INSURANCE INSTITUTE
FOR HIGHWAY SAFETY

March 29, 2013

The Honorable David L. Strickland
Administrator
National Highway Traffic Safety Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

Request for Comment on a Proposed Collection of Information; Reports, Forms, and Recordkeeping Requirements; Docket no. NHTSA-2012-0176

Dear Administrator Strickland:

The National Highway Traffic Safety Administration (NHTSA) has requested comments on a proposed collection of information about driver and passenger belt use habits and the effectiveness and consumer acceptance of rear seat belt reminder systems currently in vehicles. The agency plans to survey a target group of 2,000 drivers who own a vehicle with a rear seat belt reminder system and a comparison group of 500 drivers who do not own a vehicle with a rear belt reminder. The survey samples would be drawn from vehicle registration records of vehicles with and without rear seat reminders. The Insurance Institute for Highway Safety (IIHS) would like to offer some suggestions on the proposed target population and share the findings from our research on rear seat belt reminder systems.

IIHS has tracked the fitment of rear seat belt reminder systems in U.S. vehicles for several years. We estimate that rear seat belt reminders are standard equipment in about 3 percent of 2012 vehicle models. Most of these models were manufactured by Volvo, which first offered rear seat belt reminders in U.S. models in 2009. The few 2011 and 2012 non-Volvo models with rear reminder systems were either luxury or hybrid vehicles with low sales volumes (e.g., Chevrolet Volt).

Given the method described in NHTSA's request for comments, IIHS expects the agency's survey target population to consist mostly of Volvo owners. We encourage the agency to consider oversampling owners of non-Volvo vehicles with rear seat belt reminders. The other manufacturers that have fit their products with rear seat belt reminders may have implemented the reminders differently from Volvo. A sample with roughly equal distribution of drivers of vehicles with different rear seat belt reminder systems will allow the agency to examine how different reminder system designs relate to effectiveness and consumer acceptance. The agency also should ask sampled owners of vehicles without rear seat belt reminders about their attitudes toward rear reminder systems in general and about the specific features of different reminder systems.

IIHS recently conducted a survey on technologies to increase seat belt use. We believe the findings can support NHTSA's proposed research. We surveyed 1,218 drivers and passengers about their attitudes toward seat belt use and in-vehicle technologies to increase belt use such as seat belt reminders and belt use interlocks (Kidd et al., 2013). As part of this effort, we asked 264 drivers who regularly transport an 8-15-year-old child using a belt in the back seat about the child's belt use and their attitudes toward rear seat belt reminder systems (Kidd and McCartt, 2013). Most drivers surveyed (97 percent) said the child uses a belt all of the time. Among drivers whose children were not always belted, frequently the children never fastened their belts at the outset of the trip (77 percent) or the children unbuckled during the trip (55 percent). Rear seat belt reminders would help address these situations.

Our results indicate that rear seat belt reminder systems would be popular among drivers of 8-15-year-old rear child passengers. Most drivers said they want their vehicles to alert them when the child's belt is unbuckled (82 percent). We asked these respondents how they would want the vehicle to notify them

when the child is buckled up. Most agreed they would want a visual diagram of seating positions and corresponding belt use (87 percent), a visual warning light or text display (85 percent), or a chime or buzzer (79 percent). The majority thought the notification should last indefinitely or until the child buckles up (63 percent).

In summary, IIHS encourages NHTSA to oversample non-Volvo owners of vehicles with rear seat belt reminders. Volvo owners comprise the large majority of owners of vehicles with rear seat belt reminder systems, but their opinions about rear reminder systems may not reflect non-Volvo drivers' opinions about these systems. We believe the results from our recent survey and our survey instrument will aid NHTSA with its planned research. These documents have been placed in the docket.

Sincerely,

David G. Kidd, Ph.D.
Research Scientist

References and Attachments

Insurance Institute for Highway Safety. 2013. Survey of seat belt use and perceptions of seat belt use technologies [unpublished survey instrument]. Arlington, VA.

Kidd, D.G. and McCartt, A.T. 2013. Drivers' attitudes toward front or rear child passenger belt use and seat belt reminders at these seating positions. Arlington, VA: Insurance Institute for Highway Safety.

Kidd, D.G.; McCartt, A.T.; and Oesch, N.J. 2013. Attitudes toward seat belt use and in-vehicle technologies for encouraging belt use. Arlington, VA: Insurance Institute for Highway Safety.

Attitudes toward Seat Belt Use and In-Vehicle Technologies for Encouraging Belt Use

January 2013

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ABSTRACT

Objectives: In-vehicle seat belt reminders and interlocks can encourage belt use, but widespread adoption of these features depends on the degree of acceptance among both belted and unbelted occupants. The current study collected information about attitudes toward belt use and in-vehicle technologies for encouraging belt use.

Methods: A national telephone survey of 1,218 adult drivers and passengers was conducted using random samples of landline and cellphone numbers. Part-time belt users and non-users were over-sampled. All respondents were asked about frequency of belt use, buckling routines, and support for different types of belt interlocks. Part-time belt users and non-users were queried in more depth about different types of reminders and reminder strategies.

Results: Almost all respondents said they always use their seat belts (91%). Few said they did not always (8%) or never (1%) used belts. Driving a short distance (67%), forgetting (60%), and comfort (47%) were common reasons why part-time belt users do not buckle up; comfort (77%), not needing a seat belt (54%), and disliking being told what to do (50%) were most frequently cited among non-users. Half of full-time belt users and 19 percent of part-time belt users said they generally buckle up before ignition; 90 percent of full-time belt users and about half of part-time belt users buckle up before the vehicle is moving. When asked about various types of belt interlocks, part-time belt users and non-users most often said that ignition interlocks would make them more likely to buckle up (70% and 44%, respectively). However, only 44-51 percent of all respondents supported using the different types of interlocks to increase belt use. A larger proportion of part-time belt users and non-users said they would be more likely to buckle up in response to auditory and haptic reminders than visual reminders. More than two-thirds of part-time belt users and at least one-third of non-users said they would be more likely to buckle up in response to belt reminders that become more intense or continue indefinitely; these reminders would be acceptable to about half of part-time belt users and around one-fifth of non-users.

Conclusions: The Moving Ahead for Progress in the 21st Century law allows the National Highway Traffic Safety Administration to strengthen minimum requirements for belt reminders or allow the use of interlocks to meet federal safety standards. Even though most people always buckle up, belt interlocks are supported by only about half of full-time belt users and by fewer part-time belt users and

non-users. Ignition interlocks would inconvenience a large proportion of full-time belt users and part-time belt users who buckle up after ignition. Technologies that encourage belt use after the vehicle is moving would be less intrusive. Enhanced reminder systems are more acceptable than belt interlocks and are viewed as almost as effective as interlocks if persistent enough.

Key words: Seat belts; Belt use technologies; Interlocks; Seat belt reminders; Seat belt use

INTRODUCTION

Seat belts are an effective method of reducing injuries and preventing deaths among vehicle occupants in crashes. In 2011, seat belts saved an estimated 11,949 lives of occupants 5 and older in the United States (National Highway Traffic Safety Administration (NHTSA) 2012). Mandatory seat belt use laws and campaigns combining advertising with enforcement, such as “Click It or Ticket,” have helped increase belt use among front-seat passenger vehicle occupants from 54 percent in 1994 to more than 86 percent in 2012 (Pickrell & Ye 2012). However, recent increases in seat belt use have been modest, which suggests traditional enforcement campaigns may be reaching their maximum potential. People who do not regularly use seat belts tend to be riskier drivers (Evans & Wasielewski 1983), so increasing belt use among part-time belt users or non-users potentially could lead to large reductions in crash deaths and injuries. NHTSA (2012) estimates an additional 3,384 lives could have been saved in 2011 if all passenger vehicle occupants 5 and older had buckled up. Alternative approaches may be needed to increase belt use among people who remain resistant to traditional enforcement campaigns.

Using in-vehicle technology is a promising strategy for achieving higher belt use rates. Unlike large-scale enforcement campaigns, in-vehicle technology can continuously monitor belt use and provide immediate feedback whenever an occupant is unbuckled. It may be especially useful for people who forget to buckle up.

Until recently, there were severe restrictions on NHTSA’s capability to require or allow the use of in-vehicle technology to encourage belt use. In 1973, NHTSA required that all new cars not providing passive restraints (e.g., airbags) be equipped with a belt ignition interlock that prevented the vehicle from starting if the driver or front-seat passenger was not buckled up. Belt ignition interlock systems increased seat belt use but were unpopular with many people. As a result of the public outcry, in 1974 Congress banned NHTSA from requiring belt interlocks or allowing them to be used to meet a safety standard

(Motor Vehicle and Schoolbus Safety Amendments of 1974 1974), and prohibited the agency from requiring an auditory belt reminder lasting longer than 8 seconds. In 2012, the Moving Ahead for Progress in the 21st Century (MAP-21) law removed most of these restrictions on NHTSA. The agency now can require auditory belt reminders longer than 8 seconds and can allow manufacturers to voluntarily install belt interlocks to meet a federal safety standard.

For any in-vehicle technology that encourages belt use to be successful, it must not only provide sufficient motivation to buckle up but also achieve a minimum level of acceptance among both the belted and unbelted populations. Most people who do not regularly use their seat belts are part-time belt users. Part-time belt users generally are not opposed to using seat belts but rather forget to buckle up or buckle up only in certain situations (e.g., longer trips) (Boyle & Lampkin, 2008). Enhanced reminders, with auditory reminders lasting longer than the federal minimum requirements, are a way to increase belt use among part-time belt users. Auditory reminders lasting 8 seconds or less do little to increase belt use (Geller et al. 1980; Robertson & Haddon Jr. 1974), but enhanced reminders have been shown to increase driver belt use by 5-12 percentage points (Ferguson et al. 2007; Freedman et al. 2007; Lie et al. 2008; Williams et al. 2002). Enhanced reminders are common in newer vehicles. They are standard equipment for the driver and front passenger in 91 and 77 percent, respectively, of 2012 vehicle models. Requiring all vehicles to have more intense enhanced reminders is a promising way to increase belt use among part-time belt users, but public acceptance still is a concern because the characteristics that make reminders more effective also are the characteristics that make them more annoying (Lerner et al. 2007). It is not clear how intense a reminder needs to be to increase belt use among the remaining part-time belt users and non-users and what trade-off in annoyance is acceptable.

