The final factor solutions in Seattle and Texas, however, contained similar variables and could be interpreted in the same way. A key difference between locations was that the factor containing the violation items in Seattle was split into two separate factors in Texas (Reckless and Road Rage). The corresponding factors are described below:

- *Inattention*: items that describe errors that drivers make due to a lack of concentration on driving.
- *Bad Driving*: items that include driving mistakes or apparent lack of skill.
- *Reckless*: items that deal with dangerous violations such as racing, driving drunk, and tailgating.
- *Road Rage*: items that involve showing hostility and anger to other drivers.

Note that the “Reckless” and “Road Rage” factors were combined in Seattle.

Seattle DBQ Factor Analysis

The factor loading for the Seattle DBQ items are shown in Table E-1 below. Item categories from the study in which the questions were taken (Aberg & Rimmo, 1998), are indicated in the “Category” column. Also, items with a factor loading below 0.30 on any factor are shown below the double line in Table E-1.

Table E-1. DBQ items by factor in Seattle.

Item No.	Category	Item text	Reckless/ Road Rage	Inattention	Bad Driving
Q27	V*	Angered by other driver and catch up to them to let them know	0.844		
Q39	V	Honk horn or make obscene gesture to indicate annoyance	0.795		-0.309
Q30	V	Deliberately disregard red light at night	0.672		0.342
Q19	V	Drive close to car in front	0.661		0.378
Q18	V	Overtake on the right	0.617		
Q34	V	Angered by another type of driver and indicate hostility	0.616		
Q42	V	Get involved in unofficial races	0.609		
Q36	E	Hit something when reversing		0.650	
Q37	L	Inadvertently take usual route by mistake		0.524	
Q40	E	Miss "yield" signs and narrowly avoid collision		0.520	
Q23	L	No recollection of road travelled		0.500	
Q28	L	Misread signs and travel wrong way down one-way		0.491	
Q22	L	Switch on wrong appliance in the car		0.478	
Q26	L	Fail to notice pedestrian crossing	0.385	0.419	
Q21	L	Forget where car is in a parking lot		0.367	
Q31	E	Turning right, nearly hit cyclist			0.537
Q43	E	Misjudge road surface and skid		0.392	0.409
Q41	E	Maneuver without checking mirror			0.370
Q32	E	Nearly hit car in front when turning onto a main road			0.357
Q20	L	Try to pass a vehicle turning left			0.347
Q29	V	Pull out and block traffic when waiting to turn or get across			0.303
Q17	L	Pull away from light in wrong gear			
Q24	V	Stay in closed lane until the last minute and force in			
Q25	V	Cross an intersection when the traffic light is red			
Q33	V	Drive when over the legal blood alcohol limit			
Q35	L	Underestimate oncoming vehicle speed when attempting to pass			
Q38	E	Wrong lane approaching an intersection			

*V=Violation, E=Error, L=Lapse (from Aberg & Rimmo, 1998)

Texas DBQ Factor Analysis

The factor loading for the Texas DBQ items are shown in Table E-2 below. Item categories from the study in which the questions were taken (Aberg & Rimmo, 1998), are indicated in the "Category" column. Also, items with a factor loading below 0.30 on any factor are shown below the double line in Table E-2.

Table E-2. DBQ items by factor in Texas.

Item No.	Category	Item Text	Road Rage	Inattention	Reckless	Bad Driving
Q34	V*	Angered by another type of driver and indicate hostility	0.774			
Q27	V	Angered by another driver and catch up to let them know	0.704			
Q39	V	Honk horn or make obscene gesture to indicate annoyance	0.693			
Q22	L	Switch on wrong appliance in the car		0.696		
Q23	L	No recollection of road travelled		0.649		
Q21	L	Forget where car is in a parking lot		0.558		
Q26	L	Fail to notice pedestrian crossing		0.537		
Q35	E	Underestimate oncoming vehicle speed when attempting to pass		0.474		
Q37	L	Inadvertently take usual route by mistake		0.379		
Q38	E	Wrong lane approaching an intersection		0.348		
Q41	E	Maneuver without checking mirror		0.318		
Q19	V	Drive close to car in front	0.348		0.608	
Q30	V	Deliberately disregard red light at night			0.584	
Q18	V	Overtake on the right			0.559	
Q42	V	Get involved in unofficial races			0.494	
Q33	V	Drive when over the legal blood alcohol limit			0.480	
Q28	L	Misread signs and travel wrong way down one-way			0.426	0.312
Q43	E	Misjudge road surface and skid				0.545
Q36	E	Hit something when reversing				0.456
Q25	V	Cross an intersection when the traffic light is red				0.448
Q40	E	Miss “yield” signs and narrowly avoid collision				0.436
Q29	V	Pull out and block traffic when waiting to turn or get across				0.428
Q24	V	Stay in closed lane until the last minute and force in	0.390			0.395
Q31	E	Turning right, nearly hit cyclist		0.302		0.392
Q20	L	Try to pass a vehicle turning left				0.301
Q17	L	Pull away from light in wrong gear		0.323		-0.326
Q32	E	Nearly hit car in front when turning onto a main road				

*V=Violation, E=Error, L=Lapse (from Aberg & Rimmo, 1998)

Theory of Planned Behavior (TPB) Items

Another set of personal inventory items was based on TPB (Ajzen, 1985). This is a framework for predicting the intention to engage in a behavior that incorporates aspects, such as social norms, attitudes towards the act, beliefs about the behavior, perceived control, among other factors. The specific items included in the personal inventory were drawn from an existing application of the TPB to speeding (Elliot, Armitage, & Baughan, 2005). Thirty-four items (Q81-Q114) related to the TPB elements listed below were included in the factor analysis:

- *Behavioral Beliefs*: These represented how likely certain outcomes would be (difficulty keeping up with traffic, reducing chances of a crash, etc.) if drivers complied with the speed limit.
- *Control Beliefs*: These represented how likely drivers thought they would be able to comply with the speed limit when encountering factors that facilitated or inhibited speeding (driving when late or in a rush, in traffic calmed areas, etc.).
- *Subjective Norms*: These represented the extent to which people that are important to the drivers would want them to comply with the speed limit.
- *Normative Beliefs*: These represented referent beliefs indicating how much different groups of people (parents/kids, spouses, police, etc.) would influence drivers to comply with the speed limit.

Items about driver attitude towards speeding and perceived control were excluded from the factor analysis because they were very similar to the dependent measure (occurrence and frequency of speeding).

In both Seattle and Texas, five-factor solutions were obtained, and similar factors were found within the solution sets for each location. The resulting solutions were somewhat in agreement with the TPB elements, however, some of the factors were qualitatively different. The factors, and how they were interpreted, are listed below:

- *Behavioral and Control beliefs related to Temptation to speed (BCB-Temptation)*: This factor incorporates a subset of control beliefs and behavioral beliefs. These items seem to be related to emotional or impulsive reasons for speeding. Higher factor loadings are related to resisting temptation to speeding, with negative values indicating negative attitudes toward reasons for speeding.
- *Subjective Norms*: This factor includes mostly items that reflect how people who are important to the driver feel about speeding. Higher factor loadings indicate that important people have a larger influence on the driver's behavior.
- *Behavioral Beliefs related to Safety (BB-Safety)*: This factor was comprised of behavioral belief items that were primarily associated with safety-related aspects of speeding. Higher factor loadings indicate more concern with safety.
- *Control Beliefs related to Opportunity to speed (CB-Opportunity):* This factor contained a subset of control beliefs that mostly reflected situations in which there was limited opportunity to speed (i.e., traffic calmed areas), but with some clear exceptions (e.g., on straight long roads). The greater the loadings on this factor, the more likely a driver is influenced by external factors related to opportunity.
- *Normative Beliefs:* This factor contained mostly items related to how different groups of people (e.g., parents/kids, spouses, police, etc.) would influence drivers to comply with the speed limit. Higher factor loadings suggest greater influence of these groups on the driver's behavior.

