Matching Countermeasures to Driver Types and Speeding Behavior

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13. ABSTRACT Speeding is a common contributing factor in fatal traffic crashes. Attempts to address this problem through a variety of approaches have, so far, not led to a substantial reduction in speeding-related fatalities. An address-based mail survey of licensed drivers in Idaho was conducted to learn more about why drivers speed and what new countermeasures can be developed by examining some of the underlying behavioral and attitudinal aspects of speeding. Driver records were used to stratify survey participants based on age (18-24, 25-64, and 65+), gender, and number of speeding convictions in the previous 3 years (0, 1, 2+). A total of 1925 completed surveys were obtained. Three primary questions were examined with the data, including: (1) how well do existing typologies of speeding behavior predict speeding convictions; (2) what speeding countermeasures are most appropriate for the various driver types and roadway situations; and (3) how strong is the relationship between driver records and self-reported speeding in the survey? Data analyses addressed these questions, in addition to examining respondent attitudes, beliefs, and behaviors regarding speeding, and the relationship between demographic factors and speeding convictions.		
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Executive Summary

Speeding-related crashes continue to be a serious problem in the United States. The proportion of speeding-related fatal crashes has changed little in over a decade. In 2015 some 27 percent of all fatal crashes (9,557 fatalities) had speeding as a contributing factor (National Center for Statistics and Analysis, 2016), only a slightly lower percentage than in 2000 (29%) (Liu, Chen, Subramanian, & Utter, 2005). Speeding is also a common behavior, and most drivers exceed the speed limit at some point (Schroeder, Kostyniuk, & Mack, 2013). Given the widespread occurrence of speeding and the high toll in injuries and lives lost in speeding-related crashes, as well as the high economic costs of speed-related crashes—estimated at nearly $52 billion in economic costs and over $203 billion in comprehensive costs in 2010 (Blincoe et al., 2015), this is a safety issue that demands a great deal of attention.

So far, attempts to address this problem through a variety of approaches have not led to a substantial reduction in the percentage of speed-related fatalities (NHTSA, 2005), and speeding countermeasures have typically been associated with uncertain or limited success. NHTSA's report, *Countermeasures That Work* – 8th Edition (Goodwin, Thomas, Kirley, Hall, O'Brien, & Hill, 2015) provides a list of speeding countermeasures that have been demonstrated to be effective; however, most of these are one-dimensional in the sense that they focus on enforcement/punishment or engineering countermeasures to reduce speeding. A significant limitation with these types of countermeasures is that they do not seem to be as effective with some driver groups, such as risk-taking young males, because these drivers rarely consider the potential consequences of their behaviors (e.g., McKenna & Horswill, 2006).

NHTSA's *Motivations for Speeding* project (Richard et al., 2013) collected actual driving speeds by road type and posted speed limit for a sample of volunteer drivers (n=164) tracked over several weeks. The participants also completed a number of questionnaires involving driving attitudes and psychological measures. The analyses of the driving data identified four basic speeder types (*incidental* speeders who rarely if ever speed, *casual* speeders who speed often but in small amounts per trip, *occasional* speeders but in large amounts for a few trips, and *habitual* speeders who speed often during most if not all of their trips). The study also found that speeding patterns varied across different roadway types and, in some speed limit ranges, were significantly associated with certain psychological factors.

NHTSA's 2011 *National Survey of Speeding Attitudes and Behaviors* (NSSAB) survey collected a wide range of speeding-related information, including self-report driving behavior and attitudes on public acceptability of various countermeasures (Schroeder, Kostyniuk, & Mack, 2013). This national survey provided additional insights into patterns of speeding behavior. Cluster analyses of the national survey data indicated that 86 percent of all respondents in the survey fell into one of three distinct types of driving behavior based on six core questions on their driving tendencies regarding passing other vehicles and matching the flow of traffic, their average speeds on different types of roads, and how often they had been stopped for speeding. Of those respondents classified in the cluster analyses, 30 percent of the drivers were classified as non-speeders, 40 percent as sometimes speeders, and 30 percent were classified as speeders. For these survey respondents, concerns over the danger of speeding and attitudes towards various countermeasures clearly varied by speeder type.

Both the *Motivations for Speeding (MfS)* study and the NSSAB provided evidence that drivers could be categorized into different speeder types that reflect frequency of speeding. In both studies, these categories were derived primarily from measures based on speeding-related behaviors, either self-reported (NSSAB) or directly observed (MfS). The MfS research showed that speeder categories apply when using detailed measures of speeding behavior captured at the level of individual trips, but it did so with only a small sample of drivers. In contrast, the NSSAB showed that a speeder typology could be developed using high-level, self-reported speeding behaviors across a large driver sample. The current study provided an opportunity to examine both approaches with a focus on driver attitudes and behaviors, and with a large sample to gain a more detailed understanding of why drivers speed and what countermeasures might be effective in reducing speeding overall. Additionally, information about driver speeding convictions were obtained, which provided a means to test the usefulness of the typologies for predicting speeding convictions.

The overall project objectives were to answer the following research questions:

1. How do the speeding types that emerge from national surveys versus actual driving behaviors compare to one another in terms of predicting speeding?

2. What speeding countermeasures are most appropriate for the various driver types and roadway situations?

3. How strong is the relationship between driver records and self-reported speeding citations?

Methods:

Sample Design: Driver records were obtained with the cooperation of the Idaho Transportation Department (ITD), and used to develop the sampling frame. The dataset included one record for every person who had been a licensed Idaho driver for at least 3 years. The dataset did not contain personally identifying information (PII). Other fields in the dataset included gender, age, ZIP Code, number of speeding convictions in the past 3 years, and number of traffic-related convictions from several other selected categories related to driver safety. A complete description of the survey methodology is provided in Appendix A.

A target sample size of 1974 was selected according to a power analysis. Based on the survey methodology used (Messer & Dillman, 2011), we anticipated a response rate near 50 percent, so the initial mail-out sample consisted of 3,948 drivers. The sampling frame was stratified by age categories (18-24, 25-64, 65+), gender, and speeding convictions (0, 1, and 2+ in the last 3 years). Younger drivers and those with 2+ convictions were oversampled relative to the general population.

Survey Administration: The survey approach was based on a recent survey design experiment (Messer & Dillman, 2011), which used Priority Mail and a monetary incentive for respondents in a statewide community survey. Two modes were used for survey completion: mailed paper surveys and electronic web-based surveys. The mail survey was the primary mode; however, participants had the option to complete the survey using either mode. Respondents could take the survey in either English or Spanish. A multi-step approach was used for encouraging

participation, consistent with survey standards endorsed by the American Association for Public Opinion Research (AAPOR), which included: mailing an advance letter, mailing the survey packet via Priority Mail, mailing reminder postcards, and mailing additional survey packets. People were given a prepaid reimbursement of $5 for their time and effort completing the survey.

Data Processing: The timeline for all conviction data was calculated relative to the date that the participant response booklet was received, with two weeks subtracted to generally account for delays associated with sending, transport, and processing of the returned booklets.

Summary of Survey

A total of 1925 returned surveys were included in the analyses. Survey respondents included males (52%) and females (48%) from three age groups: younger drivers 18 to 24 (11.2%), drivers 25 to 64 (70.6%), and older drivers 65+ (18.2%). Within these demographic categories, drivers were selected based on number of speeding convictions in the previous 3 years. These included drivers with 0 convictions (49.5%), 1 conviction (19.4%), and 2+ convictions (31.1%). Drivers with 2+ convictions were greatly overrepresented in the sample relative to the Idaho driving population.

Summary of Attitudes and Behaviors

The survey questions presented in this report provide a broad view of the attitudes, beliefs, and behaviors that respondents hold towards speeding. There was a clear age-related pattern apparent across most of the questions. Specifically, the typical response distribution for older drivers was at the end of the scale that was most favorable towards not speeding. In contrast, the typical response distribution for younger drivers was consistently shifted towards responses that were more favorable/inclined towards speeding attitudes and behaviors. The distribution for the middle age group typically fell in between the younger and older driver groups. Despite these age-related differences, the overall trend in responses across the groups was quite similar. In particular, all groups tended to be on the same end of the response scale, with response distributions having similar shapes and often with the same modal response, but just shifted slightly based on age.

The questions about driver beliefs, attitudes, and behaviors also provide a high-level picture about how most Idaho drivers view their speed choices. In particular, societal norms seem to influence the majority of drivers. Most drivers acknowledge a link between speeding and safety, and most drivers also report wanting to not speed. In terms of speeding behaviors, most drivers report following traffic, but more drivers say they keep up with faster traffic than stay with slower traffic. Most drivers rarely travel at speeds that are typically viewed as speeding on high-speed (+15 mph) and lower-speed roads (+10 mph), but there are some exceptions (such as main roads through town).

Although self-reported speeding represented a minority of the responses for most of the questions, those drivers that did, indicated different reasons for speeding. Some drivers enjoy driving fast, or speed to get to their destination sooner. Some drivers may speed because it is less boring, or to reduce stress. There were also situational reasons reported for speeding, including driving a powerful car and on straight roads, or late night/early morning. This list of reasons is

not comprehensive, since it is limited to the questions asked in the survey, but it indicates that addressing driver motivations for speeding may require a multifaceted approach that covers a variety of underlying reasons why drivers may choose to speed.

Driver Convictions

Overall, the pattern of results related to driver convictions in the current survey is consistent with findings from previous studies. Specifically, driver age, gender, marital status, and weekly mileage driven were all significant predictors of speeding convictions. Also, consistent with past research on speeding behavior and studies analyzing crash data, younger drivers in the study had a higher proportion of speeding convictions. Respondents who drove more miles per week and were single had higher rates of speeding convictions.

In addition to the question about weekly driving mileage, there were also differences across conviction groups for other survey questions about driving behavior. In particular, drivers that tended to keep up with faster traffic or pass other traffic, and to report driving at higher speeds on certain roadways typically had more speeding convictions. In general, driver characteristics related to faster driving behaviors were significantly associated with having more speeding convictions.

How do the speeding types from national surveys versus actual driving behaviors compare to one another in terms of predicting speeding?

Overall, the analyses indicate that the notion of different speeder types has merit. The two approaches investigated resulted in typologies that were similar, especially in the category that represented non/low speeders. Examination of the crosstabs between the typologies confirms that the general distribution of drivers across speeder categories is quite similar for both typologies; however, the overlap between the typologies does not seem to be as strong at the level of individual drivers. (i.e., many people assigned to one speeder category in one typology end up classified as a different type of speeder in the other typology). Despite these differences, the tests for Goodness of Fit indicated that the distributions of drivers in the 0- and 1- convictions group were not different. However, for the 2+ convictions test of Goodness of Fit, the two typologies were significantly different, which suggests that classification of repeat speeders may be more complicated than other driver types.

One notable finding is that the similarities between the typologies occurred even though they were based on entirely different sets of questions. In particular, the NSSAB typology was based on questions that were about speed-related driving behaviors, while the MfS typology included a more diverse set of questions that included primarily attitudes, beliefs, and situational aspects related to speeding. This suggests that the overall approach of classifying drivers into speeder types is capturing underlying differences among drivers with regard to speeding.

Regression analyses indicated that both typologies were significant predictors of the number of speeding convictions. Because it is based primarily on questions related to driver attitudes and beliefs about speeding, the MfS typology provides more insight about the underlying motivations of these drivers. However, when it comes to predicting the number of convictions, the NSSAB typology was somewhat better for 2 or more convictions. Nevertheless, descriptive tables

indicated that neither typology was especially effective at capturing drivers with multiple convictions. This suggests that there may be different subtypes within the frequent speeder group. For example, the MfS typology had two different frequent speeder types—aggressive and emotional speeders.

The findings from the current survey add further support to the examination of speeder typologies conducted in the previous MfS and NSSAB studies. At some level, and with different data, existence of systematic difference across groups of drivers was confirmed. Further research is needed to elaborate and establish the underlying speeder types; however, the current study provides evidence that the corresponding typology will need to include elements that capture driver speeding behavior, in addition to other aspects related to driver attitudes and beliefs about speeding.

What speeding countermeasures are most appropriate for the various driver types and roadway situations?

Drivers provided a range of views regarding the effectiveness of different types of countermeasures for reducing speeding. Some countermeasures were clearly viewed as effective, such as using cruise control, speed bumps, increased enforcement, stopping distance education, and radar-based flashing speed displays. At the other end, other countermeasures that were rated as having low potential effectiveness included speed awareness courses, engine speed limiters, digital speedometers, and fuel-efficiency displays.

In terms of the relationship between specific countermeasures and drivers, there were several notable findings. One key trend was that, while drivers with convictions tended to be supportive of positive sanction (road treatments and signs); they consistently provided lower ratings for countermeasures that represented negative sanctions (fines, enforcement, vehicle limiters, etc.). Although the survey questions address countermeasure effectiveness, it could be that speeders reacted to the questions as a set-up for impending policy changes in the state that would negatively impact them. This impression is especially plausible given that the survey was mailed to them by the Idaho Transportation Department. Thus, these negative views may indicate that such countermeasures could potentially influence their speeding, but that it would likely also come with pushback from the public.

Overall, the survey was successful in obtaining useful information about potential countermeasures. While there was no clear "silver-bullet" countermeasure identified in the survey, there are several promising findings, such as with the stopping-distance education and radar-based, roadside displays that could form a starting point for the development of more detailed countermeasure strategies.

Another notable finding is that the prerequisite driver attitudes and beliefs that can support efforts to address speeding appear to be in place at a high level, at least among Idaho drivers. In particular, the survey found generally widespread support for trying to address the speeding problem. For the question that asked drivers how important it is that something be done to reduce speeding, a clear majority of all drivers believed that doing so was somewhat or very important. While there were predictable differences in agreement across conviction categories, over two-thirds of repeat speeders still expressed some degree of agreement with this view (84% for 0

convictions, 74% for 1 conviction, and 68% for 2+ convictions). It should be noted that Idaho is not representative of all states, especially since it is part of a region that generally reports lower speeding levels (as per the NSSAB). Nevertheless, this is a promising finding overall.

How strong is the relationship between driver records and self-report survey reports?

In general, there is a clear relationship between speeding convictions from driver record data and self-reported speeding citations. Specifically, the self-reported number of citations across drivers most frequently matched the number of actual convictions drivers had in the past year, but this match decreased as the number of convictions increased (89% for 0 convictions, 64% 1 for conviction, and 39% for 2+ convictions). Also, in the regression model, the variable representing number of actual convictions was highly predictive of self-reported citations.

Although generally good, the accuracy of self-reporting was also systematically affected by other factors. In particular, having other non-speeding convictions leads to over-reporting of speeding tickets, likely because of confusion between the two types. Moreover, other factors such as the passage of time and an increased desire to manage one's self-image lead to under-reporting of speeding citations. These patterns are generally consistent with previous findings related to self-reported driving events, such as citations and crashes (Maycock, 1997; Arthur et al., 2001).

Asking drivers to self-report their speeding citations remains the most efficient method of obtaining this information. While this measure has clear shortcomings, it can certainly provide a useful measure if it is analyzed with these limitations in mind.

Chapter 1   Introduction

Background

Speeding-related crashes continue to be a serious problem in the United States. The proportion of speeding-related fatal crashes has changed little in over a decade. In 2015 some 27 percent of all fatal crashes (9,557 fatalities) had speeding as a contributing factor (NCSA, 2016), only a slightly lower percentage than in 2000 (29%) (Liu, Chen, Subramanian, & Utter, 2005). Speeding is a common behavior; most drivers exceed the speed limit at some point. In the National Highway Traffic Safety Administration *2011 National Survey of Speeding Attitudes and Behaviors* (Schroeder, Kostyniuk, & Mack, 2013), when asked how often they drove 10 or 15 mph over the posted speed limit, over half of the respondents (52%) reported having driven 15 mph over the speed limit on multi-lane divided highways, over one-third (36%) reported having driven 15 mph over the posted speed limit on two-lane roads, and 36 percent also reported having driven 10 mph over the posted limit on neighborhood or residential streets. Nine percent of those surveyed reported having been stopped by the police for speeding in the previous year, and 8 percent reported receiving a speeding ticket through the mail for a violation recorded by a speed camera (Schroeder, Kostyniuk, & Mack, 2013). Given the widespread occurrence of speeding and the high toll in injuries and lives lost in speeding-related crashes, as well as the high economic costs of speed-related crashes—estimated at nearly $52 billion in economic costs and over $203 billion in comprehensive costs in 2010 (Blincoe et al., 2015), this is a safety issue that demands a great deal of attention.

So far, attempts to address this problem through a variety of approaches have not led to a substantial reduction in speed-related fatalities (NHTSA, 2005), and speeding countermeasures have typically been associated with uncertain or limited success. NHTSA's 2015 edition of its report, *Countermeasures That Work* (Goodwin, Thomas, Kirley, Hall, O'Brien, & Hill, 2015) provides a list of speeding countermeasures that have been demonstrated to be effective; however, most of these are one-dimensional in the sense that they focus on enforcement/punishment or engineering countermeasures to reduce speeding. A significant limitation with these types of countermeasures is that they do not seem to be as effective with some driver groups, such as risk-taking young males, because these drivers rarely consider the potential consequences of their behaviors (e.g., McKenna & Horswill, 2006). Similarly, National Cooperative Highway Research Program (NCHRP) Report 500 provides several engineering-based countermeasures to address speeding (NCHRP, 2005). While these countermeasures can be effective in reducing speeding at specific locations, the problem is that they can be expensive and only cover small parts of the transportation network. They are also indiscriminant because other non-speeding drivers are impacted by the countermeasures as well.

Unsurprisingly, a substantial amount of research has been conducted on causes of speeding. Table 1 shows the multitude of factors that have been found to be associated with speeding or speed-related crashes. Despite all this research, there is still uncertainty regarding the relative importance of these factors, and how this information can be used to develop countermeasures that effectively target specific types of drivers.

Table 1. Factors found to be associated with speeding in previous research.

Factor	Example Variables	Example References
Demographic	Age, Gender, Socio-economic & Education Level	Richard et al, 2012; DePelsmacker & Janssens, 2006; Harré et al., 1996; Hemenway & Solnick, 1993; Stradling et al., 2002
Personality	Attitudes, Habits, Personal & Social Norms, Thrill-seeking, Beliefs	Richard et al, 2012; Arnett et al., 1997; Clément & Jonah, 1984; DePelsmacker & Janssens, 2006; Ekos Research Associates, 2007; Gabany et al., 1997; McKenna & Horswill, 2006; Stradling et al., 2002
Roadway	Posted Speed	Book & Smigielski, 1999; Giles, 2004
Environment	Urban/Rural	Giles, 2004; Rakauskas et al., 2007
Vehicle	Engine Size; Vehicle Age	Hirsh, 1986; Stradling et al., 2002
Risky behaviors	Drinking and Driving, Seatbelt Use, Red-light Running	Richard et al, 2012; Arnett et al., 1997; Cooper, 1997; Gabany et al., 1997; Harré et al., 1996; Hemenway & Solnick, 1993; Rajalin, 1994
Situational	Trip time, Mood, Inattention, Fatigue	Arnett et al., 1997; Ekos Research Associates, 2007; Gabany et al., 1997; Hirsh, 1986; McKenna, 2005; McKenna & Horswill, 2006

NHTSA's *Motivations for Speeding* project (Richard et al., 2013) collected actual driving speeds by road type and posted speed limit for a sample of volunteer drivers (n=164) tracked over several weeks. The participants also completed a number of questionnaires involving driving attitudes and psychological measures. The analyses of the driving data identified four basic speeder types (*incidental* speeders who rarely if ever speed, *casual* speeders who speed often but in small amounts per trip, *occasional* speeders but in large amounts for a few trips, and *habitual* speeders who speed often during most if not all of their trips). The study also found that speeding patterns varied across different roadway types and, in some speed limit ranges, were significantly associated with certain psychological factors.

NHTSA's 2011 *National Survey of Speeding Attitudes and Behaviors* (NSSAB) survey collected a wide range of speeding-related information, including self-report driving behavior and attitudes on public acceptability of various countermeasures (Schroeder, Kostyniuk, & Mack, 2013). This national survey provided additional insights into patterns of speeding behavior. Cluster analyses of the national survey data indicated that 86% percent of all respondents in the survey fell into one of three distinct types of driving behavior based on six core questions on their driving tendencies per passing other vehicles and matching the flow of traffic, their average speeds on different types of roads, and how often they had been stopped for speeding. Of those respondents classified in the cluster analyses, 30 percent of the drivers were classified as non-speeders, 40 percent as sometimes speeders, and 30 percent were classified as speeders. For these survey respondents, concerns over the danger of speeding and attitudes towards various countermeasures clearly varied by speeder type.

Both the *Motivations for Speeding* (MfS) study and the NSSAB provided evidence that drivers could be categorized into different speeder types that reflect frequency of speeding. In both studies, these categories were derived primarily from measures based on speeding-related behaviors, either self-reported (NSSAB) or directly observed (MfS). The MfS research showed that speeder categories apply when using detailed measures of speeding behavior captured at the

level of individual trips, but it did so with only a small sample of drivers. In contrast, the NSSAB showed that a speeder typology could be developed using high-level, self-reported speeding behaviors across a large driver sample. The current study provided an opportunity to examine both approaches[1] with focus on driver attitudes and behaviors, and with a large sample to gain a more detailed understanding of why drivers speed and what countermeasures might be effective in reducing speeding overall. Also, as part of the current project, information about driver speeding convictions were obtained, which provided a means to test the usefulness of the typologies for predicting speeding convictions.

Objectives

The purpose of this research was to:

- Examine two typologies that define types of driver speeding behavior and compare these two typologies using a survey of a representative sample of licensed drivers in one State;
- Link appropriate countermeasures to types of driver speeding behavior;
- Match respondents' driver records to their survey results in order to:
  - o Compare driving violations to driver speeding behavior typologies; and
  - o Validate self-report survey responses with actual driving records.

The first objective of this project was to examine and compare the driver speeding typologies from the two studies described above. Each of the typologies provided a different way of defining speeder types. The four speeder types from the *Motivations for Speeding* (MfS) study were based on the actual driving behaviors of a small sample of volunteer drivers. The three speeder types from the NSSAB were based on self-reports from a nationally representative sample of drivers. The current study compared the two ways of defining types of drivers with regard to their speeding behavior, and then used driver records and a mail-out survey of a representative sample of licensed drivers to examine the utility of each way of defining types of speeders.

The second objective of this project was to explore appropriate speeding countermeasures for various speeder types. This included consideration of the various countermeasures applied to speeding, such as traditional law enforcement, automated speed enforcement, in-vehicle technologies, and driver education. This study collected information on the attitudes and experiences of the drivers surveyed with regard to speeding countermeasures, and matched countermeasures with driver types from the two speeding typologies.

The third objective of this project was to match actual driver records with individual survey responses. To this end, the project team partnered with the state of Idaho, which provided mailing addresses and speeding conviction histories of adult drivers to conduct an in-depth mail survey on speeding behavior and attitudes towards speeding countermeasures using address-based sampling of a representative sample of the Idaho's fully-licensed drivers.

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[1] Although, driving data was not collected from individual drivers in the current study, it was possible to develop a proxy speed typology based on the MfS one using survey questions that were correlated with the MfS typology in the previous study.

The subject sample used in this study was stratified based on past speeding convictions. Driver survey responses were linked with driving records obtained from the Idaho Transportation Department. Patterns of actual driving violations were compared with speeding types and other responses in order to validate self-report information found in the survey.

Chapter 2   Overview of Methods

This section describes the methods used to conduct the survey data collection. Additional details about the methodological approach are provided in Appendix A. The methods summary described below covers:

- Sample design,
- Survey preparation, and
- Survey administration.

Sample Design

De-identified driver records were obtained with the cooperation of the Idaho Transportation Department (ITD), and used to develop the sampling frame. The dataset included one record for every person who had been a licensed Idaho driver for at least 3 years. The dataset did not contain personally identifying information (PII). It did include a record ID, which ITD used to link back to the driver's name and mailing address for each driver selected for the survey sample for the sole purpose of mailing out the surveys. Other fields in the dataset included gender, age, ZIP Code, number of speeding convictions in the past 3 years, and number of traffic-related convictions from several other select categories related to driver safety.

A power analysis conducted prior to sample selection indicated that a target sample size of 1974 was sufficient to support the planned statistical analyses. Based on the survey methodology used (Messer & Dillman, 2011), a response rate near 50 percent was expected, so the initial mail-out sample consisted of 3,948 drivers. The sampling frame was stratified by age (ages 18 to 24, 25 to 64, and 65+), gender, and speeding convictions (0, 1, and 2+ in the last 3 years). Taken together, those variables form 18 strata (3x2x3=18). Each record in the sampling frame was assigned to one and only one stratum. Within each stratum, simple random sampling was used to select drivers for the mail-out. The final sampling fractions for each stratum were selected after examining the sampling frame, which was divided into the following proportions:

- *Age:* Drivers in the youngest and oldest groups were oversampled with regard to their proportion of the population to permit estimating their population parameters with good precision. At the time of the power analysis, Idaho had 1,065,547 drivers 18 and older. Approximately 11 percent of those were 25 or younger, and 19 percent of them were 65 or older, leaving around 70 percent of respondents from 26 to 64. It was necessary to oversample young and old drivers in order to estimate survey responses with good precision.
- *Gender:* The sample was divided into half male and half female drivers, to reflect the approximately 50/50 split among licensed Idaho drivers.
- *Speeding Convictions:* The sample included 40 percent of people with 0 speeding convictions, 20 percent with 1 speeding conviction, and 40 percent with 2+ speeding convictions in the past 3 years. Note that drivers with 2+ convictions only represent 0.56 percent of Idaho drivers, and were greatly oversampled to accommodate statistical comparisons.

Forty percent of the sample was devoted to drivers with no speeding convictions, and 40 percent to those with 2+ convictions, within each age stratum, in order to have adequate statistical power to identify differences between the non-speeders (0 convictions) and repeat speeders (2+ convictions). Note that the remaining drivers, those with a single speeding conviction in the past 3 years, were included to facilitate generalization to the full Idaho driver population. It is unclear whether this group is a unique type of speeder, or simply comprised of a combination of drivers who speed infrequently (similar to 0 convictions) but were unlucky enough to receive a conviction, and those who speed frequently (similar to 2+ convictions), but who were lucky enough to only be caught speeding once.

With the anticipated sample size of roughly 400 respondents in each of the 0 and 2+ groups, a statistical hypothesis test was calculated to have 80 percent power to detect a difference of 10 percent in a proportion between the two groups, if one of the groups exhibits a proportion of 50 percent. For survey questions where the responses yield a proportion either higher or lower than 50 percent, the study was well powered to identify even smaller differences.

Every survey response was assigned a sampling weight that indicated the number of Idaho drivers that their response represented. The survey weights were adjusted to account for the final sample size and any differential non-response across strata. When results were analyzed with the survey weights, the estimates and inferences based on the survey data are representative of Idaho drivers in general, and not just of those in the sample. Furthermore, it is possible to quantify the uncertainty in those estimates and inferences that is related to sampling variability. That uncertainty is quantified using confidence intervals or p-values, as appropriate.

The final cut-points for the age strata were selected in consultation with NHTSA after the sampling frame dataset was received from ITD and the distribution of speeding convictions by gender and age strata were assessed. The guiding principles of the final selection was to solicit responses from enough respondents to be able to estimate the quantities of interest with minimal uncertainty in groups that were expected to be meaningfully different, such as young drivers versus older drivers, and people with multiple speeding convictions versus those with none.

Survey Preparation

Cognitive testing was conducted on the English version of the survey with a convenience sample of nine respondents who lived in Idaho to identify any problems and to refine the questionnaire for the pilot test. An interview guide was developed for the cognitive testing, which covered aspects such as respondent understanding of questions, overall flow of the questions, and ease of moving from one question to the next if branching was used, etc. Revisions were made to the survey based on the findings from the cognitive testing and feedback from NHTSA. The full survey questionnaire is provided in Appendix B.

The final version of the survey was translated into Spanish using a professional translation service so that respondents could choose to take the survey in either English or Spanish. After receiving OMB approval, the final questionnaire was printed in a booklet format, using full color printing for ease of use by respondents. In addition, outbound envelopes, inbound business reply envelopes, postcards, and letterhead were printed.

Survey Administration

The survey approach was based on a recent survey design experiment (Messer & Dillman, 2011), which used Priority Mail and a monetary incentive for respondents in a statewide community survey. Two modes were used for survey completion: mailed paper surveys and electronic web-based surveys. The mail survey was the primary mode; however, participants had the option to complete the survey using either mode. Respondents could choose to take the survey in either English or Spanish. A multi-step approach was used for encouraging participation, consistent with survey standards endorsed by the American Association for Public Opinion Research (AAPOR), which included: mailing an advance letter, mailing the survey packet via Priority Mail, mailing reminder postcards, and mailing additional survey packets. People were given a prepaid reimbursement of $5 for their time and effort given completing the survey.

A total of 2,079 surveys were returned, of which 1,925 respondents (1) agreed to participate, (2) represented good cases, and (3) could be matched with driver records. Respondent demographic and conviction information are shown in Table 2.

Table 2. Demographic and speeding conviction breakouts for survey respondents.

Demographics	N (n = 1925)	Percentage of Responses
Gender		
Female	995	52%
Male	930	48%
Age		
18-24	216	11.2%
25-64	1,359	70.6%
65+	350	18.2%
Speeding convictions *in past 3 years*		
0	952	49.5%
1	374	19.4%
2+	599	31.1%

A non-response analysis was conducted based on the initial study sample and the returned surveys. The analysis indicated that there were large differences in response rate across age groups. The youngest age group had the lowest response rate at 29.7 percent, the oldest group had the highest rate at 75.8 percent, and the middle group were close to the basic overall response rate. In contrast, the response rates varied much less by gender. The average response rate of male drivers was only slightly below that of female drivers (46.9% versus 50.2%). Speeders were less likely to respond. Drivers who had 2 or more speeding convictions had a response rate of 37.8 percent, which was lower than the rate of 47.1 percent for those with one conviction and the rate of 60.1 percent for those with no convictions. Further details of this analysis, along with the determination of the survey weights is provided in Appendix C.

Chapter 3   Driver Characteristics

Introduction

This chapter provides the results from questions in the survey that asked about basic driver characteristics. This chapter begins by providing an aggregated summary of the sample demographics. The second section describes the results of the core set of speeding attitudes, beliefs, and behavior questions included in the survey.

Respondent Demographic Characteristics

This section provides an aggregated summary of the sample demographics. Table 3 shows the total number of respondents in each category, for each demographic question. The category distributions are shown using both the unweighted and population-weighted percentages.

Table 3. Demographic characteristics of survey respondents.

Demographics	N (n = 1925)	Unweighted Percentage	Weighted Percentage
Gender			
Female	995	52%	50.4%
Male	930	48%	49.6%
Age			
18-24	216	11.2%	10.9%
25-64	1,359	70.6%	70.5%
65+	350	18.2%	18.6%
2013 Pre-tax Income			
Did not respond	55	2.9%	3.0%
Less than $5,000	44	2.3%	2.7%
$5,000 to $14,999	113	5.9%	4.9%
$15,000 to $29,999	251	13.0%	12.9%
$30,000 to $49,999	373	19.4%	19.3%
$50,000 to $74,999	350	18.2%	19.0%
$75,000 to $99,999	217	11.3%	12.2%
$100,000 or more	296	15.4%	14.9%
Not sure	49	2.5%	2.2%
Prefer not to answer	177	9.2%	8.9%

Demographics	N (n = 1925)	Unweighted Percentage	Weighted Percentage
Education			
Did not respond	27	1.4%	1.3%
No formal schooling	2	0.1%	0.1%
First through 7th grade	7	0.4%	0.3%
8th grade	11	0.6%	0.7%
Some high school	72	3.7%	3.6%
High school graduate	380	19.7%	21.3%
Some college	767	39.8%	39.2%
Four-year college degree	324	16.8%	17.0%
Some graduate school	88	4.6%	4.4%
Graduate degree	247	12.8%	12.2%
Hispanic or Latino Ethnicity			
Did not respond	43	2.2%	2.2%
Yes	116	6.0%	4.8%
No	1,752	91.0%	92.2%
Don't know	14	0.7%	0.7%
Race			
Did not respond	42	2.2%	2.1%
White	1638	85.1%	85.7%
Other	245	12.7%	12.2%
Employment Status			
Did not respond	30	1.6%	1.5%
Employed full time	1,067	55.4%	52.2%
Employed part time	256	13.3%	13.5%
Unemployed looking for work	50	2.6%	3.0%
Retired	307	15.9%	17.8%
Going to school	45	2.3%	2.4%
Other	170	8.8%	9.7%
Marriage Status			
Did not respond	31	1.6%	1.5%
Married	1,200	62.3%	65.8%
Divorced	213	11.1%	9.5%
Separated	11	0.6%	0.5%
Widowed	60	3.1%	3.3%
Single	401	20.8%	19.0%
Don't know	9	0.5%	0.5%

Demographics	N (n = 1925)	Unweighted Percentage	Weighted Percentage
Metro Status			
Did not respond	42	2.2%	2.1%
Rural	769	39.9%	39.1%
Suburban	643	33.4%	34.0%
Urban	324	16.8%	17.3%
Other	53	2.8%	2.8%
Don't know	94	4.9%	4.8%
Rent or Own Home			
Did not respond	38	2.0%	2.0%
Own	1,342	69.7%	72.4%
Rent	400	20.8%	18.2%
Some other arrangement	137	7.1%	7.3%
Don't know	8	0.4%	0.1%
Speeding convictions *in Past 3 Years*			
0	952	49.5%	84.4%
1	374	19.4%	15.0%
2+	599	31.1%	0.6%

Driver Attitudes, Beliefs, and Behaviors Regarding Speeding

This section describes the results of the core set of speeding attitudes, beliefs, and behavior questions included in the survey. These aspects provide important insights into drivers' underlying motivations for speeding or not speeding, and can provide useful information for developing countermeasures that have a lasting impact on speeding behavior.

Responses are presented by age group (18 to 24, 25 to 64, and 65 to 84), since this factor typically yields differences in driver behaviors and attitudes towards speeding (Stradling, Meadows, & Beatty, 2001; Mercer, 1989).

Figure 1 A-D provides information on driver attitudes and beliefs about driving faster than the posted speed limit, or faster than other traffic. Table 4 provides the percentages for the same response distributions by age category. Question A1 asked drivers whether people should obey the speed limits because it is the law. Figure 1 indicates that there was a high degree of agreement that drivers should obey the speed limit, with 90 percent of all drivers either somewhat or strongly agreeing with this view. Question A2 asked respondents about whether people should keep up with the flow of traffic. As shown in Figure 1 B, there was a similar high level of agreement among drivers, with most drivers agreeing with this statement (89% of all drivers). Younger drivers were also more likely to strongly agree (55% younger versus 43% middle and older). This pattern of responses suggests that there is an inherent tension in the results for questions A1 and A2. In particular, for some drivers, agreement with this question suggests that they may think that speeding is acceptable if other traffic is speeding. The results from Question A3, "there is no excuse to exceed the speed limit," are consistent with this notion. In particular, responses were mostly split between agreement and disagreement with this belief, suggesting that many drivers (especially in younger and middle age groups) believe that speeding may be acceptable in certain situations. Specifically, 50 percent of younger drivers, and 46 percent of drivers in the middle age group either somewhat or strongly disagreed with this view, compared to 26 percent of older drivers.

Question A4 provides initial insight about why some drivers may think it is acceptable to speed. Although most respondents disagree with the statement "driving over the speed limit is not dangerous for skilled drivers," a small set of drivers comprised of all age groups responded that they "Somewhat Agree" that driving over the speed limit is not dangerous for skilled drivers. In contrast, older drivers were more likely to strongly disagree with this statement (57% older, 40% middle, and 36% younger). Overall, the results of these four questions seem to indicate that some drivers are open to speeding in certain situations, while most respondents believe in keeping within the posted speed limit.
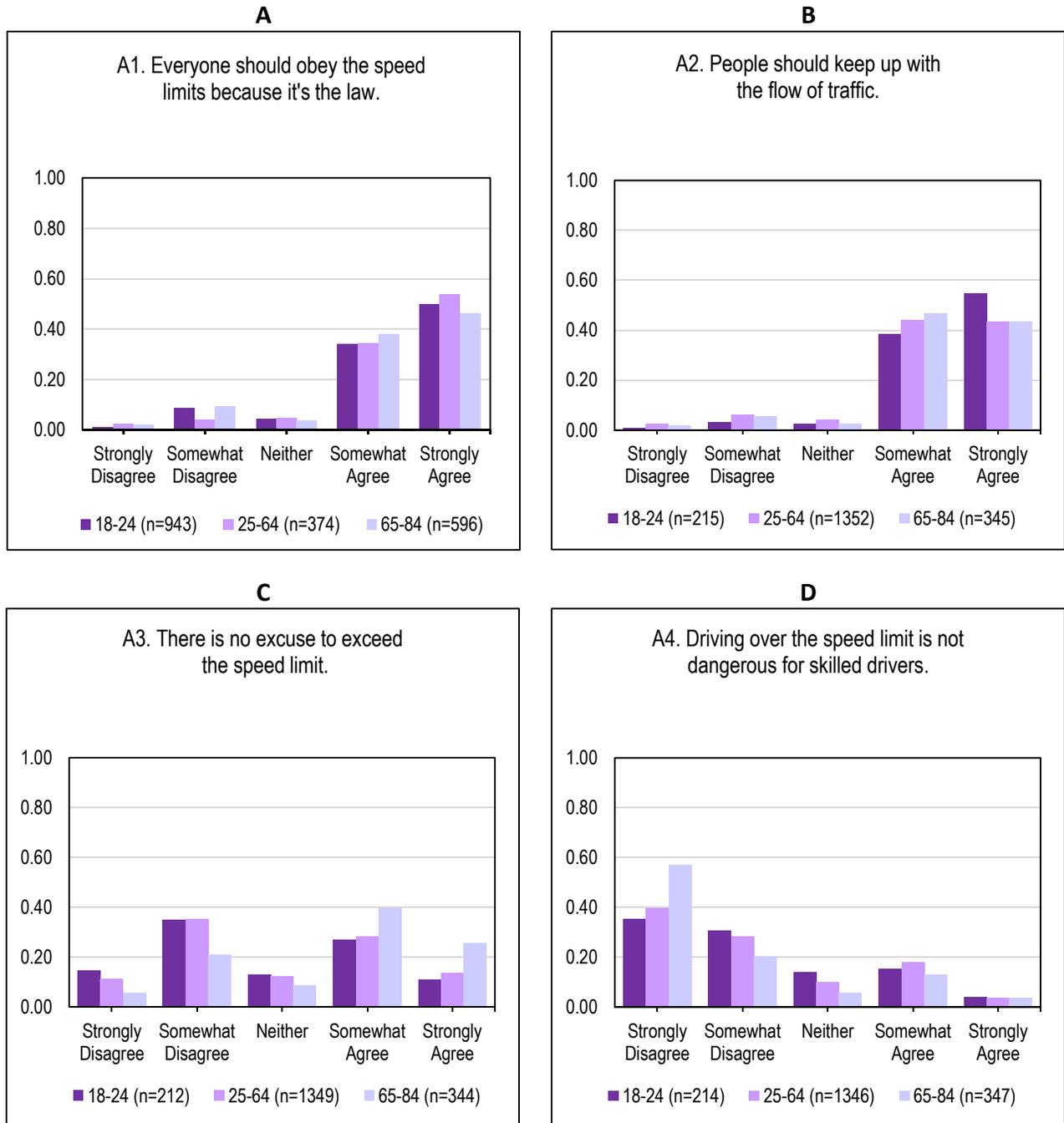
Figure 1. Attitudes and beliefs on obeying the speed limit (A), keeping up with traffic (B), exceeding the speed limit (C), and speeding of skilled drivers (D) by age group.

Table 4. Percentage of driver responses in each category by age group for questions A1, A2, A3, and A4.

	Strongly Disagree	Somewhat Disagree	Neither	Somewhat Agree	Strongly Agree
A1. Everyone should obey the speed limits because it's the law.					
18-24 (n=943)	1%	9%	5%	34%	50%
25-64 (n=374)	2%	4%	5%	34%	54%
65-84 (n=596)	2%	9%	4%	38%	46%
A2. People should keep up with the flow of traffic.					
18-24 (n=215)	1%	3%	2%	39%	55%
25-64 (n=1,352)	3%	6%	4%	44%	43%
65-84 (n=345)	2%	6%	3%	47%	43%
A3. There is no excuse to exceed the speed limit.					
18-24 (n=212)	15%	35%	13%	27%	11%
25-64 (n=1,349)	11%	35%	12%	28%	13%
65-84 (n=344)	6%	21%	8%	40%	26%
A4. Driving over the speed limit is not dangerous for skilled drivers.					
18-24 (n=214)	36%	31%	14%	15%	4%
25-64 (n=1,346)	40%	28%	10%	18%	4%
65-84 (n=347)	57%	20%	6%	13%	4%

Figure 2 A-D provides information on driver's attitudes and feelings about driving fast, or being prevented from doing so (note that the questions are reordered to facilitate discussion). Table 5 provides the percentages for the same response distributions by age category. Question A5 shows a high degree of agreement among drivers about feeling impatient when they are stuck behind slower drivers. Young drivers had a greater proportion strongly agreeing with this (31% for younger, versus 16% middle and 10% older). However, it is unclear from the survey item if this refers to other drivers going slower than the speed limit, or slower than the speed the survey respondent would like to be driving. Question A8 is similar to A5, but in general, when asked about driving near or at the speed limit, most respondents indicated that staying at the speed limit did not annoy them. Only a small number of younger drivers somewhat or strongly agreed that they found it annoying (17% younger versus 11% middle and 9% older), although there was a general trend of younger driver responses generally shifted towards the more aggressive end of this scale.