Belt use interlocks, which require belt use for different vehicle functions, may be more successful with increasing belt use. However, based on the experience with ignition interlocks in the early 1970s, NHTSA and automakers may be leery about using interlocks. Findings from recent focus group studies of part-time belt users suggest that even though belt use rates have increased dramatically since 1970, belt ignition interlocks still are perceived negatively and are not acceptable to most people (Eby et al. 2004; Equals Three Communications 2002). Less intrusive types of belt use interlocks that allow some mobility or prevent the use of convenience or entertainment vehicle features may be more acceptable than

ignition interlocks. Two studies of drivers of fleet and service vehicles found that preventing drivers from placing the vehicle in gear for a short period of time or making the accelerator pedal harder to press can increase belt use (Van Houten et al. 2010; Van Houten et al. 2011). Most drivers in these studies also found these approaches acceptable. Disabling the audio entertainment system when the driver is unbuckled is another promising approach, but a national survey of people who had not used a seat belt on at least one occasion in the past year found that this approach was unacceptable to more than half of the respondents (Eby et al. 2004).

Only a few studies have examined how drivers and passengers would respond to different technologies for encouraging belt use. Most of this research is based on small samples of part-time belt users whose opinions may not reflect the nationwide population of part-time belt users. Additionally, these studies did not look at whether drivers and passengers who always use seat belts would support different technologies for encouraging belt use or be inconvenienced by them. Lastly, previous research examined a small selection of technologies. A more comprehensive look at the effectiveness and acceptability of a range of in-vehicle technologies to encourage belt use is needed. In the current study, a national telephone survey of all types of belt users was conducted to update self-reports of seat belt use and gather new, detailed information on perceptions of a variety of in-vehicle technologies for encouraging belt use.

METHOD

Sample Design

Telephone interviews were conducted in three different sampling phases to achieve a minimum sample size of 1,200 completed interviews with at least 300 respondents who do not use seat belts all of the time and at least 250 respondents who transport children 8-15 years old riding in back seats and using seat belts. Interviews were conducted only with people 18 and older. In each sampling phase, random samples of landline numbers and cellphone numbers were obtained from an industry supplier of telephone samples (Marketing Systems Group, Horsham, PA). In all, samples of more than 39,000 landline numbers and 20,000 cellphone numbers were obtained. Telephone interviews were conducted between May 8, 2012 and July 15, 2012, by OpinionAmerica, Inc. (Cedar Knolls, NJ), a professional survey organization.

The first sampling phase was designed to conduct interviews with a large random sample of households. Random samples of 14,499 landline numbers and 7,496 cellphone numbers were used. Interviews were conducted with persons 18 and older who drove or rode in passenger vehicles at least once a week. Interviews were completed with 799 people in the first sampling phase, with about half the respondents using their cell phones.

The second sampling phase targeted part-time belt users and non-users, using random samples of 20,270 landline numbers and 12,538 cellphone numbers. People were interviewed only if they said they used their seats belt "most of the time," "some of the time," "rarely," or "never." Interviews were completed with 198 part-time belt users and 32 non-users, with about 86 percent of them conducted with landline phone users.

The third sampling phase targeted people who drive at least once per week with a child 8-15 years old who uses a seat belt rather than a child safety seat in the back seat, using a random sample of 5,000 landline numbers of households with children 8-15 years old. Interviews were completed with 189 people meeting the sampling criteria. Information about the belt use of respondents' 8-15-year-old child passengers is reported in a companion paper (Kidd & McCartt 2013), but respondents' own reported belt use and attitudes about technologies for encouraging belt use are included in the current study.

In all three sampling phases, if the respondent was on a cellphone, the interviewer asked if the respondent was driving and, if so, ended the call and called back later. From an initial combined sample of 59,803 numbers, 8,555 were reached. The cooperation rate (American Association for Public Opinion Research 2011) was 14.2 percent, resulting in 1,218 respondents. Among the households that were reached but did not participate, 2,730 did not qualify and 4,607 qualified but refused. Table 1 summarizes the completion results for each sampling phase and the total combined sample.

Survey Instrument

All respondents were asked for basic demographic information including age, gender, educational attainment, household income, and state of residence. All respondents were asked questions about their belt use including the frequency of use and at what point they buckled up when starting a trip. They also were asked whether they supported using four different types of belt use interlocks to increase belt use: ignition interlock, speed interlock, transmission interlock, and entertainment system interlock.

People classified as part-time belt users and non-users were asked additional questions about their attitudes towards seat belts and methods of increasing belt use. The questions about attitudes were taken from the 2007 Motor Vehicle Occupant Safety Survey (Boyle & Lampkin 2008) and included reasons for non-use. The respondents were asked about their likelihood of buckling up in response to different technologies and whether several technologies would be acceptable. The technologies included a seat belt reminder, resistance in the accelerator pedal, a speed interlock, an entertainment system interlock, and an ignition interlock. The part-time belt users and non-users also were asked detailed questions about the features and characteristics of seat belt reminders that would make them more likely to buckle up and would be acceptable.

Data Analysis

Data from the three sampling phases were combined for analyses, as follows. First, respondents from the first sampling phase (i.e., random sample of drivers and passengers) were placed into six groups based on two factors: belt use (full-time, part-time, non-user) and whether the respondent transports an 8-15-year-old child who uses a seat belt in the back seat (yes, no). Table 2 shows the distribution of respondents in the Phase 1 random sample across these six groups. This distribution was assumed to reflect that of the U.S. population of drivers and passengers 18 and older.

Also as shown in Table 2, the combined sample had a disproportionate number of part-time belt users and non-users (26%) and drivers transporting children using seat belts in the back seat (21%) compared with the Phase 1 random sample (9% and 7%, respectively). Weights for each of the six groups were created to normalize the distribution of the combined sample back to the distribution in the random sample; this was accomplished by dividing the number of respondents in the Phase 1 random sample in each group by the number of respondents in the combined sample in that group. The resulting weighted combined sample size was 799, equal to the size of the Phase 1 random sample.

All analyses were performed using the weighted combined data. Chi-square tests were used to assess the statistical significance of differences in responses among different types of belt users. Missing responses, refusals, or cases where respondents indicated they did not know an answer were excluded from the statistical tests and the percentages reported below unless noted otherwise. The sampling tolerance for the combined sample was about ± 3 percentage points at the 95 percent confidence level.

RESULTS

Phone interviews were completed with 1,218 people (799 weighted). The weighted sample was almost evenly divided between males and females. Nearly half of respondents were 30-59 years old and slightly more than one-third were 60 or older. Nearly one-third of respondents' household incomes were more than $75,000; about 47 percent reported a household income of less than $50,000.

Most respondents (91%) indicated that they always use their seat belts. The percentage of full-time belt users was larger for respondents who travel as passengers (94%) than for those who were drivers (90%), but the difference was not significant ($\chi^2[2]=1.8$, $p=0.4$). About 8 percent of respondents reported that they use their seat belts most of the time, some of the time, or rarely when travelling in a vehicle and were classified as part-time belt users. Nearly 8 percent of drivers were part-time belt users, and 5 percent of passengers were part-time belt users. Lastly, 1 percent of respondents were non-users who reported that they never use their seat belts. Two percent of respondents who drove at least once per week were non-users, whereas less than 1 percent of passengers were non-users.

The demographic characteristics of full-time belt users, part-time belt users, and non-users were fairly similar (see Table 3). The only statistically significant difference among these groups was the gender distribution. Non-users and part-time belt users were more likely than full-time belt users to be male ($\chi^2[2]=6.1$, $p<0.05$). The type of vehicle that respondents predominantly travel in also differed by frequency of belt use. A larger proportion of non-users reported travelling in pickup trucks ($\chi^2[8]=13.4$, $p=0.1$).

Buckling Routines and Reasons for Non-Use of Belts

All survey respondents were asked to describe when they generally first put on their seat belt (Table 4). Overall, about 50 percent of respondents said they buckle up before the vehicle starts, one-third buckle up after the vehicle starts but before it is placed in gear, 5 percent buckle up after the vehicle is in gear but before it is moving, and 4 percent buckle up after the vehicle is moving. Buckling routines differed significantly between full-time and part-time belt users ($\chi^2[6]=91.1$, $p<0.001$). Most full-time belt users buckle up before the car is started (52%), placed in gear (85%), or moving (90%). Far fewer part-time belt users buckle up before the vehicle is started (19%), placed in gear (48%), or moving (54%).

One-fifth of part-time belt users buckle up after the vehicle is moving, compared with only 3 percent of full-time users. About three times as many part-time belt users (20%) as full-time belt users (7%) indicated that the point at which they buckle up varies from trip to trip.

Part-time belt users and non-users were asked if they agreed with 11 potential reasons for not using a belt. Their responses are listed in Table 5. The most frequent reasons among part-time belt users were driving a short distance (67%), forgetting (60%), and that the belt is uncomfortable (47%). Comfort also was an issue for non-users; it was the most frequent reason for not using a seat belt (77%). Other prevalent reasons were not needing a seat belt (54%) and disliking being told what to do (50%).

Opinions about In-Vehicle Technologies That Encourage Belt Use

All survey respondents were asked if they would support, oppose, or did not know if they would support or oppose the use of the following types of interlocks for drivers to increase belt use: an ignition interlock, a speed interlock that limits the vehicle speed to 15 mph unless the driver is buckled up, a transmission interlock that prevents the vehicle from being placed in gear if the driver is unbuckled, and an entertainment system interlock (see Table 6). Around half of full-time belt users said they support using each type of interlock to increase belt use. Part-time belt users and non-users showed less support for each type of interlock. Around one-third of part-time belt users and one-fifth of non-users supported each belt use interlock. The differences in support among the belt use groups were statistically significant for each type of interlock except the entertainment interlock. The interlock that was supported by the fewest full-time and part-time belt users was an ignition interlock (46% and 27%, respectively); a speed interlock received the least support from non-users (16%). Less than 6 percent of respondents in each belt use group said they did not know if they would support or oppose using each type of interlock to increase driver belt use.