Seattle TPB Factor Analysis

The factor loading for the Seattle TPB items are shown in Table E-3 below.

Table E-3. TPB items by factor in Seattle.

Item No.	Item Text	CB-Oppor-tunity	BCB-Temp-tation	Norma-tive Beliefs	Subjec-tive Norms	BB-Safety
Q100	Driving near the SL when many pedestrians are around	0.893				
Q104	Driving near the SL on long straight roads	0.893				
Q105	Driving near the SL in areas where there are speed cameras	0.670				
Q85	Driving near the SL annoys other drivers	0.558	-0.454			
Q83	Driving near the SL makes it difficult to keep up with traffic	0.526				
Q86	Driving near the SL holds up traffic	0.471	-0.455			
Q96	Drive near SL when in traffic calmed areas	0.448	0.316			
Q99	Driving near the SL when carrying passengers who want you to drive slow	0.410				
Q94	Drive near SL when late/in a rush		0.787			
Q95	Drive near SL when others are exceeding it		0.653			
Q101	Drive near SL when on quiet roads in the day		0.594			
Q97	Drive near SL when in a fast/powerful car		0.571			
Q103	Drive near SL when it's clearly signed		0.562			
Q98	Drive near SL when carrying passengers who want you to drive fast		0.545			-0.365
Q102	Drive near SL when on quiet roads at night		0.542		0.316	
Q87	Driving near the SL takes me longer to reach my destination		-0.702			
Q90	Driving near the SL makes me feel bored		-0.722			
Q88	Driving near the SL makes me feel annoyed		-0.762			
Q111	Parents/children will/won't influence my driving near the SL			0.781		
Q112	Spouse/partner will/won't influence my driving near the SL			0.738		
Q114	Most other drivers on the road will/won't influence my driving near the SL			0.600		
Q113	The police will/won't influence my driving near the SL			0.562		
Q109	Friends of the same sex will/won't influence my driving near the SL			0.559		
Q110	Friends of the opposite sex will/won't influence my driving near the SL			0.553		
Q107	People who are important to me would disapprove/approve of my keeping near the SL				0.682	
Q106	People who are important to me disagree/agree that I should keep near the SL				0.597	0.331
Q89	Driving near the SL makes me feel relaxed				0.492	
Q108	People who are important to me think that I should not/should keep near the SL				0.492	
Q91	Driving near the SL makes me feel safer				0.306	0.405
Q82	Driving near the SL reduces my chances of an accident					0.679
Q93	Driving near the SL makes me feel more in control of my vehicle					0.675
Q92	Driving near the SL makes it easier to detect hazards					0.666
Q81	Driving near the SL puts pedestrians at less risk					0.400
Q84	Driving near the SL uses less fuel					0.363

Texas TPB Factor Analysis

The factor loading for the Texas TPB items are shown in Table E-4 below.

Table E-4. TPB items by factor in Texas.

Item No.	Item Text	CB-Opportunity	Normative Beliefs	Subjective Norms	BCB-Temptation	BB-Safety
Q100	Driving near the SL when many pedestrians are around	0.930				
Q104	Driving near the SL on long straight roads	0.930				
Q105	Driving near the SL in areas where there are speed cameras	0.661				
Q96	Drive near SL when in traffic calmed areas	0.356			0.343	
Q99	Driving near the SL when carrying passengers who want you to drive slow	0.341				
Q110	Friends of the opposite sex will/won't influence my driving near the SL		0.837			
Q109	Friends of the same sex will/won't influence my driving near the SL		0.810			
Q111	Parents/children will/won't influence my driving near the SL		0.718			
Q112	Spouse/partner will/won't influence my driving near the SL		0.699			-0.345
Q114	Most other drivers on the road will/won't influence my driving near the SL		0.518			
Q113	The police will/won't influence my driving near the SL		0.445			
Q108	People who are important to me think that I should not/should keep near the SL			0.823		
Q107	People who are important to me would disapprove/approve of my keeping near the SL			0.793		
Q106	People who are important to me disagree/agree that I should keep near the SL			0.751		
Q85	Driving near the SL annoys other drivers		0.452	-0.506		
Q86	Driving near the SL holds up traffic		0.427	-0.537		
Q83	Driving near the SL makes it difficult to keep up with traffic		0.369	-0.538		
Q103	Drive near SL when it's clearly signed				0.773	
Q95	Drive near SL when others are exceeding the SL				0.771	
Q94	Drive near SL when late/in a rush				0.703	
Q101	Drive near SL when on quiet roads in the day				0.696	
Q97	Drive near SL when in a fast/powerful car				0.688	
Q98	Drive near SL when carrying passengers who want you to drive fast				0.635	
Q89	Driving near the SL makes me feel relaxed				0.617	
Q102	Drive near SL when on quiet roads at night				0.592	
Q93	Driving near the SL makes me feel more in control of my vehicle				0.444	0.369
Q84	Driving near the SL uses less fuel				0.333	
Q87	Driving near the SL takes me longer to reach my destination				-0.509	
Q90	Driving near the SL makes me feel bored				-0.657	
Q88	Driving near the SL makes me feel annoyed		0.302		-0.696	
Q91	Driving near the SL makes me feel safer					0.550
Q92	Driving near the SL makes it easier to detect hazards					0.485
Q82	Driving near the SL reduces my chances of an accident					0.463
Q81	Driving near the SL puts pedestrians at less risk					0.401

A key difference between the Seattle and Texas factors is that a subset of the items in the Normative Beliefs factor varies between the two sites. In particular, these items include reasons why drivers could be pressured to speed, such as pressure to avoid annoying other drivers (Q85), holding up traffic (Q86), or the difficulty of keeping up with traffic (Q83). In Seattle, these items loaded with the CB-Opportunity factor, while in Texas they loaded with the Normative Beliefs factor. This may be because in Seattle there is greater traffic volume, having a larger effect on whether there is an opportunity to speed. In Texas, those items could be interpreted as expectations (or social norms) from other drivers.

CARDS Driver Behavior Items

The CARDS item set asks about a range of risky driving acts that drivers may have taken within the past three months. It is comprised of 18 questions (Q44-Q61), 16 of which were used in the factor analysis. The excluded items pertained to self-reported speeding behavior, and they were omitted because they were very similar to the dependent measure (occurrence and frequency of speeding). For both Seattle and Texas, a single factor solution was obtained, likely because the items represent different ways of engaging in risk taking. Note that the items with the highest factor loadings are generally similar in each location.

- *Dangerous Driving*: This factor was comprised of risk taking behaviors. Higher factor loadings indicate more dangerous driving behaviors.