The other two questions probe some of the reasons drivers may have for speeding. Question A6 asked if drivers enjoyed the feeling of driving fast. In this case, older drivers tended to strongly disagree more (42% older, 24% middle, and 13% younger), while younger and middle age group drivers tended to indicate a neutral opinion, or some agreement. The responses for question A7 about "trying to get where I'm going as fast as I can" yielded a pattern similar to the previous question. In particular, older drivers were more likely to strongly disagree (40% older, 27% middle, and 16% younger), but otherwise, responses were generally evenly distributed across age groups, with younger driver responses trending towards the more aggressive end.

In terms of attitudes, older drivers appear to be more accepting of staying within the speed limit, but there is also a wide range of attitudes across age groups. An exception to this is when respondents are stuck behind a slower driver, which leads to most respondents becoming impatient.

The questions shown in Figure 2 illustrate some of the complexity in the underlying driver motivations. Some drivers enjoy the feeling of going fast, and for others driving helps them get to their destination sooner. There may also be an underlying aspect of being in control of one's speed choice. In particular, more drivers responded feeling impatient about being stuck behind slower drivers than they did about feeling annoyed by traveling at or near the speed limit.
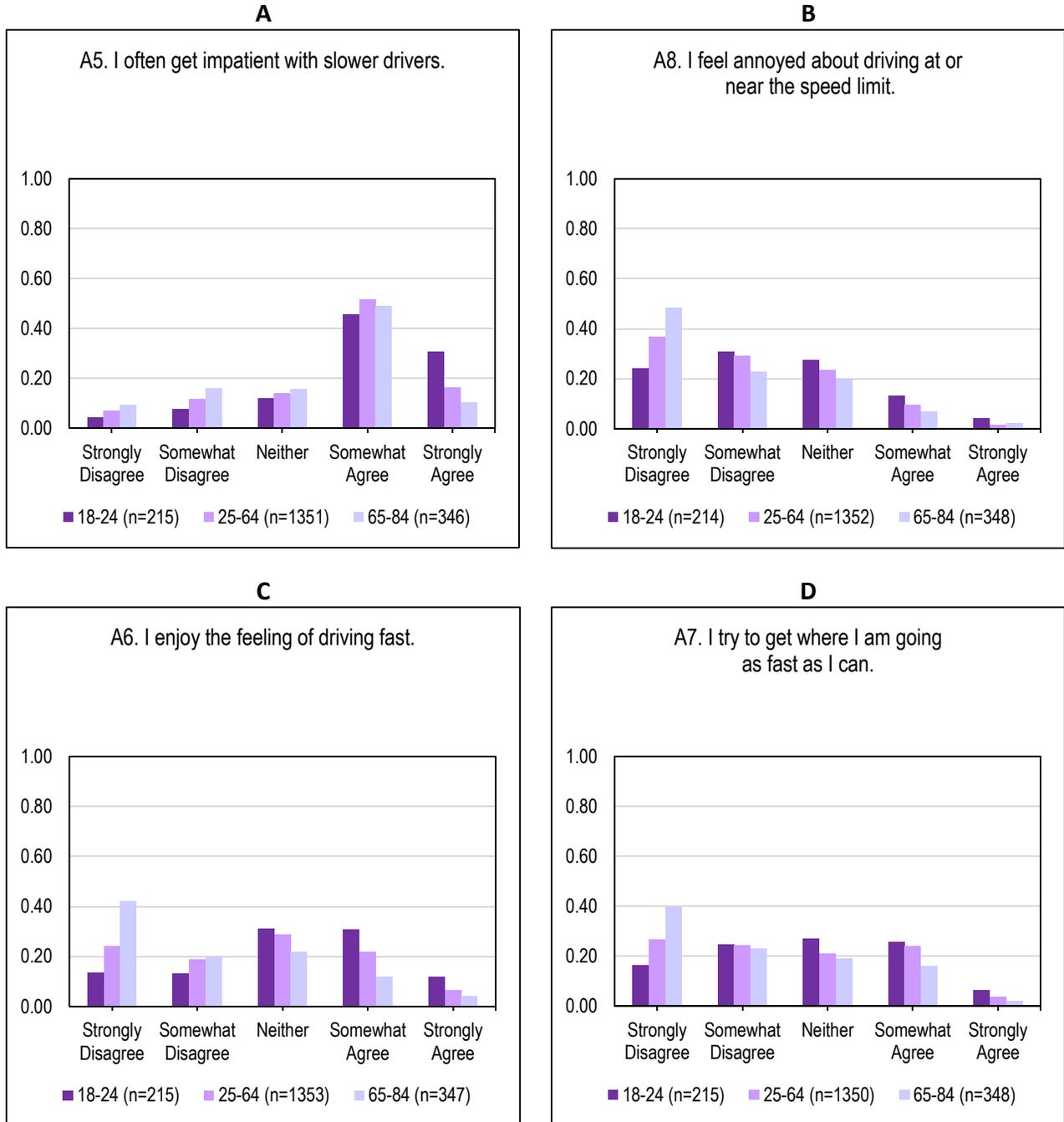
Figure 2. Attitudes and feelings about slower drivers (A), driving near the speed limit (B), driving fast (C), and efficiency of getting to a destination (D) by age group.

Table 5. Percentage of driver responses in each category by age group for questions A5, A8, A6, and A7.

	Strongly Disagree	Somewhat Disagree	Neither	Somewhat Agree	Strongly Agree
A5. I often get impatient with slower drivers.					
18-24 (n=215)	4%	7%	12%	46%	31%
25-64 (n=1,351)	7%	12%	14%	51%	16%
65-84 (n=346)	9%	16%	16%	49%	10%
A8. I feel annoyed about driving at or near the speed limit.					
18-24 (n=214)	24%	31%	28%	13%	4%
25-64 (n=1,352)	37%	29%	23%	9%	1%
65-84 (n=348)	48%	23%	20%	7%	2%
A6. I enjoy the feeling of driving fast.					
18-24 (n=215)	13%	13%	31%	31%	12%
25-64 (n=1,353)	24%	19%	29%	22%	6%
65-84 (n=347)	42%	20%	22%	12%	4%
A7. I try to get where I am going as fast as I can.					
18-24 (n=215)	16%	25%	27%	26%	7%
25-64 (n=1,350)	27%	25%	21%	24%	4%
65-84 (n=348)	40%	23%	19%	16%	2%

Figure 3 A-D provides information on driver's attitudes and beliefs about the benefits of not speeding (note that the questions are reordered to facilitate discussion). Table 6 provides the percentages for the same response distributions by age category. Question A9 shows a high level of agreement among all drivers that driving within or near the speed limit reduces the chance of being in an accident, with older drivers being more likely to strongly agree with this belief (53% older, 43% middle, and 41% younger). Question A12 provides some insight as to why this may be so. Specifically, that staying within the speed limit helps drivers feel more in control of their vehicles. The results of this question are similar to those of Question A9; however, younger and middle age group drivers are a little less likely to strongly agree that driving near the speed limit helps them feel in control (47% older, 33% middle, and 26% younger). The number of neutral responses is also greater for Question A12 compared to Question A9.

Question A10 shows that one benefit of not speeding that many drivers agree with is that it helps them feel more relaxed while driving. Older drivers particularly tended to strongly agree (32% older, 23% middle, and 18% younger), while younger and middle age group drivers tended to indicate a more neutral opinion, or to somewhat agree with this statement. Similarly, the results of Question A11 show that more older drivers strongly disagreed that driving near or within the speed limit made them feel bored (45% older, 29% middle, and 18% younger). Younger and middle age group drivers tended to indicate a neutral opinion, or some disagreement in response to this question, with younger drivers the most likely to strongly agree (7% younger versus 2% middle, and 1% older). In terms of attitudes and beliefs about the benefits of not speeding, most drivers see value in not speeding, particularly in terms of safety and reduced stress when driving.

However, there are also clear age differences, with younger drivers being less likely to agree with these views.
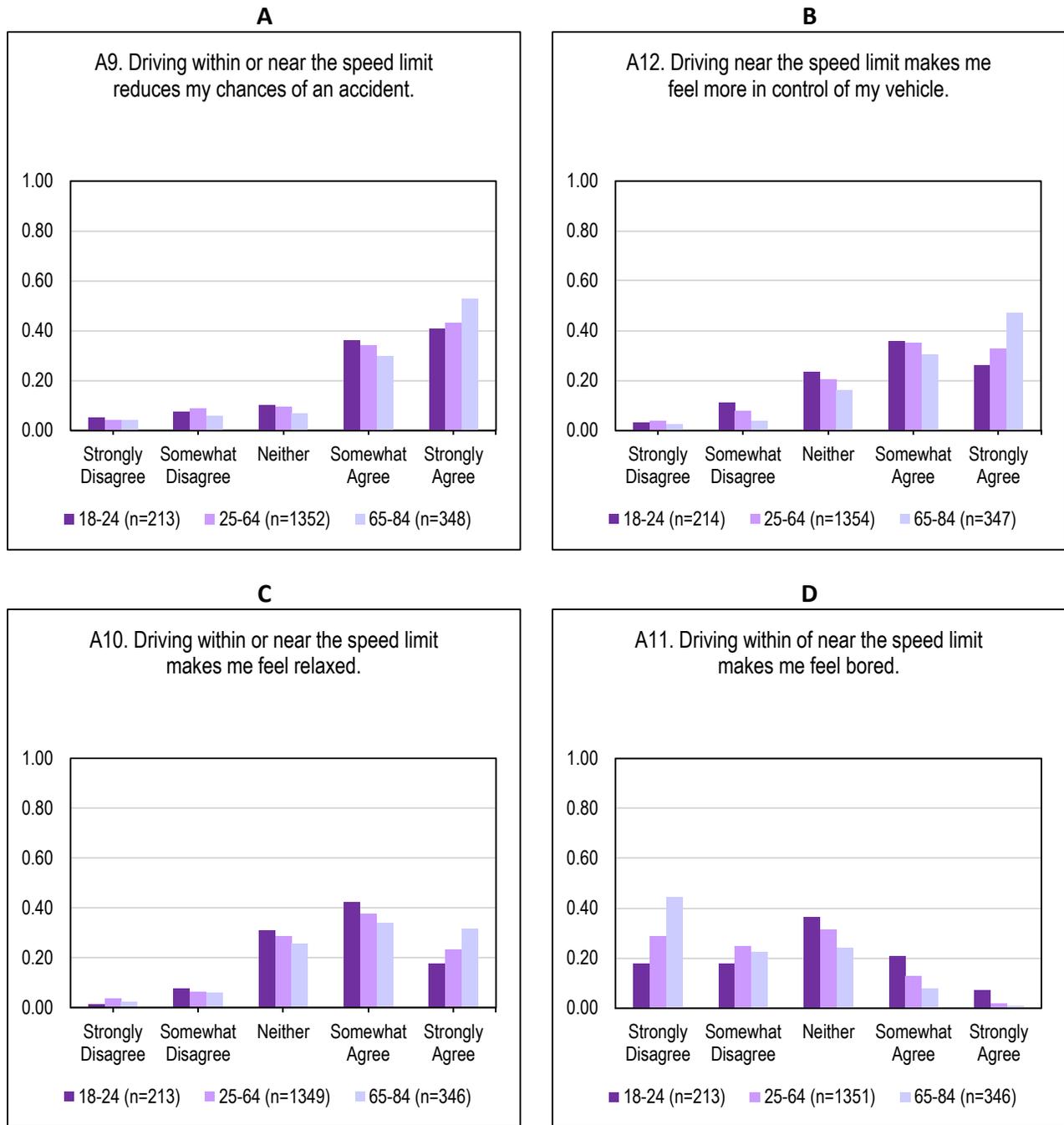
Figure 3. Attitudes and beliefs about chances of an accident when not speeding (A), feeling more in control when not speeding (B), feeling more relaxed when not speeding (C), and feeling bored when not speeding (D) by age group.

Table 6. Percentage of driver responses in each category by age group for questions A9, A12, A10, and A11.

	Strongly Disagree	Somewhat Disagree	Neither	Somewhat Agree	Strongly Agree
A9. Driving within or near the speed limit reduces my chances of an accident.					
18-24 (n=213)	5%	8%	10%	36%	41%
25-64 (n=1,352)	4%	9%	10%	34%	43%
65-84 (n=348)	4%	6%	7%	30%	53%
A12. Driving near the speed limit makes me feel more in control of my vehicle.					
18-24 (n=214)	3%	11%	23%	36%	26%
25-64 (n=1,354)	4%	8%	21%	35%	33%
65-84 (n=347)	3%	4%	16%	31%	47%
A10. Driving within or near the speed limit makes me feel relaxed.					
18-24 (n=213)	1%	8%	31%	42%	18%
25-64 (n=1,349)	4%	7%	29%	38%	23%
65-84 (n=346)	2%	6%	26%	34%	32%
A11. Driving within or near the speed limit makes me feel bored.					
18-24 (n=213)	18%	18%	37%	21%	7%
25-64 (n=1,351)	29%	25%	31%	13%	2%
65-84 (n=346)	45%	23%	24%	8%	1%

Figure 4 addresses driver intentions with regard to not speeding. Table 7 provides the percentages for the same response distributions by age category. This represents a high-level self-appraisal that is intended to capture the culmination of a variety of factors (e.g., beliefs, past experiences, attitudes, norms) that contribute to speeding behavior (e.g., Ajzen, 1985). The results of Question A45 show clear age differences. Specifically, most older drivers indicate wanting to avoid speeding "quite a bit" (38%) and "extremely so" (53%), with the modal response occurring at the most conservative option. The mode for younger drivers and middle-age drivers occurs at the "quite a bit" response (39% younger, 42% middle), but younger driver responses are generally shifted more towards the aggressive end of this scale relative to the other groups. Specifically, higher proportions of younger drivers report wanting to avoid speeding a "little" or "moderately so" than middle and older age drivers (38% younger versus 19% middle and 9% older).

Figure 5 A-B provides information about the respondents' general driving tendencies relative to other vehicles on the road. Table 8 and Table 9 provide the percentages for the same response distributions by age category. These are two key questions frequently used to assess speeding behavior (e.g., NSSAB). Question A13 indicates that most drivers tend to indicate a mix between (1) other cars passing them more than they pass other cars, and (2) passing other cars more than other cars passing them. There is a distinct demographic difference, with younger drivers indicating the greatest tendency for passing others more and older drivers indicating the least tendency to do so (32% younger, 17% middle, 8% older).

Although Question A14 is conceptually similar to Question A13 in that it addresses actions relative to other traffic, the results are noticeably different. In particular, most drivers indicated that they prefer to keep up with faster traffic, or keep with faster or slower traffic about equally. The primary difference between the results of Question A13 and A14 is the increased reluctance to report staying with slower traffic compared to keeping up with faster traffic. Again, there is a demographic difference for the results, with older drivers being the least likely to keep up with faster traffic (51% younger, 41% middle, 22% older), and most likely to stay with slower moving traffic (4% younger, 10% middle, 19% older). Younger drivers were much more likely to report keeping up with faster traffic.

Overall, many drivers responded in the middle with some responding on either end of the scale for both questions. The results of these questions are similar to those for Question A5, in which drivers indicated feeling impatient when they are stuck behind slower drivers. Younger drivers were more likely to indicate this feeling of impatience, which relates to the results shown for Questions A13 and A14.
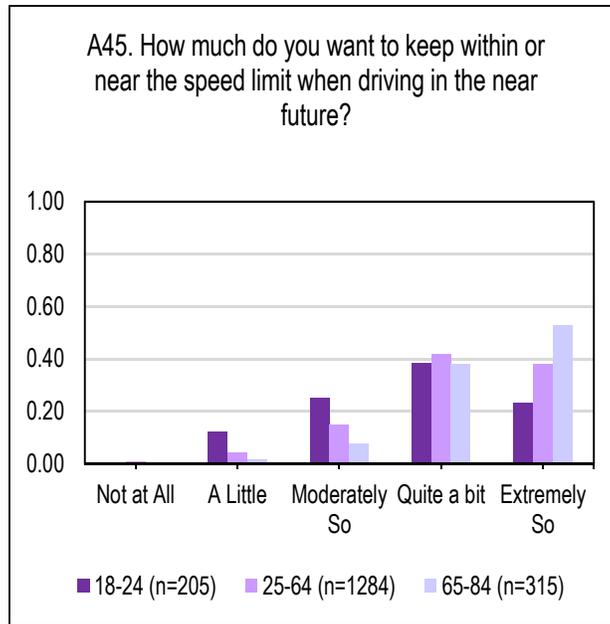
Figure 4. Intentions to not speed on the near future by age group.
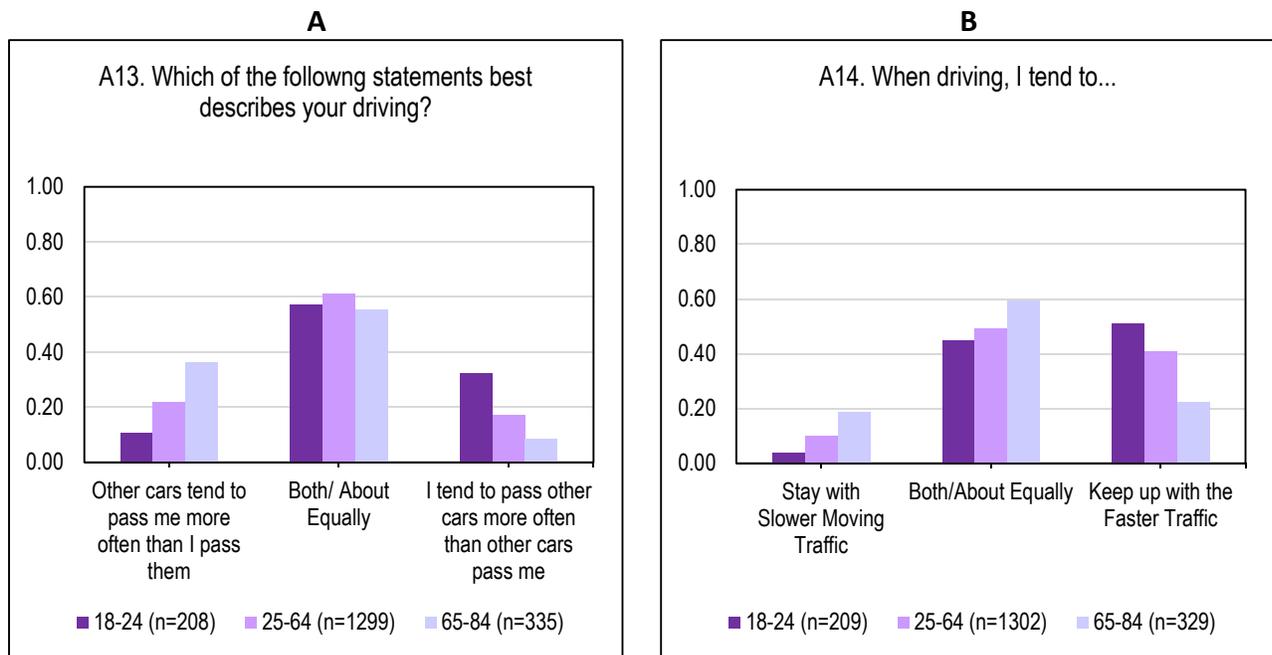
Figure 5. General driving tendencies for passing behavior (A), staying with faster or slower traffic (B), and miles driving in a week (C) by age group.

Table 7. Percentage of driver responses in each category by age group for question A45.

	Not at all	A little	Moderately so	Quite a bit	Extremely so
A45. How much do you want to keep within or near the speed limit while driving in the <u>near future</u>?					
18-24 (n=205)	0%	12%	25%	39%	23%
25-64 (n=1,284)	1%	4%	15%	42%	38%
65-84 (n=315)	0%	2%	8%	38%	53%

Table 8. Percentage of driver responses in each category by age group for question A13.

	Other cars tend to pass me more often than I pass them	Both/ about equally	I tend to pass other cars more often than other cars pass me
A13. Which of the following statements best describes your driving?			
18-24 (n=208)	11%	57%	32%
25-64 (n=1,299)	22%	61%	17%
65-84 (n=335)	36%	55%	8%

Table 9. Percentage of driver responses in each category by age group for question A14.

	Stay with slower moving traffic	Both/about equally	Keep up with the faster traffic
A14. When driving, I tend to . . .			
18-24 (n=209)	4%	45%	51%
25-64 (n=1,302)	10%	49%	41%
65-84 (n=329)	19%	59%	22%

Figure 6 A-C provides information about drivers' self-reported frequency of speeding on various types of high-speed roads (multi-lane divided highways, interstate freeways, and two-lane highways). Table 10 provides the percentages for the same response distributions by age category. In general, there is a similar pattern across the three roadway types, indicating consistency with respondent ratings, or that respondents may not have clearly distinguished the roadways as having different driving conditions. Specifically, most drivers reported never or rarely driving at these speeds; however, this behavior was slightly more common among younger drivers. Overall, only a small proportion of drivers reported exceeding the indicated speed in each scenario often or sometimes.

Question A15 shows responses for a multi-lane divided highway. Older drivers tended to respond "Never" most often (56% older, 48% middle, 37% younger), while younger drivers were more likely to indicate that they sometimes drive 15 mph over the speed limit on these roadways (15% younger, 10% middle, 8% older). The response pattern on Question A16 was very similar, with a greater proportion of responses in the "Never" category being the primary difference. The same differences across age group were also apparent.

Question A17 again, shows most drivers indicating that they never drive 15 mph over the speed limit on two-lane highways in rural areas, with some drivers indicating that they rarely do so. In particular, a small number of younger drivers indicated that they sometimes or often drive 15 mph over the speed limit on these roadways (18% younger, 9% middle, 7% older).

Questions A15 and A17 were identical to speeding questions in the NSSAB. However, the pattern of responses in the current survey is shifted more towards the non-speeding end. This could reflect regional differences in speeding behavior. In particular, the NSSAB also found that respondents from Region 10, which includes Idaho and other North Western states, were less likely to speed than in most other regions.

A

A15. How often would you say you drive 15 miles an hour over the speed limit on multi-lane divided highways?

■ 18-24 (n=212)   ■ 25-64 (1335)   ■ 65-84 (n=343)

B

A16. How often would you say you drive 15 miles an hour over the speed limit on multi-lane, interstate freeways through major towns or cities?

■ 18-24 (n=212)   ■ 25-64 (n=1334)   ■ 65-84 (n=342)

C

A17. How often would you say you drive 15 miles an hour over the speed limit on two-lane highways, one lane in each direction in rural areas?

■ 18-24 (n=212)   ■ 25-64 (n=1337)   ■ 65-84 (n=338)

Figure 6. Self-reported frequency of driving 15 mph over the speed limit on various types of roads by age group.

Table 10. Percentage of driver responses in each category by age group for questions A15, A16, and A17.

|	Often	Sometimes	Rarely	Never	Don't know
A15. How often would you say you drive 15 miles an hour over the speed limit on multi-lane divided highways?					
18-24 (n=212)	3%	15%	44%	37%	0%
25-64 (n=1,335)	1%	10%	40%	48%	0%
65-84 (n=343)	1%	8%	35%	56%	0%
A16. How often would you say you drive 15 miles an hour over the speed limit on multi-lane, interstate freeways through major towns or cities?					
18-24 (n=212)	3%	9%	37%	51%	0%
25-64 (n=1,334)	1%	8%	31%	60%	0%
65-84 (n=342)	0%	4%	28%	68%	0%
A17. How often would you say you drive 15 miles an hour over the speed limit on two-lane highways, one lane in each direction in rural areas?					
18-24 (n=212)	3%	15%	28%	54%	0%
25-64 (n=1,337)	1%	8%	32%	58%	0%
65-84 (n=338)	0%	4%	26%	70%	0%

Figure 7 A-C also provides information about drivers' self-reported frequency of fast driving for various types of roadways that have lower speed limits than the roadways in Figure 6. Table 11 provides the percentages for the same response distributions by age category. On the roadways in Figure 7, the speed exceedance threshold is 10 mph above the posted speed limit, rather than 15 mph above. Question A18 shows a mix of responses when drivers were asked about speeding exceeding 10 mph above on rural country areas. Older drivers tended to indicate that they rarely or never drive 10 mph over the speed limit in rural country areas, whereas younger drivers indicated often or sometimes driving 10 mph over the speed limit. Note that the distribution of responses in Question A18 is notably different from similar questions in the previous figure. Specifically, drivers were much more likely to respond as engaging in this speed behavior on rural roads than on other types of roadways. This could reflect that drivers do indeed go faster on rural roadways possibly due to greater distances to cover in rural area drives. However, it is also possible that drivers view rural country roads in the same way as they view the higher-speed roadways, in which case the 10 mph threshold is seen as being more acceptable and more drivers are willing to drive that fast in this scenario (i.e., the higher speed roads in the previous question set had a threshold of 15 mph above).

Question A19 indicates that most drivers reported never driving 10 mph over the speed limit on a neighborhood or residential streets, with older drivers reporting this most often (75% older, 66% middle, 69% younger). This is an expected finding given the high prevalence of vulnerable road users on this type of roadway.

Responses for Question A20 are more evenly split between the rarely and never options with regard to driving 10 mph over the speed limit on main roads in towns. A similar age pattern is again evident, with younger drivers the most likely to indicate driving 10 mph over at least sometimes or often (27% younger, 16% middle, 8% older), and older drivers more likely to never engage in this behavior (56% older, 46% middle, 40% younger).

Overall, the type of road seemed to have an influence on drivers' willingness to exceed the posted speed limit. Across the three road types asked about in Questions A18-A20, older drivers tended to indicate never driving 10 mph over the speed limit. Younger drivers were more likely to indicate driving fast sometimes or often on rural country roads, and sometimes on main roads in towns.

A

A18. How often would you say you drive 10 miles an hour over the speed limit in rural country areas?

B

A19. How often would you say you drive 10 miles an hour over the speed limit on a neighborhood or residental streets?

C

A20. How often would you say you drive 10 miles an hour over the speed limit on main roads in towns that have two lanes in each direction?

Figure 7. Self-reported frequency of driving 10 mph over the speed limit on various types of roads by age group.

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Table 11. Percentage of driver responses in each category by age group for questions A18, A19, and A20.

	Often	Sometimes	Rarely	Never	Don't know
A18. How often would you say you drive 10 miles an hour over the speed limit on rural country roads?					
18-24 (n=211)	*16%*	*42%*	*23%*	*19%*	*0%*
25-64 (n=1,328)	*8%*	*31%*	*34%*	*26%*	*0%*
65-84 (n=338)	*1%*	*19%*	*36%*	*44%*	*0%*
A19. How often would you say you drive 10 miles an hour over the speed limit on neighborhood or residential streets?					
18-24 (n=212)	*3%*	*9%*	*19%*	*69%*	*0%*
25-64 (n=1,339)	*1%*	*6%*	*27%*	*66%*	*0%*
65-84 (n=342)	*1%*	*2%*	*22%*	*75%*	*0%*
A20. How often would you say you drive 10 miles an hour over the speed limit on main roads in town that have two lanes in each direction?					
18-24 (n=212)	*3%*	*24%*	*33%*	*40%*	*0%*
25-64 (n=1,336)	*1%*	*15%*	*37%*	*46%*	*0%*
65-84 (n=341)	*1%*	*7%*	*36%*	*56%*	*0%*

Figure 8 A-D provides information about drivers' likelihood of speeding in various driving-related scenarios (note that the questions are presented out of order to facilitate discussion). Table 12 provides the percentages for the same response distributions by age category. Questions A27 and A29 involved factors that might make it less likely to avoid speeding. In particular, Question A27 asked how likely respondents would be to keep within or near the speed limit when driving a fast/powerful car. A small majority of respondents indicated that they were very likely or somewhat likely to do so; however, responses are relatively spread across the categories.

The response pattern in Question A29 is similar to that in Question A27. Specifically, many drivers indicated that they were somewhat likely or very likely to drive within or near the speed limit when driving on long straight roads. Younger drivers tended to indicate being somewhat and very unlikely to keep to the speed limit on long straight roads compared to middle age and older drivers (35% younger, 20% middle, 15% older).

Questions A28 and A30 asked about speeding in scenarios in which speeding is clearly discouraged. In both these questions, responses are shifted towards the conservative end of the scale relative to the previous two questions. In particular, most drivers indicated that they were somewhat likely or very likely to drive within or near the speed limit when driving on roads where the speed limit is clearly signed. Younger drivers generally reported being slightly less likely to do this than the older groups (78% younger, 84% middle, 84% older).

When asked about driving within or near the speed limit in traffic calmed areas (e.g., with small roundabouts, speed bumps, or special warning signs, etc.), in Question A30, most drivers indicated that they were very likely to drive within or near the speed limit when in this scenario,

with a small number of younger and middle age drmiddle-age drivers indicating they were somewhat likely to drive within or near the speed limit in this scenario (24% younger, 21% middle, 12% older). However, the age differences were relatively minor for this question.

A

A27. When driving in the near future, how likely/unlikely is it that you would drive within or near the speed limit when driving in a fast/powerful car?

18-24 (n=213) 25-64 (n=1338) 65-84 (n=338)

B

A29. When driving in the near future, how likely/unlikely is it that you would drive within or near the speed limit when driving on long straight roads?

18-24 (n=214) 25-64 (n=1341) 65-84 (n=336)

C

A28. When driving in the near future, how likely/unlikely is it that you would drive within or near the speed limit when driving when the speed limit is clearly signed?

18-24 (n=213) 25-64 (n=1338) 65-84 (n=337)

D

A30. When driving in the near future, how likely/unlikely is it that you would driving within or near the speed limit when driving in traffic calmed areas?

18-24 (n=214) 25-64 (n=1339) 65-84 (n=335)

Figure 8. Likeliness to speed when driving a fast car (A), when the speed limit is clearly signed (B), on long straight roads (C), and in traffic calmed areas (D) by age group.

Table 12. Percentage of driver responses in each category by age group for questions A27, A29, A28 and A30.

	Very unlikely	Somewhat unlikely	Neither	Somewhat likely	Very likely
A27. How likely/unlikely to drive within or near the speed limit when…driving in a fast/powerful car?					
18-24 (n=213)	12%	20%	11%	38%	19%
25-64 (n=1,338)	10%	13%	11%	29%	37%
65-84 (n=338)	19%	9%	11%	20%	41%
A29. How likely/unlikely to drive within or near the speed limit when…driving on long straight roads?					
18-24 (n=214)	8%	26%	10%	34%	21%
25-64 (n=1,341)	4%	15%	5%	39%	36%
65-84 (n=336)	6%	7%	4%	38%	44%
A28. How likely/unlikely to drive within or near the speed limit when…driving when the speed limit is clearly signed?					
18-24 (n=213)	2%	9%	10%	33%	45%
25-64 (n=1,338)	3%	6%	7%	27%	57%
65-84 (n=337)	6%	5%	5%	23%	61%
A30. How likely/unlikely to drive within or near the speed limit when…driving in traffic calmed areas?					
18-24 (n=214)	6%	6%	8%	24%	56%
25-64 (n=1,339)	6%	6%	5%	21%	62%
65-84 (n=335)	10%	9%	8%	12%	61%

Figure 9 A-C provides information on the frequency with which drivers exhibit various driving behaviors that reflect some of the more emotional aspects of driving (note that the questions are presented out of order to facilitate discussion). Table 13 provides the percentages for the same response distributions by age category. The results of Question A35 show that most drivers report never getting involved in "races" with other drivers on a roadway, or from a stoplight. Only a small proportion of drivers reported doing this at all (i.e., at least "Hardly ever"), a group which even includes a small fraction of older drivers (25% younger, 13% middle, 7% older). Overall, younger drivers were more likely to engage in racing behavior, with a tiny proportion of young drivers even reporting racing other drivers "Quite Often" (i.e., 1%).

The results of Question A40, which asks drivers about how often they take risks for fun while driving, shows a similar pattern to Question A35. Specifically, while over three quarters of drivers do not engage in this form of driving, a small fraction does. There is also an age-related trend evident. Specifically, older respondents report taking risks for fun much less often than the other groups, and younger drivers were more likely to report driving like this with a frequency of "Occasionally" or higher (10% younger, 4% middle, 3% older).

Question A39 asked respondents about driving to reduce stress or tension. The basic pattern of the response is generally similar to the previous two questions; however, since a greater proportion of drivers engaged in this behavior overall, the responses are shifted towards the more frequent end of the scale. There is also a pronounced age-related trend. Specifically, although

older drivers mostly avoided this behavior, more than half of young drivers reported driving to reduce stress or tension at least "Hardly Ever" or more often. The middle age group fell in between these two groups (60% younger, 38% middle, 21% older).

A

B

C
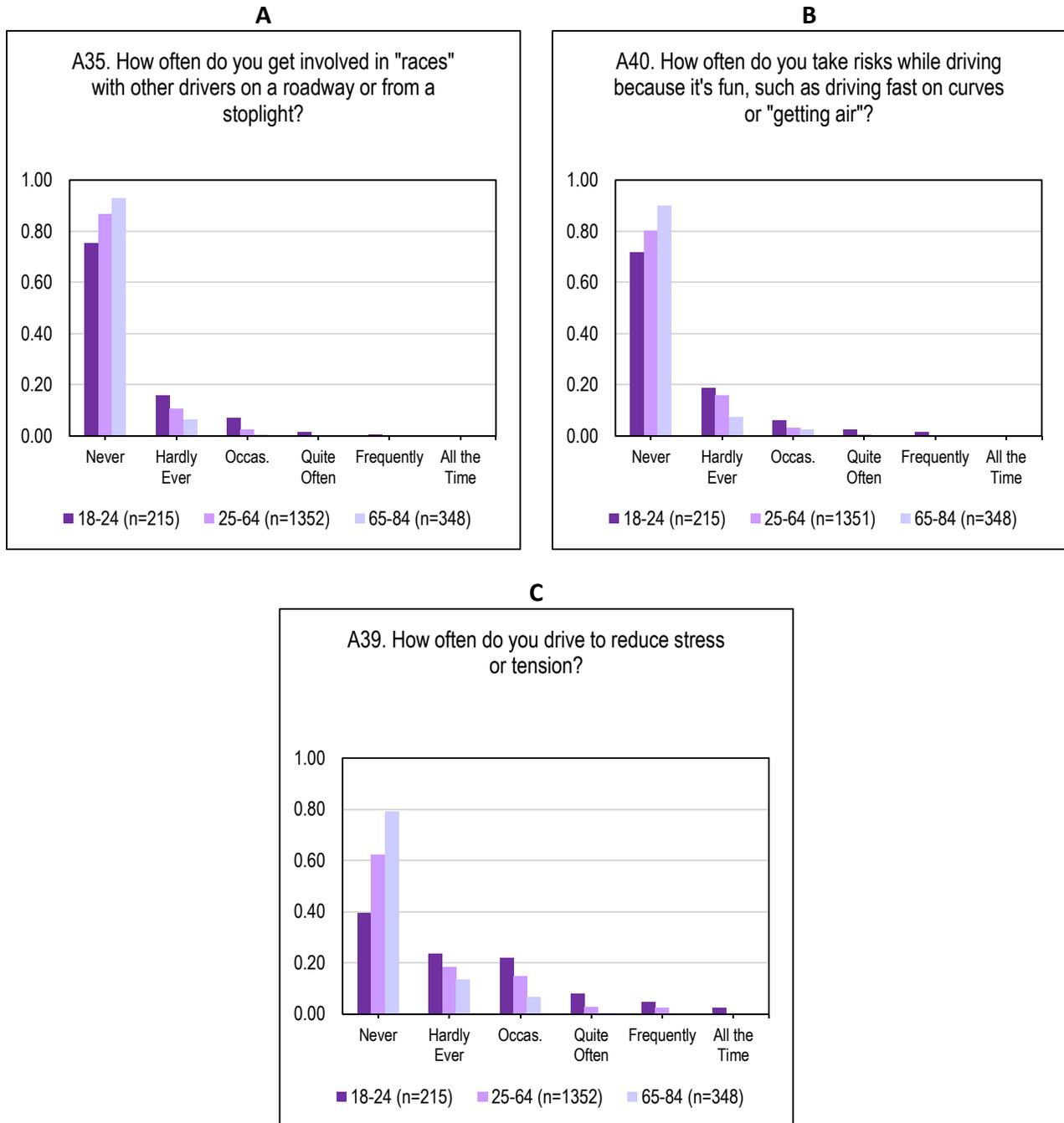
Figure 9. Frequency of racing with other drivers (A), taking risks because it's fun (B), and driving to relieve stress (C) by age group.

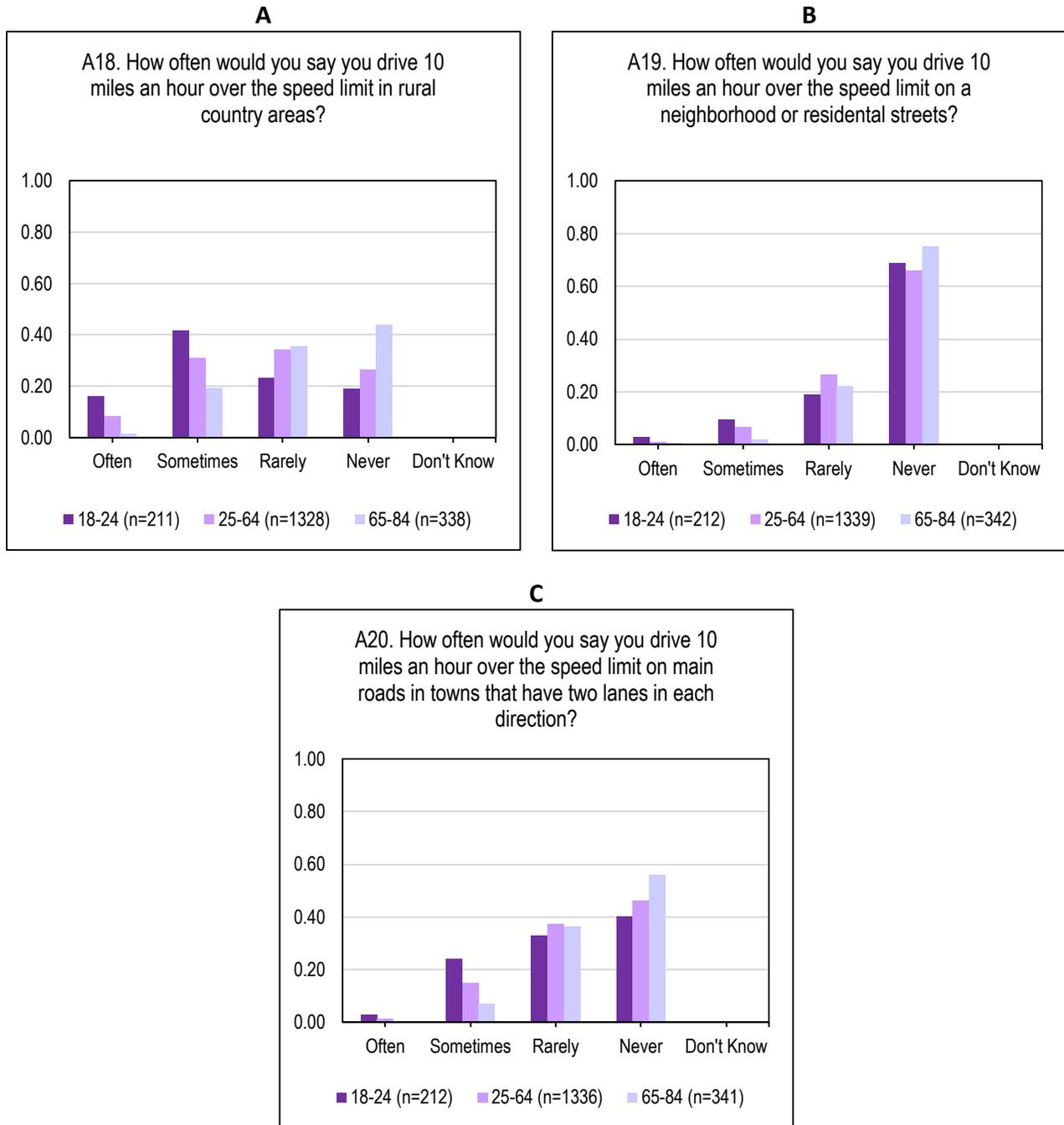**Table 13. Percentage of driver responses in each category by Age group for questions A35, A40, and A39.**

	Never	Hardly ever	Occasionally	Quite often	Frequently	All the time
A35. How often do you get involved in "races" with other drivers on a roadway or from a stop light?						
18-24 (n=215)	75%	16%	7%	1%	0%	0%
25-64 (n=1,352)	87%	11%	2%	0%	0%	0%
65-84 (n=348)	93%	6%	1%	0%	0%	0%
A40. How often do you take risks while driving because it's fun, such as driving fast on curves or "getting air"?						
18-24 (n=215)	72%	19%	6%	2%	1%	0%
25-64 (n=1,351)	80%	16%	3%	1%	0%	0%
65-84 (n=348)	90%	7%	3%	0%	0%	0%
A39. How often do you drive to reduce stress or tension?						
18-24 (n=215)	40%	24%	22%	8%	5%	0%
25-64 (n=1,352)	62%	18%	15%	3%	2%	0%
65-84 (n=348)	79%	14%	7%	1%	0%	0%

Figure 10 A-D provides information on the frequency with which drivers engage in driving behaviors that are on the aggressive end of the behavior spectrum, and there is conceptual overlap with the questions in the previous figure (note that the questions are presented out of order to facilitate discussion). Table 14 provides the percentages for the same response distributions by age category. Question A37 asked drivers how often they tailgated slower drivers to signal them to get out of their way. Although this was a generally uncommon behavior especially among older drivers, there was still a small proportion of younger and middle age drivers that reported doing this at least occasionally or more (31% younger, 23% middle, 10% older).

Question 41 also dealt with aggressive driving behavior related to driving over 20 mph above the posted speed limit. In general, most respondents reported never or hardly ever doing this, with a small fraction from all age groups speeding 20 mph over the speed limit at least occasionally.