Part-time belt users and non-users were asked detailed questions about how their belt use would be affected by various belt interlocks and a belt reminder that chimed, presented a warning light or text display, or gave a physical cue like a seat vibration, and if these technologies would be acceptable. In general, fewer non-users than part-time belt users would be more likely to buckle up in response to these in-vehicle technologies (see Table 7). The largest number of part-time belt users (70%) and non-users (44%) would be more likely to buckle up in response to an ignition interlock that keeps the car from

starting until the seat belt is buckled. More than half of part-time belt users would be more likely to buckle up with a speed interlock that prevents them from going faster than a certain speed such as 15 mph if they were unbuckled (56%) or the seat belt reminder (53%). About one-third of non-users said they would be more likely to buckle up if their vehicles had a speed interlock or reminder. Less than half of non-users and about one-fifth of non-users said they would be more likely to buckle up in response to an interlock preventing use of the in-vehicle entertainment system or technology making the gas pedal more difficult to push until the driver buckles up.

Acceptance of the different types of belt interlocks was low among part-time belt users and non-users. About one-third of part-time belt users and less than one-fifth of non-users said an accelerator interlock, entertainment interlock, speed interlock, or ignition interlock would be acceptable in their vehicles. Acceptance was greatest for the belt reminder; about 60 percent of part-time belt users and about one-quarter of non-users said that a belt reminder would be acceptable.

Enhanced Seat Belt Reminders

Part-time belt users and non-users were asked about different types of reminders in terms of the likelihood of buckling up and their acceptability. The top three types of reminders that would make part-time belt users more likely to buckle up were non-visual (see Table 6). About 56 percent of part-time belt users said they would be more likely to buckle up in response to a buzzer/chime, and slightly more than half said they would buckle up more often in response to a physical cue like a vibration in the seat or to a voice message. About one-quarter or less of non-users would be more likely to buckle up in response to any of the reminder types. A buzzer/chime (22%) and physical cue (20%) were the options for which most non-users said they would be more likely to buckle up.

The majority of part-time belt users said each type of reminder would be acceptable. In contrast, acceptance among non-users was far lower. A buzzer/chime and voice message were the most acceptable to part-time belt users (62% and 64%, respectively), and an illuminated seat belt buckle and physical cue were the least acceptable (53% and 52%, respectively). The reminders that were most acceptable to non-users were a text display, buzzer/chime, or voice message, although these reminders were acceptable only to a little more than 20% of all non-users.

With regard to reminder strategies, nearly three times as many part-time belt users would be more likely to buckle up in response to an enhanced reminder that continues indefinitely (71%) or becomes more intense (70%) as would be more likely to buckle up in response to a basic reminder that comes on for a few seconds and stops (26%). This pattern also was observed for non-users, although half as many non-users as part-time belt users would be more likely to buckle up in response to each strategy.

Although part-time belt users and non-users were least likely to say they would buckle up in response to a reminder that came on for only a few seconds, 62 percent of part-time belt users and 35 percent of non-users said this strategy would be acceptable — the most among all the reminder strategies. The reminder strategies that were acceptable to the fewest part-time belt users were reminders that become more intense as the vehicle speeds up (44%) and reminders that become more intense the longer the occupant was unbuckled (47%). These reminder strategies also were acceptable to the fewest number of non-users.

DISCUSSION

Recent changes in federal law give NHTSA much more latitude in requiring or allowing in-vehicle technologies for encouraging belt use. In choosing the optimal technology, there is an inherent trade-off between technologies that achieve the highest belt use and technologies that are acceptable. Additionally, to achieve widespread acceptance, the technology cannot unduly inconvenience people who always use belts. To aid in identifying the best technologies, the current study updated information on part-time belt users' attitudes toward buckling up and various types of belt reminders, while gathering new information about opinions toward in-vehicle technologies for encouraging belt use from all belt use groups.

Consistent with earlier research, the large majority of survey respondents who do not always use seat belts were part-time belt users. This is the main group targeted by laws, enforcement campaigns, and in-vehicle technologies for encouraging belt use. Part-time belt users' main reasons for not buckling up were forgetting, the circumstances of the trip (e.g., traveling a short distance), or discomfort. Belt use interlocks and strong belt reminders can cue forgetful part-time belt users to buckle up and motivate those who do not use belts in certain situations to buckle up. Most non-users also said the belt is

uncomfortable, but half also said they do not use belts because they do not like being told to use them. It is harder to develop strategies that can address deep-seated views about government's role, but some non-users may be persuaded to buckle up with interlocks or reminders especially if the comfort of belts can be improved.

Of the various belt use interlocks examined, the largest proportion of part-time belt users (70%) and non-users (44%) thought an ignition interlock would make them more likely to buckle up. However, less than half of all full-time belt users and less than 30 percent of part-time belt users and non-users said they would support using ignition interlocks to increase driver belt use. Even 51 percent of survey respondents who always use their belts said they oppose ignition interlocks. Opposition to ignition interlocks in the current survey is consistent with prior research (Eby et al. 2004; Equals Three Communications 2002).

Other types of belt use interlocks that, on the surface, seem to be less intrusive than ignition interlocks also were viewed negatively. Using a speed interlock, entertainment interlock, or transmission interlock to increase driver belt use was opposed by 44-47 percent of full-time belt users, 59-63 percent of part-time belt users, and 75-84 percent of non-users. A national survey conducted by Eby et al. (2004) also found entertainment interlocks were unacceptable to part-time belt users, but negative opinions towards transmission interlocks among respondents in the current survey were surprising considering a recent field study found high levels of acceptance for this technology among fleet and service drivers (Van Houten et al. 2010). It is possible that opposition to various types of interlocks may be due in part to the survey respondents' unfamiliarity with the technologies or their recollections of the backlash against ignition interlocks of the 1970s. Perhaps the reality of interlocks would not be as onerous as the image invoked by the description in the survey. Additionally, people who always buckle up may see little personal benefit from interlocks. Promoting a better understanding of the societal benefits of higher belt use rates may increase support for technologies such as interlocks among full-time belt users. Regardless, it seems that belt interlocks of any type would be a hard sell to many drivers and passengers.

It is important to gauge how the technologies would affect people who always buckle up, not just people in the target populations (i.e., part-time belt users and non-users). Full-time belt users represent

the large majority of passenger vehicle occupants. Information about buckling routines provides one means of judging how intrusive interlocks could be to full-time belt users. For instance, about 40 percent of full-time belt users said they generally buckle up after starting the car. Thus, an ignition interlock that prevents the vehicle from starting unless the seat belt is buckled would unduly inconvenience a large percentage of people who always use belts. About 90 percent of full-time belt users buckle up before the vehicle is moving (c.f., Malenfant & Van Houten 2008) compared with around half of all part-time belt users. About one-fifth of part-time belt users buckle up after the vehicle is moving. However, another one-fifth said their buckling routines vary, so the actual percentage of part-time belt users who buckle up after the vehicle is moving may be even greater. Based on these self-reported buckling routines, it appears that interlocks or other technologies that are activated after the vehicle is moving would be the least intrusive to people who always use a belt as well as part-time belt users.

Of the technologies included in this survey, entertainment interlocks, speed interlocks, resistance in the accelerator pedal, and belt reminders can intervene after the vehicle is moving. A seat belt reminder, however, was acceptable to about twice as many of part-time belt users and a larger proportion of non-users than the other technologies and also was judged to be similarly or more effective at increasing belt use. However, some types of belt reminders are significantly more effective at increasing belt use than others. Of the different types of belt reminders surveyed, part-time belt users and non-users said they would be more likely to buckle up in response to auditory and haptic belt reminders than visual reminders. This is consistent with previous research (Lerner et al. 2007). Additionally, more than two-thirds of part-time belt users and at least one-third of non-users said they would be more likely to buckle up in response to belt reminders that become more intense or continue indefinitely. In contrast, only about one-quarter of part-time users and 13 percent of non-users said that they would be more likely to buckle up in response to a basic reminder that stops after a short period of time. This also is consistent with previous research that found higher belt use in vehicles with enhanced reminders compared with vehicles with basic reminders that did not exceed the minimum federal requirement (Ferguson et al. 2007; Lie et al. 2008; Williams et al. 2002).

One drawback of making belt reminders more intense is that they also become more annoying (Lerner et al. 2007). The current study did not ask specifically about annoyance, but consistent with

Lerner et al. (2007), reminders that become more intense or continue indefinitely were not viewed as acceptable as a basic reminder (44-52% vs. 62%). However, it is encouraging that about half of part-time belt users found various types of more persistent reminders acceptable. Additionally, more persistent reminders were acceptable to a larger proportion of part-time belt users than the various types of belt interlocks.

The enactment of MAP-21 allows NHTSA to strengthen the federal belt reminder requirement. One possibility is to require an enhanced reminder, but allow flexibility in its design similar to what has been implemented successfully in Europe. The European New Car Assessment Programme (Euro NCAP) credits vehicles with reminders that meet certain design requirements, such as requiring a "loud and clear" auditory tone and a visual icon lasting at least 90 seconds during a single continuous period or across multiple intermittent periods. Even though the requirements permit a range of designs, reminders meeting Euro NCAP's requirements are judged to be similarly effective at increasing belt use (Kidd 2012) and are more effective at increasing belt use than reminders that do not meet Euro NCAP's requirements (Lie et al. 2008).

There are some limitations to the current study. The findings are based on self-reports. Self-reported full-time belt use (91%) in this study was slightly higher than self-reported belt use (88%) in NHTSA's 2007 Motor Vehicle Occupant Safety Survey (Boyle & Lampkin 2008), although this difference is consistent with an increase in observed daytime belt use since 2007 (Pickrell & Ye 2012). Overestimates of belt use likely reflect in part respondents answering in a socially desirable manner; this also may have positively biased opinions about technologies in this survey. Information on the survey population, people who travel in a passenger vehicle at least once a week, was unavailable. The demographic characteristics of the survey sample were not representative of the total U.S. adult population in some respects. The proportion of the survey respondents who were 60 or older or had at least a college degree was somewhat overrepresented compared with the U.S. population, and 18-24 year olds and those who had not completed high school were underrepresented (U.S. Census Bureau 2010).

In summary, MAP-21 allows NHTSA to strengthen minimum requirements for belt reminders or incentivize the use of interlocks through federal safety standards. Even though most people always

buckle up, belt interlocks are supported by only about half of full-time belt users. Technologies that encourage belt use after the vehicle is moving would be less intrusive than those activated sooner. Enhanced reminder systems are more acceptable than interlocks and are viewed as almost as effective as interlocks if persistent enough.