Seattle CARDS Factor Analysis

The single factor loadings for Seattle are shown in Table E-5 below. Items with a factor loading below 0.30 on any factor are shown below the double line in Table E-5.

Table E-5. CARDS items by factor in Seattle.

Item No.	Factor	Item Text: In the past 3 months while driving, how often did you . . .
Q50	0.779	Accelerate when a traffic light turns yellow?
Q60	0.759	Cut in front of another driver?
Q59	0.706	Not make a full stop at stop sign?
Q48	0.703	Take more risks because you were in a hurry?
Q49	0.594	Drive at your normal speed during bad driving conditions such as road construction, rain, ice, or snow?
Q45	0.557	Take risks while driving because it's fun?
Q58	0.497	Pass where visibility was obscured?
Q57	0.491	Turn without signaling?
Q51	0.456	Drive to reduce tension?
Q46	0.452	Not yield the right of way?
Q44	0.400	Drive when sleepy and find it hard to keep your eyes open?
Q56	0.394	Drive without wearing a safety belt?
Q52	0.371	Do other things while driving, like use cell phone, eat or drink, put on makeup, read things, or smoke cigarettes?
Q47	0.334	Make a U-turn where the sign said not too?
Q55	0.302	Not yield to pedestrians?
Q61		Use the shoulder to pass in heavy traffic?

Texas CARDS Factor Analysis

The single factor loadings for Texas are shown in Table E-6 below. Items with a factor loading below 0.30 on any factor are shown below the double line in Table E-6.

Table E-6. CARDS items by factor in Texas.

Item No.	Factor	Item Text: In the past 3 months while driving, how often did you . . .
Q50	0.837	Accelerate when a traffic light turns yellow?
Q48	0.681	Take more risks because you were in a hurry?
Q59	0.662	Not make a full stop at stop sign?
Q52	0.660	Do other things while driving, like use cell phone, eat or drink, put on makeup, read things, or smoke cigarettes?
Q46	0.598	Not yield the right of way?
Q60	0.595	Cut in front of another driver?
Q58	0.591	Pass where visibility was obscured?
Q44	0.547	Drive when sleepy and find it hard to keep your eyes open?
Q47	0.530	Make a U-turn where the sign said not too?
Q57	0.507	Turn without signaling?
Q49	0.410	Drive at your normal speed during bad driving conditions such as road construction, rain, ice, or snow?
Q55	0.374	Not yield to pedestrians?
Q45		Take risks while driving because it's fun?
Q51		Drive to reduce tension?
Q56		Drive without wearing a safety belt?

Appendix F:
Regression Analyses with Socioeconomic Control Variables

The basic regression analyses with only demographic and trip variables are included in the Results section of the main body of this report. The models shown in this appendix include additional socioeconomic variables. Each model is presented in a table, with subsequent discussion of the influence of the socioeconomic variables.

The socioeconomic variables, their levels and their abbreviations include:

- College Degree:
    - Does not have a college degree [Reference Group]
    - Has a college degree
- Vehicle Type (grouped based on horsepower):
    - Drives a passenger vehicle, minivan, or SUV [Reference Group]
    - Drives a truck or sports car
- Income Level:
    - Less than $15,000 [Reference Group]
    - $15,000 to $44,999 [15-45K]
    - $45,000 to $74,999 [45-75K]
    - Over $75,000 [75K+]

Although this survey relied on US Census response categories for education and income, the data were transformed to better fit the distribution of our sample. Having a college degree may be associated with an older age, more maturity, and/or more economic resources. Additionally, the College Station sample was less affluent, most likely a result of a large number of students in the sample.

Logistic Regression Models

Random Effects Logistic Regression with Demographic and Trip Variables: Seattle 30-35 mph Roadways

The output table from the regression analysis showing the relationship between socioeconomic, demographic, trip variables and whether or not drivers had any speeding on 30-35 mph Seattle roadways is shown below. The trip variables primarily used to control for differences in driving patterns are shown in blue text. All other variables are shown in black. Variables shown in bold are either statistically significant or approaching statistical significance.

Table F-1. Output from the logistic regression analysis showing the relationship between demographic, trip and socioeconomic variables: Seattle 30-35 mph roadways.

	Odds Ratio	Standard Error	z-score	p-value	[OR 95% Conf. Interval]	
Older Males	1.267	0.466	0.64	0.520	0.616	2.607
Younger Females	1.972	0.779	1.72	0.086†	0.909	4.278
Younger Males	2.745	1.052	2.64	0.008**	1.295	5.817
Weekend	1.288	0.162	2.01	0.044*	1.007	1.647
College Degree	1.390	0.362	1.26	0.206	0.834	2.315
Income [15-45K]	2.005	0.824	1.69	0.091†	0.896	4.488
Income [45-75K]	1.852	0.862	1.32	0.186	0.744	4.613
Income [75K+]	1.225	0.540	0.46	0.645	0.516	2.905
Truck or Sports Car	1.022	0.526	0.04	0.967	0.373	2.802
ToD [12am-5am]	0.715	0.264	-0.91	0.364	0.347	1.474
ToD [9am-3pm]	1.374	0.238	1.83	0.067†	0.978	1.930
ToD [3pm-7pm]	1.262	0.218	1.35	0.178	0.900	1.771
ToD [7pm-12am]	0.920	0.177	-0.43	0.667	0.631	1.343
logFFT30	2.227	0.151	11.82	0.000***	1.950	2.543

***p<.001; **p<.01; *p<.05; †p<.10

Number of observations: 2878

Number of groups: 81

Wald chi2(14) = 162.83

Prob> chi2 = 0.0000

Log Likelihood = -1327.126

Likelihood-Ratio Test Of Rho=0

Chibar2(01) = 167.45

Prob>=Chibar2 = 0.000

Socioeconomic Variables: None of the socioeconomic variables were associated with a significant increase in the odds of speeding. However, compared to having an income of below $15,000, respondents with an income greater than $15,000 and under $45,000 had a marginally significant increase in the odds of speeding, though income in general was not a significant predictor. Driving a truck or sports car, compared to all other vehicle types, was also not associated with an increase in the odds of speeding. Similarly, having a college degree did not increase the odds of speeding.

Demographic and Trip Variables: Including the socioeconomic variables had minimal effect on which demographic and trip variables were significant predictors. All of the variables that were strongly or marginally significant in the base model remained strongly or marginally significant, respectively.

Random Effects Logistic Regression with Demographic, Trip and Socioeconomic Variables: Seattle 55-60 mph Roadways

The output table from the regression analysis showing the relationship between socioeconomic, demographic, trip variables and whether or not drivers had any speeding on 55-60 mph roadways is shown below. The trip variables primarily used to control for differences in driving patterns are shown in blue text. All other variables are shown in black. Variables shown in bold are either statistically significant or approaching statistical significance.

Table F-2. Output from the logistic regression analysis showing the relationship between demographic, trip and socioeconomic variables: Seattle 55-60 mph roadways.