Question A36 asked respondents how often they become impatient with a slow driver in the fast lane, and then end up passing them on the right. Respondents reported engaging in this action more frequently than the other actions described in this set of questions. The modal response for younger and middle-age drivers was "Occasionally," with younger drivers more likely to report passing on the right at even higher frequencies. Older drivers were the least likely to do this, although a moderate proportion of them reported passing on the right at least "Occasionally" (72% younger, 58% middle, 35% older) This behavior is not as aggressive an action as the prior two questions, which probably explains why more drivers engage in this behavior overall.

Question A34 shows many drivers indicating that they never or hardly ever disregard the speed limits when driving at night or early in the morning. The distribution of responses is similar to those in question A36 about passing on the right; however, more of the responses were concentrated in the "Hardly ever" option. There was also an age-related trend. Specifically,

younger drivers were more likely to indicate that they disregard the speed limits at night or early in the morning at least occasionally or more, as compared to middle age and older drivers (53% younger, 33% middle, 17% older). Older drivers' responses were also shifted more towards the conservative end of the response spectrum relative to the other groups.
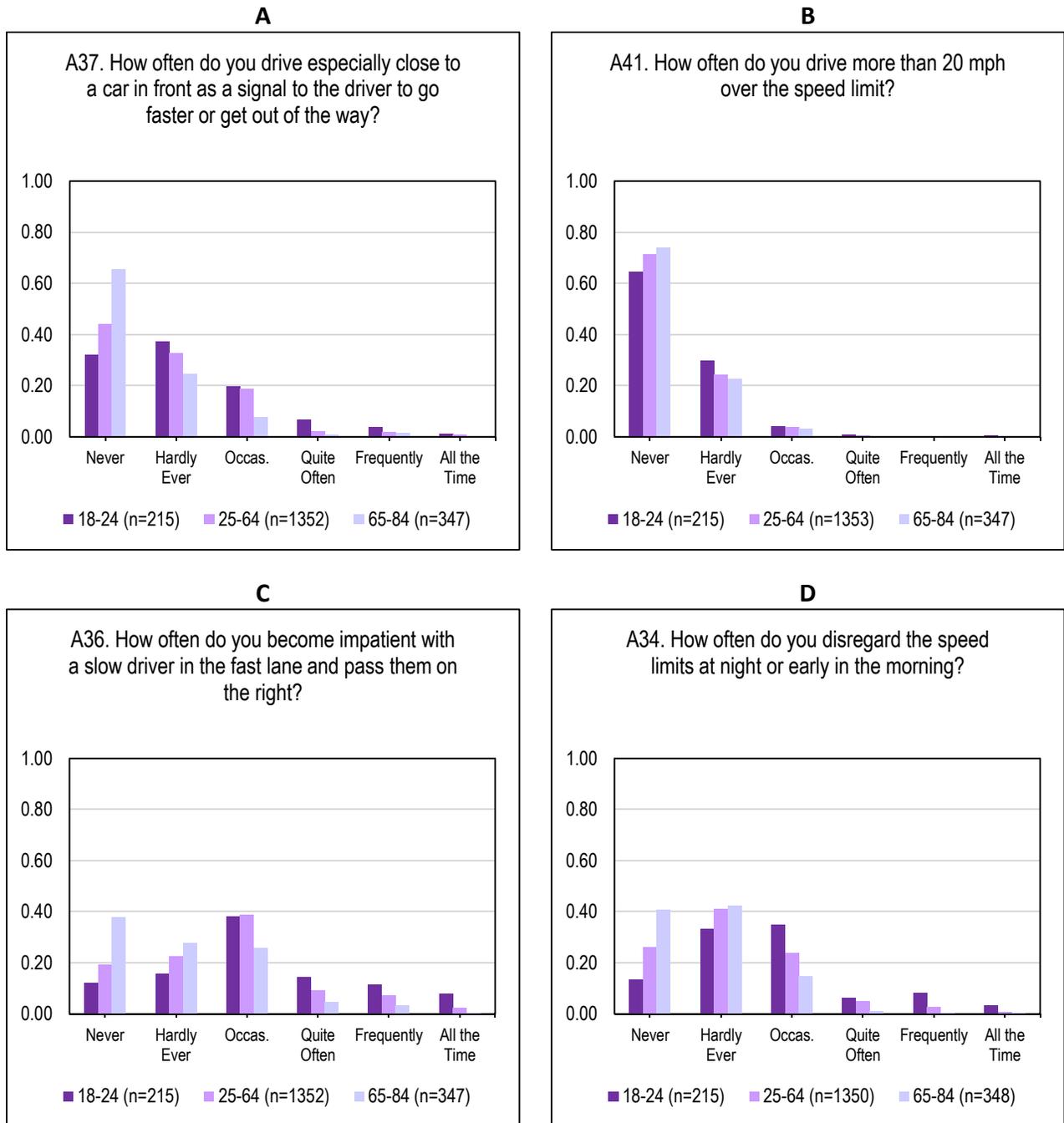
Figure 10. Frequency of speeding at night or early in the morning (A), passing a driver on the right (B), and driving especially close to a car in front (C), and driving more than 20 mph over the speed limit (D) by age group.

Table 14. Percentage of driver responses in each category by age group for questions A37, A41, A36, and A34.

	Never	Hardly ever	Occasionally	Quite often	Frequently	All the time
A37. 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?						
18-24 (n=215)	32%	37%	20%	7%	4%	1%
25-64 (n=1,352)	44%	33%	19%	2%	2%	1%
65-84 (n=347)	65%	24%	8%	1%	1%	0%
A41. How often do you drive more than 20 mph over the speed limit?						
18-24 (n=215)	65%	30%	4%	1%	0%	0%
25-64 (n=1,353)	71%	24%	4%	1%	0%	0%
65-84 (n=347)	74%	22%	3%	0%	0%	0%
A36. How often do you become impatient with a slow driver in the fast lane and pass on the right?						
18-24 (n=215)	12%	16%	38%	14%	12%	8%
25-64 (n=1,352)	19%	23%	39%	9%	7%	2%
65-84 (n=347)	38%	28%	26%	5%	3%	1%
A34. How often do you disregard the speed limits late at night or early in the morning?						
18-24 (n=215)	13%	33%	35%	7%	8%	3%
25-64 (n=1,350)	26%	41%	24%	5%	3%	1%
65-84 (n=348)	41%	42%	15%	1%	1%	1%

Figure 11 A-D provides information on the frequency with which drivers participate in various driving-related behaviors that are frequently targeted as unsafe/illegal actions in public-safety messaging campaigns (note that the questions are presented out of order to facilitate discussion). Table 15 and Table 16 provide the percentages for the same response distributions by age category. Questions A43 and A44 ask about seat belt use and impaired driving-- leading highway safety concerns. When asked about the frequency of engaging in these behaviors, a high proportion of drivers indicated wearing a seat belt all the time. There was also a small age-related trend associated with older drivers being more likely to wear the seat belt all of the time (87% older, 81% middle, 77% younger). In terms of driving after consuming alcohol, the majority of respondents indicated that they never drive after consuming alcohol, especially younger drivers. However, there were small proportions of drivers, particularly middle age and older drivers that report still driving after consuming alcohol ("Hardly ever" or more: 24% older, 28% middle, 13% younger). Note that the question did not specify the amount of alcohol consumed, so some of these responses may reflect driving while still below the illegal *per se* blood-alcohol limit of .08.

Question A42 asked drivers about the frequency with which they drive 10-20 mph over the speed limit. Note that in terms of safety, this range of speeding is not necessarily immediately dangerous, but it does represent driving with potentially reduced safety margins. In general, it may reflect more of a "casual" or "acceptable" type of speeding, but a type that is still targeted by safety and enforcement campaigns. The results in Question A42 indicate that while most

drivers never or hardly ever engage in this behavior, there is still a moderate proportion of drivers that does this occasionally or more. There is another age-related trend, with younger drivers reporting speeding in this range more frequently than other age groups (41% younger, 27% middle, 15% older).

Question A25 asked drivers about the frequency with which they use their cell phone while driving. There were clear age-related differences. The older driver group predominately did not use cell phones while driving ("No trips:" 60% older, 23% middle, 20% younger), and the older drivers that did, only used them on less than half of their trips. In contrast, most middle and younger drivers reported using cell phones while driving. Although most report using them on less than half their trips, there are still a relatively high proportion of these drivers that are willing to use a cell phone on about half of their trips or more (40% younger, 36% middle, 7% older). These age differences may partially reflect overall cell phone use patterns (i.e., cell phones are less prevalent among older drivers).

While the issue of cell phone use and driver distraction has received more attention in recent safety campaigns, the results from question A25 suggest that these efforts may still be too nascent for them to have the degree of impact that is evident with regard to seat belt use and impaired driving. Broader attitudes and cultural norms with regard to cell phone use and driving have yet to change, and the message may still be unclear, given that hands-free cell phone use is not prohibited in many jurisdictions. Interestingly, the pattern of results for speeding 10-20 mph above the posted speed limit (A42) falls in between cell phone use and the two more well-established safety issues of seat belt use and impaired driving. At a high level, the results from these questions suggest that reducing speeding may require broad cultural shifts in how drivers view this behavior.

A

A43. How often do you wear a seat belt?

18-24 (n=215)   25-64 (n=1350)   65-84 (n=346)

B

A44. How often do you drive after consuming alcohol?

18-24 (n=214)   25-64 (n=1352)   65-84 (n=347)

C

A42. How often do you drive 10-20 mph over the speed limit?

18-24 (n=214)   25-64 (n=1353)   65-84 (n=348)

D

A25. How often do you use your phone (for talking or texting) while driving? Would you say you use your phone while driving during....

18-24 (n=202)   25-64 (n=1307)   65-84 (n=334)

Figure 11. Frequency of seat belt use (A), driving after consuming alcohol (B), phone use while driving (C), and driving 10-20 mph over the speed limit (D) by age group.

Table 15. Percentage of driver responses in each category by age group for questions A43, A44, and A42.

|	Never	Hardly ever	Occasionally	Quite often	Frequently	All the time
A43. How often do you wear a seat belt?						
18-24 (n=215)	3%	4%	3%	7%	7%	77%
25-64 (n=1,350)	1%	2%	5%	4%	6%	81%
65-84 (n=346)	2%	2%	4%	2%	3%	87%
A44. How often do you drive after consuming alcohol?						
18-24 (n=214)	87%	11%	2%	0%	0%	0%
25-64 (n=1,352)	72%	21%	7%	0%	0%	0%
65-84 (n=347)	76%	18%	3%	1%	0%	1%
A42. How often do you drive 10-20 mph over the speed limit?						
18-24 (n=214)	26%	33%	31%	7%	2%	0%
25-64 (n=1,353)	31%	42%	21%	4%	2%	0%
65-84 (n=348)	49%	36%	13%	2%	0%	0%

Table 16. Percentage of driver responses in each category by age group for question A25.

	All trips	Most trips	About half	Less than half	No trips
A25. How often [proportion of trips] do you use your phone (for talking or texting) while driving?					
18-24 (n=202)	5%	17%	17%	40%	20%
25-64 (n=1,307)	6%	17%	14%	41%	23%
65-84 (n=334)	0%	4%	3%	32%	60%

Discussion

The survey questions presented in this chapter provide a broad view of the attitudes, beliefs, and behaviors that respondents hold towards speeding. There was a clear age-related pattern apparent across most of the questions. Specifically, the typical response distribution for older drivers was at the end of the scale that was most favorable towards not speeding. In contrast, the typical response distribution for younger drivers was consistently shifted towards responses that were more favorable or inclined towards speeding. The distribution for the middle age group typically fell in between the younger and older driver groups. Despite these age-related differences, the overall trend in responses across the groups was quite similar. In particular, all groups tended to be on the same end of the response scale with response distributions that had similar shapes and often with the same modal response, but just shifted based on age.

The questions about driver beliefs, attitudes, and behaviors covered in this chapter also provide a high-level picture about how most Idaho drivers view their speed choices. In particular, societal norms seem to influence the majority of drivers. Most drivers believe in obeying the posted speed limit and in general keeping up with traffic, and they are also unlikely to speed in traffic-calmed areas. However, most drivers also disagree with the statement that there are "no excuses" for exceeding the speed limit, which suggests that they think that situational speeding may be justifiable under certain conditions.

Most drivers also acknowledge a link between speeding and safety. The majority believe that keeping within or close to the speed limit reduces their chances of crashing. It also makes many of them feel more in control of their vehicle, and feel more relaxed while driving. However, they also tend to believe that speeding is not dangerous for skilled drivers.

Most drivers also report wanting to not speed. Despite this, there are overall response patterns that suggest that drivers prefer to maintain control over their speed choice. In particular, they become impatient when stuck behind slower drivers, even though most do not find it annoying to keep to the speed limit. In terms of speeding behaviors, most report following traffic, but more drivers keep up with faster traffic than stay with slower traffic. Most drivers rarely travel at speeds that are clearly seen as speeding on high-speed (+15 mph) and lower-speed roads (+10 mph), but there are some exceptions (such as main roads through town).

Although self-reported speeding represented a minority of the responses in most of the questions, those drivers that did speed, indicated different reasons for doing so. Some drivers enjoy driving fast, or speed to get to their destination sooner. Some drivers may speed because it is less boring, or to reduce stress. There were also situational reasons reported for speeding, including driving a powerful car and on straight roads, or late night/early morning. This list of reasons is not comprehensive, since it is limited to the questions asked in the survey, but it indicates that addressing driver motivations for speeding may require a multi-faceted approach that covers a variety of underlying reasons why drivers may choose to speed.

Chapter 4   Driver Convictions

Introduction

Many within the transportation safety community maintain that for speeding countermeasures to be effective they need to be targeted towards the most appropriate groups (i.e. high-risk speeders). Previous studies have tried to identify the characteristics of drivers involved in speeding with the goal of developing tailored countermeasures for these high-risk drivers (Schroeder, Kostyniuk, & Mack, 2013; Watson et. al., 2015). Several studies have explored the potential relationship between speeding and behavioral measures (e.g., sensation seeking, attitude towards safety), demographic variables (e.g., age, gender, household income), in addition to factors such as driving exposure (i.e., miles driven). The results from these studies suggest that the typical speeder is a young male with reported higher than normal and preferred speeds (Stradling, Meadows, & Beatty, 2002; Mercer, 1989), and which has a higher rate of traffic violations and thrill-seeking scores (af Wåhlberg & Dorn, 2012). In addition, a typical speeder will also be from a higher social class, have a higher household income (Stradling, Meadows, & Beatty, 2002), and have high annual miles driven (Factor, 2014). Even though these studies have identified a generic profile, their conclusions are limited by the fact that the findings are based on self-reported measures, which are not associated with the actual driving record of the respondents. It would be useful to compare survey responses on attitudes towards speeding and driving behavior with actual driving records of respondents in order to determine whether the self-reported measures that are being used to develop countermeasures are even accurate.

A key advantage of the current study was the ability to directly sample drivers with a known history of receiving speeding convictions. Combining the driver conviction data with corresponding self-reported survey responses, as well as demographic information, allowed us to: (a) validate self-reported survey responses with actual driving records, and (b) identify how driving violations varied by demographic variables. In this chapter, we compared how groups with different numbers of convictions varied with regards to key demographic variables, as well as on self-reported driving behavior questions. The goal was to examine the relationship between speeding behavior and key demographic variables, and to identify whether these factors can identify underlying relationships between demographic variables and speeding convictions. Even though speeding convictions may not be a perfect measure of speeding behavior because of situational factors and chance, at an aggregate level and over considerable time, they should still be informative for differentiating speeders, since the probability of receiving a speeding ticket will be higher for speeders than non-speeders. The surveyed sample in this study was separated into three groups based on their corresponding driving records from the prior 3 years: (a) drivers with 0 convictions; (b) drivers with 1 conviction; and (c) drivers with 2+ convictions. Finally, we conducted a regression analysis to test if driver demographic variables significantly predicted the number of convictions in the past 3 years. The analyses examined a wide range of demographic variables available from the survey. However, discussion in the current chapter is mostly limited to the subset of variables that were significant predictors in subsequent regression analyses. These include gender, age, self-reported miles driven per week, driving as a job, and marital status. The results from these analyses are discussed below.

Demographic Variables

Descriptive results for key variables by number of convictions in the past 3 years are discussed in this section. These include gender, age, marital status, education level.

Figure 12 A-B provides the distribution of respondents by gender and age across number of convictions from the driver record data. Table 17 provides the proportion of convictions by gender and age group.

Figure 12-A shows that a higher proportion of female respondents had 1 conviction or 2+ convictions than 0 convictions. In comparison, within male respondents, a higher proportion of respondents had 0 convictions. Even though the female group had a higher proportion of convictions, the overall patterns between the two genders are only slightly different. In the full population of Idaho drivers, the percentage of males with 1 or 2+ convictions was greater than females (1 conviction: 17.3% M versus 12.8% F; 2+ convictions: 0.8% M versus 0.4% F).

Figure 12-B shows the distribution of respondents by age group for the different conviction categories. Note that the middle age group (25 to 64 years old) had the highest proportion of respondents overall, since this group made up a much larger part of the sample than the other two age groups. Among younger age respondents (16 to 24 years old), a higher proportion of them had multiple convictions as compared to the other age groups. The middle age group respondents had a relatively balanced distribution across the different conviction categories; while the older drivers had the fewest speeding convictions (see Figure 13-B). The overall within-group pattern indicates that the proportion of speeding convictions decreased with age. In the full population of Idaho drivers, the percentage of younger drivers with 1 or 2+ convictions was greater than for those in the other age groups (1 conviction: 25.1% Younger versus 15.5% Middle and 7.2% Older; 2+ convictions: 1.4% Younger versus 0.5% Middle and 0.1% Older).

A   **B**
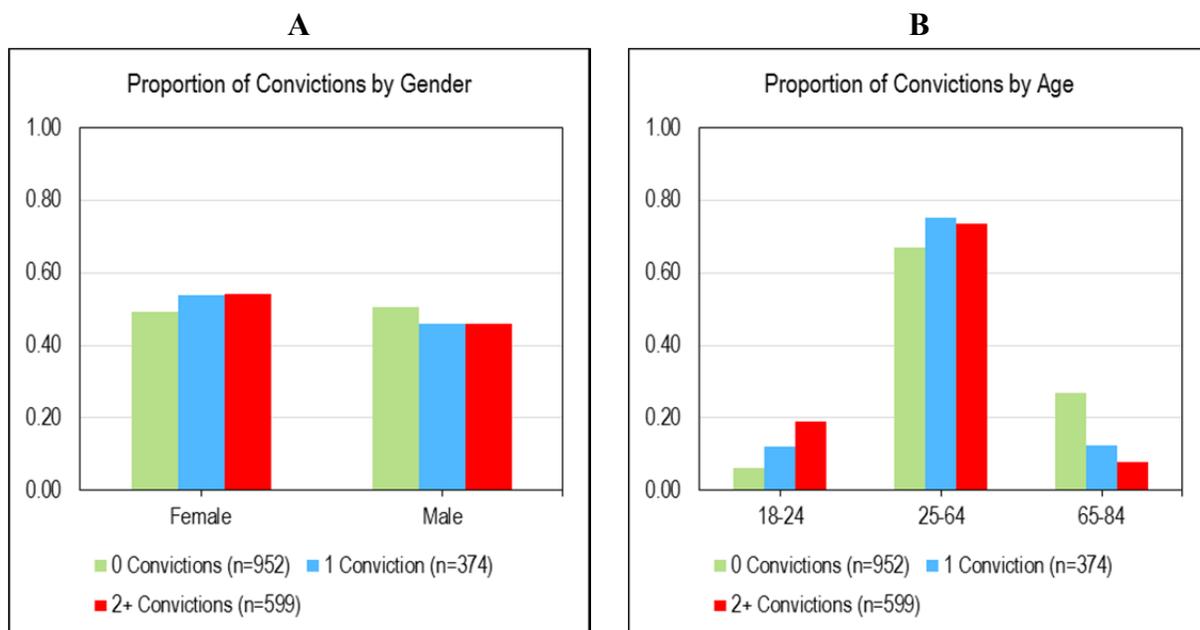
Figure 12. Proportion of convictions by gender (A) and age group (B).

Table 17. Proportion of convictions by gender and age group.

	0 Convictions	1 Conviction	2+ Convictions
Gender			
Female (n=995)	47%	20%	33%
Male (n=930)	52%	18%	30%
Age			
18-24 (n=216)	27%	21%	52%
25-64 (n=1,359)	47%	21%	32%
65-85 (n=350)	73%	13%	13%

Question C4 asked drivers about their marital status. The response options included married, divorced, separated, widowed, single, and "don't know." Table 18 provides the proportion of convictions by marital status. The overall sample of respondents was largely comprised of married drivers, followed by single and divorced drivers, with the remaining fraction of respondents distributed across the other categories (see Figure 13). When comparing within categories, the married group had the highest proportion of drivers with 0 convictions or 1 conviction. In comparison, the single and divorced groups had a higher proportion of drivers with 2+ convictions. The elevated proportion of convictions among singles likely corresponds to these drivers being younger overall.
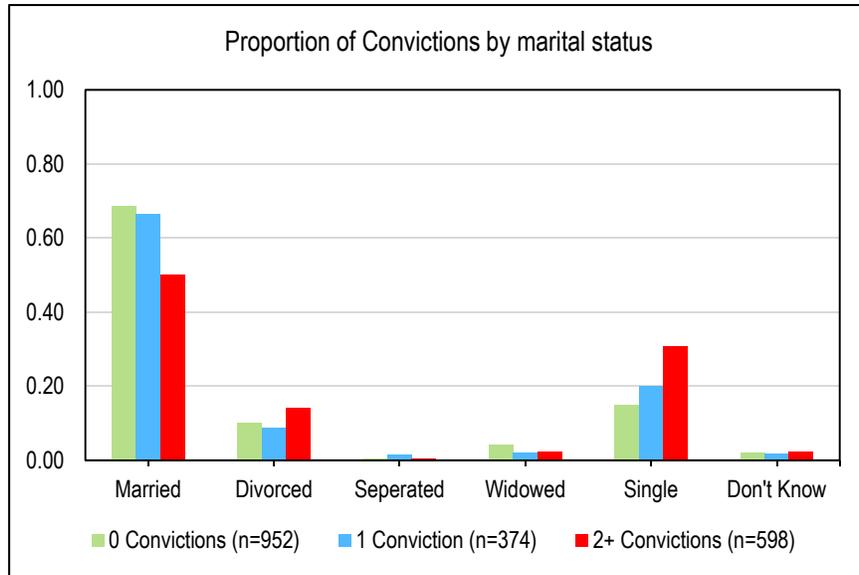
Figure 13. Proportion of convictions by marital status.

Table 18. Proportion of convictions by marital status.

	0 Convictions	1 Conviction	2+ Convictions
Marital Status			
Married (n=1,200)	68%	66%	50%
Divorced (n=213)	10%	9%	14%
Separated (n=11)	0%	1%	0%
Widowed (n=60)	4%	2%	2%
Single (n=401)	15%	20%	31%
Don't know (n=39)	2%	2%	2%

Figure 14 A-B shows the distribution of respondents for level of education and household income by number of convictions. Table 19 and Table 20 provide the proportion of convictions by level of education and household income. Question C3 asked respondents to indicate their highest grade or year of regular school that they had completed (see Figure 14-A). A higher proportion of the sample indicated that they had "Some college" education, followed by "High school graduate," and "4-year college degree." A very small portion indicated that they had a "Graduate degree."

A slightly higher proportion of respondents that indicated that they had "Some High School," "Some college" or a "Graduate degree" had 2+ convictions. Overall, however, there does not seem to be a pattern that indicates a relationship between level of education and number of speeding convictions.

Question C11 asked respondents about their total household income before taxes for the year 2013. Similar to the question about level of education (Figure 14-B), there does not seem to be a clear pattern that describes the relationship between total household income and number of speeding convictions.

A
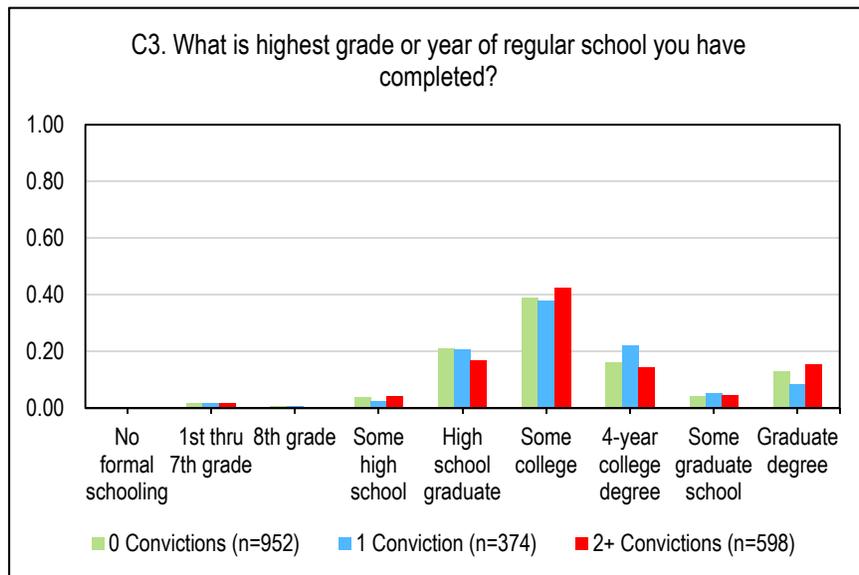
B
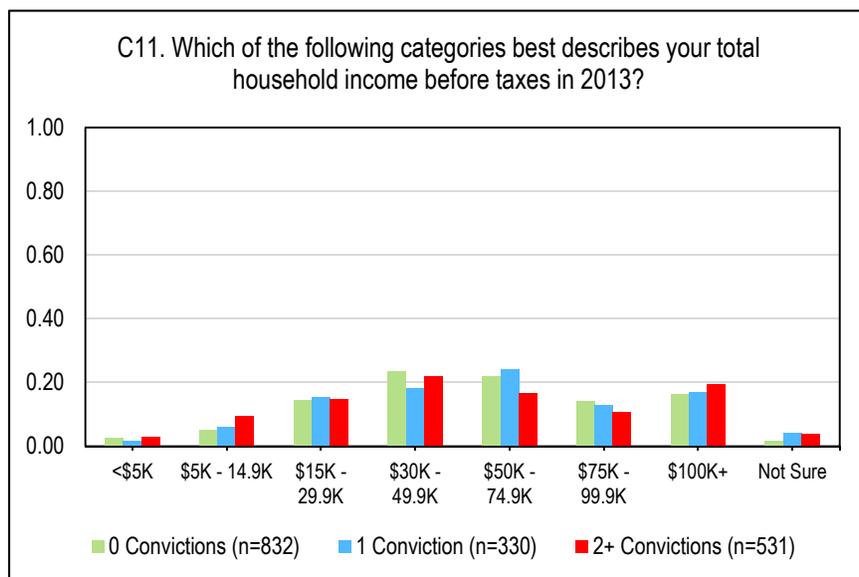
Figure 14. Proportion of convictions by level of education (A) and household income in the year 2013 (B).

Table 19. Proportion of convictions by level of education.

	0 Convictions	1 Conviction	2+ Convictions
Level of Education			
No formal schooling (n=2)	0%	0%	0%
First through 7th grade (n=33)	2%	2%	2%
8th grade (n=11)	1%	1%	0%
Some high school (n=72)	4%	2%	4%
High school graduate (n=380)	21%	21%	17%
Some college (n=767)	39%	38%	42%
Four-year college degree (n=324)	16%	22%	15%
Some graduate school (n=88)	4%	5%	5%
Graduate degree (n=247)	13%	9%	15%

Table 20. Proportion of convictions by household income.

	0 Convictions	1 Conviction	2+ Convictions
Household Income			
<$5K (n=44)	3%	2%	3%
$5K - $14.9K (n=113)	5%	6%	10%
$15K - $29.9K (n=251)	15%	15%	15%
$30K - $49.9K (n=373)	24%	18%	22%
$50K - $74.9K (n=350)	22%	24%	17%
$75K - $99.9K (n=217)	14%	13%	11%
$100K+ (n=296)	16%	17%	19%
Not Sure (n=49)	2%	4%	4%

Driving Behavior

Question A23 asked drivers to report the approximate number of miles driven each week. Table 21 provides the proportion of convictions by miles driven each week. This is a relevant variable because it represents drivers' basic exposure to conviction risk. That is, people who drive more would be expected to have a greater number of speeding citations overall, since they would have more opportunities to encounter enforcement efforts. This pattern is evident in Figure 15. Specifically, there is a higher proportion of drivers with 0 convictions in the low mileage categories, and a higher proportion of drivers with 2+ convictions in the higher mileage categories. The distribution of 1-conviction drivers falls in between these. Thus, driving exposure seems to be related to number of convictions, and should be adjusted for in inferential analyses.
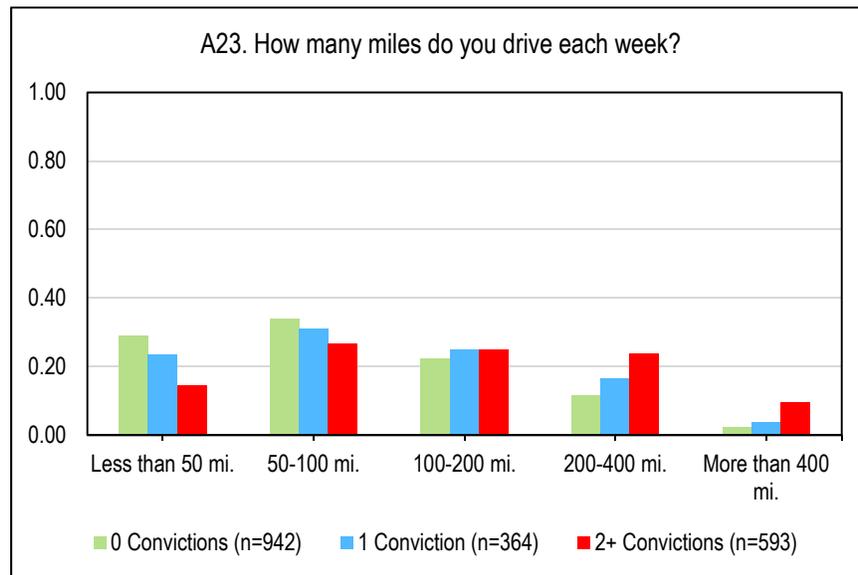
Figure 15. Proportion of convictions by miles driven each week.

Table 21. Proportion of convictions by miles driven each week.

	0 Convictions	1 Conviction	2+ Convictions
Weekly Mileage			
Less than 50 mi. (n=447)	29%	24%	15%
50-100 mi. (n=593)	34%	31%	27%
100-200 mi. (n=452)	23%	25%	25%
200-400 mi. (n=313)	12%	16%	24%
More than 400 mi. (n=94)	2%	4%	10%

Figure 16-A-B provides information on drivers' self-assessment of their own speeding behavior relative to other drivers. Table 22 provides the proportion of convictions for drivers' assessment of their behavior in relation to others. Question A13 asked drivers to choose a statement that best described their speeding behavior (Figure 16-A). There seems to be a clear pattern between how drivers identify their driving behavior and the number of convictions. For instance, within the group of drivers who identified themselves as the ones who "tend to pass other cars more often

than other cars pass me," a higher proportion of drivers had 1 and 2+ speeding convictions. In comparison, within the group of drivers who indicated that "other cars tend to pass me more often than I pass them," the proportion of drivers with 0 convictions is substantially higher. Interestingly, a small proportion of drivers with 0 convictions report that they tend to pass other vehicles. These may be speeders that have been lucky or strategic about when they speed.

Question A14 asked respondents about their preferred driving tendency relative to other traffic. The pattern seen in Figure 16-B seems to be similar to the previous question. In both cases, drivers who identified themselves with comparatively aggressive driving tendencies have a higher number of convictions. In this instance, drivers who reported that they tend to "keep up with the faster traffic" had a higher proportion of 1 and 2+ speeding convictions. In comparison, drivers who reported that they tend to "stay with slower moving traffic" had a lower proportion of convictions relative to no convictions. Another pattern that stands out is the imbalance between the "keeping up with the faster traffic" and "stay with slower moving traffic" categories (especially as compared to the end points in Question A13). This suggests that drivers may believe that it is more socially acceptable to speed if one is keeping up with faster moving traffic. The preference for keeping up with faster moving traffic could also reflect a strategy that drivers adopt to evade speeding tickets by limiting their speeding to when other vehicles are speeding—particularly since more drivers report keeping up with faster traffic than passing cars more often. This could explain the elevated proportion of drivers with 0 convictions in this category. However, this strategy may be ineffective overall, since most drivers that report this have one or more convictions anyway.
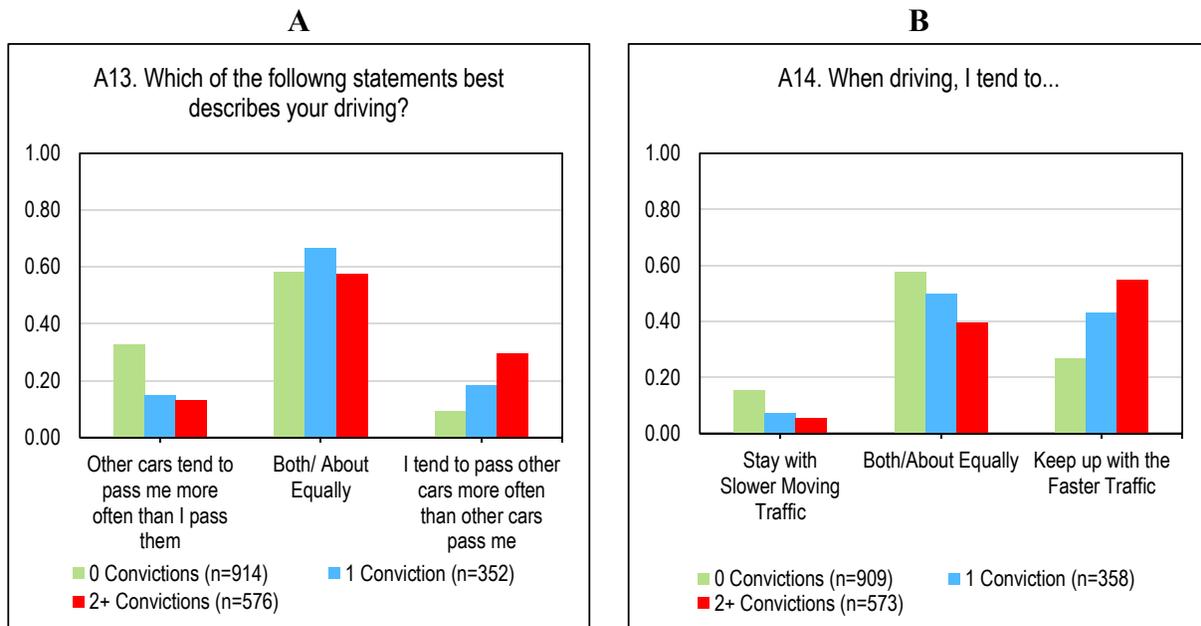
Figure 16. Proportion of convictions for drivers' assessment of their behavior in relation to others.

Table 22. Proportion of drivers' assessment of their behaviors relative to others.

	0 Convictions	1 Conviction	2+ Convictions
A13. Which of the following statements best describes your driving?			
Other cars pass me more often than I pass them (n=426)	33%	15%	13%
Both/ about equally (n=1,097)	58%	67%	57%
I pass other cars more often than they pass me (n=319)	9%	18%	30%
A14. When driving, I tend to . . .			
Stay with Slower Moving Traffic (n=197)	15%	7%	5%
Both/About Equally (n=929)	58%	50%	40%
Keep up with the Faster Traffic (n=714)	27%	43%	55%

Figure 17 A-D shows driver's self-reported speed choice behavior on different types of roads, and Table 23 provides the corresponding proportions of convictions. Question A15 asked respondents how often they drive 15 mph above the speed limit on multi-lane divided highways. The response pattern is in line with expectations that the drivers who indicated that they often or sometimes drove 15 mph over the posted speed limit had slightly more speeding convictions compared to drivers who indicated that they rarely or never drive over 15 mph over the posted speed limit. Similarly, Question A17 probed how often the respondents tend to drive over 15 mph on two-lane highways. Again, respondents who reported often or sometimes exceeding the limit by 15 mph on rural highways had a higher proportion of convictions (see Figure 17-B). In general, however, most respondents reported rarely or never speeding 15 mph above the posted speed limit on multi-lane and two lane highways.

Questions A18 and A19 probed respondents about how often they drove over 10 mph over the speed limit on rural country areas, and on neighborhood or residential streets, respectively. The responses to Question A18 show an interesting pattern. A higher proportion of drivers indicated that they would "often" or "sometimes" drive 10 mph over the posted speed limit. This is in contrast from the patterns observed in Questions A15 and A17. It is unclear why a higher proportion of drivers indicated that they speed on country area roads. Possibly the framing of the question might have promoted the responses. Specifically, since this question was asking drivers to indicate how often they drove over 10 mph as compared to 15 mph in the previous questions, it is simply possible that drivers are more likely and willing to speed over 10 mph as compared to 15 mph on these roads.

The results for Question A18 also show that respondents with 2+ convictions clearly report exceeding 10 mph on rural roads sometimes and often in greater proportion than drivers with fewer convictions. This pattern could reflect the type of driving environment encountered on a country road – wide-open spaces/fields alongside the roadway, which potentially facilitate speeding. This would suggest that respondents with 2+ convictions are more willing to take advantage of these driving conditions to speed. This finding is consistent with findings from the *Motivation for Speeding: Additional Analysis* study (Richard, Divekar, & Brown, 2016) where a higher proportion of speeding events in the College Station, Texas, area were on rural farmer-market roads.

Question A19 asked drivers how often they would drive 10 mph over the speed limit on neighborhood or residential streets. The responses are consistent with those about driving over

the posted speed limit on highways (Questions A15 and A17). That is, a high number of respondents indicated that they would "rarely" or "never" drive 10 mph over the posted speed limit in neighborhood or residential streets. Similarly, the proportion of respondents with convictions was also low for these groups. Drivers with 2+ convictions may be slightly more likely to speed more frequently on neighborhood streets, but the differences are small. One possible explanation could be that the social stigma and/or the clear safety risks associated with the perception of driving 10 mph above the posted speed limit in a residential neighborhood are sufficient to discourage this behavior in even the repeat speeders.

A

A15. How often would you say you drive 15 miles an hour over the speed limit on multi-lane divided highways?

0 Convictions (n=940)   1 Conviction (n=364)
2+ Convictions (n=586)

B

A17. How often would you say you drive 15 miles an hour over the speed limit on two-lane highways, one lane in each direction in rural areas?

0 Convictions (n=936)   1 Conviction (n=362)
2+ Convictions (n=589)

C

A18. How often would you say you drive 10 miles an hour over the speed limit in rural country areas?

0 Convictions (n=932)   1 Conviction (n=360)
2+ Convictions (n=585)

D

A19. How often would you say you drive 10 miles an hour over the speed limit on a neighborhood or residental streets?

0 Convictions (n=939)   1 Conviction (n=364)
2+ Convictions (n=590)

Figure 17. Proportion of convictions for self-reported speed choice behavior for different types of road

Table 23. Proportion of convictions for self-reported speed choice behavior for different types of roads.

	0 Convictions	1 Conviction	2+ Convictions
A15. How often would you say you drive 15 miles an hour over the speed limit on multi-lane divided highways?			
Often (n=29)	0%	1%	3%
Sometimes (n=199)	6%	10%	17%
Rarely (n=754)	35%	46%	45%
Never (n=908)	59%	43%	35%
Don't know (n=0)	0%	0%	0%
A17. How often would you say you drive 15 miles an hour over the speed limit on two-lane highways, one lane in each direction in rural areas?			
Often (n=23)	1%	1%	3%
Sometimes (n=157)	5%	10%	12%
Rarely (n=579)	26%	35%	36%
Never (n=1,128)	68%	55%	49%
Don't know (n=0)	0%	0%	0%
A18. How often would you say you drive 10 miles an hour over the speed limit on rural country roads?			
Often (n=151)	4%	8%	14%
Sometimes (n=564)	24%	29%	41%
Rarely (n=623)	35%	37%	28%
Never (n=539)	37%	26%	17%
Don't know (n=0)	0%	0%	0%
A19. How often would you say you drive 10 miles an hour over the speed limit on neighborhood or residential streets?			
Often (n=22)	1%	1%	2%
Sometimes (n=114)	4%	7%	8%
Rarely (n=471)	21%	27%	30%
Never (n=1,286)	74%	65%	61%
Don't know (n=0)	0%	0%	0%

Self-reported Traffic Stops and Speeding Citations

Question A22 asked respondents to indicate the number of times they have been cited/fined for speeding in the past 12 months. Figure 18 shows self-reported citations by actual number of speeding convictions obtained from the state records. Table 24 provides this proportion of convictions for self-reported citations within the past 12 months. Almost all drivers who reported having no citations did not have any convictions. For drivers with convictions, it was expected that their response would reflect the conviction category, but the overall pattern suggests that a high proportion of drivers with convictions--especially 2+ convictions--indicated that they did not have any citations within the past year. One potential explanation for this could be that the conviction categories indicated in the graphs were based on conviction for the previous 3 years, whereas the question asked the respondent to indicate the number of citations within the past year. Further analysis of this possibility described in Chapter 7 indicates that most of the respondents with 2+ convictions had received their tickets more than one year prior to completing the study.
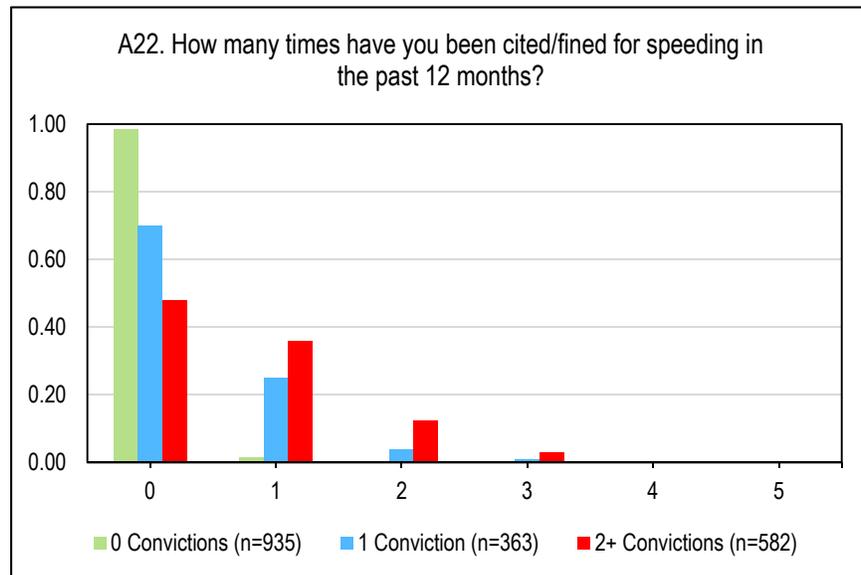
Figure 18. Proportion of convictions for self-reported citations within the past 12 months.