ACKNOWLEDGEMENTS

The authors thank Eric Teoh and Adrian Lund for their helpful contributions. This work was supported by the Insurance Institute for Highway Safety.

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Table 1. Results of attempted contacts by sampling phase.

	Sampling phase			
	Phase 1: Random sample of drivers and passengers	Phase 2: Part-time belt users and non-users	Phase 3: Drivers with 8-15 year-old in back seat	Total combined sample
Initial sample	21,995	32,808	5,000	59,803
Reached	2,841	4,898	816	8,555
Did not qualify	589	1,705	436	2,730
Qualified, but refused	1,453	2,963	191	4,607
Completed interview	799	230	189	1,218
Cooperation rate (%)	28.1	4.7	23.2	14.2

Table 2. Number (percentage) of random sample of drivers and passengers ages 18 and older and of total combined sample as a function of belt use group and transporting 8-15 year-olds using seat belt in back seat.

Driver with 8-15 year-old using seat belt in back seat	Phase 1: Random sample of drivers and passengers (n=799)			Combined sample (n=1,218)		
	Full-time belt user	Part-time belt user	Non-user	Full-time belt user	Part-time belt user	Non-user
Yes	49 (6%)	2 (<1%)	2 (<1%)	208 (17%)	42 (3%)	4 (<1%)
No	677 (85%)	59 (7%)	10 (1%)	693 (57%)	230 (19%)	41 (3%)

Table 3. Percent distribution of the demographic characteristics, seating position, and type of vehicle of full-time belt users, part-time belt users, and non-users.

	Full-time belt users (n=901; weighted n=726)	Part-time belt users (n=272; weighted n=61)	Non-users (n=45; weighted n=12)
Age			
18-24	8	10	8
25-29	7	5	0
30-59	51	40	52
60+	34	45	39
Gender			
Male	45	54	76
Female	55	46	24
Educational attainment			
Less than high school graduate	4	4	7
High school graduate	28	35	47
Some college	23	23	30
College graduate+	45	38	17
Household income			
<$15,000	9	10	3
$15,000-49,999	38	36	40
$50,000-74,999	22	27	27
$75,000-99,999	12	11	17
$100,000+	19	17	13
Seating position			
Driver	87	92	96
Passenger	13	8	4
Primary vehicle			
Car	58	52	33
Minivan	8	5	14
Pickup	14	23	43
SUV	19	19	10
Other type of van	<1	<1	0

Table 4. Percentage of different belt users who agree with various statements describing when they first put on a seat belt.

	Full-time belt users (n=901; weighted n=726)	Part-time belt users (n=272; weighted n=61)	Non-users (n=45; weighted n=12)	Entire sample (n=1,218; weighted n=799)
Before the car starts	52	19	0	49
After the car starts but before the transmission is placed in gear	33	29	0	32
After the car starts and is in gear, but before it is moving	5	6	0	5
After the vehicle is moving	3	21	0	4
When I put my seat belt on varies	7	20	0	8
I do not wear my seat belt	0	3*	100	2
Don't know	<1	<1	0	<1

Note: Percentages do not always sum 100 percent because some respondents refused to answer;
*These respondents indicated they "rarely" use a seat belt.

Table 5. Percentage of respondents who agreed with various reasons for not using a seat belt by belt use group.

Reason	Part-time belt users (n=272; weighted n=61)	Non-users (n=45; weighted n=12)
Do not need a seat belt	25	54
Don't like being told what to do	28	50
Don't want my clothes to get wrinkled	11	8
Driving a short distance	67	44
Driving in light traffic	27	28
Forget	60	23
In a rush	44	20
Other occupants not using seat belts	9	10
Probability of being in a crash is low	40	45
Seat belt is broken	6	10
Seat belt is uncomfortable	47	77

Note: Multiple responses allowed; percentages sum to more than 100 percent.

Table 6. Percentage of respondents who support or oppose different seat belt interlocks by belt use group.

	Full-time belt users (n=901; weighted n=726)		Part-time belt users (n=272; weighted n=61)		Non-users (n=45; weighted n=12)		Entire sample (n=1,218; weighted n=799)	
	Support	Oppose	Support	Oppose	Support	Oppose	Support	Oppose
Prevents vehicle from starting if driver's seat belt unfastened	46	51	27	69	20	80	44	53
			$\chi^2[4]=11.4$, $p<0.05$					
Prevents vehicle from being placed in drive or gear if driver's seat belt unfastened	53	44	33	63	18	78	51	46
			$\chi^2[4]=91.1$, $p<0.001$					
Prevents vehicle from traveling faster than 15 mph if driver's seat belt unfastened	53	44	34	62	16	84	51	46
			$\chi^2[4]=15.5$, $p<0.01$					
Prevents use of radio, CD player, other in-vehicle entertainment and communication systems if driver's seat belt unfastened	48	47	36	59	21	75	47	49
			$\chi^2[4]=7.1$, $p=0.13$					

Note: Percentage that support and oppose do not always sum to 100 percent; remaining respondents "Did not know."

Table 7. Percentage of part-time belt users and non-users who said different technologies for encouraging belt use would make them more likely to buckle up and are acceptable.

	More likely to buckle up		Acceptable	
	Part-time belt users (n=272; weighted n=61)	Non-users (n=45; weighted n=12)	Part-time belt users (n=272; weighted n=61)	Non-users (n=45; weighted n=12)
Prevents the car from starting	70	44	30	16
Only allows the vehicle to travel at low speeds like less than 15 mph	56	31	30	8
Prevents you from using in-vehicle entertainment systems	41	23	30	16
Makes the gas pedal more difficult to push	47	23	32	10
Chimes, presents a warning light or text display, or gives a physical cue like a seat vibration	53	38	61	27

Table 8. Percentage of part-time belt users and non-users who said different reminder types and reminder strategies would make them more likely to buckle up and are acceptable.

	More likely to buckle up		Acceptable	
	Part-time belt users (n=272; weighted n=61)	Non-users (n=45; weighted n=12)	Part-time belt users (n=272; weighted n=61)	Non-users (n=45; weighted n=12)
Reminder type				
Buzzer or chime	56	22	62	23
Physical cue like a vibration	53	20	52	13
Voice message	52	16	64	21
Continuously lit or flashing warning light	42	13	61	17
Text display	35	13	57	23
Illuminated seat belt buckle	29	16	53	8
Reminder strategy				
More intense the longer belt was not used until buckled	71	33	47	18
Repeats every 15 seconds until buckled	70	37	52	18
Repeats every minute until buckled	69	39	51	23
More intense as car speeds up until buckled	68	36	44	16
On for a few seconds and not on again	26	13	62	35

Drivers' Attitudes toward Front or Rear Child Passenger Belt Use and Seat Belt Reminders at these Seating Positions

January 2013

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ABSTRACT

Objective: Passengers, especially those in rear seating positions, use seat belts less frequently than drivers. In-vehicle technology can inform drivers when their passengers are unbuckled and encourage passengers to use belts. The current study collected information about drivers' attitudes towards passenger belt use and belt reminders for front passengers and children in back seats.

Methods: A national telephone survey of 1,218 people 18 and older was conducted, of which 477 respondents were drivers who transport a front-seat passenger at least once a week and 254 were drivers who transport an 8-15 year-old child in the back seat. Respondents were asked about their attitudes toward belt use by their front passengers or rear child passengers and preferences for different passenger belt reminder features.

Results: Ninety percent of drivers who regularly transport front-seat passengers said the passengers always use seat belts. Reported belt use was even higher among 8-15 year old children in the back seat (97%). Among the drivers whose children do not always buckle up, about half said the child unbuckled the belt during the trip. Almost every full-time belt use driver (96%) would encourage front passengers to buckle up if not belted, compared with 57 percent of part-time belt users and non-users. Drivers who would not encourage their front passengers to buckle up frequently cited passenger personal choice or responsibility as reasons. In contrast, nearly every driver who transports children in the back seat would encourage their belt use, regardless of the driver's belt use habits. Most drivers who transport front passengers wanted passenger belt reminders that encourage passengers to buckle up and provide information to the driver about front passenger belt use. Most of these drivers wanted a chime/buzzer or warning light or text display and wanted the reminder to last indefinitely. Most drivers who transport rear child passengers wanted the vehicle to indicate if child passengers are unbuckled. A large majority of these drivers wanted notifications via a visual diagram of seating positions and belt use, a chime/buzzer, and a warning light or text display. These drivers also wanted the vehicle to provide belt use information until the child buckled up.

Conclusions: Many drivers, especially those who always use seat belts, said they would encourage unbuckled passengers to buckle up and supported auditory and visual belt reminders for passengers, particularly for children sitting in the back seat. Front and rear passenger reminders that last

indefinitely would be acceptable to most drivers who transport these passengers. An auditory alert may be especially useful to alert drivers to children unbuckling in the back seat during a trip.

Key words: Seat belts; Seat belt reminders; Passenger belt use; Child belt use

INTRODUCTION

Passengers typically use seat belts less frequently than drivers. In 2012, 87 percent of drivers observed in vehicles were belted compared with 84 percent of front-seat passengers (Pickrell & Ye 2012). Rear passenger belt use rates are even lower. In 2011, observations at intersections found that 84 percent of occupants 8 and older were belted in front seats compared with 74 percent in back seats (Pickrell & Ye 2013).

Getting every vehicle occupant to buckle up is critical to reducing the number of crash injuries and their severity. Seat belts prevent occupants from hitting structures inside the vehicle, minimize forces from the impacts that do occur, and reduce the likelihood that occupants are ejected. As a result, lap and shoulder belts reduce the risk of fatal injury by 45 percent for front-seat car occupants 14-97 years old (Kahane 2000) and by 44 percent for back-seat outboard car occupants 5 and older (Morgan 1999).

Seat belts also can prevent occupants from colliding with one another in a crash. Unbelted back-seat passengers can be propelled into drivers or front passengers in a frontal crash or collide with neighboring occupants in a side impact crash. One study found that the risk of injury among belted occupants involved in a crash increased by 90 percent if another occupant was unbelted (MacLennan et al. 2004).