	Odds Ratio	Standard Error	z-score	p-value	[OR 95% Conf. Interval]	
Older Males	1.680	0.851	1.02	0.306	0.623	4.532
Younger Females	6.800	3.761	3.47	0.001**	2.300	20.102
Younger Males	6.184	3.275	3.44	0.001**	2.190	17.460
Weekend	1.488	0.206	2.87	0.004**	1.134	1.952
College Degree	0.997	0.362	-0.01	0.994	0.490	2.031
Income [15-45K]	2.161	1.233	1.35	0.177	0.706	6.612
Income [45-75K]	2.903	1.867	1.66	0.097†	0.823	10.238
Income [75K+]	1.704	1.042	0.87	0.383	0.515	5.646
Truck or Sports Car	0.439	0.337	-1.07	0.283	0.098	1.972
ToD [12am-5am]	0.185	0.077	-4.05	0.000***	0.082	0.418
ToD [9am-3pm]	1.324	0.226	1.64	0.101	0.947	1.850
ToD [3pm-7pm]	1.060	0.185	0.33	0.739	0.753	1.493
ToD [7pm-12am]	0.736	0.145	-1.56	0.118	0.501	1.081
logFFT60	4.648	0.379	18.85	0.000***	3.961	5.453

***p<.001; **p<.01; *p<.05; †p<.10
Number of observations: 2685
Number of groups: 84
Wald chi2(14) = 378.29
Prob> chi2 = 0.0000

Log Likelihood = -1199.09
Likelihood-Ratio Test Of Rho=0
Chibar2(01) = 352.25
Prob>=Chibar2 = 0.000

Socioeconomic Variables: No socioeconomic indicators were significant predictors of speeding. However, compared to having an income of below $15,000, respondents with an income greater than $45,000 and under $75,000 had a marginally significant increase in the odds of speeding, though income in general was not a significant predictor. Having a college degree or driving a truck or sports car did not significantly impact the odds of speeding.

Demographic and Trip Variables: Including the socioeconomic variables had minimal effect on which demographic and trip variables were significant predictors. Most of the variables that were strongly or marginally significant in the base model, remained strongly or marginally significant, respectively. However, two of the time periods (9am-3pm and 7pm-12am) were marginally significant in the base model, and not significant with the socioeconomic variables.

Random Effects Logistic Regression with Demographic, Trip and Socioeconomic Variables: Texas 30-35 mph Roadways

The output table from the regression analysis showing the relationship between socioeconomic, demographic, trip variables, and whether drivers had any speeding on 30-35 mph Texas roadways is shown below. The trip variables primarily used to control for differences in driving

patterns are shown in blue text. All other variables are shown in black. Variables shown in bold are either statistically significant or approaching statistical significance.

Table F-3. Output from the logistic regression analysis showing the relationship between demographic, trip and socioeconomic variables: Texas 30-35 mph roadways.

	Odds Ratio	Standard Error	z-score	p-value	[OR 95% Conf. Interval]	
Older Males	2.014	1.397	1.01	0.313	0.517	7.840
Younger Females	3.459	2.270	1.89	0.059†	0.956	12.522
Younger Males	1.851	1.360	0.84	0.402	0.438	7.813
Weekend	1.668	0.368	2.32	0.020*	1.082	2.571
College Degree	0.442	0.209	-1.73	0.084†	0.175	1.115
Income [15-45K]	0.616	0.803	-0.37	0.710	0.048	7.925
Income [45-75K]	2.751	3.564	0.78	0.435	0.217	34.854
Income [75K+]	2.049	2.577	0.57	0.568	0.174	24.088
Truck or Sports Car	1.093	0.530	0.18	0.854	0.423	2.828
ToD [12am-5am]	(omitted - no speeding time)					
ToD [9am-3pm]	0.516	0.127	-2.69	0.007**	0.319	0.835
ToD [3pm-7pm]	0.549	0.135	-2.44	0.015*	0.339	0.889
ToD [7pm-12am]	0.456	0.136	-2.63	0.008**	0.254	0.818
logFFT30	2.659	0.327	7.95	0.000***	2.089	3.384

***p<.001; **p<.01; *p<.05; †p<.10
Number of observations: 2361
Number of groups: 73
Wald chi2(14) = 82.20
Prob> chi2 = 0.0000

Log Likelihood = -535.30085
Likelihood-Ratio Test Of Rho=0
Chibar2(01) = 143.83
Prob>=Chibar2 = 0.000

Socioeconomic Variables: The only significant socioeconomic predictor of speeding was having a college degree, which only marginally increased the odds of speeding.

Demographic and Trip Variables: After controlling for socioeconomic factors, Younger Females had a marginally significant increase in the odds of speeding when compared to Older Females. Younger Females were not found to be significant in the base model. No other demographic relationships were significant.

The time of day and weekend variables that were significant in the base model remained significant in this model.

Random Effects Logistic Regression with Demographic, Trip and Socioeconomic Variables: Texas 55-60 mph Roadways

The output table from the regression analysis showing the relationship between socioeconomic, demographic, trip variables and whether or not drivers had any speeding on 55-60 mph Texas roadways is shown below. The trip variables primarily used to control for differences in driving patterns are shown in blue text. All other variables are shown in black. Variables shown in bold are either statistically significant or approaching statistical significance.

Table F-4. Output from the logistic regression analysis showing the relationship between demographic, trip and socioeconomic variables: Texas 55-60 mph roadways.

	Odds Ratio	Standard Error	z-score	p-value	[OR 95% Conf. Interval]	
Older Males	3.788	1.953	2.58	0.010*	1.378	10.408
Younger Females	2.529	1.262	1.86	0.063†	0.951	6.728
Younger Males	8.169	4.707	3.65	0.000***	2.641	25.269
Weekend	1.011	0.189	0.06	0.954	0.701	1.458
College Degree	1.129	0.397	0.35	0.730	0.567	2.248
Income [15-45K]	2.593	2.942	0.84	0.401	0.281	23.960
Income [45-75K]	4.620	4.974	1.42	0.155	0.560	38.116
Income [75K+]	2.232	2.294	0.78	0.434	0.298	16.724
Truck or Sports Car	0.433	0.172	-2.11	0.035*	0.199	0.943
ToD [12am-5am]	0.414	0.285	-1.28	0.200	0.107	1.594
ToD [9am-3pm]	1.197	0.243	0.89	0.375	0.804	1.783
ToD [3pm-7pm]	1.223	0.231	1.07	0.285	0.845	1.770
ToD [7pm-12am]	0.652	0.170	-1.64	0.101	0.391	1.088
logFFT60	3.546	0.374	11.99	0.000***	2.883	4.361

***p<.001; **p<.01; *p<.05; †p<.10

Number of observations: 1469

Number of groups: 74

Wald chi2(14) = 156.63

Prob> chi2 = 0.0000

Log Likelihood = -726.50782

Likelihood-Ratio Test Of Rho=0

Chibar2(01) = 131.37

Prob>=Chibar2 = 0.000

Socioeconomic Variables: Although having a college degree and income did not significantly impact speeding, driving a truck or sports car rather than any other type of vehicle actually significantly decreased the odds of speeding.

Demographic and Trip Variables: After socioeconomic variables were controlled for, more demographic differences became significant. Compared to Older Females, all other groups had increased odds of speeding. The difference was significant for Older and Younger Males, and marginally significant for Younger Females. The only significant group in the base model were the Younger Males.

Random Effects Logistic Regression with Demographic, Trip and Socioeconomic Variables: Texas 70 mph Roadways

The output table from the regression analysis showing the relationship between socioeconomic, demographic, trip variables and whether or not drivers had any speeding on 70 mph Texas roadways is shown below. The trip variables primarily used to control for differences in driving patterns are shown in blue text. All other variables are shown in black. Variables shown in bold are either statistically significant or approaching statistical significance.