Table 24. Proportion of convictions for self-reported citations within the past 12 months.

	0 Convictions	1 Conviction	2+ Convictions
A22. How many times have you been cited/fined for speeding in the past twelve months?			
0 (n=1453)	98%	70%	48%
1 (n=314)	1%	25%	36%
2 (n=87)	0%	4%	12%
3 (n=21)	0%	1%	3%
4 (n=4)	0%	0%	1%
5 (n=1)	0%	0%	0%

Regression Analysis

The objective of this analysis was to use regression to test if driver demographic variables significantly predicted the number of speeding convictions in the past 3 years. The initial set of driver demographic variables tested as model predictors is shown in Table 1. Question A23 and A24 were included to adjust for exposure (weekly driving mileage) and opportunity to speed (traffic congestion). Also, a survey eligibility question asking if respondents drove as part of their work was also included (elig3r) because it was also related to driving exposure. Predictors related to driver behavior and attitudes/beliefs are covered separately in Chapter 5.

Table 25. Driver demographic variables included in the regression analyses.

Item	Question	Notes
C1*	How old are you?	Continuous variable.
C3	What is highest grade or year of regular school you have completed?	Categorical variable; 1,898 responses to this item.
C4	Are you currently married, divorced, separated, or single?	Categorical variable; 1,894 responses to this item.
C6	Which of the following racial categories describes you?	Categorical binary variable white and other; 1,885 responses to this item;
C7*	What is your gender?	Binary variable.
C8	How many persons live in your household?	Continuous variable.
C9	How many are under age 16?	Continuous variable.
C10	Do you own or rent your home?	Categorical variable; 1,887 responses to this item.
C11	Which of the following best describes your total household income before taxes in 2013?	Categorical variable; 1,870 responses to this item
C13	Do you live in a rural, suburban or urban area (metro status)?	Categorical variable; 1,883 responses to this item
A23	How many miles do you drive each week?	Categorical variable; 1,899 responses to this item
A24	What percentage of time do you drive in congested traffic?	Continuous variable.
elig3r	Do you drive as part of your job?	Binary variable.

* Actual values for these variables were taken from the driving records rather than self-reported answers to these questions.

Approach

Multiple imputation (MI) was used to generate predicted values to replace missing survey data (see Appendix D). An ordinal logistic regression was conducted using multiple imputation data to determine if any of the demographic variables predicted the likelihood of having one or more speeding convictions.

Results and Discussion

Eight of the variables were not significant predictors at the p < 0.05 level in the initial regression models and therefore were excluded from the final model. These included C3 (education level), C6 (race), C8 (household size), C9 (number of minors in household), C10 (home ownership), C11 (income level), C13 (metro status), and A24 (congestion level).

The final regression model included age, gender, marital status (C4), weekly driving mileage (A23) and drive for work variable (elig3). The overall model was significant (χ^2 (9, N=1806) = 295.00, p > 0.0001).

As shown in Table 26, age, gender, self-reported miles driven per week, and drive for work were significant predictors of speeding convictions (all p <0.05). Also, two response items (divorced and single) from the categorical marital status variable were significant predictors of citations.

Table 26. MI Ordered logistic regression output: odds of citations by model predictors.

Variables	Model Odds Ratio	β	se	t	p-value	β max95th	β min95th
C1 Age	0.97	-0.03	0.00	-10.04	0.00	-0.04	-0.03
C7 Gender_F	1.29	0.26	0.09	2.73	0.01	0.07	0.44
A23 < 50	.	.	.	.	.	.	.
A23 50 to 100	1.47	0.39	0.13	3.04	0.00	0.14	0.63
A23 100 to 200	1.84	0.61	0.14	4.52	0.00	0.35	0.88
A23 200 to 400	2.74	1.01	0.15	6.81	0.00	0.72	1.30
A23 > 400	4.60	1.53	0.24	6.47	0.00	1.06	1.99
Driving as a job	.	.	.	.	.	.	.
Driving as not a job	0.67	-0.40	0.10	-3.98	0.00	-0.59	-0.20
C4 Married	.	.	.	.	.	.	.
C4 Single	1.35	0.30	0.13	2.38	0.02	0.05	0.55
C4 Other[1]	1.62	0.48	0.13	3.64	0.00	0.22	0.74
cut1	.	.	.	.	.	.	.
_cons	0.34	-1.07	0.21	-5.08	0.00	-1.48	-0.66
cut2	.	.	.	.	.	.	.
_cons	0.87	-0.14	0.21	-0.64	0.52	-0.55	0.28

[1]Other includes divorced, separated, widowed, don't know

_cut1 - This is the estimated cut-point on the latent variable used to differentiate 0 convictions from 1 conviction and 2+ convictions when values of the predictor variables are evaluated at 0.

_cut2 - This is the estimated cut-point on the latent variable used to differentiate 0 and 1 convictions from 2+ convictions when values of the predictor variables are evaluated at zero. Subjects that had a value between -1.07 and -0.14 on the underlying latent variable would be classified as the 1-conviction group.

Effect of Age and Gender

With regard to the age variable, the odds of having speeding convictions decreased with age. Females also had higher odds of having speeding convictions than males. As Table 27 indicates, this trend was strongest for females in the younger age category, and also evident to a smaller degree in the middle age category. Older females showed the opposite pattern.

Table 27. Distribution of Convictions across Gender and Age Category.

Age Category	Number of Convictions	Frequency		Percentage Within Age Category	
		F	M	F	M
18-24	0	28	30	22.8%	32.3%
	1	28	17	22.8%	18.3%
	2	67	46	54.5%	49.5%
	subtotal	123	93		
25-64	0	321	316	44.9%	49.1%
	1	153	129	21.4%	20.0%
	2	241	199	33.7%	30.9%
	subtotal	715	644		
65-84	0	120	137	76.4%	71.0%
	1	21	26	13.4%	13.5%
	2	16	30	10.2%	15.5%
	subtotal	157	193		
	Total	995	930		

Driving Exposure

The likelihood of having a speeding conviction in the past 3 years increased substantially with driving exposure. For instance, those who reported driving 100 to 200 miles per week had a 1.84 times increase in odds of being convicted for a speeding violation in comparison to those who reported driving less than 50 miles per week. Similarly, respondents who reported 200 to 400 and more than 400 miles per week had 2.74 and 4.6 times higher odds of a speeding conviction, respectively, according to the model results shown in Table 26. Another significant predictor was elig3, which asked respondents if they drove as part of their work. (If they responded "yes" then respondents were asked to consider only their personal driving when answering the survey questions.) Respondents who did *not* drive for work had lower odds of having speeding convictions, which may be due to lower overall driving exposure.

Table 28 shows self-reported miles by convictions. The values in the rows Col Totals, Col Percent, and Col Odds Ratio show the effect of miles on the odds of having a conviction (shown in Table 29). Note that the odds of having a conviction increase with higher levels of weekly miles driven. An odds ratio of 1 indicates a 50 percent probability of having a speeding conviction in the past 3 years; values greater than 1 indicate increased odds. Compared to the 0-conviction group, the odds of having 1 conviction increase to 1.6 for those who reported 400+

miles of driving per week. Similarly, the odds having 2+ convictions increased to 4.25 for those who reported 400+ mile of driving per week.

Table 28. Contingency Table: A23 self-reported miles driven by conviction

	Convictions			Row Totals	Row Percent	Row Odds Ratio
	0	1	2+			
Less than 50	275	86	86	447	24%	0.31
50-100	321	113	159	593	31%	0.45
100-200	212	91	149	452	24%	0.31
200-400	111	60	142	313	16%	0.20
400+	23	14	57	94	5%	0.05
Col Totals	942	364	593	1,899		
Col Percent	50%	19%	31%			
Col Odds Ratio	0.98	0.24	0.45			

Table 29. Odds of having 1 or 2+ convictions compared to having 0 convictions based on responses to Question A23 – miles driven per week

A23	Zero to 1	Zero to 2+
Less than 50**	0.75	0.41
50-100**	0.87	0.71
100-200**	1.15	1.16
200-400**	1.48	2.36
400+**	1.60	4.25

**< .001

Marital Status

Divorced and single respondents were significantly more likely to have speeding convictions compared to married respondents. From Table 26, single respondents were 1.35 times more likely to have speeding convictions, and drivers with other marital statuses (primarily divorced individuals) were 1.62 times more likely to have speeding convictions compared to married respondents.

Table 30 is a two-way table that shows Question C4 marital status by speeding conviction. The values in the rows Col Totals, Col Percent and Col Odds Ratio were used to show the effect of marital status on the odds of having a speeding conviction in the last 3 years (Table 31). The results show that the odds of having convictions depend on marital status. Specifically, divorced respondents and single respondents are significantly more likely to show an increase in odds of having speeding convictions in the last 3 years compared to married respondents.

Table 30. Contingency table: C4 by Citations

	Convictions					
	0	1	2+	Row Totals	Row Percent	Row odds ratio
C4 Married*	652	248	300	1200	63%	1.73
C4 Single	143	75	183	401	21%	0.27
C4 Other	142	46	105	293	15%	0.18
Col Totals	926	369	588	1,893		
Col Percent	49%	20%	31%			
Col Odds Ratio	0.98	0.24	0.45			

Table 31. Odds of getting 1 and 2+ convictions compared to not having a conviction based on responses to C4 – Marital Status

Response Options	Zero to 1	Zero to 2
C4 Married	0.90	0.46
C4 Single*	1.42	2.51
C4 Other**	0.80	1.22

**< .001, *<.01

Discussion

Overall, the pattern of results identified in this analysis is consistent with findings from previous studies. Driver age, gender, marital status, and weekly mileage driven were significant predictors of speeding convictions. Consistent with past research on speeding behavior and studies analyzing crash data, younger drivers in the study had a higher proportion of speeding convictions. Also, respondents who drove more miles per week and were single had higher rates of speeding convictions. The only finding that is not consistent with previous research was that more females in this study had speeding convictions as compared to male drivers, especially in the younger age group. This finding is a bit surprising, but might be a result of the portion of the sample that responded to the survey request. Based on the non-response bias analysis (See Appendix C), male drivers with 1 or more convictions had a lower response rate to the survey than corresponding females.

In sum, the key advantage of the current study was the ability to directly sample drivers with a known history of receiving speeding convictions. The findings from the analysis of the survey and the driver records bolster the validity of the study, as well as previous studies that have identified the relationship between demographic variables (age, gender, marital status, and weekly miles driven) and the likelihood of convictions related to speeding.

Chapter 5   Typologies

Introduction

An emerging idea in recent studies of driver speeding is the notion that there may be different types of speeders that vary in terms of when or where they speed, the specific speeding behaviors they engage in, and their motivations and attitudes towards speeding. Two recent NHTSA-sponsored studies examined the idea of different types of speeders.

In NHTSA's 2011 *National Survey of Speeding Attitudes and Behaviors* (Schroeder, Kostyniuk, & Mack, 2013), a wide range of speeding related information was collected from over 6,144 adult drivers in a nationally representative telephone survey, including self-report driving behavior and attitudes on public acceptability of various countermeasures. Cluster analyses of the national survey data indicated that 86 percent of all respondents in the survey fell into one of three distinct types of driving behavior based on six core questions on their driving tendencies regarding passing other vehicles and matching the flow of traffic, their average speeds on different types of roads, and how often they had been stopped for speeding. Of those respondents classified in the cluster analyses, 30 percent of the drivers reported they rarely speed (non-speeders), 40 percent of the drivers reported they sometimes speed (sometimes speeders), and 30 percent of the drivers reported they regularly speed (speeders). For these survey respondents, concerns over the danger of speeding and attitudes towards various countermeasures clearly varied by speeder type.

Speeder types were also examined in analyses of naturalistic driving data that recorded driver speeding behavior on College Station, Texas and Seattle, Washington roads (Richard et al., 2012). In this *Motivations for Speeding* study, brief episodes of speeding (i.e., driving 10 mph above the posted speed limit) were used to classify drivers into different speeder types based on frequency of speeding across trips, and amount of speeding within individual trips. The different speeder types identified included: (1) *incidental speeders* (minimal amounts of speeding), (2) *situational speeders* (a lot of speeding on just a few trips), (3) *casual speeders* (a little speeding on most trips), and (4) *habitual speeders* (frequent trips with a lot of speeding).

A key objective of the current project was to examine and compare the driver speeding typologies from the two studies described above. Each of the typologies provides a different way of defining speeder types. The three speeder types from the 2011 national survey are based on self-reports from a nationally representative sample of drivers, and the four speeder types from the MfS project are based on the actual driving behaviors of a small sample of volunteer drivers. In particular, the current survey included the same questions from the NSSAB that were used to develop that typology. However, since naturalistic driving data could not be collected from survey participants for this study, there was no direct way to recreate the typology from the MfS study. An alternative approach was to try to approximate this typology using survey questions. Specifically, participants in the MfS study completed a battery of personal inventory items in addition to the driving data that was collected. Driver responses on the personal inventory questions were analyzed to identify questions that were effective in distinguishing driver types to which respondents belonged. These questions were included in the current survey in an attempt to parse drivers into similar speeder types as the MfS study.

The remainder of this chapter examines how well each of the NSSAB and MfS typologies fit the current driver sample, in addition to directly comparing the two typologies to determine how similar they are to each other.

NSSAB 2011 Typology

This section provides descriptive analysis of basic driver characteristics of people who belonged to different types of speeders, as originally defined in NHTSA's 2011 *National Survey of Speeding Attitudes and Behaviors* (Schroeder, Kostyniuk, & Mack, 2013). A hierarchical cluster analysis was conducted using the same survey questions that were used to develop the speeder typology in the NSSAB, and the corresponding three-cluster solution was selected. Tables 32 to 35 show the distribution of responses from the current survey for the six survey items included in the cluster analysis.

Table 32. Survey sample sizes for responses to Survey Item A13 (full sample n=1,925).

A13: Which of the following statements best describes your driving?	N	%
I tend to pass other cars more often than other cars pass me	319	16.6%
Other cars pass me more often than I pass them	426	22.1%
Both/about equally	1,097	57.0%
Don't know	46	2.4%
Prefer not to answer	7	0.4%
No response	30	1.6%

Table 33. Survey sample sizes for responses to Survey Item A14 (full sample n=1,925).

A13: When driving, I tend to…	N	%
Stay with slower moving traffic	197	10.2%
Keep up with the faster traffic	714	37.1%
Both about equally	929	48.3%
Don't know	34	1.8%
Prefer not to answer	6	0.3%
No Response	45	2.3%

**Table 34. Survey sample sizes for responses to Survey Items A15 to A20
(full sample n=1,925).**

Survey Item	N	Often	Some-times	Rarely	Never	Don't know
A15: +15 mph on multi-lane divided highways?	1901	1.5%	10.5%	39.7%	47.8%	0.6%
A17: +15 mph on two-lane highways, one lane in each direction in rural areas?	1899	1.2%	8.3%	30.5%	59.4%	0.6%
A19: + 10 mph on neighborhood or residential streets?	1901	1.2%	6.0%	24.8%	67.6%	0.4%

Table 35. Survey sample sizes for responses to Survey Item A21 (full sample n=1,925).

How many times have you been stopped for speeding in the past twelve months?	
None	71.7%
Once	19.8%
Twice	5.8%
3 or more times	2.7%
Total	1,880

Responses by NSSAB 2011 Typology

The three clusters were interpreted as corresponding to the same speeder types as the NSSAB: Nonspeeders, Sometimes Speeders, and Speeders. The figures presented below illustrate the pattern of responses from our current survey for the defining questions for each cluster groups. Consistent with the reporting in the NSSAB, only the key response options are shown in the figures (Schroeder, Kostyniuk, & Mack, 2013).

Figure 19 shows partial responses for the two questions about driver passing and speed maintenance tendencies (Question A13 and A14). The majority of respondents who indicated that they passed other cars more frequently and that they keep up with faster traffic belonged to the Sometimes Speeders group (60% and 66%, per question, respectively), while a third of the respondents belonged to the Speeder group (39% and 31%, per question respectively). In other words, almost all of the Sometimes Speeders and Speeder types selected the more aggressive response options in these questions. The majority of respondents that indicated more cars passed them and that they stayed with slower moving cars belonged to the Nonspeeder group (88% and 96%, per question, respectively). The overall response patterns were consistent with the corresponding response patterns in the NSSAB.
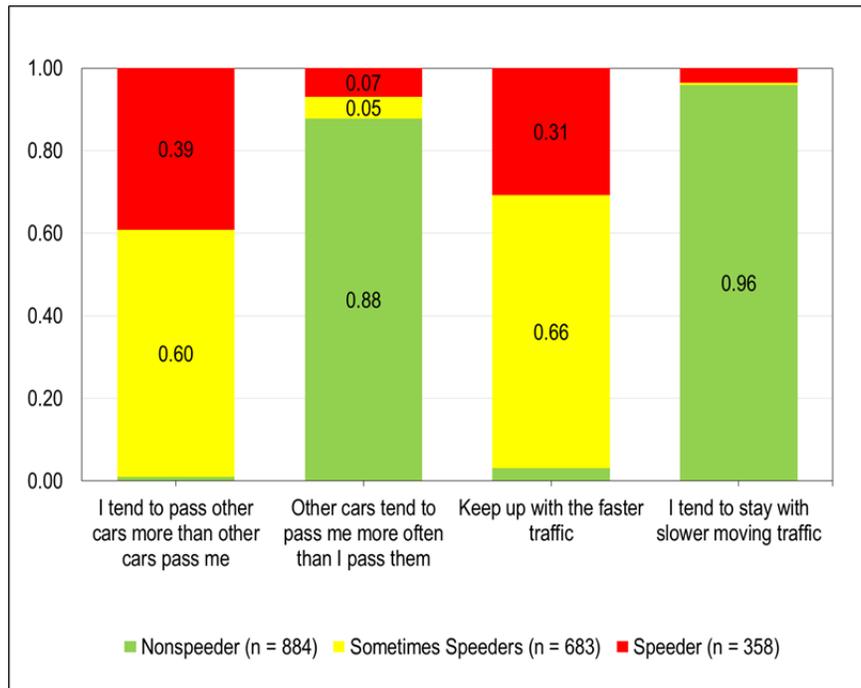
Figure 19. NSSAB driver type by driving tendency for current survey

Figure 20 shows the percent of responses to questions about speeding behavior on various roadways for the response options *Often* and *Never*. As illustrated in Figure 20, the majority of respondents that selected often for the three questions about frequency of driving over the speed limit on different road types almost entirely belonged to the Speeder group (97%, 100% and 95%, per question respectively). The majority of respondents that selected *Never* for the three questions belonged to the Nonspeeders group (72%, 68% and 57%, per question respectively), and approximately a third belonged to the Sometimes Speeders group (26%, 31% and 38%, per question respectively). The overall response patterns were consistent with the corresponding response patterns in the NSSAB.
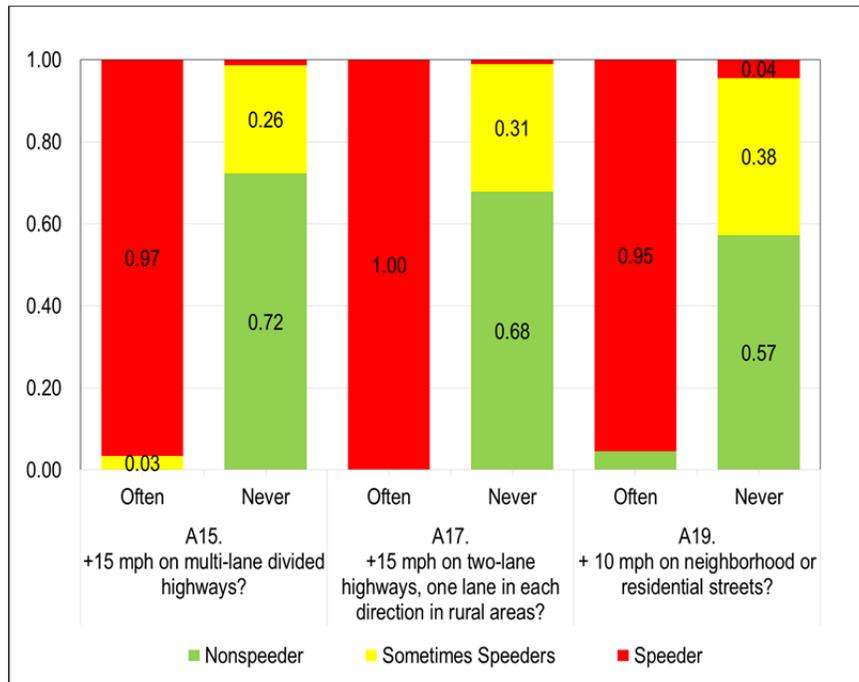
Figure 20. NSSAB taxonomy speeding behavior on various road types for current survey

Figure 21 illustrates the *Often* and *Never* responses for three similar questions about frequency of driving over the posted speed limit on additional types of roads that were not included in the NSSAB. The majority of respondents that selected Often belonged to the Speeder group (95%, 64% and 88%, per question respectively). In contrast, the majority of respondents that selected Never for the three questions belonged to the Nonspeeder group (64%, 78% and 67%, per question respectively), and less than a third belonged to the Sometimes Speeders group (32%, 22% and 30%, per question respectively). The responses to the questions in Figure 21 mirror those in Figure 20. The biggest difference is on the question about main roads in town, on which a greater proportion of Sometimes Speeders (28%) and Nonspeeders (8%) report a willingness to speed often on main roads in town with two lanes in each direction compared to other road types.
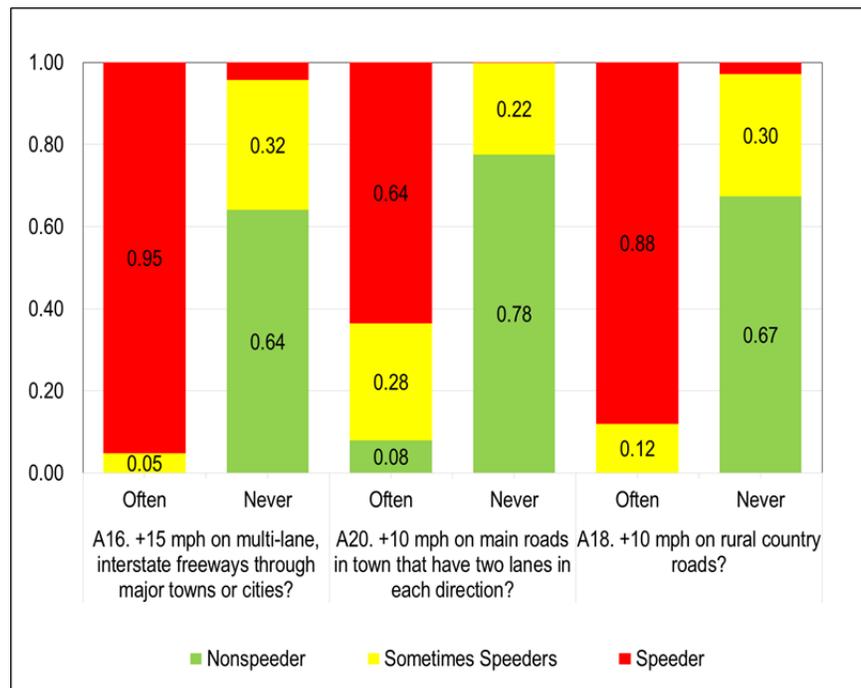
Figure 21. NSSAB taxonomy speeding behavior on various road types for current survey

Demographics by NSSAB Typologies

This section contains figures that illustrate the distributions of gender, age, and household income across the NSSAB typologies for the current survey. Figure 22 shows gender divided by cluster membership. There does not appear to be a strong dependency on gender for NSSAB typology cluster assignment; however, there is a slightly greater proportion of females in the Nonspeeder type than males. Figure 22 also shows speeder type by the three age groups. The figure indicates that there are a higher percentage of younger drivers classified as Sometimes Speeders (41%) and Speeders (28%) compared to older drivers (26% and 8%, respectively). Older respondents are much more likely to be classified as Nonspeeders.
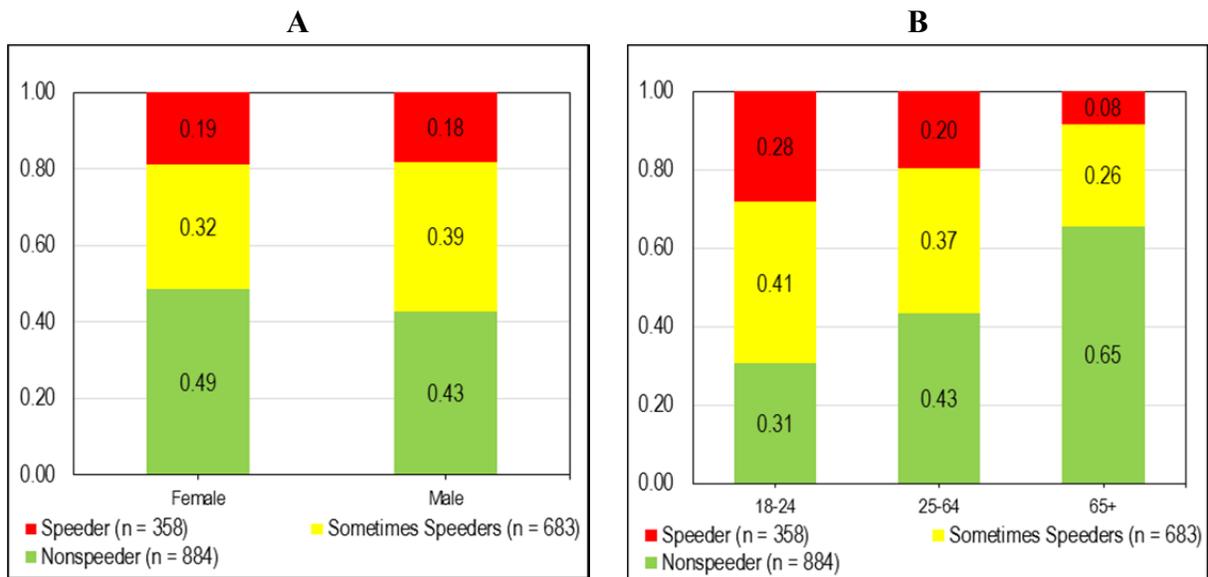
Figure 22 NSSAB driver type by gender (A) and age group (B) for current survey

Figure 23 shows cluster group by income category for the current survey. The figure depicts the curvilinear effect of income on cluster assignment. Focusing only on the respondents that were assigned to the Nonspeeder cluster group, there were fewer Nonspeeders making less than $5,000 and over $100,000 per year compared to the other income categories. These respondents tended to be in the Sometimes speeder and Speeder groups more often than the other income groups. It is important to point out that the number of respondents with incomes less than $5,500 is very small (n = 44). Alternatively, ignoring the less than $5k group, a negative association is evident, which suggests that as income increases, assignment to the Nonspeeder group becomes less likely.
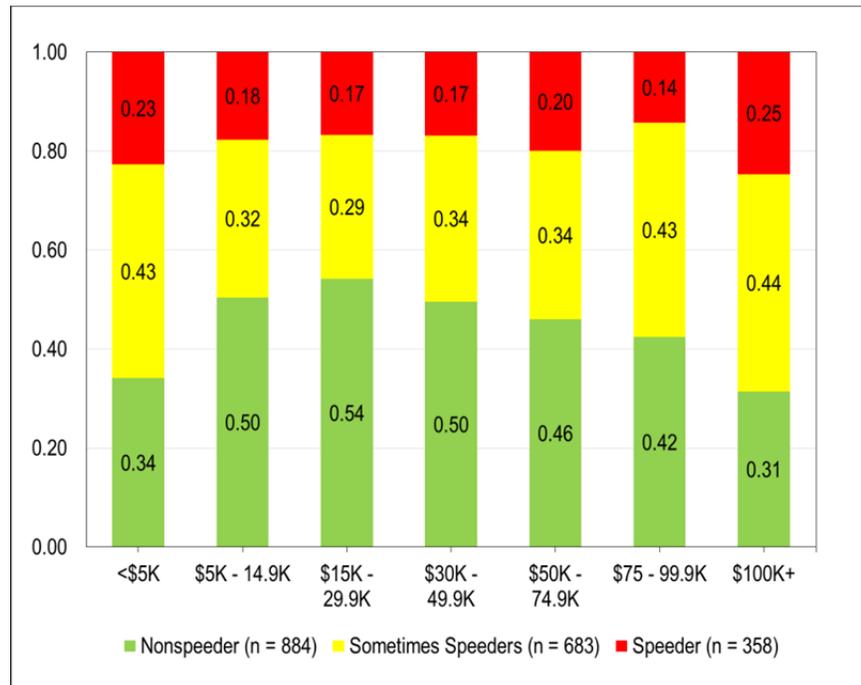
Figure 23. NSSAB driver type by income

Motivations for Speeding Typology

This section provides descriptive analysis of basic driver characteristics of people in the current survey that belonged to different types of speeders, based on a speeder typology developed in the original MfS study (Richard et al., 2012). A hierarchical cluster analysis was conducted using questions selected based on the preliminary analysis conducted to select MfS questions for the current survey. Eleven questions that were good differentiators of the groups in the MfS Typology were used in the current cluster analyses. None of the questions used in the MfS typology were the same as those included in the NSSAB 2011 typology. The questions included the following.

1. A9 - Driving within or near the speed limit reduces my chances of an accident.
2. A11 - Driving within or near the speed limit makes me feel bored.
3. A27 - How likely/unlikely is it that you would drive within or near the speed limit driving in a fast/powerful car?
4. A28 - How likely/unlikely is it that you would drive within or near the speed limit Driving when the speed limit is clearly signed?
5. A34 - How often do you disregard the speed limits late at night or early in the morning?
6. A35 - How often do you get involved in "races" with other drivers on a roadway or from a stop light?
7. A40 - How often do you take risks while driving because it's fun, such as driving fast on curves or "getting air"?
8. A42 - How often do you drive 10-20 mph over the speed limit?
9. A45 - How much do you want to keep within or near the speed limit while driving in the **near future**?
10. A46 - At what speed would you typically be driving on a Multi-Lane, divided Interstate freeway that passes through a major town or city, such as I-90 or I-84 (as shown in the picture below), with a **65** mph posted speed limit.
11. A47 - At what speed would you typically be driving on a main (arterial) road with two travel lanes in each direction in a town (as shown in the picture below) with a **35** mph posted speed limit.

Responses to the eleven questions were used to cluster drivers using the k-means clustering algorithm. The analysis was repeated with 1 to 15 cluster centers. Figure 24 shows how well each of these cluster solutions fit the data. Lower within-groups sum of squares indicate that members of each cluster are closer to its center. The inflection point around four clusters suggested that a four-cluster solution represented a point of diminishing returns, where adding more clusters provided diminishing benefit relative to the overall fit to the data. Cluster solutions from 2-6 were examined, and the four-cluster solution was selected because it was the most interpretable, in addition to being comprised of the most distinct clusters.
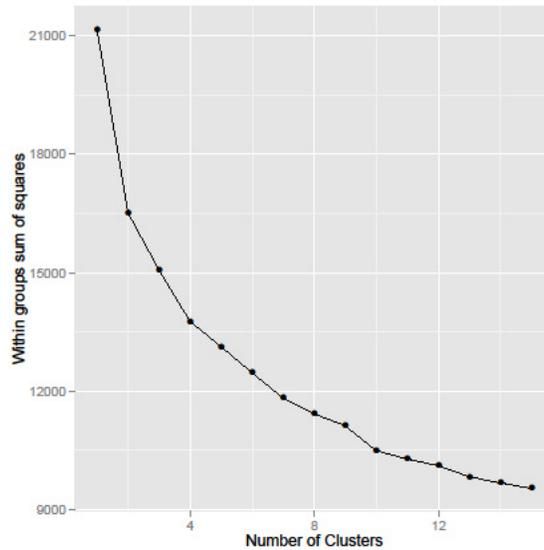
Figure 24. Cluster analysis scree plot

Table 36 below provides a description of the four driver types identified by the cluster analysis. The clustering primarily parsed drivers into groups based on differences in their self-reported attitudes and behaviors, and speed choices. Labels that reflect the response patterns across the questions were assigned to each group. Note that while there are similarities with the MfS speeder categories, it was not possible to directly map participants in the current study with those of the original MfS typology without having actual driving data from the current survey respondents. Thus, while the typology described in this section is based on the differentiating characteristics from the original MfS typology, it may represent different underlying speeder types.

The Infrequent type of speeder consisted of a greater proportion of older and female drivers, and these people were generally inclined to respond positively regarding driving within the speed limit. Casual speeders included drivers from all demographic groups and these respondents tended to have intermediate views about speeding. Emotional speeders included a greater proportion of younger and male drivers. They mostly held intermediate views about speeding, but were more inclined towards speeding than the Casual group. Emotional speeders also had the highest average responses on questions related to thrill-seeking/emotional driving, such as "take risks while driving because it's fun." The last group had a similar demographic composition as the Emotional speeders, but their responses tended to be the most aggressive and favorable

towards speeding in most of the speeding questions. They also reported typical driving speeds that were the fastest of all the speeder types.

Table 36. Characteristics of the four motivations for speeding driver-type clusters.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Label	Infrequent	Casual	Emotional	Aggressive
Number of respondents	900	696	172	157
Attitudes and behaviors	Favorable towards not speeding, low risk	Intermediate views, closer to Infrequent than Aggressive	Intermediate views, but high on emotional speeding questions	Favorable towards speeding and generally riskiest
Speed choice	Slowest: At or within 5 mph of posted speed limit	Not as fast as Aggressive, but typically faster than posted speed limit	Not as fast as Aggressive, but typically faster than posted speed limit	Fastest: Above posted speed limit
Demographics	Older, more Females	Representative/ balanced	More Young Males	Younger, slightly more Males

Responses by Motivations for Speeding Typology

This section provides descriptive analysis of self-reported speeding tendencies of people who belonged to different types of speeders defined by the MfS typology.

Figure 25 illustrates the responses for the two questions about passing and speed maintenance tendencies (Questions A13 and A14). The majority of respondents who indicated that they passed other cars more frequently than other cars passed them and that they keep up with faster traffic belonged to the Casual group (45% and 47%, per question respectively) while the next largest group of respondents belonged to the Aggressive group (29% and 17%, per question respectively). The majority of respondents that indicated more cars passed them and that they stayed with slower moving cars belonged to the Infrequent group (71% and 79%, per question respectively) and the next largest group of respondents belonged to the Casual group (24% and 17%, per question, respectively). In general, the pattern of findings is similar to that of the NSSAB pattern, except that most groups are more spread out across the speeding categories. However, similar to NSSAB, the aggressive speeders are concentrated in the higher-speeding categories.
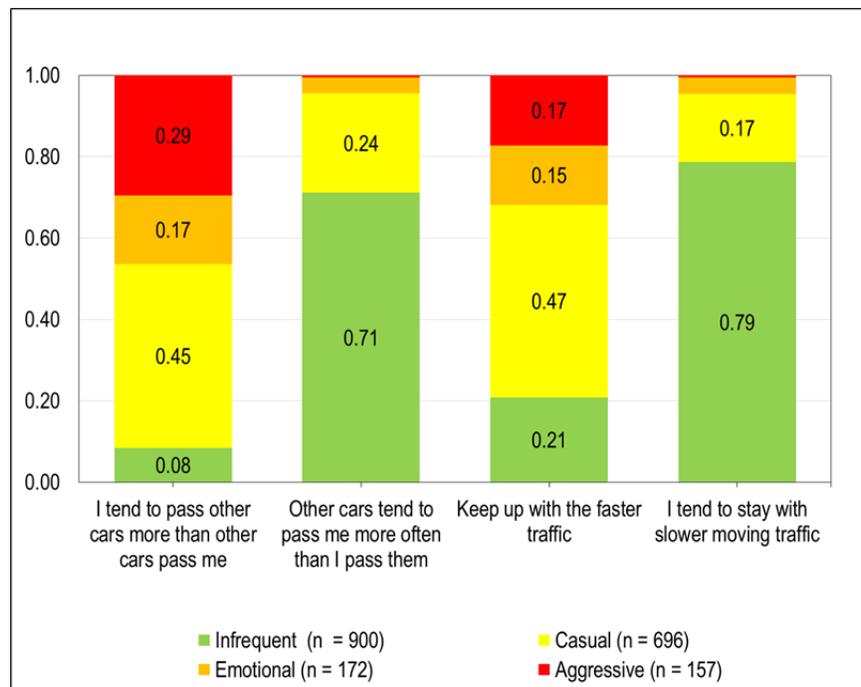

Figure 25. MfS driver type by driving tendency for current study

Figure 26 shows the percent of responses to questions about speeding behavior on various roadways by the two responses *Often* and *Never*. As illustrated in Figure 26, the majority of respondents that selected often for the three questions about frequency of driving over the speed limit on different road types belonged to the Aggressive group (72%, 74% and 73%, per question, respectively) with the next largest group belonged the Emotional group (14%, 17%, and 14%, per question, respectively). The majority of respondents that selected Never for the three questions belonged to the Infrequent group (67%, 62% and 57%, per question, respectively), and a third belonged to the Casual group (28%, 31% and 32%, per question, respectively). Figure 26 shows similarities to the NSSAB data. The Aggressive speeders dominate in the Often speed categories, and the Emotional speeder type tends to fall in these behavior categories as well.
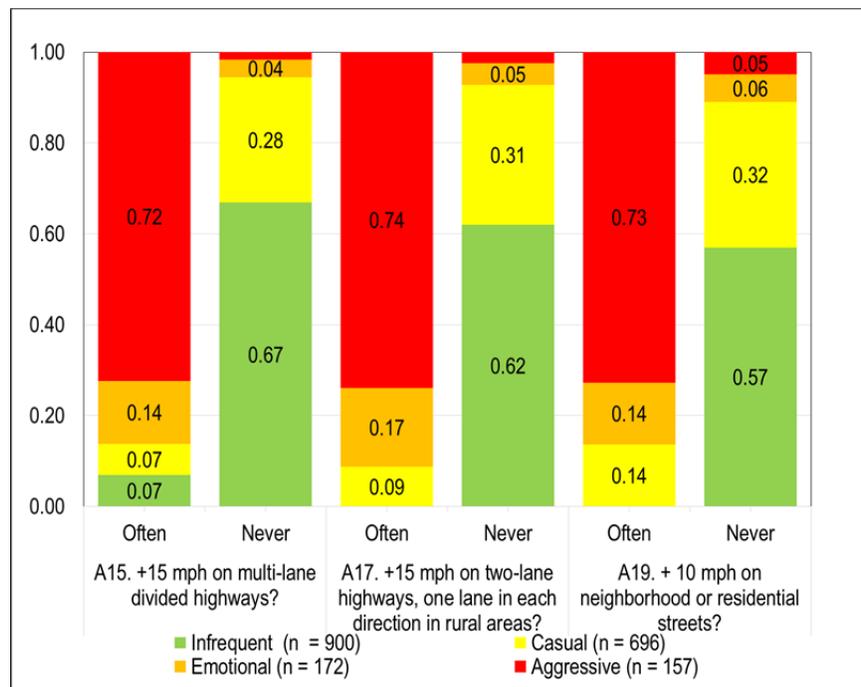
**Figure 26. MfS taxonomy speeding behavior on various road types for current study**