Campaigns such as “Click It or Ticket” have increased driver and front passenger belt use through well-publicized enforcement (Solomon et al. 2009; Williams et al. 1996). Belt use is higher in states with primary enforcement seat belt laws; in 2012, observed belt use rates among front-seat occupants were 90 percent in states with primary enforcement seat belt laws compared with 78 percent in states with secondary enforcement laws or no law (Pickrell & Ye 2012). Similarly, states with laws requiring belts in all seating positions had higher belt use rates among back-seat occupants 8 and older (83 percent) in 2011 than states that require belt use only in the front seats (67 percent) (Pickrell & Ye, 2013). Although strong enforcement of belt use laws is effective in increasing belt use, some communities

have limited resources and can conduct special enforcement campaigns only at certain times during the year. Thus, many people who do not buckle up go undetected.

In-vehicle seat belt reminders are another successful strategy for increasing belt use. Unlike enforcement, reminders can provide continuous, immediate feedback about non-use. Seat belt reminders use auditory and/or visual signals to remind occupants to buckle up and can further motivate belt use by removing these signals only after the belt is fastened. Currently, vehicles are required to have an auditory and visual reminder for the driver that lasts 4-8 seconds after the vehicle is turned on. The National Highway Traffic Safety Administration (NHTSA) has been prohibited by Congress from requiring an auditory reminder that lasts longer than 8 seconds, but vehicle manufacturers can install them voluntarily. Enhanced seat belt reminders that exceed the federal minimum requirement increase U.S. driver belt use by 5-6 percentage points (Ferguson et al. 2007; Williams et al. 2002) and reduce driver fatality risk by 6 percent (Farmer & Wells 2010). Enhanced reminders also may increase belt use among front passengers (Freedman et al. 2007).

Enhanced belt reminders for front-seat occupants are increasingly common. Of 2012 vehicle models available in the United States, 91 percent had enhanced reminder systems for the driver and 77 percent had reminder systems for the right-front passenger. In 2012, the Moving Ahead for Progress in the 21st Century (MAP-21) law lifted the prohibition on requiring a driver belt reminder lasting longer than 8 seconds, so NHTSA now can require a stronger reminder for drivers. Because driver and front passenger reminders in a vehicle generally are the same, a stronger requirement for driver belt reminders likely would result in stronger front-seat passenger reminders as well. The European New Car Assessment Programme (Euro NCAP) gives credit to vehicles with enhanced reminders for front seats that comply with its design requirements including reminder duration; it requires a 90-second continuous or intermittent auditory and visual signal that is “loud and clear” for front seating positions. European research shows that belt use in vehicles with reminders that meet the Euro NCAP design requirements is about 12 percentage points higher than belt use in vehicles without them (Lie et al. 2008). Whether or not U.S. drivers would accept stronger, European-style reminders to encourage front passengers to buckle up is unknown.

Only 3 percent of 2012 models in the U.S. were equipped with reminders for rear passengers. Manufacturers may be reluctant to voluntarily install rear reminders because rear reminders may be prone to false warnings and thereby annoy consumers. Rear seats may be occupied by cargo or animals so reminder systems must accurately distinguish between human passengers and non-human cargo to avoid false warnings. Observational surveys conducted in 2011 found that nearly all children younger than 3 ride in rear seats (Pickrell & Ye 2013). Child seats installed using the vehicle's Lower Anchors and Tethers for Children (LATCH) system present a technical challenge for rear passenger reminders because LATCH systems do not use the seat belt.

Even if rear seat belt reminders are prone to false alarms, they still may be acceptable. In particular, parents may want to know if their children are buckled up in the back seat. In 2011, 59 percent of fatally injured, unrestrained second-row passenger vehicle occupants ages 8-15 were traveling with belted drivers (Insurance Institute for Highway Safety, 2013). It is likely that some of these belted drivers did not know that their children were unbelted. In 2007, Public Citizen and Advocates for Highway Safety petitioned NHTSA to require rear belt reminders. This is mooted, however, by a MAP-21 requirement that NHTSA begin rulemaking to require rear reminders. This means that these systems eventually will become more common. Several studies have examined how various belt reminder features influence driver belt use (e.g., Freedman et al. 2007; Kidd 2012; Lerner et al. 2007), but the features that are successful with drivers may not be acceptable ways of encouraging passenger belt use or delivering information about passenger belt use. The objective of the current study was to gauge the amount of support for passenger belt reminder technology among drivers who transport front or rear passengers and to gather detailed information about drivers' attitudes toward various types of passenger belt reminders.

METHOD

Sample Design

Three sampling phases were undertaken to achieve a target sample of 1,200 completed interviews with a minimum of 300 part-time adult belt users and non-users and 250 drivers who regularly transport 8-15 year-old children in the back seat. At least 200 drivers who regularly drive with a front-seat passenger were expected to be interviewed during the three sampling phases. National random samples

of landline and cellphone numbers were obtained from an industry supplier of telephone samples (Marketing Systems Group, Horsham, PA) and telephone interviews were conducted by OpinionAmerica, Inc. (Cedar Knolls, NJ) between May 8, 2012 and July 15, 2012. Interviews were conducted with persons 18 and older who drove or rode in a passenger vehicle at least once a week.

The first sampling phase was a national random sample of people 18 or older who drive or ride in passenger vehicles at least once per week. Interviews were completed with 799 individuals. The second sampling phase screened for people who did not use their belts all of the time. Interviews were completed with 198 part-time belt users and 32 non-users. The third sampling phase targeted people who drive with an 8-15 year-old child who rides in the back seat at least once a week. Random samples of landline numbers were drawn from a database of households known to have children 8-15 years old, and interviews were completed with 189 drivers.

In total, random samples of 59,803 telephone numbers were obtained and 8,555 households were reached. Of these, 7,337 households either refused to participate or did not meet screening criteria resulting in a cooperation rate of 14.2 percent (American Association for Public Opinion Research 2011) and 1,218 completed interviews. The final sample included 317 part-time belt users or non-users, 254 drivers who transport an 8-15 year-old child who uses a belt in the back seat, and 477 drivers who transport a front-seat passenger at least once a week.

Survey Instrument

Respondents were asked basic demographic information and questions about their seat belt use. People who do not always use their belts were asked about attitudes toward belt use technologies and reasons for non-use. Information from these questions is reported in a companion paper (Kidd et al. 2013).

Additional questions were administered to drivers who transport passengers. People who regularly transport right front-seat passengers at least once a week were asked about the frequency of their front passengers' belt use; if they encourage passengers to buckle up, and if not, the reasons why; and whether they want the vehicle to encourage passengers to buckle up. Drivers who want to know when their front passengers are unbuckled were asked how the vehicle should notify passengers (e.g., buzzer or chime, warning light) and how long the notification should last (e.g., briefly, indefinitely).

People who did not regularly transport front passengers but regularly transport 8-15 year-old children who primarily use a seat belt in the back seat rather than sitting in a child safety seat were asked about their child passengers' belt use patterns. People with child passengers who do not always buckle up were asked if they agree with various statements about the situations of non-use. Drivers who indicated they want to know when child passengers are unbuckled were asked how the vehicle should notify them and how long the notification should last.

At the end of the survey, respondents who drove at least once a week (n=1,090) were asked if they would encourage unbuckled passengers of various ages (6, 11, 16, 21, 40, 60, and 80 years) to buckle up.

Data Analysis

Data from the three sampling phases were combined for analyses. To incorporate the oversampled groups, weights were calculated by separating respondents from the random sample into six groups according to two variables: reported belt use (full-time, part-time, non-user) and regularly transporting 8-15 year-old passengers who sit in the rear and primarily use seat belts rather than sitting in a child safety seat (yes, no). The composition of each sample according to these variables is listed in Table 1.

For each of the six groups, weights were calculated by dividing the number of respondents in that group from the random sample by the total number of respondents in the random sample plus the two oversamples. For example, responses from part-time belt use drivers who transport an 8-15 year-old child in the back seat were weighted by 0.05 [i.e., 2/(2+27+13)]. Applying the corresponding weight to each of the 1,218 cases resulted in a weighted combined sample of 799 cases. In the weighted sample about 46 percent of respondents transport a front-seat passenger at least once a week (weighted n=365.6), and, by design, about 7 percent transport an 8-15 year-old child passenger in the back seat at least once a week (weighted n=53). The sampling tolerance for the combined sample (n=1,218) was about $\pm$3 percentage points at the 95 percent confidence level. The sampling tolerance for the sample of respondents who regularly transport front-seat passengers or children using seat belts in the back seat was $\pm$4 and $\pm$6 percentage points, respectively.

All analyses were performed using the weighted data. Responses to the survey questions were analyzed as a function of driver belt use. Only a few non-users regularly transport front-seat passengers (n=17, weighted n=4.1) or children in the back seat (n=4, weighted n=2), so responses from non-users were combined with part-time belt users. Chi-square tests were used to assess the statistical significance of differences in responses between full-time belt users and other respondents. Missing responses, refusals, or cases where respondents indicated they did not know an answer were not included in the analyses. In some analyses, more than 25 percent of the expected frequencies were below five, so the Chi-square test may not have been valid. These analyses are included and should be considered exploratory.

A repeated measures logistic regression was used to examine whether or not drivers would tell unbuckled passengers of different ages to buckle up. Driver belt use (full-time belt user, part-time belt user, non-user), passenger age, and the interaction between these two variables were used to predict the likelihood of encouraging an unbuckled passenger to buckle up. A random intercept was included in the model and a compound symmetry covariance structure was assumed to account for association between multiple responses from individual drivers.

RESULTS

Interviews with Drivers who Transport Front-seat Passengers

Phone interviews were completed with 477 (weighted n=365.6) people who transport a front-seat passenger at least once a week. Most of these drivers always buckle up (90%) and most of the others use belts part of the time (9%). More than half of the drivers transporting front passengers were male (56%) and 30-59 years old (51%). About 45 percent said they had received a college degree or additional education. Around one-third reported their annual income is $15,000-$49,999. Drivers more often drove a car (55%) rather than an SUV, minivan, or pickup. The demographic characteristics of full-time belt users, part-time belt users, and non-users are listed in Table 2. A greater proportion of the part-time belt users and non-users were male compared with full-time belt users.