Table F-5. Output from the logistic regression analysis showing the relationship between demographic, trip and socioeconomic variables: Texas 70 mph roadways.

	Odds Ratio	Standard Error	z-score	p-value	[OR 95% Conf. Interval]	
Older Males	1.584	0.723	1.01	0.314	0.647	3.874
Younger Females	1.258	0.608	0.47	0.635	0.488	3.241
Younger Males	3.186	1.721	2.15	0.032*	1.105	9.184
Weekend	1.313	0.263	1.36	0.174	0.887	1.944
College Degree	1.396	0.450	1.04	0.301	0.742	2.626
Income [15-45K]	0.999	1.059	0.00	0.999	0.125	7.982
Income [45-75K]	1.059	1.029	0.06	0.953	0.157	7.116
Income [75K+]	1.689	1.577	0.56	0.575	0.271	10.534
Truck or Sports Car	1.352	0.536	0.76	0.447	0.621	2.942
ToD [12am-5am]	0.697	0.622	-0.40	0.686	0.121	4.001
ToD [9am-3pm]	0.896	0.197	-0.50	0.619	0.582	1.380
ToD [3pm-7pm]	0.825	0.166	-0.96	0.338	0.556	1.223
ToD [7pm-12am]	0.704	0.216	-1.14	0.252	0.386	1.284
logFFT70	2.821	0.302	9.67	0.000***	2.286	3.481

***p<.001; **p<.01; *p<.05; †p<.10
Number of observations: 1451
Number of groups: 68
Wald chi2(14) = 102.18
Prob> chi2 = 0.0000
Log Likelihood = -584.15533
Likelihood-Ratio Test Of Rho=0
Chibar2(01) = 72.20
Prob>=Chibar2 = 0.000

Socioeconomic Variables: No socioeconomic variables significantly predicted any change in the odds of speeding.

Demographic and Trip Variables: Younger Males were at significantly increased odds of speeding compared to Older Females. In the base model (without socioeconomic variables), Older Males were at marginally increased odds of speeding compared to Older Females, but not with the socioeconomic variables.

Linear Regression Models

Random Effects Linear Regression with Demographic, Trip, and Socioeconomic Variables: Seattle 30-35 mph Roadways

The output from the linear regression analysis showing the relationship between demographic, trip, and socioeconomic variables, and the proportion of "free-flow" driving on 30-35 mph Seattle roads in individual trips that is speeding is shown below. The trip variables primarily used to control for differences in driving patterns are shown in blue text. All other variables are shown in black. Variables shown in bold are either statistically significant or approaching statistical significance. Note that the dependent variable (proportion of time speeding in an individual trip) is log transformed, which makes the magnitude of the coefficient difficult to interpret.

Table F-6. Output from the linear regression analysis showing the relationship between demographic, trip and socioeconomic variables and the proportion of "free-flow" driving: Seattle 30-35 mph roadways.

logspd30	Coefficient	Standard Error	z-score	p-value	[95% Conf. Interval]	
Older Males	0.262	0.179	1.47	0.142	-0.088	0.262
Younger Females	0.223	0.184	1.22	0.224	-0.137	0.223
Younger Males	0.094	0.174	0.54	0.590	-0.247	0.094
Weekend	0.007	0.106	0.07	0.944	-0.201	0.007
College Degree	0.082	0.116	0.70	0.482	-0.146	0.082
Income [15-45K]	0.346	0.187	1.85	0.065†	-0.021	0.346
Income [45-75K]	0.331	0.213	1.56	0.120	-0.086	0.331
Income [75K+]	0.185	0.195	0.95	0.344	-0.198	0.185
Truck or Sports Car	0.259	0.217	1.20	0.232	-0.166	0.259
ToD [12am-5am]	0.423	0.324	1.31	0.191	-0.211	0.423
ToD [9am-3pm]	-0.133	0.148	-0.90	0.366	-0.422	-0.133
ToD [3pm-7pm]	-0.745	0.327	-2.28	0.023*	-1.386	-0.104
ToD [7pm-12am]	-0.655	0.332	-1.97	0.048*	-1.306	-0.005
logFFT30	-0.841	0.063	-13.35	0.000***	-0.965	-0.718
Constant	1.992	0.457	4.36	0.000***	1.097	2.888

***p<.001; **p<.01; *p<.05; †p<.10

Number of observations: 641

Number of groups: 73

Wald chi2(14)=233.53

Prob> chi2 = 0.0000

R-Squared

Within = 0.2418

Between = 0.4765

Overall = 0.2809

Socioeconomic Variables: Having a college degree did not influence the logged speed variable. An income between $15,000 and $45,000, compared to less than $15,000, was significantly associated with an increase in the logged speed variable, but the effects were marginal. Overall, income was not a significant predictor. Similarly, the type of car driven was not significant.

Demographic and Trip Variables: No age and gender interactions significantly predicted any change in the logged speed variable.

The time bands that were significant in the base model remained significant with the addition of socioeconomic variables. Additionally, driving between 7pm and 12am was significantly more likely to decrease the logged speed variable when the socioeconomic variables were added, but not in the base model. As the amount of free-flow time spent on 30-35mph roads in a trip increased one standard unit, the logged speeding variable decreased by one unit.

Random Effects Linear Regression with Demographic, Trip, and Socioeconomic Variables: Seattle 55-60 mph Roadways

The output from the linear regression analysis showing the relationship between demographic, trip, and socioeconomic variables, and the proportion of "free-flow" driving on 55-60 mph Seattle roads in individual trips that is speeding is shown below. The trip variables primarily used to control for differences in driving patterns are shown in blue text. All other variables are shown

in black. Variables shown in bold are either statistically significant or approaching statistical significance. Note that the dependent variable (proportion of time speeding in an individual trip) is log transformed, which makes the magnitude of the coefficient difficult to interpret.

Table F-7. Output from the linear regression analysis showing the relationship between demographic, trip and socioeconomic variables and the proportion of "free-flow" driving: Seattle 55-60 mph roadways.

	Coefficient	Standard Error	z-score	p-value	[OR 95% Conf. Interval]	
Older Males	0.264	0.372	0.71	0.477	-0.464	0.993
Younger Females	0.543	0.379	1.43	0.152	-0.201	1.287
Younger Males	0.480	0.361	1.33	0.184	-0.228	1.188
Weekend	0.307	0.101	3.04	0.002**	0.109	0.505
College Degree	-0.183	0.254	-0.72	0.472	-0.682	0.316
Income [15-45K]	0.577	0.387	1.49	0.136	-0.182	1.336
Income [45-75K]	0.311	0.433	0.72	0.472	-0.537	1.160
Income [75K+]	-0.023	0.412	-0.05	0.956	-0.830	0.785
Truck or Sports Car	0.008	0.545	0.01	0.989	-1.061	1.076
ToD [12am-5am]	-0.943	0.347	-2.72	0.007**	-1.622	-0.263
ToD [9am-3pm]	-0.013	0.132	-0.10	0.922	-0.272	0.246
ToD [3pm-7pm]	0.115	0.133	0.86	0.390	-0.147	0.376
ToD [7pm-12am]	-0.022	0.151	-0.14	0.885	-0.318	0.274
logFFT60	-0.187	0.059	-3.20	0.001**	-0.302	-0.073
Constant	-2.788	0.613	-4.54	0.000***	-3.990	-1.586

***p<.001; **p<.01; *p<.05; †p<.10

Number of observations: 976

Number of groups: 80

Wald chi2(14)=40.94

Prob> chi2 = 0.002

R-Squared

Within = 0.0297

Between = 0.1723

Overall = 0.0872

Socioeconomic Variables: No socioeconomic variables significantly predicted a change in the logged speeding variable.