Figure 27 illustrates the responses for three similar questions about frequency of driving over the speed limit on the additional types of road included in the survey that were not in the NSSAB survey. For two of the questions (A16 and A20), the majority of respondents that selected often belonged to the Aggressive group (67% and 68%, respectively), while respondents that selected often for Question A18 were more evenly distributed between the Aggressive and Casual groups (35% and 40%, respectively). The majority of respondents that selected never for the three questions belonged to the Infrequent group (62%, 79% and 68%, per question respectively), and the next largest group belonged to the Casual group (31%, 18% and 25%, per question respectively). These patterns are similar to those observed with the NSSAB typology.
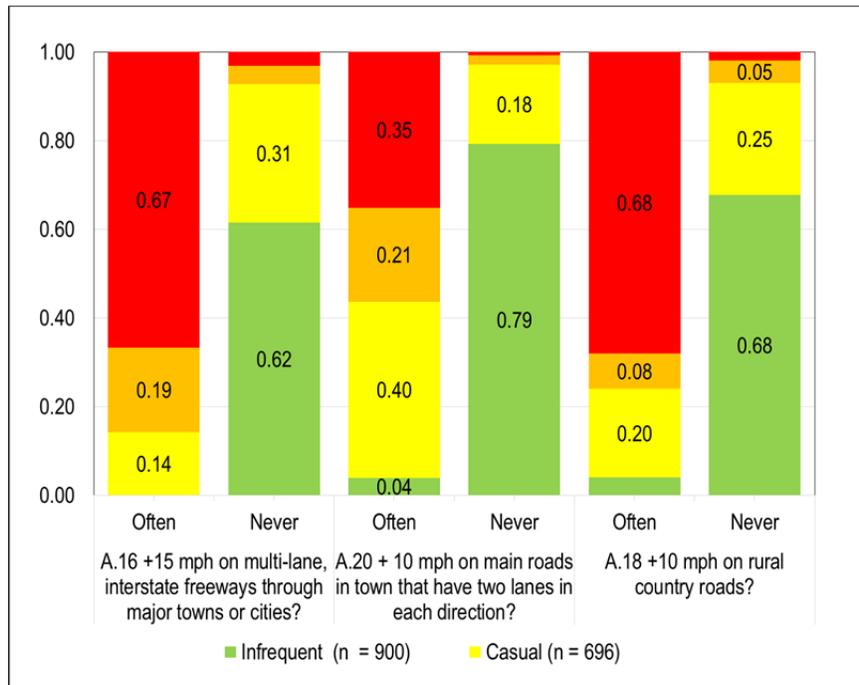
Figure 27. MfS taxonomy speeding behavior on various road types for current study

Demographics by MfS Typologies

This section contains graphs and figures that show the distributions of gender, age, and household income for the current study across the MfS typology. Figure 28-A shows small gender differences, as there are proportionally more females (52%) in the infrequent speeder group as compared to males (41%). Figure 28-B also shows speeder type by the three age groups. There appears to be a strong dependency between age and cluster assignment, with the proportion of respondents in the Infrequent speeder group increasing as age increases. Similarly, the proportion of respondents assigned to Casual, Emotional and Aggressive speeder types decreases as age increases.
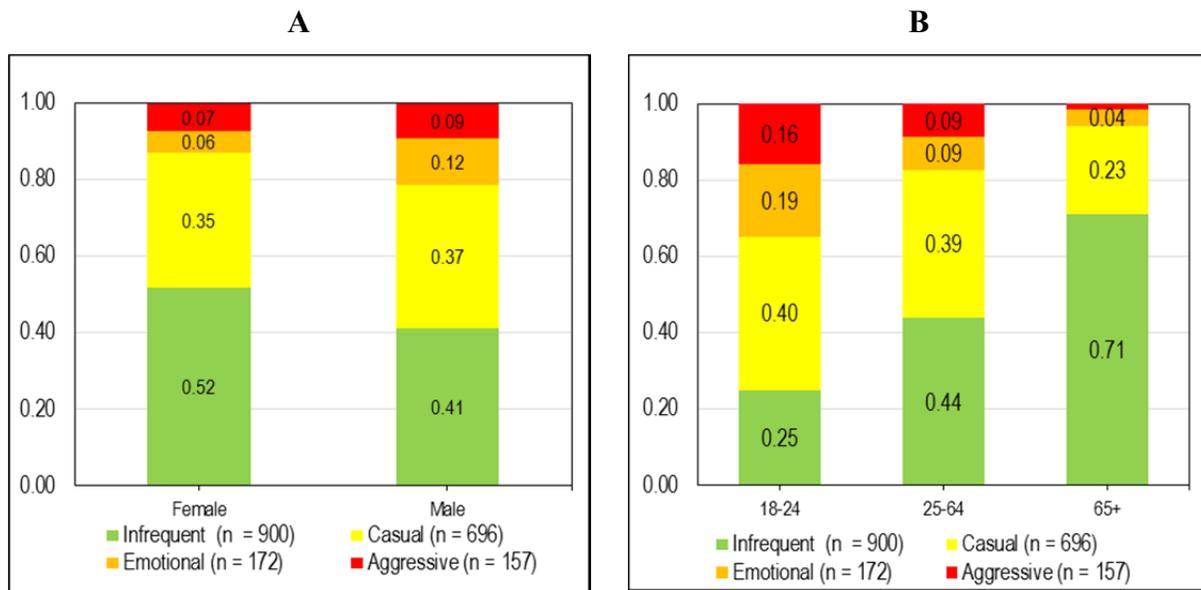
Figure 28. MfS driver type by gender (A) and age group (B) for current study

Figure 29 shows cluster groups by income category. The figure depicts the curvilinear effect of income on cluster assignment. The curvilinear component of the trend may be carried by smaller sample sizes for the lowest income brackets. Ignoring the less than $5K-income bracket--which represents just a small number of respondents--shows that the general relationship involves a decrease in the proportion of Infrequent speeder type drivers as income increases. This is accompanied by increases in the proportion of Casual and Aggressive speeders over the same range.
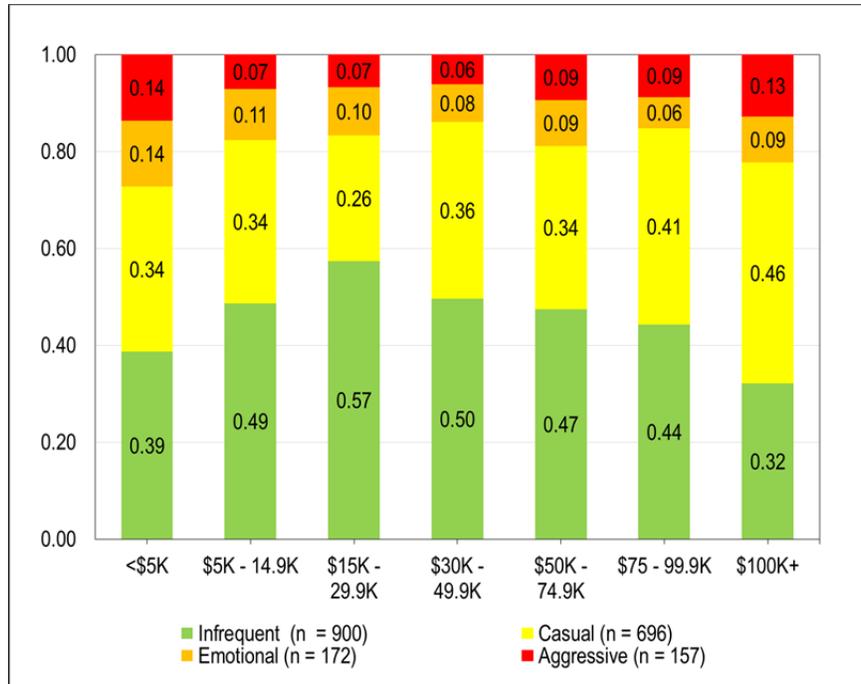
Figure 29. MfS driver type by household income

Comparison of Typologies

This section describes analyses conducted to directly compare the NSSAB and MfS typologies. Both typologies were also compared to the number of speeding convictions in the past 3 years to validate the effectiveness of the typology categories. The descriptive analyses presented above indicated that the typologies showed similarities in that they both generally categorized drivers in terms of amount of speeding, even though they did so using completely different survey questions.

Table 37 below shows the distribution of drivers across both typologies. The most common typology combination is that of Nonspeeders versus Infrequent speeders (n=647). Following this is the combination of Sometimes Speeders and Casual speeders (n=349). For each of these combinations, both categories are conceptually similar, so it is not surprising that these are to two most common. There is also reasonable agreement in terms of the highest speeders (Emotional and Aggressive versus Speeder), with the aggressive speeders being slightly more prevalent of the two MfS speeder types.

Table 37. Distribution of respondents by cluster for the NSSAB and MfS typologies. Bolded, shaded cells represent conceptually similar combinations.

	NSSAB 2011				
	Speeder Type	*Nonspeeder*	*Sometimes Speeder*	*Speeder*	*Total*
MfS	*Infrequent*	647	212	41	900
	Casual	202	349	145	696
	Emotional	26	75	71	172
	Aggressive	9	47	101	157
	Total	884	683	358	1,925

To simplify comparisons, drivers in the Emotional and Aggressive speeder groups for the MfS typology were combined into a single high-speeder MfS group. The distribution in terms of percentages is shown in Table 38. The diagonal cells represent consistent classification of drivers across the two typologies, which includes 61 percent of the driver sample overall.

Table 38. Percentage distribution of drivers across driver types for the NSSAB and MfS typologies. Emotional and Aggressive speeders in the MfS typology are combined into a single high-speeder group. Bold cells represent conceptually similar combinations.

		NSSAB 2011			
	Speeder Type	*Nonspeeder*	*Sometimes Speeder*	*Speeder*	*Total*
MfS	*Infrequent*	**34%**	11%	2%	900
	Casual	10%	**18%**	8%	696
	Emo/Aggr	2%	6%	**9%**	329
	Total	884	683	358	1,925

χ² Goodness of Fit Test for Comparing the Similarities between MfS, NSSAB, and Convictions

A $\chi2$ goodness-of-fit test was conducted to determine if the typologies are similar to each other, and to test the degree of similarity when the effects of speeding convictions are accounted for. The null hypothesis of this test is that the MfS and NSSAB typologies are similar, and the alternative hypothesis is that they are different. The χ^2 goodness-of-fit test included an omnibus test with the MfS frequency distribution as the observed values and the NSSAB frequency distribution as the expected values. Three a-priori tests were also run on the cluster assignments by conviction groups, again with MfS used as the observed values and NSSAB as the expected values. The omnibus model was not significant (χ^2 (2, N=1925) = 2.9, p = 0.2). Table 39 shows the frequency distributions used in the omnibus test. The percent of respondents that were assigned to the cluster groups were nearly identical.

Table 39. MfS and NSSAB counts per cluster group.

	MfS				NSSAB		
	Count	*Percent*	*Cum.*		*Count*	*Percent*	*Cum.*
Infrequent	900	47%	47%	*NonSpeeder*	884	46%	46%
Casual	696	36%	83%	*Sometimes*	683	35%	81%
Emo/Aggr	329	17%	100%	*Speeder*	358	19%	100%

The follow-up test for the zero convictions group was not significant (χ^2 (2, N=952) = 4.0, p = 0.1). Table 40 shows the frequency distributions used in the a-priori test on the zero-convictions subgroup of respondents. Again, the percent of membership is nearly identical across the NSSAB and MfS cluster groups indicating that both typologies capture the zero-conviction group in a similar manner.

Table 40. Zero Convictions Division: MfS and NSSAB counts per cluster group.

	MfS, 0 Convictions				NSSAB, 0 Convictions			
	Count	*Percent*	*Cum.*		*Count*	*Percent*	*Cum.*	*% Diff*
Infrequent	553	58%	58%	*NonSpeeder*	578	61%	61%	-3%
Casual	298	31%	89%	*Sometimes*	288	30%	91%	1%
Emo/Aggr	101	11%	100%	*Speeder*	86	9%	100%	2%

The follow-up test for the one conviction group was not significant (χ^2 (2, N=952) = 4.0, p = 0.1; χ^2 (2, N=374) = 4.0, p = 0.1). Table 41 shows the typology counts used in the a-priori test on the one conviction division of respondents. Again, the percent of membership is nearly identical across the NSSAB and MfS cluster groups indicating that both typologies capture the one-conviction group in a similar manner.

Table 41. One Conviction Division: MfS and NSSAB counts per cluster group.

	MfS, 1 Conviction				NSSAB, 1 Conviction			
	Count	*Percent*	*Cum.*		*Count*	*Percent*	*Cum.*	*% Diff*
Infrequent	166	44%	44%	*NonSpeeder*	147	39%	39%	5%
Casual	142	38%	82%	*Sometimes*	155	41%	81%	-3%
Emo/Aggr	66	18%	100%	*Speeder*	72	19%	100%	-2%

However, the follow-up test for the two or more convictions group was significant (χ^2 (2, N=599) = 11.3, p = 0.003). Table 42 shows the typology counts used in the a-priori test on the two or more convictions division of respondents. The percent membership numbers suggest that the two typologies are more different than in the previous comparisons, and that they do not capture the two-or-more convictions group in an identical manner. This result indicates that a larger number of respondents were categorized as speeders using the NSSAB typology compared to the number of respondents categorized as Emotional/Aggressive.

Table 42. Two or more Convictions Division: MfS and NSSAB counts per cluster group.

	MfS, 2+ Convictions				NSSAB, 2+ Convictions			
	Count	*Percent*	*Cum.*		*Count*	*Percent*	*Cum.*	*% Diff*
Infrequent	181	30%	30%	*NonSpeeder*	159	27%	27%	3.7%
Casual	256	43%	73%	*Sometimes*	240	40%	67%	3%
Emo/Aggr	162	27%	100%	*Speeder*	200	33%	100%	-6%

Two additional posteriori χ^2 goodness of fit tests were run to determine the relationship between convictions and typologies. To conduct the test, the frequency distributions of each typology were used as observed values and number of convictions as the expected values.

The test on NSSAB and speeding convictions was significant ($\chi^2_{(2, N=1925)} = 357.1$, $p < 0.001$). The percent column in Table 43 shows two different distributions: the percent of the full sample that was assigned to each cluster group; and the percent of convictions across the convictions groups. Note that respondents were mailed surveys based on a 40%, 20%, 40% sampling frame across the 0, 1, and 2+ conviction categories, and the particular distribution across conviction groups shown in Table 43 arises from this sampling imbalance.

As Table 43 shows, the percent values for the three groups are not identical, which indicates that the distribution of convictions is not the same as the distribution of NSSAB cluster assignments. In particular, the percentages in the first row appear to match; there is a similar percentage of the full sample that were assigned to the Nonspeeder group compared to the percent of the sample that were in the zero convictions group. However, the second and third rows show differences. There is a low percentage of people in the 1-conviction group, which does not correspond to the higher percentage of Sometimes speeders and there is a higher percentage of respondents in the 2+ convictions group, which does not correspond to the lower percentage of Speeders. Thus, the NSSAB typology does not reliably capture drivers with 2+ convictions within the Speeder category.

Table 43. Convictions compared to NSSAB.

	NSSAB				Convictions Past Year			
	Count	*Percent*	*Cum.*		*Count*	*Percent*	*Cum.*	*% Diff*
NonSpeeder	884	46%	46%	*0*	952	49%	49%	-4%
Sometimes	683	35%	81%	*1*	374	19%	69%	16%
Speeder	358	19%	100%	*2+*	599	31%	100%	-13%

The test on the MfS typology and speeding convictions was also significant ($\chi^2_{(2, N=1925)} = 401.8$, $p < 0.001$). The results suggest that the speeding convictions distribution is not statistically similar to the distribution of cluster assignments. Table 44 shows the frequency distributions used to compare Convictions to the MfS typology (note that distribution of convictions is the same as the convictions in Table 44).

As Table 44 shows, the percent values for the three groups are not identical, which indicates that the distribution of convictions is not the same as the distribution of MfS typology cluster assignments. Similar to the NSSAB typology, the first row shows similar percentages for the Infrequent speeders and the 0-conviction group. Also, there are fewer Emotional/Aggressive relative to Casual speeders compared to the 1 and 2+ conviction groups. Thus, the MfS typology also fails to reliably capture drivers with 2+ convictions within the Emotional and Aggressive speeder types.

Table 44. Convictions compared to MfS.

	MfS				Convictions Past Year			
	Count	Percent	Cum.		Count	Percent	Cum.	% Diff
Infrequent	900	47%	47%	0	952	49%	49%	-3%
Casual	696	36%	83%	1	374	19%	69%	17%
Emo/Aggr	329	17%	100%	2+	599	31%	100%	-14%

Typology by Number of Convictions

As indicated by the chi-square goodness-of-fit tests in the previous section, both the MfS and NSSAB typologies represent different underlying constructs than the speeding conviction data. To better understand the relationship between the typologies and speeding convictions, ordinal logistic regressions were run on convictions using the speeder types from each typology as predictors.

NSSAB

The same base variables as in the previous models (age, gender, weekly mileage, and drive for work) were included in the regression to adjust for demographics and driving exposure. The only other variables included were the different types of speeder categories from the NSSAB typology. As Table 45 indicates, the overall model was significant.

Table 45. Model results (NSSAB).

Sample Size	1836
χ^2	428
Log Likelihood	-1668
Degrees of Freedom	9

Table 46 shows the model coefficients and odds ratios for the predictor variables. The results of the regression analysis indicate that--after adjusting for demographics and exposure measures--

the NSSAB speeder type was a significant predictor of number of convictions. In particular, the odds of Sometimes speeders having more convictions than Nonspeeders was 2.21 times, and the odds of Speeders having more convictions than Nonspeeders was even greater, at 4.73 times.

Table 46. Ordered logistic regression output:
Odds of convictions by model predictors and NSSAB.

Variables	Model Odds Ratio	β	p-value	z-score	β max95th	β min95th
C1 Age	0.97	-0.03	0.00	-9.34	-0.02	-0.03
C7 Gender_F	1.45	0.37	0.00	3.76	0.56	0.18
A23 < 50	.	.	.	.	.	.
A23 50 to 100	1.38	0.32	0.02	2.42	0.58	0.06
A23 100 to 200	1.69	0.52	0.00	3.75	0.80	0.25
A23 200 to 400	2.35	0.86	0.00	5.59	1.16	0.56
A23 > 400	4.09	1.41	0.00	5.66	1.90	0.92
Driving for work	.	.	.	.	.	.
Driving not for work	0.65	-0.43	0.00	-4.17	-0.23	-0.64
NSSAB Nonspeeder	.	.	.	.	.	.
NSSAB Sometimes	2.21	0.79	0.00	7.41	1.00	0.58
NSSAB Speeder	4.73	1.55	0.00	11.55	1.82	1.29
cut1						
_cons	0.64	-0.45	0.03	-2.18	-0.05	-0.86
cut2						
_cons	1.70	0.53	0.01	2.53	0.94	0.12

Motivations for Speeding

The same basic regression analysis as before was run for the MfS typology. As Table 47 indicates, the overall model was significant.

Table 47. Model results (MfS).

Sample Size	1,836
χ^2	340.38
Log Likelihood	-1712.6
Degrees of Freedom	10

Table 48 shows the model coefficients and odds ratios for the predictor variables. All speeder types had significantly greater odds of convictions than the Infrequent speeders. The odds ratios

for the Emotional and the Aggressive speeder groups were similar, and both were smaller than the Speeder group in the NSSAB regression model discussed above[2].

Table 48. Ordered logistic regression output:
Odds of convictions by model predictors and MfS.

Variables	Model Odds Ratio	β	p-value	z-score	β max95th	β min95th
C1 Age	0.97	-0.03	0.00	-8.85	-0.02	-0.03
C7 Gender_F	1.54	0.43	0.00	4.38	0.63	0.24
A23 < 50	.	.	.	.	.	.
A23 50 to 100	1.38	0.32	0.01	2.45	0.58	0.06
A23 100 to 200	1.71	0.54	0.00	3.90	0.81	0.27
A23 200 to 400	2.46	0.90	0.00	5.95	1.20	0.60
A23 > 400	4.34	1.47	0.00	6.01	1.95	0.99
Driving for work	.	.	.	.	.	.
Driving not for work	0.65	-0.43	0.00	-4.20	-0.23	-0.63
MfS Infrequent	.	.	.	.	.	.
MfS Casual	1.81	0.59	0.00	5.59	0.80	0.39
MfS Emotional	2.63	0.97	0.00	5.59	1.31	0.63
MfS Aggressive	2.75	1.01	0.00	5.60	1.37	0.66
cut1						
_cons	0.59	-0.53	0.01	-2.50	-0.11	-0.95
cut2						
_cons	1.50	0.41	0.06	1.89	0.83	-0.01

Although both typologies do a reasonable job of predicting convictions, they are still associated with a relatively high number of missed classifications. In particular, both typologies only identify 58 and 61 percent of drivers with no convictions as non/infrequent speeders (see Table 49). The typologies are even less accurate with drivers that have two or more convictions, classifying only 27 and 33 percent as high speeders. In addition, 17 percent of drivers that had two or more convictions were classified as non-speeders by both typologies. This is perplexing because these drivers were clearly non-speeders based on their survey responses about driving/speeding behaviors and attitudes, yet they still had multiple speeding convictions. It is possible that there is a random element as to whom gets stopped and convicted for speeding, or that additional typology development or refinement may be needed.

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[2] Note that these two groups were not combined in the regression analysis like they were in the comparison with the NSSAB described in the previous section. This was done in the previous analysis to match the number of groups in the two typologies. No such restriction was needed for the regression analysis.

Table 49. Comparison of the two typologies across number of convictions.

Speeder Type		NSSAB 2011 by Number of Convictions											
		0 Convictions				*1 Conviction*				*2 Convictions*			
		Non	*Some*	*Spdr*	*Total*	*Non*	*Some*	*Spdr*	*Total*	*Non*	*Some*	*Spdr*	*Total*
MfS	*Infreq*	47%	10%	2%	58%	26%	16%	2%	44%	17%	10%	3%	30%
	Casual	12%	16%	4%	31%	11%	18%	8%	38%	8%	22%	13%	43%
	Emo/ Aggr	2%	5%	3%	11%	2%	7%	9%	18%	1%	8%	18%	27%
	Total	61%	30%	9%		39%	41%	19%		27%	40%	33%	

Overall, the analyses in this Chapter indicate that the notion of different speeder types has merit. The two approaches investigated resulted in typologies that were similar (especially at the low-speeder end), even though they were based on entirely different types of questions. In addition, regression analyses indicated that both typologies were significant predictors of the number of speeding convictions. Because it is based primarily on questions related to driver attitudes and beliefs about speeding, the MfS typology provides more insight about the underlying motivations of these drivers. However, when it comes to predicting the number of convictions, the NSSAB typology was somewhat better for 2 or more convictions. Nevertheless, descriptive tables indicated that neither typology was particularly effective at capturing drivers with multiple convictions.

Chapter 6   Countermeasures

Introduction

This chapter discusses the survey questions that asked drivers about their opinions regarding the effectiveness of different speeding countermeasures, and a few other questions that examined some of their underlying beliefs about these measures. Although the survey questions addressed individual countermeasures, these could be categorized into broader groups based on how drivers would be affected (e.g., enforcement, education, etc.). The discussion of the descriptive results in this chapter follows this organization. Specifically, the descriptive results are presented initially by mean responses across all drivers and categories to identify the countermeasure that drivers find most effective overall. The final section of this chapter presents a summary of multiple regression analyses conducted for each countermeasure using demographic variables and number of convictions in the previous 3 years as predictors.

Evaluation of Countermeasures:

One goal of this project is the exploration of different types speeding countermeasures. To this end, drivers were asked to rate the potential effectiveness of a range of speeding countermeasures from different categories, including those that focus on:

- *Enforcement* approaches
- *Infrastructure*-based treatments or signs
- Driver *education* or instruction
- *Vehicle* operation or information displays
- *Economic* penalties or incentives

Table 50, below, provides a list of the individual countermeasures that respondents evaluated in the survey. The question numbers and a brief description for each countermeasure are also provided in the table. Note that countermeasures are listed in order based on category membership, rather than question number.

Table 50. List of Countermeasures evaluated in the survey.

Question Number	Countermeasure Type	Countermeasure Category	Countermeasure Description	Average Rating
B13	More Enforcement	Enforcement	Increased police presence and enforcement	4.06
B5	Knowing enforcement locals	Enforcement	Know which roads have frequent speed enforcement	3.78
B3	Radar-based speed displays	Infrastructure	Dynamic signs along the roadside that display the posted speed and drivers' actual speed	4.01
B4	More speed limit signs	Infrastructure	A greater concentration of speed limit signs across the road network so drivers encounter them more often	3.78
B15	Roadside Rumble Strips	Infrastructure	Grooved pavement along the roadway shoulder	3.39
B16	Speed Bumps	Location-Specific	A ridge set on the road surface that is uncomfortable to traverse at high speeds	4.16
B6	Fatality signs	Location-Specific	A sign that marks the location of speed-related fatal crash	3.19
B21	Stopping Distance Education	Education	Education on stopping distance under different speeds	4.04
B8	Better fine awareness	Education	Increasing awareness about fine amounts for speeding tickets	3.84
B20	Speed Course	Education	Speed awareness course when drivers are obtaining or renewing their license	2.64
B1	Cruise Control	Vehicle	Setting cruise control to keep from speeding	4.47
B18	Dashboard display	Vehicle	A visual display in the dashboard that shows the posted speed limit on current roadway	3.46
B2	Digital Speedometer	Vehicle	A speedometer that displays current speed as large digits rather than an analog needle display	3.15
B17	Speed Limiter	Vehicle	A device in the engine that prevents the vehicle from exceeding a maximum speed	2.64
B11	Incentives	Economic	Providing incentives, such as free license renewals to non-speeders	3.60
B7	Higher fines for Habitual	Economic	Progressively higher fines each time speeders receive a ticket	3.58
B9	Higher Insurance	Economic	Requiring higher insurance rates for speeders	3.21
B19	Fuel Efficiency Display	Economic	A dashboard display that shows the vehicle's current fuel efficiency	3.16

In the sections that follow, the findings for individual countermeasures are presented alongside other countermeasures from the same category. In addition to describing the overall pattern of responses, each section also provides a table that shows the breakdowns of responses by age group (18-24, 25-64, and 65+) and number of convictions (0, 1, 2+) for each survey question. Also, to simplify the discussion, overall findings regarding agreement level are based on combining both the "somewhat agree" and "strongly agree" response categories, unless a particular response category is specifically indicated.

Note that some interpretation of the response patterns may be required. For example, if there is a countermeasure that non-speeders find effective, but that speeders do not, the speeder responses could reflect the possibility that speeders would not like to see a countermeasure implemented. In these cases, the countermeasure could directly affect them in a negative way, such as higher fines for speeding convictions.

Enforcement Countermeasures

Increased police enforcement is a widely implemented countermeasure for reducing speeding. In question B13, respondents were asked to rate the overall effectiveness of this type of countermeasure. As seen from Figure 30, a high proportion of drivers agreed that police enforcement of speed limits was an effective countermeasure (83% agreed). Police enforcement of speeding had one of the highest effectiveness ratings of all the countermeasures included in the survey. When the data were segregated based on convictions, however, the results were slightly different (see Table 51). Drivers with 2+ convictions were slightly less likely to agree about the effectiveness of the police enforcement as a countermeasure (76% 2+ convictions versus 85% other groups). This is not surprising given that enforcement was likely an insufficient deterrent to keep them from speeding, or getting the multiple speeding convictions that got them into that group in the first place. There was also a large age difference in terms of strongly agreeing about effectiveness, with older drivers having the strongest opinions about the effectiveness of this approach (26% young, 36% middle, and 45% older).

Drivers were also asked whether knowing where the higher enforcement roadways are would reduce speeding. Only 66 percent of respondents agreed that this information would be effective. One reason for the lower ratings may be that this information allows drivers to speed strategically in low-enforcement areas to avoid tickets (Richard et al., 2012). This is also consistent with the finding that drivers with 2+ convictions had a higher proportion of responses indicating that they strongly agreed with the notion that knowing the enforcement levels influenced their speed choice, as compared to drivers with no convictions (34% versus 26%).
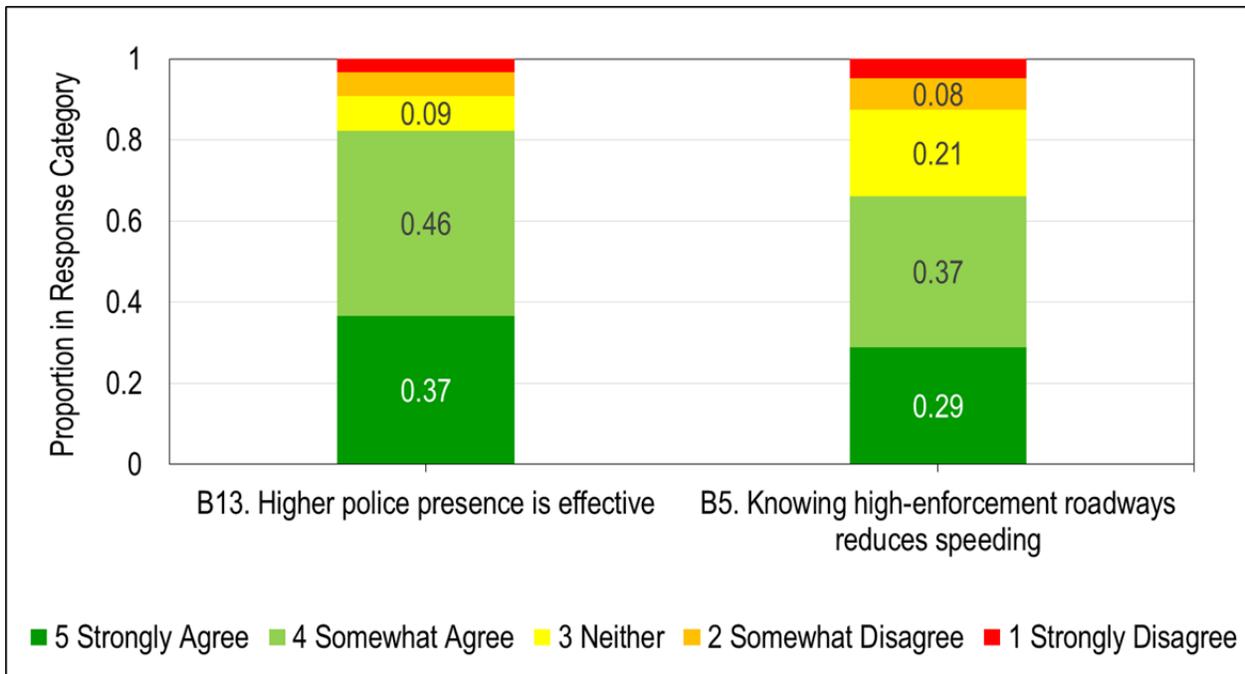
Figure 30. Proportion of responses by category for questions surveying the effectiveness of higher police presence (B13) and information about high-enforcement roadways as countermeasures to reducing speeding.

Table 51. Percentage of driver responses in each category by age group, number of convictions, and the total across all respondents (overall) for survey questions related to enforcement countermeasures (B13 and B5).

Response Options	Age				Convictions				
B13. Higher police presence/enforcement									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		*Overall*
Strongly Agree	26%	36%	45%		41%	35%	31%		37%
Somewhat Agree	43%	46%	45%		44%	50%	45%		46%
Neither	15%	9%	5%		8%	9%	10%		9%
Somewhat Disagree	8%	6%	4%		5%	5%	7%		6%
Strongly Disagree6%	7%	3%	2%		2%	2%	6%		3%
B15. Knowing locations of high-enforcement roadways									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		*Overall*
Strongly Agree	38%	28%	26%		26%	29%	34%		29%
Somewhat Agree	39%	37%	36%		37%	37%	38%		37%
Neither	15%	22%	23%		23%	22%	18%		21%
Somewhat Disagree	6%	8%	8%		8%	8%	7%		8%
Strongly Disagree	3%	5%	6%		6%	4%	3%		5%

Infrastructure-Based Countermeasures

Infrastructure-based countermeasures provide a way to directly control drivers' ability to speed on a roadway, as well as providing visual cues that can directly influence driver perception of how fast they are traveling. Many infrastructure countermeasures are location-specific, which means that their effectiveness may be limited to a small portion of the road network. It also means that these treatments also affect all drivers encountering them, which can be indiscriminant, since even non-speeders are impacted. This section describes the findings related to both road-treatment countermeasures and sign-based countermeasures.

Speed Bumps and Rumble Strips: Speed bumps and roadside rumble strips provide cues to drivers about their speed/driving in the form of haptic feedback. However, it seems that drivers view their effectiveness differently. As seen in Figure 31, there was a strong consensus that speed bumps are clearly effective in slowing drivers; with 87 percent either strongly agreeing or somewhat agreeing that this is an effective approach. Even though speed bumps are only a practical measure for reducing speeding on low-speed roads, these findings provide some degree of validation that drivers tend to see them as effective tools for forcing drivers to traverse them slowly.
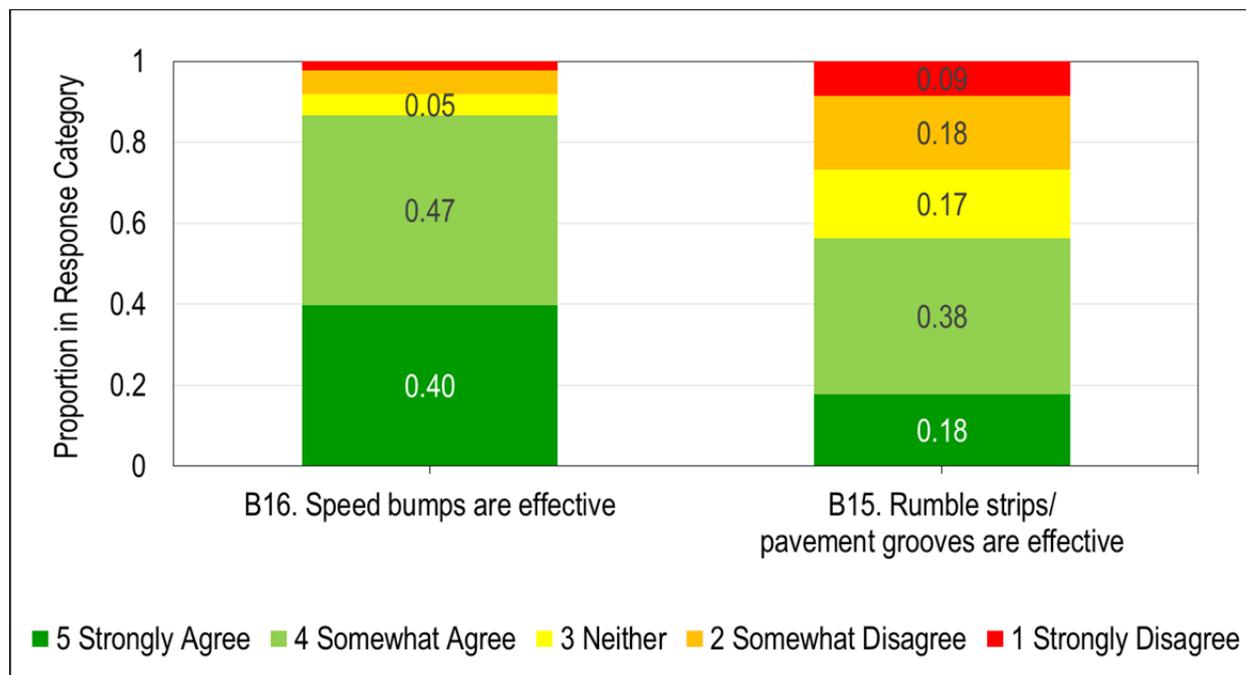
Figure 31. Proportion of responses by category for questions surveying the effectiveness of speed bumps (B16) and rumble strips (B15) as countermeasures to reducing speeding.

Driver responses for roadside rumble strips were not as clear as they were for speed bumps. In particular, a greater proportion of drivers disagreed about the effectiveness of the rumble strips for reducing speeds. This is not surprising given that the rumble strips described in the question are placed along the shoulder of the roadway, which requires that drivers first cross lane boundaries to encounter them, and may be more associated with lane maintenance than speeding for some respondents. However, a small majority of respondents (56%) still expressed some

degree of agreement regarding the effectiveness of this measure for reducing speeds. Although traversing a rumble strip may first require crossing the lane boundary, it may be that it also serves as an important reminder to drivers that they need to slow down as well as a reminder to stay within their lane.

Overall, there were age-related differences in responses for both countermeasures. In particular, older drivers were more likely to strongly agree than other age groups that these measures were effective at reducing speeding (see Table 52). In contrast, the pattern regarding convictions was less clear, with 1-conviction drivers being slightly more likely to somewhat agree than other groups for both countermeasures.

Table 52. Percentage of driver responses in each category by age group, number of convictions, and the total across all respondents (overall) for survey questions related to Infrastructure-based countermeasures (B13 and B5).

Response Options	Age				Convictions				
B16. Speed bumps									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		*Overall*
Strongly Agree	35%	39%	48%		40%	37%	42%		40%
Somewhat Agree	47%	48%	42%		48%	52%	42%		47%
Neither	7%	6%	3%		5%	6%	6%		5%
Somewhat Disagree	6%	6%	6%		6%	4%	6%		6%
Strongly Disagree	6%	2%	1%		2%	1%	4%		2%
B15. Roadside rumble strips									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		*Overall*
Strongly Agree	16%	16%	25%		16%	19%	20%		18%
Somewhat Agree	38%	37%	42%		38%	42%	37%		38%
Neither	21%	18%	14%		19%	17%	15%		17%
Somewhat Disagree	16%	20%	12%		19%	17%	18%		18%
Strongly Disagree	9%	9%	8%		8%	6%	11%		9%

Location-specific signage: Drivers were also asked to rate the effectiveness of different types of signs as countermeasures to speeding. Figure 32 indicates that roadside, radar-based speed displays were the most highly rated (78% agreed) sign-based countermeasures. Older drivers were more likely to strongly agree on this question than the other groups (50% older versus 35% middle, and 26% younger); however, there were no differences across number of convictions. In a follow-up question (B14), most respondents also agreed that these signs were most effective at locations with potential hazards, such as crosswalks or schools, where drivers tend to be more concerned about conflicts with hazards than driving fast.

In Question B4, drivers were asked about the effectiveness of posting the speed limit along roadways more frequently. Most respondents rated this as a relatively effective measure for reducing speed (70%). This countermeasure likely applies to unintentional speeding that can occur when drivers are not deliberately trying to speed and may not know what the speed limit is

for a particular road segment. A greater prevalence of posted speed limit signs should make it more likely that drivers can obtain this information.

Another countermeasure that was examined was the implementation of road signs indicating where speeding fatalities occurred. Overall, this countermeasure was identified as the least effective of the location-specific countermeasures, with only 43 percent of drivers agreeing to some extent that this was an effective countermeasure. Perceived effectiveness also varied by age. Specifically, a higher proportion of younger drivers (53%) indicated that they considered fatality signs to be effective, as compared to middle (41%) and older drivers (42%). There was no effect of number of convictions on driver responses to these location specific countermeasures.
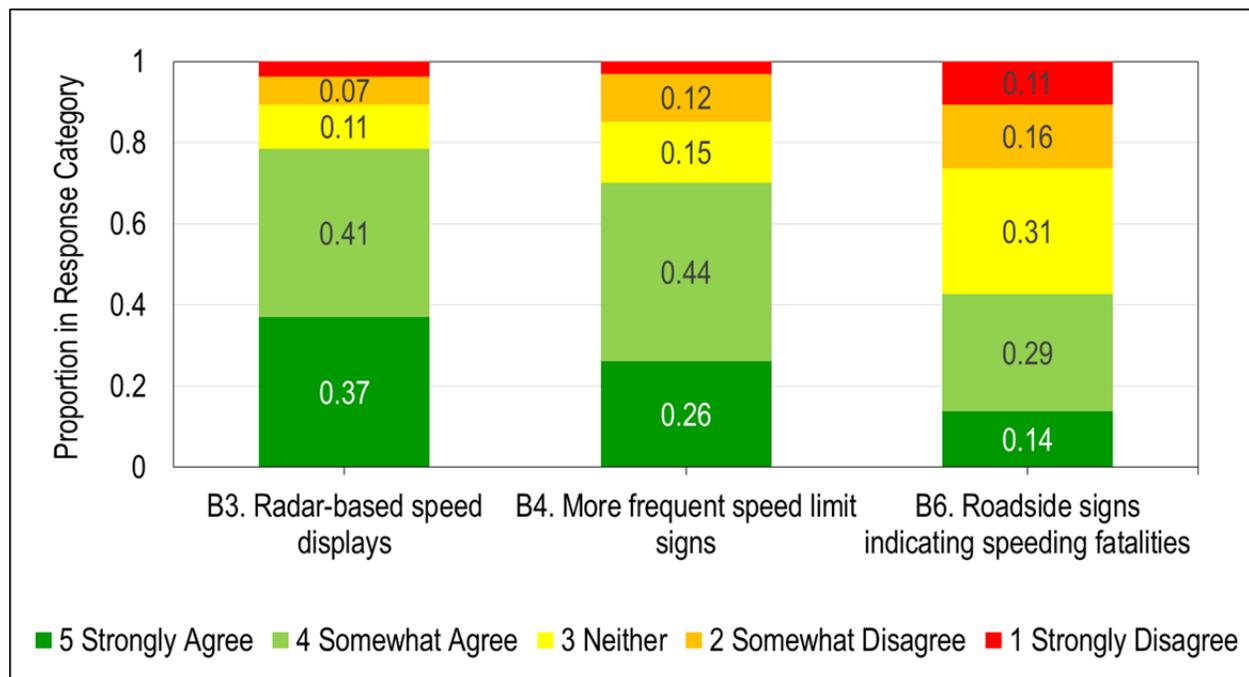
Figure 32. Proportion of responses by category for questions surveying the effectiveness of radar-based speed displays (B13), frequent speed limit signs (B4), and roadside fatality signs (B6) as countermeasures to reducing speeding.

Table 53. Percentage of driver responses in each category by age group, number of convictions, and the total across all respondents (overall) for survey questions related to infrastructure-based countermeasures (B3, B4, and B6).