Age and belt use among front-seat passengers. More than two-thirds of drivers who transport front passengers said their passengers are 25 or older. About 15 percent said their front passengers are 16-24 years old, and 13 percent said their front passengers are 15 or younger. About 90 percent of

drivers said their front passengers always use seat belts. The reported frequency of front passenger belt use was significantly different between drivers who always use their seat belts and drivers who do not regularly or never use their seat belts ($\chi^2[4]=51.4$, $p<0.001$). Ninety-three percent of drivers who always use seat belts said their front passengers always buckle up, about 5 percent said their passengers are belted most or some of the time, and 2 percent said their passengers rarely or never use a belt. In contrast, slightly more than half (55%) of drivers who do not always use belts said their front passengers always use them; 38 percent said their front passengers use belts most or some of the time, and 14 percent said passengers rarely or never use belts.

Driver willingness to encourage front-seat passengers to buckle up. Drivers who transport front-seat passengers were asked if they would encourage their unbuckled passengers to use a seat belt. Nearly all drivers who always buckle up said "yes" (96%), compared with 57 percent of drivers who do not always buckle up; this difference was statistically significant ($\chi^2[1]=60.9$, $p<0.001$). Drivers who would not encourage their front passengers to buckle up were asked if they agreed with five potential reasons (Table 3). The drivers who always buckle up most often agreed with the statement that belt use is the passenger's responsibility (64%), followed by the statement that drivers do not want to monitor passenger belt use (45%). Drivers who do not always buckle up most often agreed with the statement that passengers' belt use is a personal choice (88%) or the passenger's responsibility (80%). Few respondents indicated that the lack of a legal requirement for passenger belt use factors into their decision not to encourage passenger belt use.

Seat belt reminders for front-seat passengers. All drivers who transport front-seat passengers were asked about seat belt reminders for front passengers. A significantly larger proportion of full-time belt use drivers (91%) than part-time belt users and non-users (61%) said they are responsible for passenger belt use ($\chi^2[1]=25.5$, $p<0.001$). Overall, full-time belt use drivers had more positive opinions than part-time belt users and non-users about belt reminder technology for front passengers (Table 3). A significantly larger proportion of full-time belt use drivers (82%) than part-time belt users and non-users (52%) want the vehicle to tell them when their front passenger is unbuckled. Additionally, significantly more full-time belt use drivers want the vehicle to encourage front passengers to buckle up (81% vs. 67%). Three-quarters of full-time belt use drivers (75%) and about half of part-time belt users and non-

users (51%) want the vehicle to serve the dual functions of notifying drivers when front passengers are unbuckled and encouraging passengers to buckle up.

Drivers were asked what kind of passenger reminder they would like if their vehicle notified them about front passenger belt use. Table 4 presents the responses for drivers who want to be notified about front passenger belt use. Most of these drivers who also want the vehicle to encourage front passengers to use belts would like the vehicle to use a chime or buzzer (84%) or a warning light or text display (84%). About three-quarters (78%) would like a visual diagram of seating positions showing belt use. The majority of drivers who want the vehicle to encourage front passengers to buckle up would like notifications to last until the passenger buckles up (63%). In contrast, about three-quarters of drivers who do not want the vehicle to encourage front passengers to buckle up would like the vehicle to use a visual diagram of seating positions; 60 percent would like a chime or buzzer, and 56 percent would like a warning light or text display. Forty percent wanted the notification to be brief, and about half wanted it to be moderately long (17%) or last until the passenger buckles up (35%). Respondents' opinions about the types of notifications and desired length of notifications did not vary significantly by driver belt use.

Interviews with Drivers who Transport 8-15 Year-olds in the Back Seat

Interviews were conducted with 254 drivers (weighted n=53) who transport 8-15 year-olds using a seat belt (rather than a child safety seat) in the back seat at least once a week. Table 2 lists the demographic characteristics and vehicle types of these drivers by their reported belt use. Nearly all these drivers said they always use a seat belt (92%), 4 percent use a seat belt part of the time, and 4 percent never use a belt. Ninety-two percent were 30-59 years old and more than half were female. The most frequent vehicle type driven was a car (37%), although 48 percent of the drivers who did not always buckle up drove pickup trucks. More than 60 percent of the respondents who transport 8-15 year-olds in the back seat received a college degree or advanced degree, and the most frequently reported annual income level was $100,000 or higher.

Age and belt use among back-seat child passengers. Among drivers transporting children in the back seat, about 17 percent said the child is younger than 10, 39 percent said the child is 10-12 years old, and 44 percent said the child is 13-15 years old. Nearly all drivers said the child always buckles up (97%). Only 15 of the 254 drivers interviewed (weighted n=1.5) indicated the child does not always buckle

up; 11 (weighted n=1.1) said the child buckles up most of the time and 4 (weighted n=0.4) said the child uses a belt only some of the time.

Drivers who said their children do not always use seat belts were asked if they agreed with eight statements about the situations of their children's non-use of belts (Table 5). Parents most often agreed with the statements that the child did not like the seat belt (84%), never fastened the belt at the outset of the trip (77%), or took the belt off during the trip (55%). Fewer than 1 in 5 parents agreed that improper fit (16%) or not having a seat belt available (17%) were factors.

Seat belt reminders for back-seat child passengers. Nearly every driver said that they were responsible for the belt use of the children. Most wanted their vehicle to tell them when the child was not buckled up in the back seat (82%) and to encourage the child to buckle up (72%). Drivers who wanted their vehicle to tell them when the child was unbuckled were asked about several methods of notification (Table 6). The largest proportion of drivers agreed that they would want a visual diagram of seating positions and corresponding belt use (87%), followed closely by a visual warning light or text display (85%). A somewhat smaller percentage said they would want a chime or buzzer notification (79%). The majority of drivers thought the rear reminder should last indefinitely until the child buckles up (63%); about 17 percent said the rear reminder should be moderately long, and 19 percent said it should be brief. None of these survey items varied by driver reported belt use.

Reminding Passengers of Different Ages to Buckle Up

Drivers were asked if they would encourage an unbuckled passenger to use a seat belt if the passenger was 6, 11, 16, 21, 40, 60, or 80 years old. A larger proportion of drivers who said they always use their seat belt than those who use their belt part of the time or never said they would encourage passengers in each age category to use their belt (Figure 1). The pattern of responses for all driver belt use groups, however, varied substantially by passenger age. Passengers 6 or 11 years old would be encouraged to buckle up by virtually all drivers who always buckle up or who buckle up part of the time and by more than 85 percent of drivers who never buckle up. Passengers who are 16 years old would be encouraged to buckle up by virtually all drivers who always buckle up, 87 percent who buckle up part of the time, and 75 percent who never buckle up. In contrast, more than 90 percent of drivers who always

buckle up said they would encourage an unbuckled passenger 40, 60, or 80 years old to use a seat belt, compared with about half of part-time belt users and 20 percent of non-users.

Responses to this question were modeled using a repeated measures logistic regression to assess the interaction of driver belt use (full-time belt user, part-time belt user, non-user) and passenger age on the likelihood of encouraging passengers to buckle up. Table 7 shows the contribution of each predictor to the full model. Overall, drivers were significantly less likely to encourage older passengers to buckle up compared with younger passengers (p<0.001). The odds of telling a passenger to buckle up decreased by about 50 percent for every 10-year increase in passenger age. As a group, full-time belt users were 24 times more likely than non-users to encourage a passenger to buckle up and part-time belt users were nearly twice as likely as non-users to encourage belt use; these differences were statistically significant (p<0.001 and p<0.01 respectively).

The interaction between passenger age and driver belt use approached statistical significance. Compared with drivers who said they always buckle up, those who never buckle up were less likely to encourage older passengers to use a belt than younger passengers (p=0.06). For example, the predicted probability of encouraging a 15-year-old passenger to buckle up was 0.98 for full-time belt use drivers and 0.61 for non-users. In contrast, the predicted probability of full-time belt use drivers telling a 60 year-old passenger to buckle up was slightly lower than the probability of their telling a 15 year-old to buckle up (0.95 vs. 0.98), but for a non-user the probability was drastically lower (0.20 vs. 0.61). The probability of part-time belt use drivers encouraging passenger belt use for passengers of different ages was not significantly different from non-users (p=0.11).

DISCUSSION

Passenger belt use rates typically are lower than driver belt use rates, especially rates among rear seat passengers (Pickrell & Ye 2013). Seat belt reminders potentially can increase passenger belt use by encouraging passengers to buckle up or informing drivers of non-use. The enactment of MAP-21 allows NHTSA to require stronger belt reminders and requires the agency to begin rulemaking for rear seat reminders. Little is known about attitudes toward reminders for passengers and what kinds of passenger reminders are acceptable to drivers. The current study gathered information about drivers'

perceptions of passenger belt use and reminders for front and rear passengers to identify passenger belt reminders that will increase belt use, while being acceptable to most drivers.

Consistent with observations of driver and front passenger belt use (Nambisan & Vasudevan 2007), driver-reported front passenger belt use rates were substantially higher with drivers who said they always buckle up. Attitudes about passenger belt use also differed between drivers who always use belts and drivers who do not. Nine out of 10 full-time belt use drivers said they were responsible for front passengers' belt use, compared with only 6 out of 10 part-time belt users and non-users. Nearly all drivers who always use belts said they would encourage unbuckled passengers to use belts, compared with slightly more than half of part-time belt users and non-users.

Drivers who do not always use seat belts frequently said they would not encourage front passengers to buckle up because it is the passenger's personal choice or responsibility. However, nearly all drivers, regardless of their own belt use habits, said they were responsible for the belt use of 8-15 year-olds riding in the rear seat and that they would encourage a 6 or 11 year-old passenger to buckle up. This reported behavior is somewhat inconsistent with observations of restraint use; in 2011, restraint use among children younger than 8 was considerably lower with unbelted drivers (67%) than with belted drivers (95%) (Pickrell & Ye 2013). It is possible that some part-time belt users and non-users in the current survey were responding in a socially desirable manner and may not, in reality, be likely to encourage children to buckle up. In addition, unbelted drivers who do, in reality, encourage children to buckle up may not always be aware of their child's belt use during a trip.

Previous research on belt reminders has identified reminder signals that motivate driver belt use (e.g., Kidd 2012; Lerner et al. 2007), but these same signals may not be acceptable for encouraging passenger belt use or informing drivers about passenger belt status. Most drivers who transport front passengers wanted reminders that encourage passengers to buckle up and also provide information to the driver on passenger belt use. Most wanted either a warning light/text display or a chime/buzzer to encourage passengers to buckle up and reminders that last indefinitely until the front passenger buckles up. These findings suggest that stronger front passenger reminders, such as those meeting Euro NCAP's design requirements, may be acceptable to most drivers who transport front passengers.