Demographic and Trip Variables: No demographic variables significantly predicted a change in the logged speeding variable.

The time bands and weekend driving periods that were significant in the base model remained significant with the addition of the socioeconomic variables. Every unit increase of free-flow time spent on 55-60mph roads (logFFT60) significantly decreased the dependent variable by one unit.

Random Effects Linear Regression with Demographic, Trip, and Socioeconomic Variables: Texas 30-35 mph Roadways

The output from the linear regression analysis showing the relationship between demographic, trip, and socioeconomic variables, and the proportion of "free-flow" driving on 30-35 mph Texas roads in individual trips that is speeding is shown below. The trip variables primarily used to control for differences in driving patterns are shown in blue text. All other variables are shown in

black. Variables shown in bold are either statistically significant or approaching statistical significance. Note that the dependent variable (proportion of time speeding in an individual trip) is log transformed, which makes the magnitude of the coefficient difficult to interpret.

Table F-8. Output from the linear regression analysis showing the relationship between demographic and trip variables and the proportion of "free-flow" driving: Texas 30-55 mph roadways.

	Coefficient	Standard Error	z-score	p-value	[95% Conf. Interval]	
Older Males	0.212	0.346	0.61	0.540	-0.466	0.212
Younger Females	0.327	0.341	0.96	0.338	-0.342	0.327
Younger Males	0.459	0.371	1.24	0.216	-0.268	0.459
Weekend	0.028	0.170	0.17	0.868	-0.305	0.028
College Degree	-0.660	0.243	-2.72	0.007**	-1.137	-0.660
Income [15-45K]	-1.067	0.777	-1.37	0.170	-2.591	-1.067
Income [45-75K]	-0.705	0.751	-0.94	0.348	-2.176	-0.705
Income [75K+]	-0.173	0.733	-0.24	0.814	-1.609	-0.173
Truck or Sports Car	0.341	0.247	1.38	0.167	-0.142	0.341
ToD [12am-5am]	(omitted) no speeding time					
ToD [9am-3pm]	0.112	0.181	0.62	0.538	-0.244	0.112
ToD [3pm-7pm]	0.028	0.196	0.14	0.888	-0.356	0.028
ToD [7pm-12am]	-0.035	0.248	-0.14	0.887	-0.521	-0.035
logFFT30	-0.813	0.103	-7.89	0.000***	-1.015	-0.813
Constant	1.276	0.926	1.38	0.168	-0.539	1.276

***p<.001; **p<.01; *p<.05; †p<.10

Number of observations: 206

Number of groups: 44

Wald chi2(14)=99.13

Prob> chi2 = 0.0000

R-Squared

Within = 0.1972

Between = 0.5279

Overall = 0.4708

Socioeconomic Variables: Having a college degree significantly decreased the logged speeding variable. Other socioeconomic variables such as income and vehicle type were not predictors of speeding.

Demographic and Trip Variables: No demographic variables were significant, consistent with the base model.

Neither time of day nor day of week significantly changed the logged speeding variable. Every unit increase in the amount of free flow time spent on 30-35 mph Texas roads significantly decreased the speed by one unit.

Random Effects Linear Regression with Demographic, Trip, and Socioeconomic Variables: Texas 55-60 mph Roadways

The output from the linear regression analysis showing the relationship between demographic, trip, and socioeconomic variables, and the proportion of "free-flow" driving on 55-60 mph Texas roads in individual trips that is speeding is shown below. The trip variables primarily used to

control for differences in driving patterns are shown in blue text. All other variables are shown in black. Variables shown in bold are either statistically significant or approaching statistical significance. Note that the dependent variable (proportion of time speeding in an individual trip) is log transformed, which makes the magnitude of the coefficient difficult to interpret.

Table F-9. Output from the linear regression analysis showing the relationship between demographic, trip and socioeconomic variables and the proportion of "free-flow" driving: Texas 55-60 mph roadways.

	Coefficient	Standard Error	z-score	p-value	[95% Conf. Interval]	
Older Males	-0.097	0.381	-0.25	0.800	-0.843	0.649
Younger Females	0.034	0.363	0.09	0.925	-0.678	0.746
Younger Males	0.406	0.415	0.98	0.328	-0.408	1.221
Weekend	-0.008	0.119	-0.07	0.946	-0.241	0.225
College Degree	-0.253	0.261	-0.97	0.332	-0.765	0.258
Income [15-45K]	-0.634	0.981	-0.65	0.518	-2.556	1.288
Income [45-75K]	-0.174	0.913	-0.19	0.848	-1.963	1.614
Income [75K+]	-0.469	0.870	-0.54	0.590	-2.175	1.237
Truck or Sports Car	-0.056	0.289	-0.19	0.846	-0.623	0.511
ToD [12am-5am]	-0.979	0.498	-1.96	0.049*	-1.955	-0.002
ToD [9am-3pm]	0.101	0.126	0.80	0.422	-0.146	0.348
ToD [3pm-7pm]	0.004	0.116	0.03	0.974	-0.224	0.232
ToD [7pm-12am]	-0.053	0.182	-0.29	0.770	-0.410	0.304
logFFT60	-0.465	0.072	-6.50	0.000***	-0.605	-0.325
Constant	0.431	1.010	0.43	0.669	-1.548	2.410

***p<.001; **p<.01; *p<.05; †p<.10

Number of observations: 489

Number of groups: 59

Wald chi2(14)=57.57

Prob> chi2 = 0.0000

R-Squared

Within = 0.0958

Between = 0.2329

Overall = 0.0506

Socioeconomic Variables: No socioeconomic variables significantly predicted a change in the logged speeding variable.

Demographic and Trip Variables: No demographic variables were significant, consistent with the base model.

The time of day variables that were significant in the base model remained significant with the addition of socioeconomic variables. Every unit increase in the amount of free flow time spent on 55-60 mph Texas roads significantly decreased the speed by one unit.

Random Effects Linear Regression with Demographic, Trip, and Socioeconomic Variables: Texas 70 mph Roadways

The output from the linear regression analysis showing the relationship between demographic, trip, and socioeconomic variables, and the proportion of "free-flow" driving on 70 mph Texas roads in individual trips that is speeding is shown below. The trip variables primarily used to

control for differences in driving patterns are shown in blue text. All other variables are shown in black. Variables shown in bold are either statistically significant or approaching statistical significance. Note that the dependent variable (proportion of time speeding in an individual trip) is log transformed, which makes the magnitude of the coefficient difficult to interpret.