Response Options	Age				Convictions				Overall
B3. Radar-based, roadside speed displays									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		*Overall*
Strongly Agree	26%	35%	50%		37%	37%	36%		37%
Somewhat Agree	43%	43%	34%		42%	41%	40%		41%
Neither	12%	11%	8%		11%	11%	11%		11%
Somewhat Disagree	10%	7%	4%		6%	6%	8%		7%
Strongly Disagree	8%	3%	3%		3%	4%	5%		4%
B4. More frequent speed limit signs									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		*Overall*
Strongly Agree	28%	25%	28%		25%	26%	28%		26%
Somewhat Agree	39%	44%	47%		44%	43%	43%		44%
Neither	15%	16%	13%		16%	18%	13%		15%
Somewhat Disagree	14%	12%	9%		12%	11%	12%		12%
Strongly Disagree	4%	3%	3%		3%	2%	4%		3%
B6. Roadside signs indicating speeding fatalities									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		*Overall*
Strongly Agree	21%	13%	14%		12%	13%	17%		14%
Somewhat Agree	32%	28%	28%		28%	31%	29%		29%
Neither	24%	31%	34%		34%	30%	27%		31%
Somewhat Disagree	14%	17%	13%		16%	14%	17%		16%
Strongly Disagree	8%	11%	11%		11%	11%	10%		11%

Education-Based Countermeasures

This section describes the results of questions that probed drivers' views regarding the effectiveness of different education-related countermeasures for reducing speeding. Out of the three educational countermeasures queried for effectiveness (see Figure 33), most drivers indicated that educating drivers about stopping distance at various speeds (79%), and educating drivers about the amount of fines (72%) would both be relatively effective. For the question about educating drivers about stopping distance, a slightly higher proportion of older drivers indicated that they either somewhat or strongly agreed about the effectiveness (Older 86 % versus Middle 78% versus 76% Young). Similarly, drivers with no convictions were slightly more likely to somewhat or strongly agree about the effectiveness of education on stopping distance (84% for 0 convictions versus 75% and 75% for 1 and 2+ convictions, respectively).

While the question about increasing awareness of fine amounts was rated as having a similar overall effectiveness as education on stopping distances, a smaller proportion of drivers strongly agreed that it would be effective (25% versus 36%). There were no clear patterns in differences in ratings across age category or number of convictions.

The responses assessing the effectiveness of a speed awareness course during licensing process had varying levels of agreement across drivers, but overall, it was a poorly regarded countermeasure. Specifically, 48 percent of respondents indicated that they did not think it was effective; 26 percent selected "neither," and only 26 percent indicated that they thought that it would be effective to some degree in reducing speeding. The responses to questions probing the effectiveness of speed awareness training did not vary by age or convictions.

Figure 33. Proportion of responses by category for questions surveying the effectiveness of different education countermeasures.

Table 54. Percentage of driver responses in each category by age group, number of convictions, and the total across all respondents (overall) for survey questions related to education countermeasures (B21, B8, and B20).

Response Options	Age				Convictions				Overall
B21. Education about stopping distance									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		*Overall*
Strongly Agree	35%	34%	46%		39%	32%	34%		36%
Somewhat Agree	41%	44%	40%		45%	43%	41%		43%
Neither	14%	12%	9%		9%	17%	13%		12%
Somewhat Disagree	8%	7%	5%		6%	6%	8%		7%
Strongly Disagree	2%	3%	1%		1%	2%	4%		2%
B8. Better awareness of fine amounts									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		*Overall*
Strongly Agree	30%	23%	29%		28%	21%	24%		25%
Somewhat Agree	45%	47%	48%		48%	52%	44%		47%
Neither	14%	18%	15%		16%	14%	19%		17%
Somewhat Disagree	6%	9%	7%		6%	10%	10%		8%
Strongly Disagree	5%	3%	2%		2%	3%	4%		3%
B20. Speed awareness courses									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		*Overall*
Strongly Agree	8%	4%	7%		5%	6%	6%		5%
Somewhat Agree	20%	19%	26%		21%	20%	20%		21%
Neither	25%	27%	24%		27%	27%	24%		26%
Somewhat Disagree	28%	30%	27%		29%	30%	28%		29%
Strongly Disagree	18%	20%	16%		18%	17%	22%		19%

Vehicle-Based Countermeasures

Drivers' opinions about the effectiveness of vehicle-based countermeasures were also queried. As seen from Figure 34, cruise control was the highest rated countermeasure. Almost 91 percent of drivers indicated that setting the cruise control within or near the speed limit would be effective in helping them avoid speeding. This measure is one that some drivers already report using on long, higher-speed roadways to avoid inadvertently driving too fast (Richard et al., 2012).

Having a display on the dashboard showing the posted speed limit was rated as being moderately effective, with 60 percent of drivers indicating that it could help reduce speeding. Younger drivers and those with 2+ convictions were slightly more likely to strongly agree that this countermeasure would be effective, but otherwise the differences across conviction and age categories were minor (see Table 55).

In general, drivers did not believe that a digital speedometer works better than the needle-style speedometer for reducing speeding, with only 31 percent indicating some degree of agreement. Similarly, a speed limiter installed in the engine was also rated as having low effectiveness. In contrast to other questions, however, a much higher proportion of drivers "Strongly disagreed" that this countermeasure was effective. There was a trend towards younger drivers strongly disagreeing more as compared to older drivers (35% versus 28%). Also, drivers with 2+ convictions were more likely to strongly disagree as well (37% versus 30% for the others). This is possibly due to the fact that repeat speeders would be more likely to be impacted by this countermeasure since it would limit their ability to deliberately drive at high speeds.

Figure 34. Proportion of responses by category for questions surveying the effectiveness of different vehicle countermeasures.

Table 55. Percentage of driver responses in each category by age group, number of convictions, and the total across all respondents overall for survey questions related to vehicle-based countermeasures (B1, B18, B2, B17).

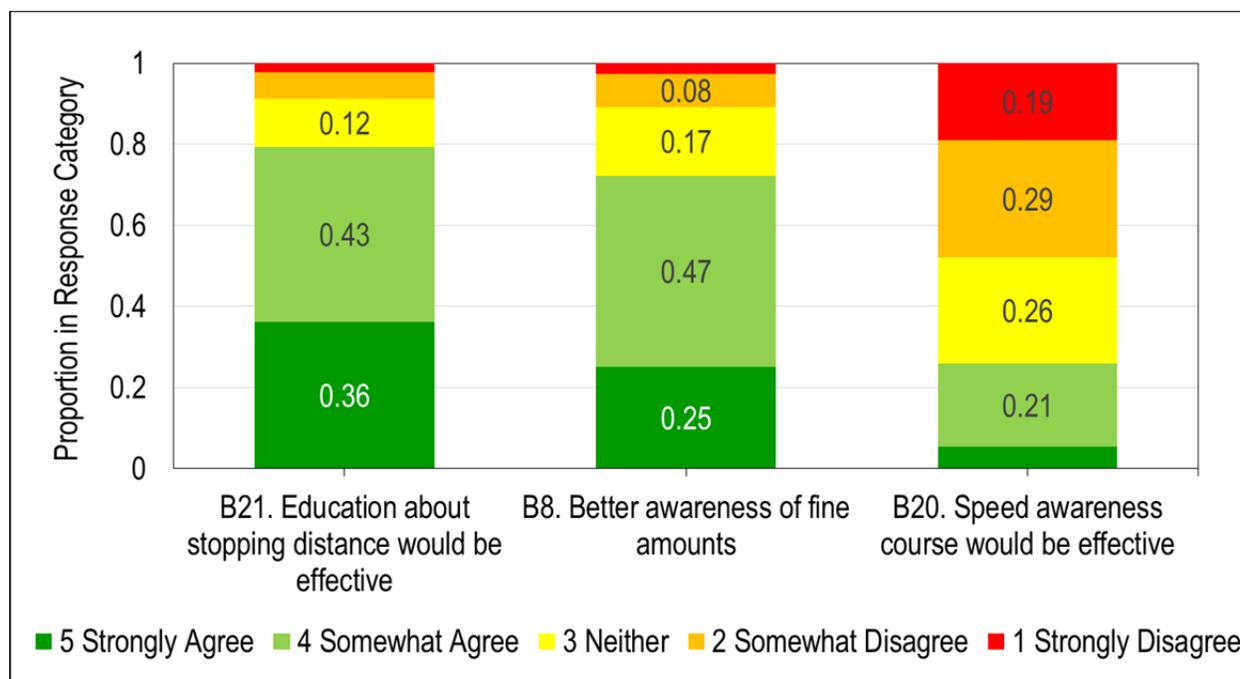| Response Options	Age				Convictions				
B1. Setting cruise control									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		
Strongly Agree	59%	66%	58%		62%	68%	64%		64%
Somewhat Agree	31%	26%	28%		27%	24%	28%		27%
Neither	6%	4%	10%		7%	5%	4%		6%
Somewhat Disagree	2%	2%	2%		2%	3%	2%		2%
Strongly Disagree	2%	2%	2%		2%	1%	3%		2%
B18. Dashboard speed limit display									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		
Strongly Agree	25%	15%	13%		13%	16%	21%		16%
Somewhat Agree	42%	45%	48%		48%	44%	41%		45%
Neither	16%	16%	16%		17%	17%	14%		16%
Somewhat Disagree	8%	15%	17%		15%	15%	13%		15%
Strongly Disagree	8%	9%	6%		7%	7%	10%		8%
B2. Digital speedometer									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		
Strongly Agree	18%	12%	10%		11%	12%	15%		12%
Somewhat Agree	21%	18%	23%		20%	19%	18%		19%
Neither	40%	51%	49%		52%	49%	46%		49%
Somewhat Disagree	11%	10%	11%		10%	11%	10%		10%
Strongly Disagree	10%	10%	6%		7%	10%	11%		9%
B17. Speed limiter in the engine									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		
Strongly Agree	15%	13%	12%		12%	13%	15%		13%
Somewhat Agree	16%	17%	22%		19%	20%	15%		18%
Neither	19%	20%	21%		21%	22%	18%		20%
Somewhat Disagree	15%	18%	17%		20%	15%	15%		17%
Strongly Disagree	35%	32%	28%		29%	30%	37%		32%

Economic-Based Countermeasures

The final set of countermeasures examined involved some form of economic motivation. These included both monetary penalties for speeding and incentives for not speeding. In general, effectiveness ratings were lower for these types of countermeasures.

As seen in Figure 35, the ratings for questions B7 (higher fines) and B11 (incentives for not speeding) had the highest ratings in this set. For question B7, a majority of drivers thought that progressively higher fines for habitual speeders would be effective in reducing speeding. However, there was a clear division based on number of convictions. In particular, drivers with zero or one conviction believed that higher fines were more effective than drivers with two or more convictions (77% and 63%, versus 44%, respectively). Moreover, repeat speeders were much more likely to strongly disagree with the effectiveness of this countermeasure (22% versus 4% 0-convictions and 9% 1-conviction). Younger drivers were also less likely to agree than other age groups (50% younger versus 63% middle and 79% older), and had a higher level of disagreement as well. On a related question about the fairness of higher penalties (B12), younger drivers were also twice as likely as the other groups to strongly agree that these are unfair (22% versus 11%). These patterns of responses may actually indirectly reflect the underlying effectiveness of this approach. In particular, it is the drivers that are the most directly impacted by higher fines (repeat speeders/ younger drivers) that are the most adamant about the ineffectiveness of this countermeasure. Their response patterns are consistent with these drivers acting in their own self-interest and "pushing back" against possible changes in speeding policies that they perceive that their state may be considering, especially given that drivers received the survey directly from Idaho Department of Transportation.

Question B11 asked drivers about the effectiveness of providing incentives for not speeding, such as free license renewal. While the overall pattern of responses was similar to that of the previous question, the breakout by number of convictions and age was different. In particular, responses were highly similar based on convictions, and the dominant age pattern was that younger drivers were more likely to strongly agree relative to other groups (36% younger versus 25% middle and 14 % older). This is not surprising, given that the perceived value of this incentive would likely be greater among younger drivers, who typically earn lower incomes.

For Question B9, about 47 percent of drivers agreed that higher insurance rates as penalties for speeding are more effective in reducing speeding than increasing the fines for speeding. Responses varied by age and convictions. A higher proportion of older drivers agreed as compared to younger drivers (55% versus 42%). Drivers with 2+ convictions were slightly more likely to strongly disagree with the effectiveness of the higher insurance rates. This countermeasure is functionally similar to higher fines, so it makes sense that the response pattern is generally similar to the one from that question (B7).

The results from question B19 regarding the perceived effectiveness of fuel efficiency displays was low. Although, it is only indirectly related to speeding, driving slower and in a more controlled manner can increase fuel efficiency, which could act as a small monetary incentive. The pattern was similar to previous questions, with 48 percent agreeing and 31 percent disagreeing. Younger drivers were more likely to "strongly agree," perhaps because they are more price sensitive when it comes to gas consumption due to lower income levels.
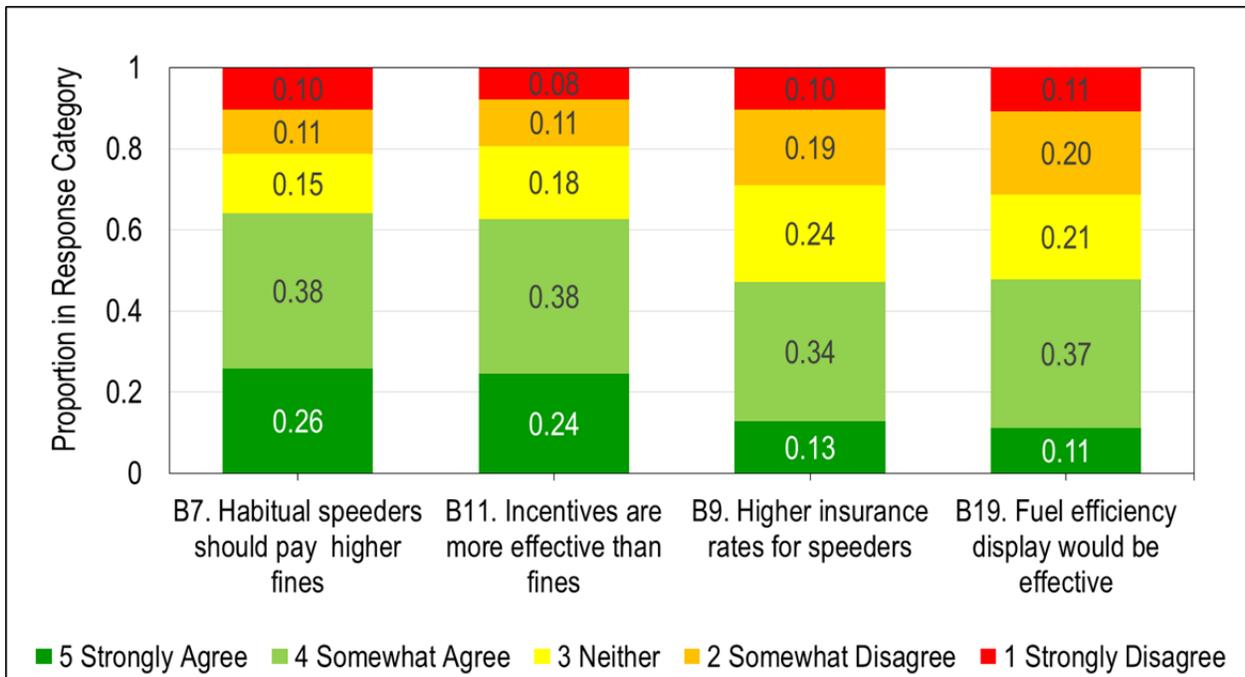
Figure 35. Proportion of responses by category for questions surveying the effectiveness of different incentives and fines as countermeasures to speeding.

Table 56. Percentage of driver responses in each category by age group, number of convictions, and the total across all respondents (overall) for survey questions related to economic countermeasures (B7, B11, B9, B19).
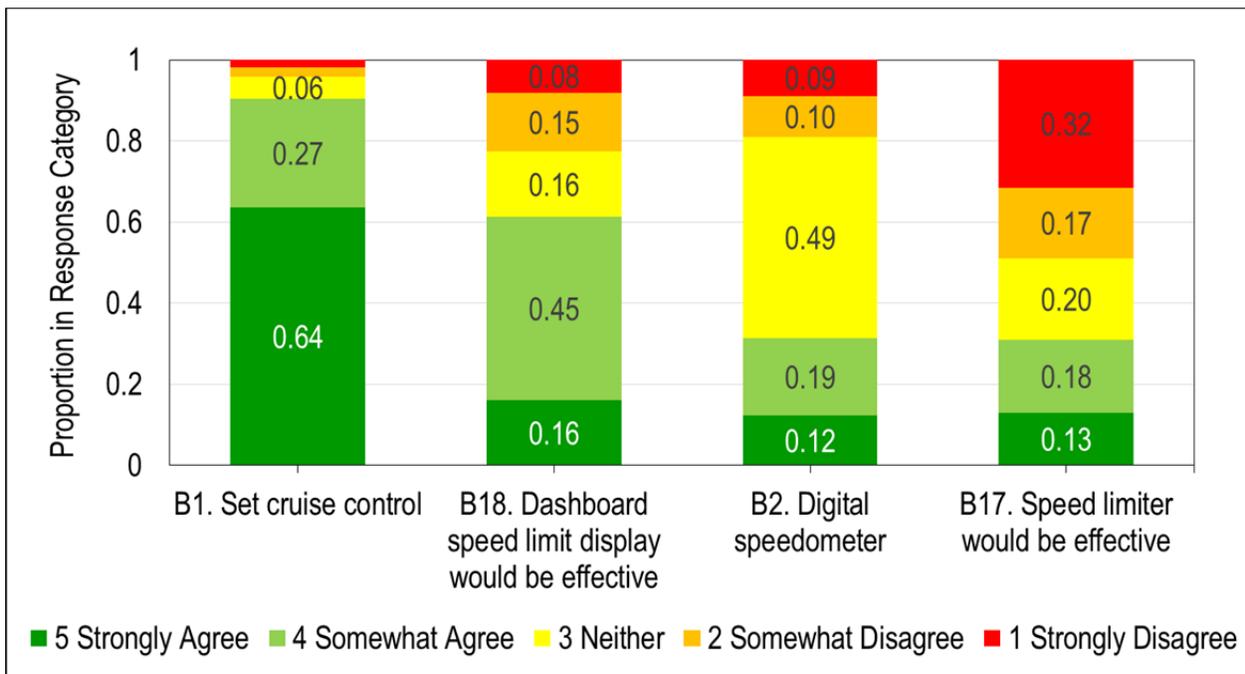
Response Options	Age				Convictions				
B7. Habitual speeders should pay higher fines									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		*Overall*
Strongly Agree	20%	24%	38%		34%	22%	15%		26%
Somewhat Agree	30%	39%	41%		43%	40%	30%		38%
Neither	17%	15%	10%		12%	16%	19%		15%
Somewhat Disagree	18%	11%	6%		8%	12%	15%		11%
Strongly Disagree	16%	11%	4%		4%	9%	22%		10%
B11. Incentives are more effective than fines									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		*Overall*
Strongly Agree	36%	25%	14%		21%	22%	31%		24%
Somewhat Agree	36%	39%	36%		37%	44%	36%		38%
Neither	22%	16%	25%		18%	19%	17%		18%
Somewhat Disagree	4%	12%	16%		14%	7%	10%		11%
Strongly Disagree	3%	8%	10%		9%	7%	6%		8%
B9. Higher insurance rates for speeder									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		*Overall*
Strongly Agree	16%	12%	14%		12%	13%	14%		13%
Somewhat Agree	26%	34%	41%		36%	36%	31%		34%
Neither	19%	25%	21%		24%	25%	22%		24%
Somewhat Disagree	18%	19%	16%		20%	18%	16%		19%
Strongly Disagree	21%	9%	8%		8%	7%	16%		10%
B19. Fuel efficiency display									
Response	*18-24*	*25-64*	*65+*		*0*	*1*	*2+*		*Overall*
Strongly Agree	23%	10%	8%		9%	11%	15%		11%
Somewhat Agree	33%	36%	39%		36%	36%	37%		36%
Neither	20%	21%	21%		20%	24%	20%		21%
Somewhat Disagree	14%	21%	22%		24%	16%	17%		20%
Strongly Disagree	11%	11%	10%		10%	12%	11%		11%

Importance of reducing speeding

A useful perspective when examining opinions about countermeasure effectiveness is the question on how important it is to drivers that the speeding problem be addressed in the first place. If drivers' do not see speeding as a problem, they are less likely to objectively rate the effectiveness of the measure. With this in mind, drivers were asked in Question B39 to indicate how important it was to reduce speeding. As seen in Figure 36, most drivers indicated that reducing speeding was important to them. The overall pattern also suggests a relationship between convictions and perception of the importance of reducing speeding. Specifically, a higher proportion of drivers with 0 convictions indicated that reducing speeding was very important and somewhat important. In comparison, a higher proportion of drivers with 1 and 2+ convictions indicated that reducing speeding was "Not too important" or "Not at all important." This pattern is not surprising, since it is not in their interest for drivers with multiple speeding convictions to want authorities to further limit their speeding or to potentially cause them to incur greater penalties.
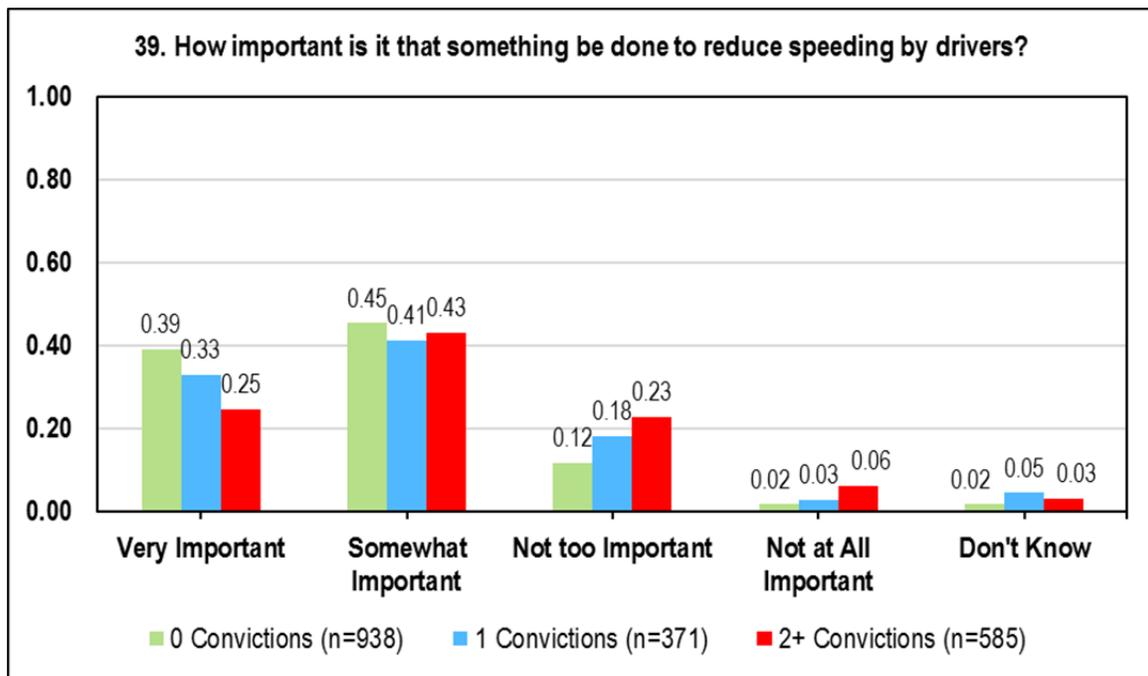
**Figure 36. Responses to the question (B39) about importance
of reducing speeding by convictions.**

Regression Analysis of Countermeasures

One of the key objectives of this study is to identify countermeasure approaches that are likely to be effective with speeders. A potentially useful approach is to focus on drivers with the most speeding convictions, since they are identified as repeat speeders. If it is possible to identify countermeasures that will change the motivations, beliefs, and/or attitudes of this group, then the findings could be applied more broadly towards curbing this behavior among known speeders.

The previous section in this chapter provides graphs showing how different speeder types (e.g., age categories, conviction number) vary in terms of the distribution of responses to the countermeasure questions. This section describes a more comprehensive analysis conducted using ordinal logistic regressions analysis to identify variables that significantly predict driver responses for a subset of the countermeasure questions. This was an exploratory analysis to identify how responses to countermeasure questions are related to driver demographics and number of convictions.

Basic demographic and exposure variables were included in all ordinal logistic models. In addition, two income variables were included, since some of the countermeasures involve costs that may be perceived differently for lower- versus higher-income drivers. The primary income measure separated drivers into lower income (less than 2x the poverty level) and higher income categories (everyone else). An additional "dummy" income variable was included to adjust for systematic variance attributable to drivers that did not answer the income question (e.g., if most were high-income earners).

A separate regression was run for each of the countermeasure questions discussed in the previous section. The results from individual regression models were collated into a global table (Table 57), which summarized the co-efficient direction for the significant predictor variables.

Model predictors are shown as column headings in each table, and the specific countermeasure questions are listed as row headers. Each cell has one of three different values. A blank cell indicates that a variable was not a significant predictor for the corresponding question. An upward pointing triangle symbol (▲) indicates a positive association, whereas a downward-pointing triangle symbol (▼) indicates a negative association. Furthermore, the significance level for a predictor is indicated by multiple symbols. Specifically, one ▲ or ▼ symbol indicates a p-value less than 0.05; two ▲▲ or ▼▼ symbols indicate a p-value less than 0.01; and three ▲▲▲ or ▼▼▼ symbols indicate a p-value less than 0.001. Note that an "*" symbol denotes significance of the dummy variable, which is left uninterpreted.

Positive associations reflect an increase in odds that higher levels of a predictor are associated with more *positive* beliefs about countermeasure effectiveness for a specific question. In contrast, negative associations reflect an increase in odds that higher levels of a predictor are associated with more *negative* beliefs about countermeasure effectiveness for a specific question (i.e., that they are ineffective).

Findings

The findings are discussed in terms of demographic predictors and convictions. Demographic factors were significant for many countermeasure questions. Age effects were mixed, but on balance, there was a positive association between older age and perceived countermeasure effectiveness for many of the countermeasures. The exceptions are countermeasures that involved saving money (e.g., incentives for not speeding, fuel-efficiency displays, know locations of increased enforcement), which had a negative association with effectiveness ratings, suggesting that they were viewed more positively by younger drivers. One highly consistent pattern is that female drivers tended to rate many of the countermeasures as more effective than male drivers; however, there is no clear explanation for this other than a general positive-rating bias. The income variable was also significant for several of the questions, but the direction of the effect was mixed and difficult to interpret consistently. One notable finding regarding income, however, is that this predictor was not significant for most of the monetary questions.

The key information in the table involves the conviction-related predictors. In particular, significant conviction predictors indicate that—after adjusting for demographic factors—drivers with 1 or 2+ convictions rate individual countermeasures as potentially more effective in reducing speeding as compared to ratings by drivers with no convictions. Thus, this provides a way to identify potentially effective measures for those speeder groups. For many of the questions, convictions were significant. In general, there was good agreement between 1 and 2+ convictions in terms of the direction of the effect when they co-occurred; however, there were more instances in which the 2+ category group was significant, but not the 1-conviction group.

Most of the different countermeasure categories had multiple measures that had either 1 or 2+ convictions as a significant predictor. The infrastructure-based group had the most positive associations, while at the other end, the economic and vehicle-based categories had the fewest or none at all. It is interesting that drivers in the 2+ conviction group perceived many of the infrastructure-based countermeasures to be at least somewhat effective. This may be due, in part, to personal experiences with these infrastructure-based countermeasures that have led them to reduce their speeds.

Countermeasures involving monetary aspects generally had a negative association. Also, younger drivers were less agreeable towards scenarios that cost more. There was also an overriding theme with regard to the enforcement and economic countermeasures. Specifically, drivers with 2+ convictions seem to be more averse to being penalized, and there was a negative association with greater enforcement and higher penalties, while also showing a positive association with knowing the enforcement locations and the belief that higher fines are unfair. This pattern is consistent with the one observed with individual ratings of the economic countermeasures. Specifically, it is the drivers who are the most directly impacted by higher fines that are the most adamant about the ineffectiveness of this countermeasure. Their response patterns are consistent with these drivers acting in their own self-interest and "pushing back" against possible changes in speeding policies that they perceive that their state may be considering, especially given that drivers received the survey directly from the ITD.

Table 57. Summary of ordinal logistic regression model for each countermeasure question using demographic, and convictions in the past 3 years as predictors.

	Question No.	Question	Age	Gender (female)	Income	Income Dummy Variable	Drive for Work	1 Conviction	2+ Convictions
Enforcement	B13	More Police Enforcement	▲▲▲	▲▲▲					▼▼
Enforcement	B5	Knowing Enforce Locations	▼▼	▲▲	▲▲▲	▼▼			▲▲
Infrastructure	B16	Speed Bumps	▲▲▲						
Infrastructure	B15	Rumble Strips	▲▲▲	▲				▲▲	▲▲
Infrastructure	B14	Roadside Speed Display at Dangerous Locations*	▲▲▲	▲					▲
Infrastructure	B3	Roadside Speed Displays	▲▲▲	▲▲▲	▲	▼▼			
Infrastructure	B4	More Speed Limit Signs	▲▲	▲▲▲					▲
Infrastructure	B6	Fatality Signs		▲▲▲					▲
Education	B21	Stopping-Distance Education	▲▲▲					▼▼	▼
Education	B8	Better Awareness of Fine Amounts			▼▼▼			▼	▼▼
Education	B20	Speed Course			▼▼				
Vehicle	B1	Use Cruise Control to Avoid Speeding		▲					
Vehicle	B18	Dashboard Speed Limit Display	▼▼	▲	▲	▼▼			
Vehicle	B2	Digital Speedometer			▲▲				
Vehicle	B17	Speed Limiter		▲▲▲					
Economic	B11	Incentives for Not Speeding	▼▼▼						
Economic	B7	Higher Fines for Habitual Speeders	▲▲▲				▲	▼▼▼	▼▼▼
Economic	B12	Higher Fines Unfair*	▼		▼▼▼			▲▲	▲▲▲
Economic	B9	Higher Insurance	▲						
Economic	B19	Fuel Efficiency Display	▼▼						

*Question not separately described in previous section.
Positive Association: ▲ = $p < 0.05$; ▲▲ = $p < 0.01$; ▲▲▲ = $p < 0.001$
Negative Association: ▼ = $p < 0.05$; ▼▼ = $p < 0.01$; ▼▼▼ = $p < 0.001$

Discussion

Drivers provided a range of views regarding the effectiveness of different types of countermeasures for reducing speeding. Some countermeasures were clearly viewed as effective, such as using cruise control, speed bumps, increased enforcement, stopping distance education, and radar-based flashing speed displays. Other countermeasures were rated as having low potential effectiveness included speed awareness courses, engine speed limiters, digital speedometers, and fuel-efficiency displays.

Within individual countermeasures, there were differences in opinions of effectiveness across age and conviction groups. Demographic variables were consistent predictors for most of the countermeasure ratings. Older drivers and female drivers tended to have more favorable views towards the countermeasures overall. However, there were some clear exceptions for age, with younger drivers believing that countermeasures, such as speed fatality signs and incentives for not speeding, were more effective than middle and older age drivers. With regard to convictions, drivers with any convictions generally had negative views on most countermeasures, especially ones that could potentially result in negative sanctions on them.

In terms of the relationship between specific countermeasures and drivers, there were several notable findings. One key trend was that, while drivers with convictions tended to be supportive of positive sanction (road treatments and signs); they consistently provided lower ratings for countermeasures that represented negative sanctions (fines, enforcement, vehicle limiters, etc.). Although the survey questions address countermeasure effectiveness, it could be that speeders reacted to the questions as a set-up for impending policy changes in the state that would negatively affect them. This impression is especially plausible given that the survey was mailed to them by ITD. Thus, these negative views may indicate that such countermeasures could potentially influence their speeding, but that it would likely come with public pushback.

The results for stopping distance education countermeasure were interesting. Across all groups, this measure received ratings that were among the highest for practical countermeasure solutions (similar ratings as increased enforcement and radar-based roadside speed displays). This measure has good potential as a public safety message. However, drivers with convictions tended to rate this as less effective than drivers with no convictions, which suggests that it may be relatively less effective for the key target groups. A closer examination of the survey shows that the order of the questions may have influenced this response pattern. In particular, this question directly followed the question about taking a speed awareness course. Some drivers may have interpreted the stopping-distance education as a separate training course that had to be taken as well (the negative view is consistent with the response that drivers with convictions had towards negative sanctions). While a training course is an option, stopping-distance information would probably be communicated more effectively as a public awareness campaign message, so it still may have promising value.

Another notable finding was that countermeasures that would assist drivers in avoiding unintentional speeding were not viewed as particularly useful. These measures essentially function to give drivers better tools for managing their speed, either by providing more precise information about the posted speed limit (e.g., more frequent signage, or in-vehicle speed limit displays), or making it easier to determine their travel speed (e.g., digital speedometer). These

countermeasures generally received middling effectiveness ratings. Also, drivers with one conviction (those most likely to have been caught unintentionally speeding) did not particularly favor these approaches any more than the other conviction groups, which suggests that these may not be a good strategy to address accidental speeding. However, it may not have been clear to drivers in the 1-conviction group that these measures would lead to better knowledge of the posted speed limit. Another possibility is that these drivers received their conviction for a wide range of reasons in addition to unintentional speeding, so they do not stand out within this group.

Overall, the survey was successful in obtaining useful information about potential countermeasures. While there was no clear "silver-bullet" countermeasure identified in the survey, there are several promising findings, such as stopping-distance education and radar-based roadside displays that could form a starting point for the development of more detailed countermeasure strategies.

Chapter 7   Comparison of Self-Reported Speeding Citations With Driving Records

Background on previous research on this problem

Self-reported driving-related data, such as frequency of citations and crashes or certain high-risk behaviors, are important measures in driving safety research. There are several advantages of using self-report data. The first is the richness of information. Specifically, people are the best-qualified witnesses to their own personalities because no one else has access to more information about themselves (Paulhus & Vazire, 2007). Another advantage is that people are typically motivated to provide this type of information, since they are usually pleased to talk about themselves (Paulhus & Vazire, 2007). Finally, the self-report technique has practical advantages as well, since it provides an efficient and inexpensive data collection method.

There are also important limitations and disadvantages of self-report information. The credibility of respondents is often unknown, and researchers must trust the respondents to report on events that typically cannot be verified. The reliability of respondents' recollection is also an important factor regarding whether self-report data is accurate. Respondents must not only remember that an event occurred, but typically must accurately place that event in time, since many questions posit a specific timeframe, such as the events in the past year. Moreover, there is the potential for confusion with other similar events. In the case of speeding citations, confusion could come from other types of citations, such as failure to stop at a stop sign or inattentive driving, that drivers have received over a similar period.

Previous traffic-safety research has found that driver recall of crash histories is limited. In one study, 14 percent of people involved in injury crashes failed to recall this event just one year later (Loftus, 1993). Another study found that when drivers were asked to report their crashes from the previous 3 years, their recall of individual crashes diminished by approximately 30 percent per year (Maycock, 1997). However, self-reported crashes may not be directly comparable to speeding convictions because they are likely to be more salient and memorable.

Driver recall of less salient events, such as near crashes, appears to be markedly worse. In particular, Chapman and Underwood (2000) compared reports and recall of more than 7000 trips made by 80 drivers in one year, a set that included more than 400 near crashes. The results showed that near crashes were generally forgotten quickly. Specifically, for 80 percent of the incidents, drivers failed to recall them within 2 weeks from when they occurred. Since being stopped by the police and issued a citation is a relatively salient and uncommon event, recall of these events should be more memorable than near misses[3]. Another study by Arthur et al. (2001) evaluated the match between driving record and self-report measures of motor vehicle crash involvement and moving violations. The results indicated that participants generally self-reported more crashes and tickets than appeared on their driving records. Because of the lack of convergence of self-report and driver record data, the authors suggested that these two sources are not the same and cannot be used interchangeably.

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[3] Idaho does not have automated speed enforcement, so all convictions in the database would have to be traffic stops.

In addition to difficulties remembering past events, another factor that can yield inaccurate self-reporting is response bias on the part of the respondent (Paulhus, 1991). Response bias takes the form of well-documented response sets and styles that can systematically bias responses, including Socially Desirable Responding (the tendency to respond in a way perceived as socially acceptable), Acquiescent Responding (the tendency to respond positively regardless of the question content), and Extreme Responding (the tendency to respond at the extreme end of response scales) (Paulhus & Vazire, 2007). In general, self-reports of personality, attitudes, and behavior tend to be inaccurate or biased to some degree because at least some respondents engage in socially desirable responding (have a tendency to give answers that make the respondent look good) (Nederhof, 1984; Paulhus, 1991; Paulhus & Reid, 1991). For example, drivers tend to report speeding tickets, but honestly "forget" their involvement in other types of traffic violations (Summala & Hietamaki, 1984).

This type of response bias led to the development of the Driver Social Desirability Scale (DSDS; Lajunen, Corry, Summala, & Hartley, 1997). This scale attempts to quantify socially desirable responding in self-reports of driver behavior. It has two parts, the driver impression management component, and the driver self-deception component. When administered to Finnish and Australian drivers, results indicated that the DSDS was a cross-culturally reliable method of measuring traffic-related socially desirable responding (Lajunen, Corry, Summala, & Hartley, 1997).

The current study provided an opportunity to examine the accuracy of self-reported driving citations in detail. Driver self-response speeding citation data were collected in a broader survey examining speeding behavior in Idaho drivers. As part of this research, limited driver record information was also collected. This permitted the comparison of respondents' self-reports of the number of speeding citations in the past year with the number of actual speeding convictions received in the same period. The study also had available information about other types of convictions, such as failure to stop at a stop sign or inattentive driving, which drivers might confuse with speeding convictions. Finally, all respondents were asked to complete the DSDS as part of the survey, which provided a means for corroborating this scale with self-report trends about speeding citations.

Of particular interest was one survey question that asked drivers to report the number of speeding citations that they had received in the previous year. This number could be matched with data from driving records to compare the self-reported number to the actual number of convictions obtained during a comparable period. Note that because of a 1-4 month lag between when driving records were obtained and when participants returned their survey, there was not a perfect match between the time periods, and a small proportion of respondents may have received citations during the interval in which driving records were obtained and when participants completed the surveys. Despite these limitations, this dataset provides a unique opportunity to compare self-reported responses for speeding citations with actual driving records.

Accuracy of self-reports

In question A22 of the survey, drivers were asked about the number of speeding citations they received in the previous year. Table 58 shows the response distribution across number of self-reported citations/ convictions.

Table 58. Responses Question A22 (full sample n=1,925)

How many times have you been cited/fined for speeding in the past 12 months?	
None	75.5%
Once	16.3%
Twice	4.5%
Three	1.1%
Four times or more	0.3%
Did not answer	2.3%
Total	1925

Table 59 shows the number of self-reported citations by the actual number of speeding convictions in the previous year. The diagonal (shaded) cells represent agreement between self-reports and driving records. As indicated in Table 59, the percentage of drivers that correctly report their number of speeding citations is relatively accurate for drivers with no convictions, but drops substantially as the number of actual speeding convictions increases from 0 to 2. Only 4 drivers had more than 2 speeding convictions so drivers with 2+ convictions were excluded.

Table 59. Distribution of self-reported citations by actual convictions in the past year. Bold font indicates accurate response.

Self-Reported Citations	Actual Convictions in Past Year		
	0	1	2
0	**89%**	21%	20%
1	8%	**64%**	27%
2	2%	11%	**39%**
3	0%	3%	10%
4+	0%	1%	4%

Table 60 reframes the Table 59 data in terms of under and over-reporting of citations. This table shows that under-reporting is more prevalent than over-reporting if drivers have either 1 or 2+ actual convictions.

Table 60. Under- and over-reporting of citations by convictions in the past year. Bold font indicates accurate response.

Self-reported convictions	Actual Convictions in Past Year		
	0	1	2
Under-reporting	---	21%	47%
Accurate reporting	**89%**	**64%**	**39%**
Over-reporting	11%	15%	14%

Factors that affect self-reports

To identify variables that were associated with self-reported speeding citations, an ordinal logistic regression was run using relevant predictor variables with the responses to question A22 (self-reported speeding citations for the past year) as the outcome variable. The variables included in the final model are described in Table 61. Note that four control variables were included to adjust for demographic and driving exposure variables that were found to be related to speeding convictions (see Chapter 4). The remaining model variables represent factors that might have affected self-reported citations. These include (1) other non-speeding driving convictions, such as failure to stop at a stop sign or inattentive driving, that could have been confused with speeding convictions (*allcnt*), (2) the time that has passed since a driver's last conviction (*DaysFromSpdConv),* which can lead to forgetting, and (3) components of the Driver Social Desirability Scale (Lajunen, Corry, Summala, & Hartley, 1997).

Table 61. Variables included in the ordinal logistic regress of self-reported convictions.

Variable	Description	Note
age	Respondent age	Control variable
GenderM	Respondent gender (males)	Control variable
WkMiles1-5	Weekly Mileage	Control variable
elig3	Drive for work	Control variable
TotSpdYr	Total speeding convictions in past 12 months	Primary predictor variable
allcnt	All convictions in last 3 years	Most convictions were speeding related
DaysFromSpdConv	Number of days since last speeding conviction	Those with no convictions were assigned a value of 365 days * 3 years
DSDS-DIM	Impression-management component of DSDS	Captures potential response bias related to a deliberate tendency to report favorable self-descriptions to others
DSDS-DSD	Self-Deception component of DSDS	Captures potential response bias related to an implicit bias towards positive self-assessment

The final model is shown in Table 62, with the odds ratios shown in Table 63. Age was the only demographic variable that was significant; however, most of the variables related to self-report accuracy were significant predictors.

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Table 62. Ordinal regression model output.

Model Variables	Co-efficient	Std. Error	t-value	p-value
age	-0.015	0.005	-3.410	0.001
GenderM	-0.037	0.143	-0.261	0.794
WkMiles1	-	-	-	-
WkMiles2	0.046	0.199	0.231	0.818
WkMiles3	0.130	0.207	0.629	0.529
WkMiles4	-0.066	0.218	-0.301	0.763
WkMiles5	0.211	0.303	0.697	0.486
elig3	-0.020	0.147	-0.134	0.894
TotSpdYr	0.641	0.177	3.614	0.000
allcnt	0.572	0.083	6.905	0.000
DaysFromSpdConv	-0.003	0.000	-8.792	0.000
DSDS-DIM	-0.028	0.013	-2.230	0.026
DSDS-DSD	-0.013	0.023	-0.566	0.571
_cut1	-1.085	0.574	-1.889	0.059
_cut2	1.044	0.578	1.806	0.071

_cut1 - This is the estimated cut-point on the latent variable used to differentiate 0 convictions from 1 conviction and 2+ convictions when values of the predictor variables are evaluated at 0.