Reminders that continue indefinitely are perceived to encourage belt use more effectively than reminders that stop after a short period of time (Lerner et al. 2007), but a drawback is that they can be more annoying, especially if they are auditory. A small proportion of drivers did not want the vehicle to encourage front passengers to buckle up and wanted only information about front passenger belt use. These drivers preferred less intrusive reminders and most frequently wanted a visual reminder and reminders that do not last indefinitely. Long-lasting, auditory front passenger reminders might not be acceptable to these drivers, so it is important to find ways to reduce the potential annoyance of front passenger reminders without compromising their effectiveness. Kidd (2012) found that among reminders meeting Euro NCAP design requirements, reducing the proportion of time an auditory reminder is present (i.e., duty cycle) helped reduce annoyance without sacrificing the perceived effects on driver belt use. Additional research is needed to determine if the same holds for front passenger reminders.

Most drivers who transport rear child passengers want the vehicle to tell them if their children are unbuckled. These drivers had positive opinions about both auditory and visual reminders but somewhat preferred visual reminders like a warning light/text display or visual diagram of seating positions over a chime/buzzer. Most drivers also thought that the reminder should last until the child buckles up. In addition to being less annoying, visual reminders may be easier to understand than auditory reminders and can provide information about belt status more discretely. However, a drawback of visual reminders is that they may not be as effective as auditory reminders in alerting drivers when passengers unbuckle their belt during the trip. This is important because many drivers whose children did not always buckle up mentioned that the child took the belt off during the trip. Hence, notifying drivers about changes in belt status is an important feature for rear reminders. For this reason, automakers may want to supplement visual rear reminders with an auditory tone to draw attention to changes in rear passenger belt use.

As noted above, in 2012 Congress required NHTSA to begin rulemaking to require rear reminders. Euro NCAP gives credit to vehicles with rear reminders meeting certain design requirements. These requirements can serve as a starting point for NHTSA's deliberations. Euro NCAP requires a continuous or intermittent rear seat belt reminder with a visual signal lasting at least 30 seconds at the start of a trip and an auditory and visual signal when a rear seat belt is unbuckled during a trip. Although most of Euro NCAPs design requirements are consistent with drivers' preferences expressed in the

current survey, many drivers would like a reminder to last indefinitely until the child buckles up. NHTSA may want to consider a stronger duration requirement as well as the activation of an auditory reminder if belts are unbuckled during the trip.

There are some technical challenges in accurately detecting rear passenger presence. If they cannot be overcome, these may limit the effectiveness and the acceptance of rear seat reminders, especially reminders with long durations. Weight sensors are commonly used in front seating positions to detect adult occupants for airbag deployment, and these should work well for front passenger reminders. However, the sensors may not reliably discriminate between people, children in child restraints, animals, and cargo in rear seating positions. Parents might ignore or disable rear reminders that issue numerous false warnings, and false warnings also may annoy drivers without rear passengers. Future research should examine the effects of belt reminder system reliability on driver trust, acceptance, and detection of changes in rear passenger belt use.

There are some limitations to the current survey findings. Information on the population of drivers who transport front passengers or rear child passengers was unavailable, but the demographic characteristics of drivers in this survey differ in some respects from the U.S. population (U.S. Census Bureau, 2010). Compared with the entire U.S. population, a larger proportion of drivers who transport front passengers in this survey were 60 or older or had at least a college degree. Drivers who transport rear passengers interviewed in this survey were more affluent compared with U.S. households with children younger than 18, had a higher educational attainment than U.S. households with children 6-17 years old, and were older than the U.S. population with children younger than 12.

The relatively high educational attainment and income may explain why the driver-reported belt use of 8-15 year-old rear passengers (97%) in the current study was substantially higher than observed belt use rates for this group in 2011 (80%; Pickrell & Ye 2013). A recent national survey found self-reported belt use among those earning more than $100,000 or those with at least a college degree was higher than those with lower income or educational attainment (Boyle & Lampkin 2008). Most full-time belt use drivers in the current study felt responsible for their children's belt use, nearly all would encourage their children to buckle up, and most support reminders. This means that the opinions

expressed in this survey may be positively biased and portray a more favorable view of rear reminders than would be found among the general population of drivers transporting children in the back seat.

In conclusion, passenger belt reminders can increase belt use by motivating passengers to buckle up and providing information about non-use to drivers. Many drivers, especially those who always use seat belts, said they would encourage passengers to buckle up and supported belt reminders for front or rear passengers. Most drivers wanted visual and auditory reminders for front and rear passengers, and also wanted reminders to last until passengers buckled up. Passenger belt reminders, especially reminders for rear seating positions, are less common in newer model year vehicles than reminders for drivers. The information from the current study suggests broad support for reminders for passengers, especially children in the back seat.

ACKNOWLEDGEMENTS

The authors thank Nathan Oesch and Eric Teoh for their helpful contributions. This work was supported by the Insurance Institute for Highway Safety.

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Table 1. Unweighted frequency and percentage of respondents in each sampling phase as a function of belt use and drivers who transport 8-15 year-olds in the back seat.

8-15 year-olds in the back seat who use seat belt	Random sample (n=799)			Part-time belt users and non-user oversample (n=230)			Child in back seat oversample (n=189)		
	Full-time belt user	Part-time belt user	Non-user	Full-time belt user	Part-time belt user	Non-user	Full-time belt user	Part-time belt user	Non-user
Yes	49 (6%)	2 (<1%)	2 (<1%)	0 (0%)	27 (12%)	1 (<1%)	159 (84%)	13 (7%)	1 (1%)
No	677 (85%)	59 (7%)	10 (1%)	0 (0%)	171 (74%)	31 (13%)	16 (8%)	0 (0%)	0 (0%)

Table 2. Percent distribution of the demographic characteristics of drivers who regularly transport a front passenger or a child passenger belted in the back seat and the type of vehicle by driver belt use.

	Drivers transporting front passengers		Drivers transporting children in back seat	
	Full-time belt users (weighted n=330.2)	Part-time belt users and non-users (weighted n=35.4)	Full-time belt users (weighted n=49)	Part-time belt users and non-users (weighted n=4)
Age				
18-24	9	11	2	13
25-29	9	6	<1	0
30-59	52	45	92	81
60+	30	39	6	6
Gender				
Male	55	64	46	79
Female	45	36	54	21
Educational attainment				
Less than high school graduate	3	1	1	15
High school graduate	28	37	16	38
Some college	24	20	18	24
College graduate+	46	42	65	23
Household income				
<$15,000	8	7	3	0
$15,000-49,999	35	28	21	31
$50,000-74,999	24	31	21	32
$75,000-99,999	14	12	23	26
$100,000+	19	22	33	12
Primary vehicle				
Car	57	44	38	27
Minivan	8	8	20	18
Pickup	15	24	14	48
SUV	20	23	27	6
Other type of van	1	1	1	0

Table 3. Weighted frequency and percentage of drivers who transport front passengers who agreed with various statements about front passenger belt use and belt reminders by driver belt use.

	Driver belt use		
	Full-time belt users [weighted n (%)]	Part-time belt users and non-users [weighted n (%)]	Chi-square
Among drivers who would not encourage passengers to buckle up, percent who agree with reasons why			
Belt use is personal choice	2.9 (27)	10.9 (88)	$\chi^2[1]=8.8$, $p<0.01$
Belt use is passenger's responsibility	6.8 (64)	10.2 (80)	*n.s.*[†]
Do not want to be nuisance	1.0 (9)	5.6 (47)	$\chi^2[1]=3.9$, $p<0.05$[†]
Do not want to monitor passenger belt use	4.9 (45)	8.7 (71)	*n.s.*
Not required by law	1.0 (9)	2.3 (19)	*n.s.*[†]
Percentage of drivers who want specific functions of front passenger belt reminders			
Let driver know when passenger unbuckled	269.6 (82)	18.1 (52)	$\chi^2[1]=16.6$, $p<0.001$
Encourage passenger to buckle up	261.8 (81)	23.3 (67)	$\chi^2[1]=3.7$, $p=0.05$

Note: Missing responses, refusals, or cases where respondents indicated they did not know an answer are excluded. [†] Indicates more than 25% of expected frequencies less than 5.

Table 4. Weighted frequency and percentage of drivers who want to be notified about front passenger belt use who agreed with various statements about reminders as a function of whether or not they would want the reminder to encourage belt use.

	Also want vehicle to encourage passenger to buckle up [weighted n (%)]	Do not want vehicle to encourage passenger to buckle up [weighted n (%)]	Chi-square
Percentage who want various types of notification for front passenger			
Chime or buzzer	215.9 (84)	13.5 (60)	$\chi^2[1]=7.8$, $p<0.01$
Visual diagram of seating positions and belt use	198.7 (78)	17.1 (74)	*n.s.*
Warning light or text display	214.4 (84)	13.0 (56)	$\chi^2[1]=11.9$, $p<0.001$
Duration of notification would want for front passenger			
Last until passenger buckles	160.0 (63)	8.1 (35)	$\chi^2[3]=11.3$, $p<0.05$
Moderately long, several miles into trip	37.8 (15)	3.9 (17)	
Brief and end shortly after vehicle ignition	51.7 (20)	9.3 (40)	
Should not tell passenger at all	3.9 (2)	2.0 (8)	
Total valid responses	253.3 (100)	23.2 (100)	

Note: Missing responses, refusals, or cases where respondents indicated they did not know an answer are excluded.

Table 5. Among drivers whose children in the back seat do not always use seat belts, percentage who agree with various statements about the situations of their children's non-use of seat belts

	n=15, weighted n=1.5
Child does not like belt	84
Child never fastened belt at the beginning of the trip	77
Child took off the seat belt	55
Short trip	30
Not required by law	23
Belt not available	17
Improper fit	16
Child does not need a belt	16

Note: Multiple responses allowed; percentages sum to more than 100 percent.

Table 6. Weighted frequency and percentage of drivers who transport a rear child passenger who agree with various statements about belt reminders by driver belt use.