Table F-10 Output from the linear regression analysis showing the relationship between demographic, trip, and socioeconomic variables and the proportion of "free-flow" driving: Texas 70 mph roadways.

logspd60	Coefficient	Standard Error	z-score	p-value	[95% Conf. Interval]	
Older Males	0.019	0.301	0.06	0.949	-0.571	0.610
Younger Females	0.003	0.314	0.01	0.993	-0.612	0.617
Younger Males	0.439	0.343	1.28	0.200	-0.232	1.111
Weekend	0.124	0.162	0.77	0.444	-0.194	0.443
College Degree	0.065	0.211	0.31	0.758	-0.348	0.478
Income [15-45K]	-0.212	0.695	-0.31	0.760	-1.574	1.150
Income [45-75K]	-0.059	0.610	-0.10	0.923	-1.255	1.137
Income [75K+]	-0.322	0.583	-0.55	0.581	-1.464	0.821
Truck or Sports Car	0.046	0.273	0.17	0.865	-0.488	0.581
ToD [12am-5am]	0.256	0.758	0.34	0.735	-1.229	1.742
ToD [9am-3pm]	0.151	0.191	0.79	0.431	-0.224	0.525
ToD [3pm-7pm]	0.153	0.166	0.92	0.357	-0.173	0.480
ToD [7pm-12am]	-0.192	0.260	-0.74	0.459	-0.702	0.317
logFFT70	-0.876	0.083	-10.53	0.000***	-1.039	-0.713
Constant	0.972	0.912	1.07	0.287	-0.815	2.759

***p<.001; **p<.01; *p<.05; †p<.10

Number of observations: 276

Number of groups: 52

Wald chi2(14)=137.75

Prob> chi2 = 0.0000

R-Squared

Within = 0.2496

Between = 0.6602

Overall = 0.3854

Socioeconomic Variables: No socioeconomic variables significantly predicted a change in the logged speeding variable.

Demographic and Trip Variables: No demographic variables were significant, consistent with the base model.

Neither time of day nor day of week significantly changed the logged speeding variable. Every unit increase in the amount of free flow time spent on 65-70 mph Texas roads significantly decreased the speed by one unit.

Appendix G:
Draft Moderator Guide for the Phase 2 Focus Groups

I. INTRODUCTION [7 minutes]

[Note that the Moderator's Guide serves as a framework to help the moderator generally cover the topics of interest. However, given that this is a moderated discussion, these questions should be considered to be more as "touch points" rather than fixed topics. The moderator will follow up on related topics opportunistically, with the objective of exploring issues related to the topics of interest.]

Good (Morning, Afternoon, Evening). My name is Christian Richard and I am the moderator for today's discussion. As you were probably told by the person who called you, we will be here for about two hours and the purpose of today's group is to talk about a number of topics related to yourselves, driving, and your selection of speed while you drive. We are more interested in hearing about your own experiences than those of others you know.

SELF DISCLOSURES: I work for a company called Windwalker, Inc., which provides research to clients on a wide variety of subjects. I travel around the country talking to groups like yours and giving them opportunities to share their thoughts, ideas and feelings. That's what we'll do here tonight.

Please remember, my job is to report what you have to say back to my client, the National Highway Traffic Safety Administration of the US Department of Transportation. I have no vested interest in your answers. I am not here to sell you anything and my job will continue regardless of how you answer. Thus, I encourage you to be honest and feel free to offer both positive and negative comments.

BROADER DISCLOSURES: As you also may have noticed, this session is being videotaped. This is not because I want to keep track of "who said what" but more to keep a record of today's information for my report. I do a lot of these groups in many cities and it would be difficult for me to remember the specifics of each group without having something to help verify what I'm reporting. I assure you, the tape will be used for no other purpose.

GROUND RULES: Before we get started, I'd like to go over some ground rules to help me get the information I need and help you get an idea about how focus groups work.

- Please speak clearly and one at a time so that everyone in the group can hear you. Also, keep your voice level at least as loud as mine is now so that the tape can pick up what you say.
- Since focus groups are conducted w/ complete confidentiality, we are using first names only. None of you will be identified by name in my report or anywhere else.
- You are each being paid for your time to be here because we are interested in what you have to say. Thus, it is important that we hear from everyone. There will be times when you may be the only one in the group that feels a particular way. Please speak up when this occurs as this group represents a larger population. You may not think the same way

as anyone in this room, but you may be representing the ideas of thousands of other people that are not here tonight. All opinions are valuable. There are no right or wrong answers.

- At any time feel free to get up and get additional refreshments or go to the rest room if you would like. Smoking is not permitted inside the session.

Are there any questions? OK, before we begin, let's go around the room and introduce ourselves by giving our first names and a brief description of where we'd be and what we'd be doing if we weren't here right now. I'll go first: I'm John, and if I weren't here I'd probably still be at work, writing up a report on a focus group like this one.

Now that we all know each other, let's get started.

II. GENERAL DRIVING [8 minutes]

II-1) Warm-up questions:

Now, I'd like you to think back a little bit to your early driving days.

1. How did you learn to drive?
2. Are there any key things you will always remember about that experience?
3. If you were teaching a friend or younger brother/sister to drive (child for older groups), what are the most important things you would tell them?

III. SPEED CHOICES AND BEHAVIORS [50 minutes]

Now let's go back to those driving lessons. Discussions about driving can cover many topics but we are most interested in finding out how and why you choose your driving speeds, situations when you will choose to speed, and what sort of conditions or factors might inhibit you from speeding.

III-1) Basic factors affecting speed choice

4. First, what are your typical driving speeds: below the speed limit, at or near the speed limit, above the speed limit?
5. Would this vary depending on the roadway you are on: residential street, 35mph arterial road, 60 mph freeway?
6. What are some of the conditions or factors that you consider when setting your speed (go through discussions, then probe relative impacts of: posted speed limit, concerns about getting a ticket, traffic conditions and volumes, road conditions, etc.).

Now, I'd like to get your opinions about posted speed limits.

7. When you see a posted speed limit sign, how do you interpret it or how does it affect your driving?

8. What does the posted speed mean to you (PROBES: maximum speed, target speed, recommended speed, etc).

9. Does your view differ for different types of roads (e.g., residential, commercial, rural, highways, freeways)?

10. How do you think posted speeds are set?

11. How credible/useful are they to you?

III-2) Driver risk perception

12. In general, how risky do you think it is to exceed the posted speed?

13. Is there a speed at which you think it becomes unsafe?

III-3) Driving habits

I'd like to talk a bit more about driving speed.

14. Generally, how aware are you of your driving speed?

15. Are there certain conditions or situations in which you become more aware of your speed (PROBES: unfamiliar roads/locations; nearby pedestrians/bicyclists; driving in town; passengers).

III-4) Influence of social norms and riding with passengers

16. Are there certain passengers or types of passengers that make you more careful about your speed?

17. Are there any passenger types or that make you *less* careful about your speed?

III-5) Past experiences with critical events (e.g., crashes or speeding infractions)

18. Have there been any specific driving situations –maybe a close call – that you've experienced that have had a big influence on your attitudes or behaviors about speeding? [probe: discuss example situations]

19. How did they change your attitudes or behaviors about speeding?

20. Have you ever received a ticket or warning for speeding; and under what circumstances (speed vs. posted speed, type of roadway, time-of-day, etc.)?

21. Did that change your driving behavior in any way?

IV. SPEEDING COUNTERMEASURES [50 minutes]

Now I'm going to walk through a series of options for how our society could respond to excessive speeding and ask for your thoughts and opinions about each one. I'll include descriptions and pictures for each option.