_cut2 - This is the estimated cut-point on the latent variable used to differentiate 0 and 1 convictions from 2+ convictions when values of the predictor variables are evaluated at 0.

Table 63. Odds ratios for predictors of self-reported convictions

Model Variables	OR	Confidence Interval	
		2.50%	97.50%
Age	0.985**	0.976	0.993
GenderM	0.963	0.727	1.275
WkMiles2	1.047	0.710	1.549
WkMiles3	1.139	0.760	1.710
WkMiles4	0.937	0.611	1.436
WkMiles5	1.235	0.677	2.229
elig3	0.981	0.736	1.309
TotSpdYr	1.899***	1.335	2.711
allcnt	1.773***	1.511	2.079
DaysFromSpdConv	0.997***	0.997	0.998
DSDS-DIM	0.972*	0.948	0.997
DSDS-DSD	0.987	0.944	1.032

Note: * $p \le .05$, ** $p \le .01$, *** $p \le .001$

TotSpdYr (total speeding convictions in past 12 months) was highly significant, which is to be expected if drivers are accurate in reporting their speeding citations. In addition to this variable, other aspects that influenced self-reported speeding citations included: number of overall convictions, time since last speeding conviction, and the impression management component of the DSDS (see Table 64). The impression management component of the DSDS, which reflects respondents deliberately framing their responses in a more socially favorable manner, was a marginal predictor, and in the direction as previous studies that included this measure (Lajunen, Corry, Summala, & Hartley, 1997). In contrast, the self-deception component was not a significant predictor.

Table 64. Interpretation of significant predictors of self-reported convictions.

age	Older drivers were less likely to report more citations
TotSpdYr	Convictions significantly predicted self-reported citations
allcnt	Drivers with more total convictions reported more citations
DaysFromSpdConv	The more days since last conviction, the lower the self-reported citations
DSDS-DIM	Higher impression management was associated with fewer self-reported citations

Table 65 below provides some insight about the relationship between all convictions and self-reported speeding citations by speeding convictions and average days since last speeding citations. Drivers are grouped down the side based on the number of all convictions they had in the previous 3 years (which includes speeding convictions) and by number of self-reported citations, with both ranging from 0 convictions to 3+ convictions. Some of the key observations are as follows:

- There is a general trend of accuracy diminishing as both the number of all convictions in the past 3 years increases, and as the total number of speeding convictions in the past year increases. This may be due to drivers having more difficulty differentiating between numerous citation events in the recent past.

- With regard to average number of days since last conviction, drivers with correct responses (i.e., the diagonal cells), typically have the lowest average days since convictions. An exception is the group of drivers with 2 all convictions and 3+ self-reported speeding citations (mean=132 days), but this group only represents 5 drivers. This pattern is consistent with the notion that self-report accuracy decreases farther back in time.

- Drivers that have had 0 convictions of any type in the past 3 years were very accurate in reporting that they had no speeding citations (99%). This is the simplest case since drivers only have to remember that they were not cited by police in the past few years. No information must be recalled about number of citations, or when they occurred in time. In contrast, having one non-speeding conviction in the past 3 years reduced accuracy for drivers with 0 speeding convictions from 99 percent to 87 percent. In general, the more of all types of convictions that drivers had, the less likely they are to report 0 speeding citations in the past year even if they had none.

- Drivers whose only conviction in the study was a single speeding conviction in the past 12 months were moderately accurate in reporting that speeding citations (68%), and 25 percent of them reported receiving no speeding citations, perhaps because they forgot.

Table 65. Distribution of self-reported citations and average days since last conviction by number of convictions in past year and all convictions in past 3 years.

	Percentage Convictions				Average Days Since Last Conviction			
	Self-Reported Citations	Number of Speeding Convictions in Past Year			Self-Reported Citations	Number of Speeding Convictions in Past Year		
		0	1	2+		0	1	2+
All Convictions = 0 (n=885)	0	99%	-	-	0	-	-	-
	1	1%	-	-	1	-	-	-
	2	0%	-	-	2	-	-	-
	3+	0%	-	-	3+	-	-	-
		0	1	2+		0	1	2+
All Convictions = 1 (n=359)	0	87%	25%	-	0	-	266	-
	1	12%	68%	-	1	-	169	-
	2	1%	6%	-	2	-	201	-
	3+	0%	1%	-	3+	-	38	-
		0	1	2+		0	1	2+
All Convictions = 2 (n=504)	0	70%	18%	24%	0	-	210	210
	1	20%	67%	24%	1	-	179	176
	2	8%	13%	42%	2	-	172	123
	3+	2%	3%	11%	3+	-	132	159
		0	1	2+		0	1	2+
All Convictions = 3+ (n=105)	0	66%	28%	14%	0	-	217	144
	1	21%	50%	43%	1	-	185	140
	2	10%	11%	43%	2	-	191	112
	3+	3%	11%	0%	3+	-	209	

Table 65 suggests that the number of days from last conviction affects accuracy of self-reported citations. A likely explanation is a memory decay effect that represents drivers being more likely to forget that they received a conviction as more time passes since the conviction.

Figure 37 provides some evidence of the time-decay effects in drivers that had one speeding conviction in the past 3 years. This figure plots self-reported speeding citations as a function of how much time has passed since they received their single speeding conviction. The yellow line shows the percentage of drivers that reported having one speeding citation in the past year. The green line shows the percentage of drivers that reported they received no speeding citations in the past year. The red line shows the percentage of drivers that reported they received two speeding citations in the past year. In actuality, all drivers in this figure had only one speeding conviction in the past year.

If drivers were highly accurate in recalling when their speeding conviction occurred, the yellow line would show the percentage reporting one citation as very high and relatively flat for the first 12 months, then dropping to near zero after that. The green line would be near zero for the first 12 months reflecting little or no under-reporting of speeding convictions in the past year. The green line would then be high and flat, at or near 100 percent, after the first 12 months, since the question asked only about the last 12 months, and the points beyond that represent speeding convictions received more than 12 months prior. If respondents were highly accurate in their self-reports, there would be no red line because all of the drivers included in this figure received only a single speeding citation in the past 3 years; no one had more than one.[4] In contrast, the drivers that accurately self-reported only one speeding citation (yellow) in the past year were most accurate within 3 months of the actual conviction (82%), then dropped to 77 percent at 6 months, 54 percent at 9 months, and 50 percent at 12 months. The percentage of drivers reporting no speeding citations in the past year (green) was very accurate at 3 months (near 0%) and then under-reporting gradually increased up to the 12-month mark (40% under-reporting); they then become increasingly more accurate as citations beyond that were prior to the period asked about in the question, reaching near 100 percent accuracy at 27 months. All points on the red line above zero percent (over-reporting) reflect inaccurate responses; these over-reports of speeding convictions were highest for those drivers who received their one speeding conviction within the last 12 months. Some of this over-reporting could be related to driver confusion between speeding and other non-speeding convictions observed in the regression analysis and in Table 65.

Figure 37 is consistent with respondents being more likely to forget when or if they received a speeding conviction over time, as indicated by the decrease over time in the percentage of drivers with one speeding conviction accurately reporting that number. In addition, the absence of a clear step-function pattern also suggests that respondents' ability to accurately remember the approximate date of their speeding citations may be poor when thinking back one year into the past. Specifically, there are still a moderate percentage of respondents reporting that speeding convictions from 15-24 months prior as having occurred in the previous year.

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[4] Note that the delay between when driver records were obtained and when drivers returned the surveys would obscure this pattern to some degree.

Figure 37. Change in self-report patterns for drivers with *1 speeding conviction only* as a function of time passed since they received their conviction.

Based on the pattern of self-reporting accuracy found in Figure 37, it seems that limiting self-reported citations to a duration that is shorter than one year (e.g., the previous three to six months) may yield more accurate self-reporting of events. However, another consideration is the number of events (convictions in this case) that are available within that time window. For most drivers, speeding convictions are relatively rare events, thus shortening the time window makes it more difficult to find many drivers with one or more convictions.

Consider Figure 38, which shows the prevalence of speeding convictions over time for drivers with at least one conviction. In particular, the 1- and 2- speeding conviction lines show the percentage of drivers within each group that had 1 (yellow line) or 2 (red line) speeding convictions, respectively, within different time periods prior to responding to the surveys (months since last conviction). For example, 19 percent of drivers in the 2-speeding conviction group had at least two speeding convictions in the 12 months prior to completing the survey, while 50 percent of drivers in this group had two or more after 24 months. This graph shows a clear tradeoff between the prevalence of convictions within each category and the time window for the survey question (i.e., it takes a longer time window to capture more drivers in each conviction category). Given that the total number of drivers in the population with 2+ convictions was low to begin with (less than 0.4% of the Idaho driving population), there are inherent limits to how recent the question window should be in order to make sampling of drivers with multiple speeding convictions feasible.
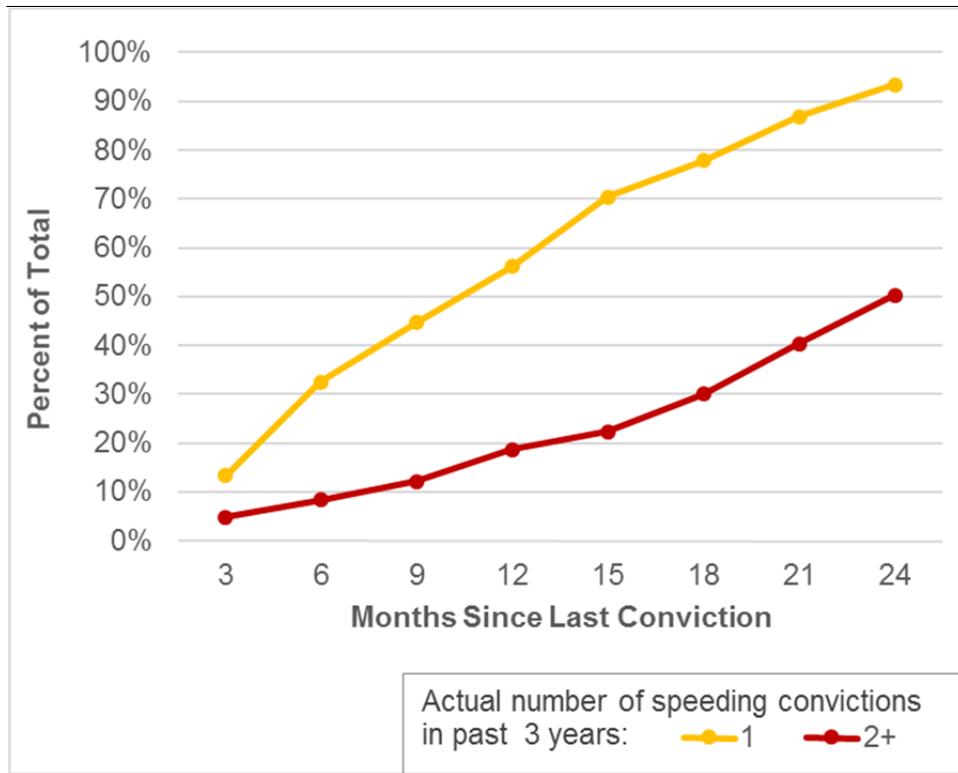
Figure 38. Percentage of actual speeding convictions within each self-report speeding conviction category that occurred by number of months in the past.

Discussion

The analyses indicated that multiple factors can influence driver recall of self-reported speeding citations. In particular, respondents' accuracy in recalling the number of speeding citations in the previous year was reduced by time passed since the actual conviction occurred, the number of other non-speeding convictions, and an increased desire to manage one's image. These patterns are generally consistent with previous findings related to self-reported driving events, such as citations and crashes (Maycock, 1997; Arthur et al., 2001).

The findings from the current study also have implications for the use of self-reported measures in driving safety research. Specifically, asking about two or more citations may be uninformative and counterproductive. Receiving two speeding convictions in a one-year period is relatively uncommon. Only around 20 percent of the 2+ conviction group had two convictions in the year prior, which makes this group difficult to sample. Moreover, 15 percent of drivers with just a single speeding conviction in the previous year incorrectly reported having two or more. Limiting the sample to only drivers with zero or one or more convictions in the prior year and asking a yes/no question about whether they had received a ticket could improve response accuracy.

The time periods are approximate at best because of the imprecision associated with obtaining completed surveys. Moreover, it was only possible to obtain driver records in advance of mailing the surveys. While every attempt was made to obtain driver records that were as recent as

possible, some drivers may have received convictions in the time between when the records were captured and when drivers completed the surveys. A more accurate way to address this issue would have been to obtain a second set of driving records after the survey data had been collected, which would have captured any recent convictions. However, this was not possible in the current study.

Chapter 8   Conclusions and Summary

This section provides an overall summary of the findings from the survey. It also addresses the primary research objectives and provides initial ideas for the development of a broader effort to address speeding.

Summary of Survey

This report describes the results of a mail-out survey conducted with licensed drivers residing in the state of Idaho. A total of 1,925 returned surveys were included in the analyses. Survey respondents included males (48%) and females (52%) from three age groups: younger drivers 18 to 24 (11.2%), drivers 25 to 64 (70.6%), and older drivers 65+ (18.2%). Within these demographic categories, drivers were selected based on the number of convictions in the previous 3 years. These included drivers with 0 convictions (49.5%), 1 conviction (19.4%), and 2+ convictions (31.1%). Drivers with 2+ convictions were greatly overrepresented in the sample relative to the Idaho driving population.

Summary of Attitudes and Behaviors

The survey questions presented in this Chapter provide a broad view of the attitudes, beliefs, and behaviors that respondents hold towards speeding. There was a clear age-related pattern apparent across most of the questions. Specifically, the typical response distribution for older drivers was at the end of the scale that was most favorable towards not speeding. In contrast, the typical response distribution for younger drivers was consistently shifted towards responses that were more favorable / inclined towards speeding. The distribution for the middle age group typically fell in between the younger and older driver groups. Despite these age-related differences, the trend in responses across the groups was quite similar overall. In particular, all groups tended to be on the same end of the response scale, with response distributions having similar shapes and often with the same modal response, but just shifted slightly based on age.

The questions about driver beliefs, attitudes, and behaviors also provide a high-level picture about how most Idaho drivers view their speed choices. In particular, societal norms seem to influence the majority of drivers. Most drivers acknowledge a link between speeding and safety, and most drivers report wanting to not speed. In terms of speeding behaviors, most report following traffic, but more drivers keep up with faster traffic than stay with slower traffic. Most drivers rarely travel at speeds that are typically viewed as speeding on high-speed (+15 mph) and lower-speed roads (+10 mph), but there are some exceptions (such as main roads through town).

Although self-reported speeding represented a minority of the responses for most of the questions, those drivers that did report speeding, indicated different reasons for speeding. Some drivers enjoy driving fast, or speed to get to their destination sooner. Some drivers may speed because it is less boring, or to reduce stress. There were also situational reasons reported for speeding, including driving a powerful car and on straight roads, or late night/early morning. This list of reasons is not comprehensive, since it is limited to the questions asked in the survey,

but it indicates that addressing driver motivations for speeding may require a multi-faceted approach that covers a variety of underlying reasons why drivers may choose to speed.

Driver Convictions

Overall, the pattern of results related to driver convictions in this analysis is consistent with findings from previous studies. Specifically, driver age, gender, marital status, and weekly mileage driven were all significant predictors of speeding convictions. Consistent with past research on speeding behavior and studies analyzing crash data, younger drivers in the study had a higher proportion of speeding convictions. Also, respondents who drove more miles per week and were single had higher rates of speeding convictions. The only finding that is not consistent with previous research is that more females in this study had speeding convictions as compared to male drivers, especially in the younger age group. This finding is a bit surprising, but might be a result of the sample that responded to the survey request.

In addition to the question about weekly driving mileage, there were also differences across conviction groups for other survey questions about driving behavior. In particular, drivers that tended to keep up with faster traffic or pass other traffic, and to report driving at higher speeds on certain roadways typically had more speeding convictions. These aspects of driving were examined together in the analysis of driver typologies (see Chapter 5). In general, driver characteristics related to faster driving behaviors were significantly associated with having more speeding convictions.

Project Objectives

This section summarizes the key survey findings related to the overall project objectives. These include:

> 1. How do the speeding types that emerge from national surveys versus actual driving behaviors compare to one another in terms of predicting speeding?

> 2. What speeding countermeasures are most appropriate for the various driver types and roadway situations?

> 3. How strong is the relationship between driver records and self-report survey reports?

The conclusions related to each of these questions are discussed below.

How do the speeding types that emerge from national surveys versus actual driving behaviors compare to one another in terms of predicting speeding?

Overall, the analyses indicate that the notion of different speeder types has merit. The two approaches investigated resulted in typologies that were similar, especially in the category that represented non/low speeders. Examination of the crosstabs between the two typologies (NSSAB and MfS) confirms that the general distribution of drivers across speeder categories is quite similar for both typologies; however, the overlap between the typologies does not seem to be as strong at the level of individual drivers. (i.e., many people assigned to one speeder category in

one typology end up in classified as a different type of speeder in the other typology). Despite these differences, the tests for Goodness of Fit indicated that the distributions of drivers in the 0- and 1- convictions group were not different. However, for the 2+ convictions test of Goodness of Fit, the two typologies were significantly different, which suggests that classification of repeat speeders may be more complicated than other driver types.

One notable finding is that the similarities between the typologies occurred even though they were based on entirely different sets of questions. In particular, the NSSAB typology was based on questions that were about speed-related driving behaviors, while the MfS typology included a more diverse set of questions that included primarily attitudes, beliefs, and situational aspects related to speeding. This suggests that the overall approach of classifying drivers into speeder types is capturing underlying differences among drivers with regard to speeding.

Regression analyses indicated that both typologies were significant predictors of the number of speeding convictions. Because it is based primarily on questions related to driver attitudes and beliefs about speeding, the MfS typology provides more insight about the underlying motivations of these drivers. However, when it comes to predicting the number of convictions, the NSSAB typology was somewhat better for 2 or more convictions. Nevertheless, descriptive tables indicated that neither typology was especially effective at capturing drivers with multiple convictions. This suggests that there may be different subtypes within the frequent speeder group. For example, the MfS typology had two different frequent speeder types—aggressive and emotional speeders.

Another general finding was that speeding was less prevalent in the current study of Idaho drivers than in the NSSAB. Specifically, the national survey found that Region 10, which includes Idaho, was among the group of regions that had the lowest level of speeders (25.1% – 27.5%), in comparison to other regions (i.e., Region 8 and 9) in the other Western U.S. states, which had the highest rates (32.4% - 35.9%). Moreover, the population of Idaho drivers with 2+ convictions in the past 3 years is quite small overall (less than 0.04%). It is possible that the typology-based approach could work better in a region that has a larger sample of high speeders.

The findings from the current survey add further support to the examination of speeder typologies conducted in the previous MfS and NSSAB studies. At some level, and with different data, existence of systematic difference across groups of drivers was confirmed. Further research is needed to elaborate and establish the underlying speeder types; however, the current study provides evidence that the corresponding typology will need to include elements that capture driver speeding behavior, in addition to other aspects related to driver attitudes and beliefs about speeding.

What speeding countermeasures are most appropriate for the various driver types and roadway situations?

Drivers provided a range of views regarding the effectiveness of different types of countermeasures for reducing speeding. Some countermeasures were clearly viewed as effective, such as using cruise control, speed bumps, increased enforcement, stopping distance education, and radar-based flashing speed displays. Other countermeasures were rated as having low

potential effectiveness included speed awareness courses, engine speed limiters, digital speedometers, and fuel-efficiency displays.

In terms of the relationship between specific countermeasures and drivers, there were several notable findings. One key trend was that, while drivers with convictions tended to be supportive of positive sanction (road treatments and signs), they consistently provided lower ratings for countermeasures that represented negative sanctions (fines, enforcement, vehicle limiters, etc.). Although the survey questions addressed countermeasure effectiveness, it could be that speeders reacted to the questions as a set-up for impending policy changes in the state that would negatively affect them. This impression is especially plausible given that the survey was mailed to them by ITD. Thus, these negative views may indicate that such countermeasures could potentially influence their speeding, but that it would likely also come with public pushback.

Overall, the survey was successful in obtaining useful information about potential countermeasures. While there was no clear "silver-bullet" countermeasure identified in the survey, there are several promising findings, such as with the stopping-distance education and radar-based, roadside displays that could form a starting point for the development of more detailed countermeasure strategies.

Another notable finding is that the prerequisite driver attitudes and beliefs that can support efforts to address speeding appear to be in place at a high level, at least among Idaho drivers. In particular, the survey found generally widespread support for trying to address the speeding problem. For the question that asked drivers how important it is that something be done to reduce speeding, a clear majority of all drivers believed that doing so was somewhat or very important. While there were predictable differences in agreement across conviction categories, over two-thirds of repeat speeders still expressed some degree of agreement with this view (84% for 0 convictions, 74% for 1 conviction, and 68% for 2+ convictions). It should be noted that Idaho is not representative of all states, especially since it is part of a region that generally reports lower speeding levels (NSSAB). Nevertheless, this is a promising finding overall.

How strong is the relationship between driver records and self-report survey reports?

In general, there is a clear relationship between speeding convictions from driver record data and self-reported speeding citations. Specifically, the self-reported number of citations across drivers most frequently matched the number of actual convictions drivers had in the past year, but this match decreased as the number of convictions increased (89% for 0 convictions, 64% 1 for conviction, and 39% for 2+ convictions). Also, in the regression model, the variable representing number of actual convictions was highly predictive of self-reported citations.

Although generally good, the accuracy of self-reporting was also systematically affected by other factors. In particular, having other non-speeding convictions was related to over-reporting of speeding convictions, likely because of confusion between the two types. Moreover, other factors such as the passage of time and an increased desire to manage one's self-image led to under-reporting of speeding citations. These patterns are generally consistent with previous findings related to self-reported driving events, such as citations and crashes (Maycock, 1997; Arthur et al., 2001).

The findings from the current study also have implications for the use of self-reported measures in driving safety research. Specifically, asking drivers about two or more citations may be uninformative and counterproductive. One limitation is that receiving two speeding convictions in a one-year period is relatively uncommon. Only 19 percent of the 2+ conviction group had two convictions in the year prior, which makes this group difficult to sample. Moreover, 15 percent of drivers with just a single speeding conviction in the previous year incorrectly reported having two or more. Thus, categorizing drivers into groups with either zero or one or more convictions in the prior year, and asking a yes/no question about whether they had received a conviction could be a way to improve response accuracy; particularly since respondents that had no convictions of any type in the previous year were highly accurate at reporting that they had no citations (99%).

Asking drivers to self-report their speeding citations remains the most efficient method of obtaining this information. While this measure has clear shortcomings, it can certainly provide a useful measure if it is analyzed with these limitations in mind.

The current study helps advance our understanding about driver attitudes, beliefs, and behaviors regarding speeding. This type of information can be helpful in identifying messages that are likely to be effective with drivers, and identifying some of the driver-specific aspects that programs should consider addressing as part of broader safety efforts.

Appendix A – Survey Methods

Sample Design

De-identified driver records were obtained with the cooperation of the Idaho Transportation Department (ITD), and used to develop the sampling frame. The dataset included one record for every person who had been a licensed Idaho driver for at least 3 years. The dataset did not contain personally identifying information (PII). It did include a record ID, which ITD used to link back to the driver's name and mailing address for each driver selected for the survey sample. Other fields in the dataset included gender, age, ZIP Code, number of speeding convictions in the past 3 years, and number of traffic-related convictions from several other select categories related to driver safety.

A target sample size of 1974 was selected according to a power analysis. Based on the survey methodology previously used (Messer & Dillman, 2011), a response rate near 50 percent was expected, so the initial mail-out sample consisted of 3,948 drivers. The sampling frame was stratified by three age categories (18 to 24, 25 to 64, and 65+), gender (male/female), and speeding convictions (0, 1, and 2+ in the last 3 years). Taken together, those variables form 18 strata (3x2x3=18). Each record in the sampling frame was assigned to one and only one stratum. Within each stratum, simple random sampling was used to select drivers for the mail-out. The final sampling fractions for each stratum were selected after examining the sampling frame in the following proportions:

- *Age:* Over-sampling drivers in the youngest and oldest categories with regard to their proportion of the population, to be sure to be able to estimate their population parameters with good precision, and comparatively under-sampling those in the middle category. According to a recent data analysis at the time of our survey, Idaho had 1,065,547 drivers 18 and older. Fourteen percent of those were 25 or younger, and 11 percent were 70 or older, leaving about 75 percent from 25 to 70 years old. Using 25 and 70 as the age cut-points required an oversampling of young and older drivers in order to estimate survey responses with good precision.
- *Gender:* Half male and half female, to reflect the 50/50 split among licensed Idaho drivers.
- *Speeding Convictions:* 40 percent of people with 0 speeding convictions, 40 percent with 2+ speeding convictions, and 20 percent with 1 speeding conviction in the past 3 years.

Forty percent of the sample was devoted to those with no speeding convictions and 40 percent to those with 2+ convictions, within each age stratum, in order to have adequate statistical power to identify differences between these two groups of drivers. The remaining drivers, those with a single speeding conviction in the past 3 years, were a mix of people who speed infrequently and who were unlucky enough to be caught once, and those who speed frequently, and who were lucky enough to be caught only once.

With the anticipated sample size of roughly 400 respondents in each of the 0 and 2+ groups, a statistical hypothesis test was calculated to have 80 percent power to detect a difference of 10 percent in a proportion between the two groups, if one of the groups exhibits a proportion of

50%. For survey questions where the responses yield a proportion either higher or lower than 50%, the study was well powered to identify even smaller differences.

Every survey response was assigned a sampling weight that indicates the number of Idaho drivers that their response represents. The survey weights were adjusted to account for the final sample size and any differential non-response across strata. When results are analyzed with the survey weights, the estimates and inferences based on the survey data are representative of Idaho drivers in general, and not just of those in the sample. Furthermore, it is possible to quantify the uncertainty in those estimates and inferences that is related to sampling variability. That uncertainty is quantified using confidence intervals or p-values, as appropriate.

The final cut-points for the age strata were selected in consultation with NHTSA after the sampling frame dataset was received from ITD and the distribution of speeding convictions by gender and age strata were assessed. The guiding principles of the final selection were to solicit responses from enough respondents to be able to estimate the quantities of interest with minimal uncertainty in groups that were expected to be meaningfully different, such as young drivers versus older drivers, and people with multiple speeding convictions versus those with none.

Cognitive Testing and Revision of the Questionnaire

Cognitive testing was conducted on the English version of the survey with a convenience sample of nine respondents who lived in Idaho to identify any problems and to refine the questionnaire for the pilot test. Battelle developed an interview guide for the cognitive testing and incorporated feedback from NHTSA prior to conducting the interviews. The guide covered aspects such as respondent understanding of questions, overall flow of the questions, and ease of moving from one question to the next if branching is used, etc.

The testing was held in a rented facility in the outskirts of Boise, ID using two data collectors (one to ask the questions and one to take notes) and all interviews were audio recorded. Audio recordings were later destroyed after we were comfortable with our understanding of the data. This location made it easy to recruit drivers who lived in rural areas, while at the same time allowing us to conduct all the testing from a single facility. To encourage participation from rural drivers that had to travel a significant distance to the facility, we offered gas cards to offset fuel costs. Each pre-test participant received a $50 honorarium for his/her participation. Data collection was conducted in a single wave spanning 5 days, and changes were made to the survey instrument after each three interviews, allowing us to test alternative versions of the questions and the questionnaire. Battelle and NHTSA met after each set of three interviews to review the data and to make changes to the survey based on participant feedback.

Cognitive interview participants were recruited using online ads. An experienced Battelle interviewer contacted interested individuals, explained the details of participating, confirmed their willingness to participate, and scheduled a time to conduct an in-person interview. During the interview, participants were asked to review the advance letter, cover letter, and reminder postcard and to respond to the paper survey. After they completed the survey, they were asked all items included in the cognitive interview guide, and probed for specific ways in which the questionnaire could be improved.

As shown in Table 66, participants evenly represented both urban and rural participants and (5 lived in urban areas and 4 lived in rural areas) and gender (5 females and 4 males), and ranged in age from 27 to 72.

Table 66. Demographic characteristics of cognitive interview participants

Urban/Rural	Gender	Age
Urban	Male	27
Rural	Female	70
Rural	Male	37
Urban	Male	50
Urban	Female	38
Rural	Male	72
Rural	Female	28
Urban	Female	49
Urban	Female	58

It took participants an average of 21 minutes to review the cover letter and complete the survey. The cognitive interviews took an average of about one hour in total (including the time reviewing the cover letter and complete the survey). We received a lot of positive feedback about the survey, and everyone found the survey easy and understandable in general. There were a handful of decisions that were made based on the input from the cognitive interviews:

- Printed the photographs at the end of Section A in color.

- Eliminated a set of questions about speeding cameras.

- Eliminated the option to complete the survey online from the advance letter.

- Made slight wording changes in a few questions.

- Made slight formatting changes in a few sections.

Survey Administration

Battelle used an approach similar to a recent survey design experiment (Messer & Dillman, 2011) which used Priority Mail and a monetary incentive for respondents for a statewide community survey and achieved a response rate of 68.4 percent.

Survey Mode

We used two modes for survey completion: mailed paper surveys and electronic web-based surveys. The mail survey was the primary mode; however, participants had the option to complete the survey using either mode. Battelle used the electronic web survey for entering survey data from the paper surveys. A key advantage of a web-based approach is that it accommodates certain user groups that prefer this approach, such as young urban drivers that may otherwise be less likely to complete paper version of the survey. In addition, Dillman and

his colleagues have found that people with more education are more likely than those with less education to complete web surveys (Millar et al., 2009). In this same article, it was reported that 90 percent of those expressing a preference for a web survey completed the survey on the web as compared to another method. For these reasons, we believed that many respondents would prefer to complete the survey on the web. Web-based surveys are less effective in areas with poor access to the internet or less educated populations. However, paper surveys were provided for all drivers, which ensured that this segment of drivers could still be adequately represented in the survey sample, even if they had limited access to computers.

Preparing for Data Collection

Battelle had the final version of the survey translated into Spanish using a professional translation service, so that respondents could choose taking the survey in either English or Spanish. After receiving OMB approval, the final questionnaire was printed in a multi-page booklet format, using full color printing for ease of use by respondents. In addition, outbound envelopes, inbound business reply envelopes, postcards, and letterhead were also printed. Battelle also programmed the survey instrument for online completion, as well as data entry of hardcopy paper surveys in both English and Spanish. In addition, Battelle developed a tracking system with the following features.

- Unique caseID for every case

- Unique password for Web Survey access for every case

- Functionality to produce all mailings

There were two instances of the tracking system – one at Battelle that had the CaseID only, and one at ITD that had the PII merged into it. ITD personnel used the tracking database to produce the mailing labels, personalized cover letters, and other materials in the participant mail-out packets that require driver information. These functions were programmed into the tracking database by Battelle. ITD personnel also used the tracking database to track surveys and other mailings that were returned to ITD as undeliverable. Battelle received the completed surveys, and entered those into the tracking database. Before each mailing, Battelle provided ITD with a report that updated their tracking with completed cases (by caseID), so that these people would not receive any additional survey or postcard mailings.

Survey Protocol

Battelle used a multi-step approach for encouraging participation, consistent with survey standards endorsed by the AAPOR. The specific activities include:

- Mailing an advance letter,

- Mailing the survey packet via Priority Mail,

- Mailing reminder postcards, and

- Mailing additional survey packets.

Advance Letter Mailing: The initial contact to participants was by an advance letter using ITD letterhead. The purpose of the advance letter was to notify the sample members that a survey would be coming. The $5 payment was mentioned in the advance letter. We had planned to include the survey URL and web password in the advance letter, but based on feedback from the cognitive interviews, we decided to remove it. The participants in the cognitive interview felt that if people received the paper survey with the incentive after completing the web survey, they would be annoyed by that.

Battelle provided printed letterhead and stamped envelopes, and hired a local staff person to prepare the mailing in the ITD offices. A Battelle staff person was there to oversee the process, train all staff (including the ITD staff person who printed the letters and address labels), and provide quality control. Letters were printed in batches with address labels by ITD staff and assembled on site. Only ITD had access to the database with the respondents' names and contact information. The letters and the envelopes were printed in the same order, but before envelopes were sealed, they were checked to ensure quality.

Initial Survey Packet Mailing: Within several days of receiving the advance letter, people received a survey packet by priority mail. The packet included:

- The survey questionnaire with a pre-printed ID number;

- A personalized cover letter emphasizing the importance of the study;

- A postage-paid, self-addressed return envelope; and

- A reimbursement of $5 for the individual's time and effort given to the study.

Battelle prepared all of the survey packets ahead of the mailing and shipped them to the State of Idaho for personalizing and mailing. The survey packets included the survey booklet with the unique caseID, a $5 bill, and a postage-paid, self-addressed return envelope. The packet was placed in a manila envelope with the same caseID label on the front. Battelle had procedures in place to ensure proper accounting and distribution of the participant compensation. To safeguard the money, Battelle limited the people involved in packet assembly so that only authorized individuals were in contact with the survey compensation. Packet assembly is conducted with two researchers working together. As part of the quality control process, two senior study staff inspected the packet contents to ensure that all required materials, including the correct compensation, are included, and that the caseID from the survey booklet matches the caseID on the outer envelope. The team then seals the packets together.

Battelle utilized their local staff hire to prepare the survey packets. A Battelle staff person was also present at the mailings to oversee the process, and conduct quality control activities. Only ITD had access to the database with the respondents' names and contact information. ITD printed personalized letters on printed letterhead, as well as address labels. The manila envelopes were matched up with the caseID printed on the letter, and then the letter and the packet were placed in a priority mail envelope, that was address to the respondent. The packet was checked for quality by matching the caseID on the manila envelope with the caseID on the letter and by matching the address in the letter with the address in the envelope. After quality control was completed for a batch, the batch could be sealed.

The cover letter included language about how to complete the survey online. It also stressed the importance of the study and was signed by the Battelle Principal Investigator and the ITD Sponsor. The letter asked respondents to return the completed survey in the postage-paid, return envelope. The survey cover letter also provided the name and toll-free telephone number of a staff member to call with questions about the study, as well as the name and telephone number of a person to call with questions regarding human subjects protection.

The return address on all survey mailings was the address of the ITD. The address on the business reply envelope (for returning completed surveys) was Battelle's address. As such, the State never had access to a participant's survey data, and Battelle never had access to a participant's contact information or name. Due to the anonymous nature of the survey, we hoped that sample members were more likely to respond and be more candid.

Battelle was also prepared to accommodate respondents who preferred to take the survey in Spanish; however, no one opted to take the survey in Spanish.

Follow-Up Mailings: Our goal was to achieve a response rate of at least 50 percent to the survey. Therefore, it required repeated follow-up with non-respondents. After the initial survey mailing, we mailed a reminder postcard. The protocol also included two additional survey mailings followed by reminder postcards. The reminder mailings are described below:

Thank you/reminder postcards. Two weeks after the initial mailing, a reminder postcard was sent to each respondent thanking them for participating and encouraging survey completion. The postcard included a toll-free number that could be called if the respondent had any questions about completing the survey or needed to have another copy of the survey mailed. The postcard was printed on cardstock that matched the cover of the survey booklet. Two additional reminder postcards were mailed for non-respondents at six and ten weeks following the initial survey mailing.

Additional survey mailings. Two weeks after the postcard reminder was mailed, a second survey was mailed. A cover letter was included stressing the import the initial mailing. No additional compensation was provided in the subsequent mailings.

Table 67 shows the expected and actual mailing dates and the expected and actual number of participants we planned to contact at each stage of the survey. We originally estimated a response rate of about 15 percent after the initial survey mailing and response rates of about 10 percent after each additional mailing. Our achieved response rates were higher than expected so we mailed fewer mailings at each stage than we originally planned.

Table 67. Expected and achieved date of survey mailings and sample size by type of contact with study participants.

Mailing	Expected Date	Actual Date	Expected Number	Actual Number
Advance Letter	August 20, 2014	August 20-27, 2014	3,948	3,948
Survey Packet	August 22, 2014	August 25-29, 2014	3,948	3,948
First Postcard	September 5, 2014	September 10, 2014	3,356	3,344
Second Survey	September 19, 2014	September 19-22, 2014	3,021	2,448
Second Postcard	October 3, 2014	October 3, 2014	2,720	1,779
Third Survey	October 17, 2014	October 17, 2014	2,448	1,496
Third Postcard	October 31, 2014	October 31, 2014	2,204	1,335

Monitoring the Progress of Data Collection

The tracking database was programmed so that study staff could generate regular disposition reports summarizing the status of the data collection activity throughout the data collection period (e.g., number of surveys mailed, number of surveys undeliverable, number of surveys received).

Entering Data into an Electronic Database

The printed surveys were formatted to facilitate data entry. Data entry began when the first surveys were returned. Data entry was completed by professional staff that has experience using Battelle data-entry systems. Electronic data cleaning was conducted to detect errors not identified during data entry. These programs checked for outliers, incorrect use of skip patterns, and logical consistency checks between variables to identify inconsistencies. Questionable data was flagged by the program and then checked by referring to the paper survey questionnaire. Verifiable errors were corrected.

Appendix B: Survey Questions

Are you the person this survey was addressed to?

Are you willing to complete the survey?

Do drive as part of your job (not including your commute to and from work)?

Section A. Driving Related Attitudes, Beliefs, and Habits

Please indicate the extent that you agree or disagree with the following statements.

Strongly Disagree   Somewhat Disagree   Neither   Somewhat Agree   Strongly Agree

A1 Everyone should obey the speed limits because it's the law.

A2 People should keep up with the flow of traffic.

A3 There is no excuse to exceed the speed limit.

A4 Driving over the speed limit is not dangerous for skilled drivers.

A5 I often get impatient with slower drivers.

A6 I enjoy the feeling of driving fast.

A7 I try to get where I am going as fast as I can.

A8 I feel annoyed about driving at or near the speed limit.

A9 Driving within or near the speed limit reduces my chances of an accident.

A10 Driving within or near the speed limit makes me feel relaxed.

A11 Driving within or near the speed limit makes me feel bored.

A12 Driving near the speed limit makes me feel more in control of my vehicle.

A13 Which of the following statements best describes your driving? Please select one response.

☐ I tend to pass other cars more often than other cars pass me

☐ Other cars tend to pass me more often than I pass them

☐ Both/About equally

☐ Don't know

☐ Prefer not to answer

A14 When driving, I tend to . . .

☐ Stay with slower moving traffic

☐ Keep up with the faster traffic

☐ Both/About equally

☐ Don't know

☐ Prefer not to answer

This section concerns how people may change the way they drive on different types of roads, such as multi-lane highways, rural routes, or residential streets.

| Often | Sometimes | Rarely | Never | Don't know |

A15 How often would you say you drive **15** mph over the speed limit on multi-lane divided highways?

A16 How often would you say you drive **15** mph over the speed limit on multi-lane, interstate freeways through *major towns or cities*?

A17 How often would you say you drive **15** mph over the speed limit on two-lane highways, one lane in each direction in rural areas?

A18 How often would you say you drive **10** mph over the speed limit on rural country roads?

A 19 How often would you say you drive **10** mph over the speed limit on neighborhood or residential streets?

A20 How often would you say you drive **10** mph over the speed limit on main roads in town that have two lanes in each direction?

A21 How many times have you been stopped for speeding in the past 12 months?

A22 How many times have you been cited/fined for speeding in the past 12 months?

A23 How many miles do you drive each week? Please include *personal travel* only, including your commute to and from work, but excluding any driving you do for work.

☐ Less than 50

☐ 50 - 100

☐ 100 - 200

☐ 200 - 400

More than 400

A24 What percentage of the time do you drive in the following conditions?
(Please make sure the total of A and B adds to 100 percent and include *personal travel* only, including your commute to and from work, but excluding any driving you do for work.)

A. In conditions where it is congested (i.e. rush hour or heavy traffic conditions).

B. In conditions where it is not congested (i.e. moderate or light traffic conditions).

A25 How often do you use your phone (for talking or texting) while driving? Would you say you use your phone while driving during . . .

- All trips
- Most trips
- About half of your trips
- Fewer than half of your trips
- None of your trips
- Don't know
- Not applicable - don't have a mobile phone

A26 Do you have a laser/radar detector in your car?
- Yes
- No
- Prefer not to answer

Please answer the following questions thinking about the posted speed limit, plus or minus a few mph. When driving in the **near future**, how likely/unlikely is it that you would drive within or near the speed limit under the following circumstances?

Very Unlikely   Somewhat Unlikely   Neither   Somewhat Likely   Very Likely

A27 Driving in a fast/powerful car?

A28 Driving when the speed limit is clearly signed?

A29 Driving on long straight roads?

A30 Driving in traffic calmed areas (e.g., with small roundabouts, speed bumps, special warning signs, etc.)?

A31 Driving when carrying passengers who want you to drive fast?

A32 Driving through a school zone?

A33 Driving with a child in the car?

Based on what you remember about your own driving, how often would you say that you did the following activities? Your best guess is fine.

Never	Hardly Ever	Occasionally	Quite Often	Frequently	Nearly All the Time

A34 How often do you disregard the speed limits late at night or early in the morning?

A35 How often do you get involved in "races" with other drivers on a roadway or from a stop light?

A36 How often do you become impatient with a slow driver in the fast lane and pass on the right?

A37 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?

A38 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?

A39 How often do you drive to reduce stress or tension?

A40 How often do you take risks while driving because it's fun, such as driving fast on curves or "getting air"?

A41 How often do you drive more than 20 mph over the speed limit?

A42 How often do you drive 10-20 mph over the speed limit?

A43 How often do you wear a seat belt?

A44 How often do you drive after consuming alcohol?

A45 How much do you want to keep within or near the speed limit while driving in the **near future**?
- ☐ Not at All
- ☐ A Little
- ☐ Moderately So
- ☐ Quite a Bit
- ☐ Extremely So

For the next six questions, p*lease think about driving on a sunny day with no traffic ahead of you*. At what speed would you typically be driving on the following types of roads:

A46 Multi-Lane, divided Interstate freeway that passes through a major town or city, such as I-90 or I-84 (as shown in the picture below), with a **65** mph posted speed limit.

A47 Main (arterial) road with two travel lanes in each direction in a town (as shown in the picture below) with a **35** mph posted speed limit.

A48 Neighborhood or residential road (as shown in the picture below) with a **20** mph posted speed limit.

A49 Paved rural country road (as shown in the picture below) with a **45** mph posted speed limit.

A50 A low-traffic, rural State Highway with one travel lane in each direction (as shown in the picture below) with a **60** mph posted speed limit.

A51 Divided Interstate Highway with two travel lanes in your direction like I-84 between Boise and Mountain Home (as shown in the picture below) with a **75** mph posted speed limit.

Section B. Attitudes and Beliefs about Speeding

The following section is about conditions or factors that you consider when setting your driving speed. Please indicate the extent that you agree or disagree with the following statements.

 Strongly Disagree   Somewhat Disagree   Neither   Somewhat Agree   Strongly Agree

B1 Setting the cruise control within or near the speed limit can keep me from speeding.

B2 A digital speedometer works better than the needle-style speedometer in indicating driving speed.

B3 Radar speed signs that flash my speed when I pass them would make me more aware of my speed.

B4 Posting the speed limit along roads more often would help me avoid speeding.

B5 Knowing which roads have frequent speed enforcement keeps me from speeding on those roads.

B6 Seeing a road sign showing where someone died in a speed-related crash would discourage me from speeding at that location.

The following section concerns how effective you think higher penalties and increased enforcement would be for reducing speeding. Please indicate the extent that you agree or disagree with the following statements.

 Strongly Disagree   Somewhat Disagree   Neither   Somewhat Agree   Strongly Agree

B7 Habitual speeders should be fined a lot more each time they speed than other drivers who speed less often.

B8 To reduce speeding, people should be aware of how much a ticket is.

B9 Higher insurance rates as penalties for speeding are more effective in reducing speeding than increasing the fines for speeding.

B10 For habitual speeders who almost always speed, increasing penalties does not have any effects on reducing their speeding behavior.

B11 Providing incentives, such as free license renewal, rather than issuing penalties would be more effective in reducing speeding behavior.

B12 Higher penalties could sometimes be unfair to some people (e.g., people with lower incomes).

B13 Increasing police presence on the highway is effective in reducing speeding.

The following questions are about how effective you think the following approaches would be for reducing speeding for the general public. Please indicate how much you agree or disagree with the following statements.

Strongly Disagree	Somewhat Disagree	Neither	Somewhat Agree	Strongly Agree

B14 Flashing speed displays would be the most effective when they are in locations with lots of hazards (e.g., pedestrians).

B15 Rumble strips, grooved pavement along the shoulders, are effective in slowing drivers down.

B16 Speed bumps are effective in slowing drivers down.

B17 A device in the engine that sets a maximum speed for the vehicle would be effective in reducing speeding in all situations.

B18 A display on the dashboard that showed the posted speed limit would help reduce speeding.

B19 A display on the dashboard that showed the vehicle's fuel efficiency (FE) would encourage drivers not to speed.

B20 A speed awareness course would be effective if it was offered when drivers are getting or renewing their driver's license.

B21 Education on stopping distance under different driving speeds is important.

Please indicate to what extent the following statements are true or not true for you.

Not True at All	Somewhat not True	Neutral	Somewhat True	Completely True

B22 I have never exceeded the speed limit.

B23 I have never wanted to drive very fast.

B24 I have never driven through a traffic light when it has just been turning red.

B25 I always obey traffic rules, even if I am unlikely to get caught.

B26 I always keep sufficient distance from the car in front of my car.

B27 If there were no police controls, I would still obey speed limits.

B28 I have never crossed a solid yellow line in the center of the road when passing another car.

B29 I sometimes feel resentful when things don't go my way in traffic.

B30 I never regret my decisions in traffic.

B31 I don't care what other drivers think of me.

B32 I always am sure how to act in traffic situations.

B33 I always remain calm and rational in traffic.

There are a number of existing methods and potential new technologies that could be used to reduce speeding. These next questions ask what you think about the use of these technologies to reduce speeding on American roads.

Good Idea	Neither	Bad Idea	Don't know

B34 More frequent ticketing for speeding.

B35 Issuing higher fines for speeding tickets.

B36 A device in your vehicle that notifies you with a buzzer or a flashing light when you drive faster than the speed limit.

B37 A device in your vehicle that records your speed data and gives you the option to provide the information to your insurance company to lower your premiums, if you obey the speed limits.

B38 A device in your motor vehicle which slows the vehicle down when it senses another car or object is too close to your motor vehicle.

B39 How important is it that something be done to reduce speeding by drivers? Is it …
- ☐ Very important
- ☐ Somewhat important
- ☐ Not too important
- ☐ Not at all important
- ☐ Don't know

Section C: Driver Characteristics

C1 How old are you?

C2 Are you currently employed full time, part time, unemployed and looking for work, retired, going to school, a homemaker, or something else? Please check all that apply.
- ☐ Employed full time
- ☐ Employed part time
- ☐ Unemployed and looking for work
- ☐ Retired
- ☐ Going to school
- ☐ Homemaker
- ☐ Disabled
- ☐ Other

☐ Not sure

C3 What is highest grade or year of regular school you have completed?
☐ No formal schooling
☐ First through 7th grade
☐ 8th grade
☐ Some high school
☐ High school graduate
☐ Some college
☐ Four-year college degree
☐ Some graduate school
☐ Graduate degree

C4 Are you currently married, divorced, separated, widowed, or single?
☐ Married
☐ Divorced
☐ Separated
☐ Widowed
☐ Single
☐ Don't know

C5 Do you consider yourself to be Hispanic or Latino?
☐ Yes
☐ No
☐ Don't know

C6 Which of the following racial categories describes you? You may select more than one.
☐ American Indian or Alaska Native
☐ Asian
☐ Black or African-American
☐ Native Hawaiian or Other Pacific Islander
☐ White
☐ Hispanic/Latino
☐ Other, specify

C7 What is your gender?
☐ Male
☐ Female

C8 How many people live in your household? Please include all people, including yourself, even those who are under the age of 16.

C9 How many of those are under age 16?

C10 Do you own or rent your home?
- ☐ Own
- ☐ Rent
- ☐ Some other arrangement
- ☐ Don't know

C11 Which of the following categories best describes your total household income before taxes in 2013? Your best estimate is fine.
- ☐ Less than $5,000
- ☐ $5,000 to $14,999
- ☐ $15,000 to $29,999
- ☐ $30,000 to $49,999
- ☐ $50,000 to $74,999
- ☐ $75,000 to $99,999
- ☐ $100,000 or more
- ☐ Not sure
- ☐ Prefer not to answer

C12 What is your ZIP Code?

C13

Do you live in a rural, suburban, or urban area?
- ☐ Rural
- ☐ Suburban
- ☐ Urban
- ☐ Other, specify
- ☐ Don't know

C14 What do you think is the best way to reduce speeding on Idaho roads?

C15 Do you have any other comments you'd like to make about driving safety or this survey?

Appendix C: Non-Response Analysis and Survey Weighting

This section describes non-response and weighting by using the expected frequency of survey responses and the actual frequency.

Survey Non-Response and Method for Weighting

When prospective survey respondents do not receive, complete, or return a survey, the survey information is missing for all survey questions. This is called unit non-response, as compared to item non-response where only some survey questions are missing. If the unit non-response occurs just by chance, it would not affect the inferences from the survey. However, when it occurs in a non-random manner, as it typically does, it will cause bias as the intended mix of survey respondents would not be achieved. Further adjustments are needed to account for non-response bias. In the following sections, we will first discuss the survey status and the overall response rate. Then we present the non-response bias analysis to see how non-responses varied by gender, age and speeding group. In the final section, we discuss how the survey weight was calculated and how it was adjusted based on the non-response rate.

Survey Status and Overall Response Rate

After all surveys were received and responses were coded into text and SAS data sets, additional effort was made to check on the quality of the data. Systematic checking on known variables such as gender, age and ZIP code was carried out to make sure that respondents were the intended respondents and that responses were trustworthy. For surveys with inconsistent matches, actual survey pamphlets were pulled to double check on the responses and their coding. In a few cases, incorrect entries were found and corrected. Once these quality assurance and quality control activities were completed, the survey status of all respondents was summarized.

Survey Response Rate Results

Table 68 shows the rundown of survey status in four broad categories. The first is the completed surveys. Respondents were offered two ways to fill out a survey, either by paper or by the Internet. Most people chose the paper form of the survey. Less than 10 percent of completed surveys came from web survey. There were 30 returned surveys without the case ID label that displayed the unique survey ID. We were able to rediscover the IDs for 9 of these surveys through matching gender, age and ZIP code with those in the master sample list. A total of 1,925 surveys were completed, which accounted for 48.6 percent of the 3,964 master sample.

A small portion of surveys were returned with all or most survey questions missing because respondents either refused to answer in the beginning, or completed only a few questions then stopped, or answered most questions but tore off the label, which lead to difficulties in identifying these respondents. We also validated the survey by comparing the age, gender and ZIP code in the survey pamphlets with those in the master list and found 16 returned surveys with wrong gender and/or age, likely filled by people other than the intended respondents. These cases were excluded from the completed cases.

The third category is about surveys that did not have a chance to reach prospective respondents. There were 16 surveys that were not sent out because of a scheduling issue. There were also another 699 surveys that were returned as undeliverable, likely because the corresponding addresses were not up to date, or prospective respondents had moved. The master sample list was built from the driver database of the Idaho Transportation Department for drivers with active records in the last three and half years before mid-2014. It is possible that some drivers changed address or moved out of the state, but had not updated their address information. There were two cases where the respondents were deceased.

The last category is for those who received the survey, but did not return anything. They are the classical type of survey non-respondents, accounting for about 29 percent of all respondents.

The basic response rate calculated as the number of completed surveys over all respondents was 48.6 percent, close to the expected 50 percent response rate. However, if we excluded the third category of respondents who were not reachable (not mailed out or mail returned as undeliverable) from the denominator, the adjusted response rate was 59.3 percent.

Table 68. Survey status and response rates

Survey Status	Number of Survey Respondents	% of Total Survey Respondents	% of Total Survey Respondents Adjusted
I. Completed	1,925	48.6% *	59.3% **
Web Completion	187	5%	6%
Paper Completion	1,738	44%	53%
II. Returned but Incomplete	155	3.9%	4.8%
Refused	80	2%	2.5%
Incomplete	38	1%	1.2%
Invalid	16	0.4%	0.6%
Non-Matched Label-Off	21	0.5%	0.6%
III. Undeliverable or Not Sent	717	18.1%	x
Returned because Undeliverable	701	17.7%	x
Not Sent	16	0.4%	x
IV Sent and Not Returned	1,167	29.4%	35.9%
	3964	100%	100%

* Survey response rate calculated as completed surveys over all respondents.
** Adjusted survey response rate calculated as completed surveys over all respondents excluding undeliverable (III).

Non-Response Bias Analysis

Even though the overall survey response was close to the expected 50 percent response rate, it may not be uniform across demographics such as age and gender. We hypothesized in the survey design stage that young and male drivers were less likely to respond, as were people who speed and/or have two and more convictions.

Table 69 shows the basic response rate by age, gender and speeding groups. It turns out that there were dramatic differences in response rate across age groups. The youngest age group of those 18 to 24 had the lowest response rate at 29.7 percent, the oldest group of 65 to 84 had the highest rate at 75.8%, and the middle group 25 to 64 at 49%, were close to the basic overall response rate.

Table 69. Basic response rate by gender, age and speeding group

Strata Variable	Completed Survey	Total Respondents	Basic Response Rate
Age Category			
18-24	216	728	29.7%
25-64	1,359	2,774	49.0%
65-84	350	462	75.8%
Gender			
Female	995	1,982	50.2%
Male	930	1,982	46.9%
Speeding Group			
0 convictions	952	1,584	60.1%
1 conviction	374	794	47.1%
2+ convictions	599	1,586	37.8%

In contrast, the response rates varied much less by gender. The average response rate of male drivers was only slightly below that of female drivers (46.9% versus 50.2%). The Table 69 also confirms the hypothesis that speeders were less likely to respond. The drivers who had 2 or more speeding convictions in the last three and half years had a response rate of 37.8 percent, about 20 percentage points lower than the 60.1 percent for those with no convictions. Despite the much lower response rates for young drivers and speeders, the actual cases in the completed survey for 18- to 24-year-olds and the 2+ conviction group, as shown in the second column, were quite reasonable because of the over-sampling of these groups in anticipation of lower response rate.

The differences in response rates were even more pronounced once we looked at the survey strata instead of the averages for these three strata variables. Table 70 shows the response rate by survey strata created by a three-way table of age category, gender and speeding group.

First of all, it seems that young females had a low response rate around 35 percent regardless of speeding convictions, compared to a much higher response rate of 40 percent for young male non-speeders. The young male speeder had a response rate of 20 percent. In other words,

speeding matters more for young males than for young females with regard to response rate. For the 25-to-64 age group, drivers with 2 or more convictions had a lower response rate than those with 1 conviction, and this response rate was much lower than those with no convictions. Male drivers in this age group had a slightly lower response rate when they had 1 or more convictions as compared to corresponding females, but the response rate was the same for drivers with no convictions. This was similar to the youngest age group in that male drives were more sensitive to speeding convictions. The pattern continued to some extent to the old age group of 65 to 84. The most interesting thing, however, was that all sub groups for the older drivers had a very high response rate, regardless of gender and speeding convictions. In fact, the lowest response rate at 65 percent for males with 1 conviction was higher than the highest rate 57.9 percent of 25-64 female with no convictions. So apparently, age trumped other factors. People 65 and older are more likely to have retired, and may be less concerned about their own social image. Last, males from the 65-to-84 age group with no convictions had the highest response rate at 83.5 percent.

Table 70. Basic response rate by survey strata (gender, age and speeding group)

Survey Strata	Completed Survey	Total Respondents	Basic Response Rate
18-24, F, 0	28	78	35.9%
18-24, F, 1	28	74	37.8%
18-24, F, 2+	67	206	32.5%
18-24, M, 0	30	74	40.5%
18-24, M, 1	17	72	23.6%
18-24, M, 2+	46	224	20.5%
25-64, F, 0	321	554	57.9%
25-64, F, 1	153	292	52.4%
25-64, F, 2+	241	562	42.9%
25-64, M, 0	316	554	57.0%
25-64, M, 1	129	284	45.4%
25-64, M, 2+	199	528	37.7%
65-84, F, 0	120	160	75.0%
65-84, F, 1	21	32	65.6%
65-84, F, 2+	16	24	66.7%
65-84, M, 0	137	164	83.5%
65-84, M, 1	26	40	65.0%
65-84, M, 2+	30	42	71.4%

The prospective respondents who did not receive a survey could not return the survey. The response rate for these potential respondents was by definition zero. If the pattern of undeliverable was systematically different from the basic non-response rate, the true non-response rate could reveal a different pattern or factor that would have contributed to it. With this in mind, we looked at the patterns of undeliverable by survey strata variables. Table 71 below shows the percent undeliverable among all respondents. The youngest group had the highest

undeliverable rate at 21.2 percent. This is consistent with expectation, as one would expect this group to be the most mobile, followed by the 25-to-64 age group. The 65-to-84 age group had a much lower rate at only 6.7 percent, which apparently contributed to the higher response rate for this group. The pattern by speeding group probably reflects the age difference as the 2+ conviction group is much younger than other two groups. One interesting observation is the higher undeliverable rate for females than males (18.8% versus 16.4%). One may recall the only slightly higher basic response rate for females than males (50.2% versus 46.9%). The true (or adjusted) response rate would be several points wider as more females were unreachable than males.

In our non-response analysis, we only looked at survey strata variables, including age, gender and speeding group, as we know the true values of these variables for all respondents including those who did not respond. We could expand this analysis to ZIP code and associated geographic and socioeconomic characteristics to see whether those factors are associated with non-response, which would contribute to our understanding of non-response behaviors in the speeding survey. Due to time and space constraints, the current focus is on the survey strata variables only.

Table 71. Percent undeliverable by gender, age and speeding group

Variable	Undeliverable	Total Respondents	% Undeliverable
Age Category			
18-24	154	728	21.2%
25-64	514	2,774	18.5%
65-84	31	462	6.7%
Gender			
Female	373	1,982	18.8%
Male	326	1,982	16.4%
Speeding Group			
0 convictions	228	1,584	14.4%
1 conviction	138	794	17.4%
2+ convictions	333	1,586	21.0%

Survey Weighting and Adjustment for Non-Response

The main objective of the speeding survey was to understand how repeat speeders are different from non-speeders. The study was designed such that most of the sample cases were spent for drivers with 0 or 2+ convictions, and a limited number of cases were spent for one-conviction drivers. This design allowed us to generalize the results to all drivers in Idaho. Since the probability of sampling for each strata is very different, the survey weight attached to each strata was different as a result. The first three columns in Table 72 shows the survey strata, total population within it and intended survey sample size for that strata. For example, the sample size for 18 to 24 age female drivers with two and more convictions was 206, while the total number of drivers in the population was only 483. Therefore, the design weight for each respondent was slightly more than 2. In contrast, there were more people in the population for 18 to 24 age

female drivers with no convictions (42,961) but the sample size was smaller (78), so the design weight for this group was much larger at 551.

If the survey response was 100%, the design weight would have been the weight to use for survey analysis. However, the response rate was always less than 100 percent. In the design stage, we were expecting an average 50 percent response rate (the 4th column). As one can see, the actual response for completed surveys was different from the expected 50 percent response rate. For example, the response rate was lower than 50 percent for young age strata and higher for old age strata. To account for this uneven response rate, a final weight in the last column was calculated so that weight for each completed survey properly represented the population.

Table 72. Survey weight calculation and non-response adjustment

Survey Strata	Population	Survey Sample	Targeted Response 50% RR	Survey Actual Response	Design Weight	Response Rate	Final Weight Through Non Response
18-24, F, 0	42,961	78	37	28	551	35.9%	1534.3
18-24, F, 1	11,943	74	36	28	161	37.8%	426.5
18-24, F, 2+	483	206	111	67	2	32.5%	7.2
25-64, F, 0	310,178	554	277	321	560	57.9%	966.3
25-64, F, 1	48,071	292	142	153	165	52.4%	314.2
25-64, F, 2+	1,329	562	263	241	2	42.9%	5.5
65-84, F, 0	89,172	160	81	120	557	75.0%	743.1
65-84, F, 1	4,987	32	20	21	156	65.6%	237.5
65-84, F, 2+	56	24	20	16	2	66.7%	3.5
18-24, M, 0	38,165	74	38	30	516	40.5%	1272.2
18-24, M, 1	15,833	72	36	17	220	23.6%	931.4
18-24, M, 2+	1,091	224	102	46	5	20.5%	23.7
25-64, M, 0	288,418	554	277	316	521	57.0%	912.7
25-64, M, 1	62,395	284	146	129	220	45.4%	483.7
25-64, M, 2+	2,583	528	281	199	5	37.7%	13.0
65-84, M, 0	84,532	164	80	137	515	83.5%	617.0
65-84, M, 1	8,602	40	15	26	215	65.0%	330.8
65-84, M, 2+	199	42	12	30	5	71.4%	6.6
Total	1,010,998	3,964	1,974	1,925	255	48.6%	

Appendix D: Multiple Imputation of Data Set for Analysis

This appendix describes how the multiple imputation (MI) for filling in missing survey responses was conducted. Section 1 describes the approach and validation, and the Section 2 provides the imputation model variables and missing data patterns.

Section 1

Objective

The objective of this analysis was to generate and evaluate a dataset without missing data to predict convictions. Multiple imputation was used generate predicted values to replace missing values. Regression analysis of imputed data tested the significance of age, gender, self-reported miles driven per week, driving as a job, and marital status for predicting convictions in the past 3 years.

Approach

A list of variables included in the imputation model and tables of missing data patterns are in Section II of this Appendix. Most variables (103 total) were included in the imputation model. The inclusion of a maximum number of variables increases the predictive power of imputation modeling. Inspection of the survey data indicates data are Missing At Random (MAR) rather than monotonic or dependent on the explanatory variables, an assumption that must be met in order to use the Amelia II imputation program (Honaker, King, & Blackwell 2009). From the overall dataset, there were 87 patterns of missing data. Completed data is the largest of those patterns. Forty-percent of the data did not have missing cases. In other words, 40 percent of participants provided responses to all survey items in the dataset. From the remaining 60 percent of data, 19 percent fall into eight unique patterns with membership of 1 percent to 6 percent, and 41 percent belonging to 77 unique patterns with less than 1 percent of the data in each pattern.

The imputed data analysis involved three steps. First, there were five imputed datasets generated through a multivariate imputation model. The models were formulated using the Amelia II program, which uses a bootstrapping-based, expected-maximization algorithm. Second, analyses were run on each of the five data sets and the results combined using the multiple imputations procedure. Combining the results provides a single regression model that includes the estimates for missing data. The combined results use between-imputation variance for including variation of the simulated values across the 5 imputed datasets. The imputation variance is used for computing regression-model error variance. Third, the original dataset without imputed data was evaluated using regression; the result of the regression was compared to the results of the MI regression to provide a reference for the robustness of the data.

Ordinal logistic regression was used for the regression analyses of the MI and original data. The purpose was to determine the demographic factors recorded in survey responses explain variance in the likelihood of being convicted of speeding.

Table 73 shows counts of missing variables for the variables used in the regression on demographics. The first column shows that 94 percent of the data belong to the pattern of non-missing cases, and 6 percent belong to 5 patterns of missingness. Table 74 shows the missing data patterns for these variables. Age and Gender are not missing data. As stated above, the imputation model replaces the missing data with simulated data that are estimated based on the actual responses provided by the full sample of respondents.

Table 73. Missing data counts by variable

Variable	Missing cases
Self-reported miles driving per week	26
Driving as a job	64
Marital status	31

Table 74. Missing data pattern for self-report marital status and driving as a job

Percent of data	Self-Report	Marital status	Driving as job
94%	1	1	1
3%	1	1	0
2%	1	0	1
1%	0	1	1
<1%	1	0	0
<1%	0	0	1

Regression Results:

The regression model included age, gender, marital status (C4), weekly driving mileage (A23) and drive for work variable (elig3). The overall model was significant (χ^2 (9, N=1806) = 295.00, p > 0.0001) as shown in Table 75.

Table 75. Imputation estimate model results

Sample size	1,925
Adjusted r²	< 0.0001
Degrees of Freedom	9

Table 76 outlines the variance estimations for the explanatory variable in the demographics model. The table provides information on the variance within (using the variance of the SE of each imputation) and between the imputed datasets (using the variance across imputation coefficients), and the total variance adjusted by the number of imputations. As shown by the total variance, there is the required variance across imputed files. Table 76 also provides

Relative variance information (RVI), this estimate of variance due to missing cases shows that the relative variance across the explanatory variables. The final column provides a value that represents the efficiency of the error variance attributed the chosen set of imputations, five in this case, to more imputations. Efficiency values close to 1 indicate that more imputations would not substantially effect variance.

Table 76. MI Variance information

Variable	Within	Between	Total	RVI	efficiency
age	0.000	0.000	0.000	0.005	0.999
1.sex	0.009	0.000	0.009	0.008	0.998
a23					
2	0.016	0.000	0.016	0.005	0.999
3	0.018	0.000	0.018	0.028	0.994
4	0.022	0.000	0.022	0.006	0.999
5	0.054	0.001	0.056	0.032	0.994
2.elig3	0.010	0.000	0.010	0.022	0.996
c4ri					
2	0.016	0.000	0.016	0.006	0.999
3	0.017	0.001	0.017	0.047	0.991
/cut1	0.044	0.000	0.044	0.006	0.999
/cut2	0.044	0.000	0.044	0.006	0.999

- The Within column gives the within imputation variance (i.e., the average of the estimated variances across the m imputations).
- The Between column gives the between imputation variance (i.e., the variance in coefficient estimates across the m imputed datasets).
- The Total column contains the total variance, which is the sum of the within and between variance with an adjustment for the number of imputations.
- The RVI column gives the relative variance increase (RVI), this is the between variance (with an adjustment for the number of imputations) divided by the within variance. This gives a sense of how much the variance in coefficient estimates increased due to missing values.
- The Efficiency column gives the relative efficiency; this is a measure that compares the estimate of the variance with the current value of m, to the variance with an infinite number of imputations. As the number of imputations increases, this value will approach 1.

Table 77 shows the output table for the regression analysis using the MI values, and Table 78 shows the output using the original variable values. As shown by the tables, the results are very similar. In general, the odds ratios are slightly lower with MI values, but the p-values are almost the same.

Table 77. MI Ordered logistic regression output: odds of citations by model predictors.

Variables	Model Odds Ratio	β	se	t	p-value	β max95th	β min95th
C1 Age	0.97	-0.03	0.00	-10.04	0.00	-0.04	-0.03
C7 Gender_F	1.29	0.26	0.09	2.73	0.01	0.07	0.44
A23 < 50	.	.	.	.	.	.	.
A23 50 to 100	1.47	0.39	0.13	3.04	0.00	0.14	0.63
A23 100 to 200	1.84	0.61	0.14	4.52	0.00	0.35	0.88
A23 200 to 400	2.74	1.01	0.15	6.81	0.00	0.72	1.30
A23 > 400	4.60	1.53	0.24	6.47	0.00	1.06	1.99
Driving as a job	.	.	.	.	.	.	.
Driving as not a job	0.67	-0.40	0.10	-3.98	0.00	-0.59	-0.20
C4 Married	.	.	.	.	.	.	.
C4 Single	1.35	0.30	0.13	2.38	0.02	0.05	0.55
C4 Other1	1.62	0.48	0.13	3.64	0.00	0.22	0.74
cut1	.	.	.	.	.	.	.
_cons	0.34	-1.07	0.21	-5.08	0.00	-1.48	-0.66
cut2	.	.	.	.	.	.	.
_cons	0.87	-0.14	0.21	-0.64	0.52	-0.55	0.28

[1]Other includes divorced, separated, widowed, don't know

_cut1 - This is the estimated cut-point on the latent variable used to differentiate 0 convictions from 1 conviction and 2+ convictions when values of the predictor variables are evaluated at 0.

_cut2 - This is the estimated cut-point on the latent variable used to differentiate 0 and 1 convictions from 2+ convictions when values of the predictor variables are evaluated at zero. Subjects that had a value between -1.07 and -0.14 on the underlying latent variable would be classified as the 1-conviction group.

Table 78. Ordered logistic regression output: odds of citations by model predictors.

Variables	Model Odds Ratio	β	se	t	p-value	β max95th	β min95th
C1 Age	0.97	-0.03	0.00	-9.79	0.00	-0.03	-0.04
C7 Gender_F	1.32	0.28	0.10	2.86	0.00	0.47	0.09
A23 < 50	.	.	.	.		.	.
A23 50 to 100	1.52	0.42	0.13	3.21	0.00	0.68	0.16
A23 100 to 200	1.90	0.64	0.14	4.64	0.00	0.91	0.37
A23 200 to 400	2.79	1.03	0.15	6.75	0.00	1.32	0.73
A23 > 400	4.77	1.56	0.25	6.28	0.00	2.05	1.08
Driving as a job	.	.	.	.	.	.	.
Driving as not a job	0.67	-0.41	0.10	-3.96	0.00	-0.21	-0.61
C4 Married	1.00	0.00	.	.	.	0.00	0.00
C4 Single	1.38	0.32	0.13	2.48	0.01	0.58	0.07
C4 Other1	1.64	0.49	0.13	3.67	0.00	0.76	0.23
cut1	.	.	.	.	.	.	.
_cons	0.36	-1.03	0.22	-4.74	0.00	-0.60	-1.45
cut2	.	.	.	.	.	.	.
_cons	0.90	-0.10	0.22	-0.47	0.64	0.32	-0.52

[1]Other includes divorced, separated, widowed, don't know

_cut1 - This is the estimated cut-point on the latent variable used to differentiate 0 convictions from 1 conviction and 2+ convictions when values of the predictor variables are evaluated at 0.

_cut2 - This is the estimated cut-point on the latent variable used to differentiate 0 and 1 convictions from 2+ convictions when values of the predictor variables are evaluated at zero. Subjects that had a value between -1.07 and -0.14 on the underlying latent variable would be classified as the 1-conviction group.

Section 2: Imputation Model Variables and missing data patterns

Table 79. Variables included in the imputation model by missing data pattern row

Row																
Row 1	b5r	b1r	a50r	a51r	b4r	b14r	a47r	a46r	a35	a39	a41	a42	a49r	b21r	b6r	a12r
Row 2	a6	a8	a36	a37	a40	b13r	b20r	b19r	a34	a44	a7	a9r	a1r	a2r	a5	b7r
Row 3	a48r	b12r	b3r	a38	a43r	b8r	a11	b18r	b15r	a10r	a4	b11r	b9r	b10r	b16r	a3r
Row 4	b2r	a23	c3r	b24r	b25r	b26r	b28r	b31r	b22r	b17r	b23r	b27r	c4r	b33r	a19r	a32r
Row 5	b30r	b32r	b29	a29r	a33r	a15r	a20r	a27r	a28r	a30r	a16r	a17r	c10r	a31r	c5r	a21
Row 6	a22	c8	a18r	c9	c11r	elig3	a24a	a25r	a13r	a14r	b39r	a45r	b36r	b37r	b35r	b38r
Row 7	a26r	b34r														

Table 80. Missing data pattern representing 40 percent of all imputed variables

Row																
Row 1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 7	1	1														

Note: 1= complete, 0 = missing data

Table 81. Missing data pattern representing 6 percent of all imputed variables

Row																
Row 1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 7	0	1														

Note: 1= complete, 0 = missing data

Table 82. Missing data pattern representing 3 percent of all imputed variables

Row																
Row 1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 7	1	0														

Note: 1= complete, 0 = missing data

Table 83. Missing data pattern representing 2 percent of all imputed variables

Row 1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 6	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1
Row 7	1	1														

Note: 1= complete, 0 = missing data

Table 84. Missing data pattern representing 2 percent of all imputed variables

Row 1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 6	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1
Row 7	1	1														

Note: 1= complete, 0 = missing data

Table 85. Missing data pattern representing 2 percent of all imputed variables

Row 1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 6	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
Row 7	1	1														

Note: 1= complete, 0 = missing data

Table 86. Missing data pattern representing 2 percent of all imputed variables

Row 1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Row 7	1	1														

Note: 1= complete, 0 = missing data

Table 87. Missing data pattern representing 1 percent of all imputed variables

Row 1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1
Row 7	1	1														

Note: 1= complete, 0 = missing data

Table 88. Missing data pattern representing 1 percent of all imputed variables

Row 1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Row 6	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1
Row 7	1	1														

*Note:* 1= complete, 0 = missing data

Appendix E: Comment Content Analysis

The last two questions of the survey (C14 and C15) were open format, meaning participants were able to say as little or as much as they wanted in response to each question. We received an abundance of comments in response to the two questions. To analyze the responses, we conducted a content analysis, which included reviewing the individual responses and categorizing similar responses into groups. We focused primarily on the responses for question C14; however, both questions were included in the content analysis. Responses from both questions are combined and discussed below. Question C14 asked "What do you think is the best way to reduce speeding on Idaho roads?" and question C15 asked "Do you have any other comments you would like to make about driving safety or this survey?" The results of the content analysis are split into three sections. The first section discusses countermeasures that respondents felt would be effective for addressing speeding, the second section discusses respondent comments about their general thoughts about speeding, and the third section discusses respondent views about the survey itself.

Speeding Countermeasures

Many of the responses provided were speeding countermeasures that had been mentioned in previous sections of the survey. The frequency with which participants mentioned those countermeasures is shown in the Figure 39 below. It should be noted that several participants listed more than one countermeasure in their responses to these questions. Participants cited more law enforcement, higher fines, and more education/awareness about speeding as well as many other countermeasures that could potentially help reduce speeding. One participant suggested the following: "Continuing education for experienced drivers, comprehensive drivers training (including manual transmission) for beginners, plus a thorough media campaign on the dangers of driving too fast and too close." Another participant thought that "education is the best way to reduce speeding. People need to think about other drivers and all of the circumstances that come into play while on the roadways. The public service ads on TV and radio seem effective for alcohol and drugs. I think they could be effective for driving as well."
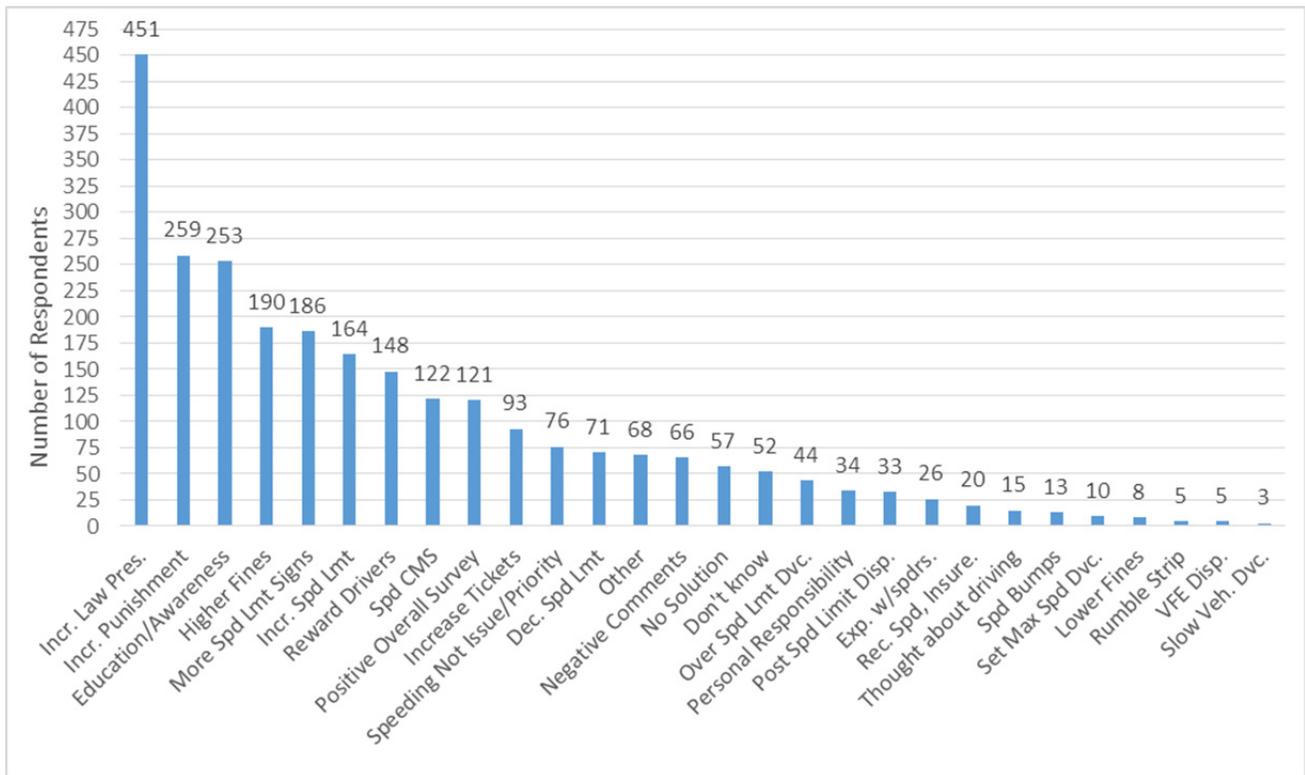
Figure 39. Frequency of countermeasures types suggested by participants.

Importance of the Speeding Issue

In response to the two questions, some participants provided responses that did not include any speeding countermeasures, but more of an opinion about the importance of the speeding problem. As shown in the Figure 40 below, these responses were categorized into three groups: speeding is not an issue/priority, driver personal responsibility, and no solution. The speeding not issue/priority group refers to the responses in which participants indicated that they did not think that there was a speeding problem in Idaho or that there were other issues or topics that should receive more focus, i.e., driving under the influence, using an electronic device while driving, compared to speeding.

The personal responsibility group refers to the responses in which participants indicated that it is up to the driver to not speed. One participant said it quite well, "People need to just want to drive slow. If they don't, they won't, no matter what the penalty is." Another participant shared a similar thought, "Speeding is a mind set by a driver. These drivers act in this manner no matter what is tried to educate and discourage driving in this manner."

Finally, the no solution group refers to the responses in which participants indicated that, in their opinion, there was no solution to reduce speeding: "It is impossible to eliminate. People will always speed." Another participant indicated the following: "[It] really doesn't matter what you do. There are the ones out there that do not care. They make it harder on the ones that do obey the laws."
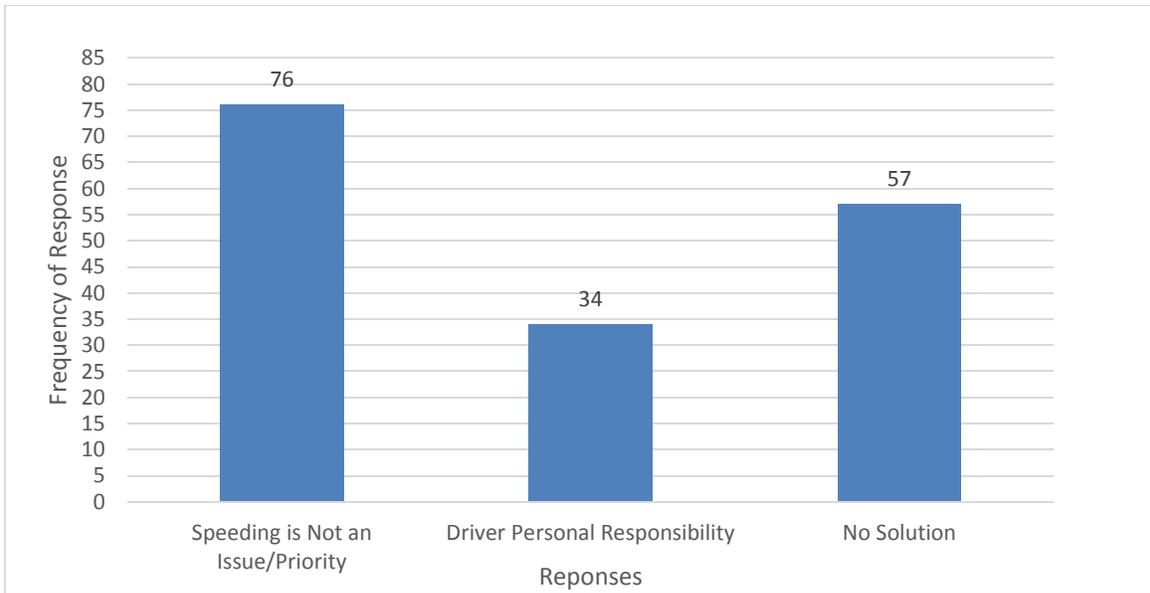
Figure 40. Frequency of respondent opinions about the importance that something be done to address the speeding issue.

Survey Comments

In addition to the types of responses discussed above, we also received responses from participants regarding the format of the survey, the usefulness of the survey, and other comments related to the survey itself. We divided these responses into positive comments and negative comments. Responses categorized as positive included participants saying thank you for giving them the opportunity to participate, saying thank you for asking their opinion on the topic, and expressing support for the administration of the survey. Responses categorized as negative included participants opposing the administration of the survey, comments on the format of the questions and response options, and other general dislike about the survey.
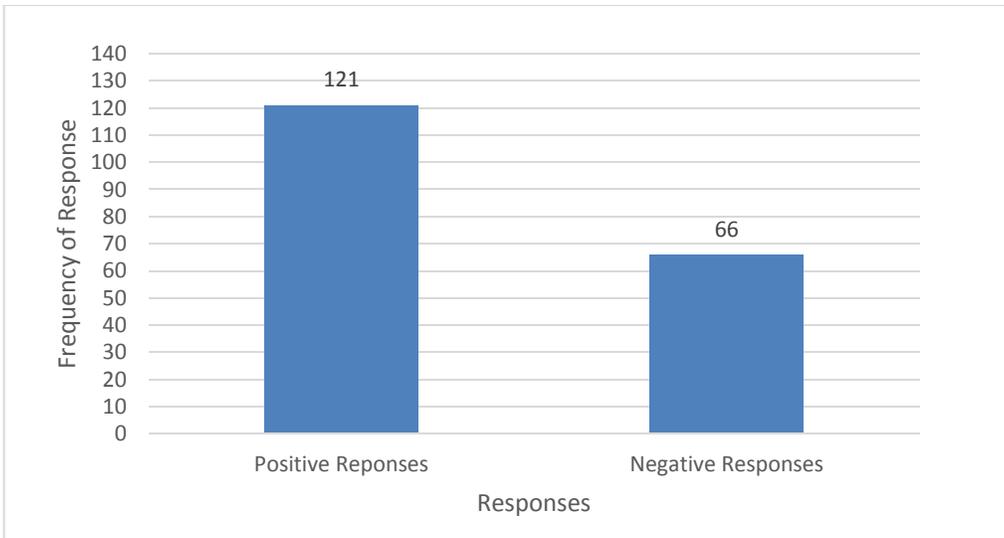
Figure 41. Frequency of positive and negative comments about the survey.

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