In each case we will discuss your thoughts about:

- Whether it helps solve the problem.
- Whether it will improve safety.
- Advantages and disadvantages.
- Ideas you might have for how to implement the option.

[Moderator's Note: remain sensitive to whether respondents clearly match responses to countermeasures.]

IV-1) Countermeasure 1: Higher penalties and Increased Enforcement

Provide Description: This involves deliberately higher penalties for aggressive driving, or drivers who get repeated speeding tickets. This could include the potential for criminal charges for drivers that get in crashes caused by excessive speed, and other higher penalties such as costlier fines, higher insurance costs, license suspensions, etc.

22. How effective do you think that these types of countermeasures would be?

23. What would be some advantages and disadvantages?

24. What concerns or suggestions would you have about how to implement this in our cities and neighborhoods?

IV-2) Countermeasure 2: Speed Awareness Course

Provide Description: This would apply to drivers that get repeated speeding tickets, who would then get a chance to have the offences dismissed/removed if they attended a speeding awareness course. The course itself would cover the costs and dangers of speeding, in addition to strategies for not speeding.

25. How effective do you think that this type of countermeasures would be?

26. What would be some advantages and disadvantages?

27. What concerns or suggestions would you have about how to implement this in our cities and neighborhoods?

IV-3) Countermeasure 3: Engineering Countermeasures

Provide Description: These include making changes to roadways in certain areas, such as residential streets that "naturally" discourage fast driving. These measures can provide a

perception of driving faster than you really are (e.g., tree-lined street with parking), or include the redesign of roadways to deliberately slow you down (e.g., wide speed bump, roundabouts, or other speed-calming measures).

28. How effective do you think that these types of countermeasures would be?

29. What would be some advantages and disadvantages?

30. What concerns or suggestions would you have about how to implement this in our cities and neighborhoods?

IV-4) Countermeasure 4: Vehicle-based Countermeasures

Provide Description: These countermeasures involve devices installed on vehicles that directly or indirectly encourage drivers to go slower. This includes devices that physically limit how fast your vehicle can go, and those that provide reminders of how fast you are traveling relative to the posted speed. Another option is a "fuel economy" display that discourages aggressive driving.

31. How effective do you think that these types of countermeasures option would be?

32. What would be some advantages and disadvantages?

33. What concerns or suggestions would you have about how to implement this in our cities and neighborhoods?

IV-5) Countermeasure 5: Automated Enforcement

Provide Description: This involves some type of "Radar" camera placed either at fixed or random locations that take pictures of passing vehicles that are speeding. These vehicles are not pulled over by a police officer, but rather a speeding ticket is sent to the registered vehicle owner by mail.

34. How effective do you think that this option would be?

35. What would be some advantages and disadvantages?

36. What concerns or suggestions would you have about how to implement this in our cities and neighborhoods?

V. CLOSE

Thank you again for taking the time to come out and talk with us this [morning, afternoon, evening]. Before closing, are there any additional thoughts you'd like to offer about the topics we discussed? [If not, conclude the session, if so, briefly allow additional thoughts to come forward.] The person at the front desk will give you your stipend for participating.

INCREASED PENALTIES & ENFORCEMENT

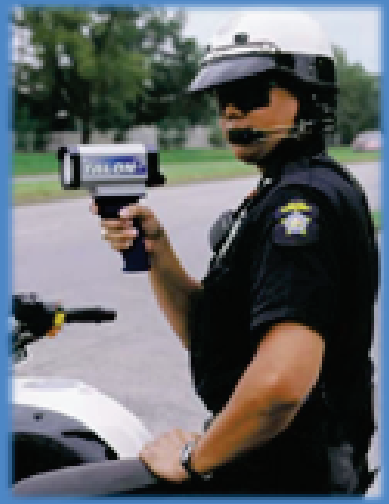
Higher Penalties

MPH over Limit	Current Fine	Higher Fine
1-5	$93	$116
6-10	$113	$141
11-15	$144	$180
16-20	$175	$219
21-25	$206	$258
26-30	$247	$309
31-35	$298	$373
36-40	$349	$436
Over 40	$411	$514

Higher fines for higher speeds and/or repeat speeders

Targets only drivers who are caught speeding

Increased Police Presence



Increased number of police patrols and "speed traps" which increases chances of getting caught speeding

Targets all speeders

SPEED-AWARENESS COURSE

Multi-session "classroom" course that teaches the dangers of speeding and speed awareness strategies

Targets repeat and/or dangerous speeders

ROADWAY COUNTERMEASURES

Rumble/Vibration Treatments

Surface treatments that are "uncomfortable" to cross at higher speeds

Pavement Markings

Markings that make it seem drivers are traveling faster than they really are

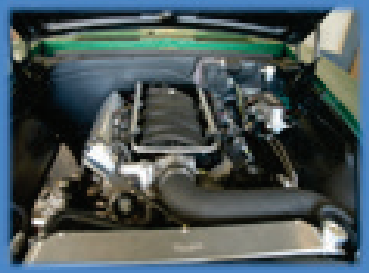
Speed Displays

Changeable signs that remind drivers of their current speed

Targets all drivers, whether they are speeders or not

VEHICLE-BASED COUNTERMEASURES

Speed Limiter in Engine



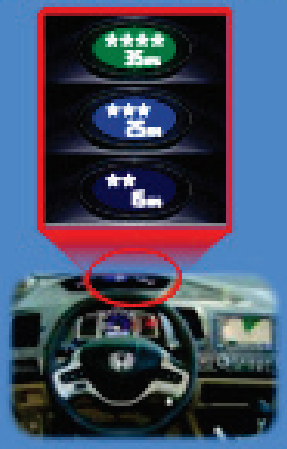
Instrument installed in engine that physically limits vehicle speed

Option 1: Targets repeat and/or dangerous speeders
Option 2: Installed on new vehicles

In-vehicle Speed Limit Display

Display shows posted speed even when signs are not visible or nearby

Fuel Economy Display

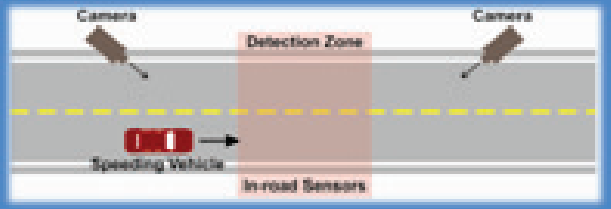


Electronic display of real-time fuel economy, which encourages "non-aggressive" driving

Installed on new vehicles – targets all drivers

AUTOMATIC ENFORCEMENT

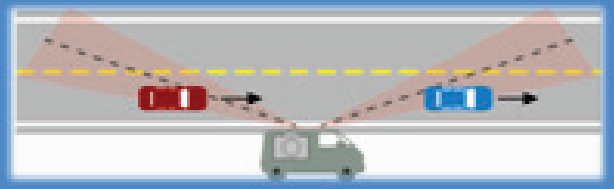
Fixed Location



Fixed cameras detect speeding vehicles through a permanent detection zone and issue tickets by mail

Targets speeders at the same "trouble-spot" location

Random Location



Truck-mounted cameras detect speeding vehicle speeds and issue tickets by mail

Targets speeders at different locations each day

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DOT HS 811 819
September 2013

U.S. Department
of Transportation
**National Highway
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9787-092313-v4a