	Belt use group		
	Full-time belt users [weighted n (%)]	Part-time belt users and non-users [weighted n (%)]	Chi-square
Percentage who agree with role of rear seat child passenger reminders			
Let me know when child is unbuckled	39.1 (83)	3.1 (80)	*n.s.*[†]
To encourage child to buckle up	33.2 (72)	3.0 (75)	*n.s.*[†]
Among drivers who want to be notified about rear child passenger belt use:			
Percentage who want various types of notification about rear child passenger belt use			
Chime or buzzer	31.1 (80)	2.1 (70)	*n.s.*[†]
Visual diagram of seating positions and belt use	33.0 (87)	2.9 (94)	*n.s.*[†]
Warning light or text display	32.7 (84)	3.0 (97)	*n.s.*[†]
Duration of notification would want			
Last until child buckles	25.2 (64)	1.5 (48)	*n.s.*[†]
Moderately long, several miles into trip	6.4 (16)	0.7 (23)	
Brief and end shortly after vehicle ignition	7.3 (19)	0.8 (28)	
Should not tell passenger at all	0.2 (1)	0.1 (2)	
Total valid responses	39.1 (100)	3.0 (100)	

Note: Missing responses, refusals, or cases where respondents indicated they did not know an answer are excluded. [†] Indicates more than 25% of expected frequencies less than 5.

Table 7. Log-linear regression of passenger age and reported driver belt use on the likelihood of drivers encouraging an unbelted passenger to buckle up.

Parameter	Log odds ratio	Standard error	Odds ratio	95% confidence limits
Constant	1.05	0.24		
Passenger age	-0.04	0.01	0.96	(0.94, 0.98)
Driver belt use (full-time belt users vs. non-users)	3.17	0.29	23.73	(13.55, 41.55)
Driver belt use (part-time belt users vs. non-users)	0.64	0.26	1.90	(1.14, 3.16)
Passenger age x driver belt use (full-time belt users vs. non-users)	0.02	0.01	1.02	(0.99, 1.04)
Passenger age x driver belt use (part-time belt users vs. non-users)	0.01	0.01	1.01	(0.99, 1.03)

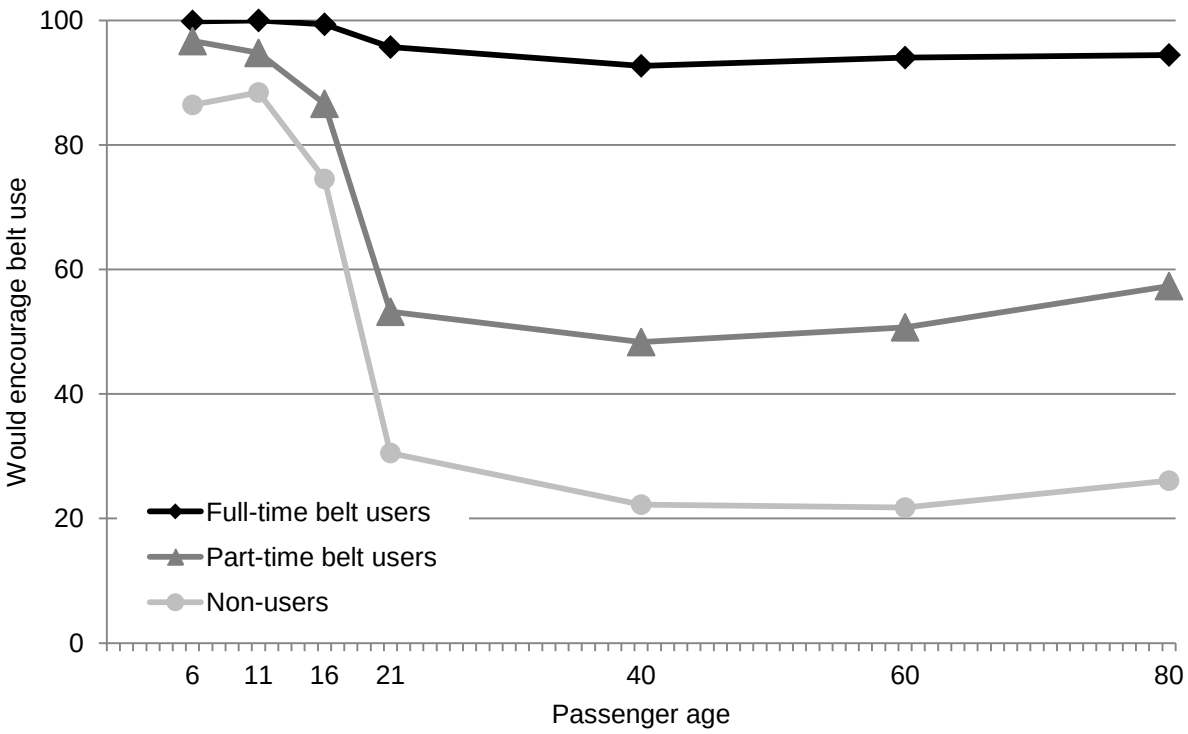

Figure 1. Percentage of drivers who would encourage passengers to buckle up as a function of passenger age and driver belt use.

ID # _____
Initials: _____

INSURANCE INSTITUTE FOR HIGHWAY SAFETY

Survey of seat belt use and perceptions of seat belt use technologies

INTRODUCTION AND SCREENING

Q1 Hello, my name is **<INTERVIEWER'S NAME>** from Opinion America, calling on behalf of the Insurance Institute for Highway Safety. Your household has been selected randomly for a research study about seat belt use. We would appreciate your help in this study by participating in a 15-minute survey.

Are you 18 years of age or older?

(INTERVIEWER: IF NOT 18 YEARS OF AGE, ASK: "May I talk to someone in your household who is 18 or older?" Repeat introduction when adult is on the phone.)

1	Yes	
2	Not ready/ Adult unavailable	**RESCHEDULE**
3	No, unwilling – terminate	**TERMINATE/THANK**
98	Don't know	**RESCHEDULE**
99	Refused	**TERMINATE/THANK**

Q2 Right now, are you using a cell phone or a land line?

1	Cell phone	**GO TO Q2A**
2	Land line	**GO TO Q2C**
98	Don't know	**GO TO Q3**
99	Refused	**GO TO Q3**

Q2A Are you currently driving or doing anything that would make it unsafe for you to be on the phone?

1	Yes	**THANK AND SET UP AN UNSCHEDULED CALLBACK**
2	No	**GO TO Q2B**
98	Don't know	**GO TO Q3**
99	Refused	**GO TO Q3**

Q2B Do you also have a land-line telephone that you have used in the past month?

1	Yes	**GO TO Q3**
2	No	**GO TO Q3**
98	Don't know	**GO TO Q3**
99	Refused	**GO TO Q3**

Q2C Do you also have a cellular telephone that you have used in the past month?

1	Yes	**GO TO Q3**
2	No	**GO TO Q3**
98	Don't know	**GO TO Q3**
99	Refused	**GO TO Q3**

PROGRAMMER – CODE AS FOLLOWING

IF Q2 = 1 AND Q2B = 2, THEN 1. Cellular telephone only
IF Q2 = 2 AND Q2C = 2, THEN 1. Land-line telephone only
IF Q2 = 1 AND Q2B = 1, THEN 1. Dual user
IF Q2 = 2 AND Q2C = 1, THEN 1. Dual user

Q3 The survey is voluntary and the information you provide us will be used for statistical purposes only. We will not collect any personal information that would allow anyone to identify you. If there is a question that you don't want to answer, that is OK.

1	Continue interview	
2	Arrange callback	**RESCHEDULE**
3	Want to think about it/Not sure	**RESCHEDULE**
99	Refused	**TERMINATE/THANK**

Q4 Do you currently drive or ride in a motor vehicle at least once a week?

1	Yes	
2	No	**TERMINATE/THANK**
98	Don't know	**TERMINATE/THANK**
99	Refused	**TERMINATE/THANK**

Q5 Are you usually the driver of the vehicle or a passenger?

1	Driver
2	Passenger
98	Don't know
99	Refused

Q6 Is the vehicle you are in most often a car, minivan, SUV, pickup, motorcycle, heavy truck, or other?

IF RESPONDENT DRIVES MORE THAN ONE VEHICLE OFTEN, ASK: What kind of vehicle did you LAST drive?

1	Car (including station wagon)	
2	Minivan	
3	Pickup	
4	SUV	
5	Motorcycle	**TERMINATE/THANK**
6	Heavy truck	**TERMINATE/THANK**
7	Other (SPECIFY)	
98	Don't know	
99	Refused	

Q7 What is the year, make, and model of this vehicle? **RECORD.**

X	Year
X	Make
X	Model
98	Don’t know
99	Refused

SEAT BELT USE

Q8 How often do you wear your seat belt?
READ 1-5.

1	All of the time
2	Most of the time
3	Some of the time
4	Rarely, or
5	Never
98	Don't know
99	Refused

Q9 In the past 12 months, has your use of seat belts increased, decreased, or stayed the same?

1	Increased	**GO TO Q9A**
2	Decreased	**GO TO Q9A**
3	Stayed the same	**GO TO Q10**
4	New driver	**GO TO Q10**
98	Don't know	**GO TO Q10**
99	Refused	**GO TO Q10**

Q9A What caused the change?
RECORD RESPONSE.

X	RESPONSE
98	Don't know
99	Refused

Q10 Which of the following statements best describes when you first put on your seat belt. I generally put my seat belt on…
READ LIST.

1	Before the car starts
2	After the car starts but before the transmission is placed in gear
3	After the car starts and is in gear, but before it is moving
4	After the vehicle is moving
5	I do not wear my seat belt
6	When I put my seat belt on varies
98	Don't know
99	Refused

IF Q5 = 2, THEN GO TO Q11, ELSE GO TO Q12

Q11 When you are a passenger, do you usually ride in the front seat or the back seat?

1	Front seat
2	Back seat
98	Don't know
99	Refused

IF Q8 >= 2 AND <=5, THEN GO TO Q12, ELSE GO TO Q22
(Selects part-time belt users and non-users)

Q12 Please tell me if you agree or disagree with the following statements about your use of seat belts. Sometimes I do not wear my seat belt because…..
RANDOMIZE ORDER A-K.

		Agree	Disagree	Don't Know	Refused
a.	I'm only driving a short distance	1	2	98	99
b.	I'm driving in light traffic	1	2	98	99
c.	I'm in a rush	1	2	98	99
d.	I forget to put it on	1	2	98	99
e.	I don't want my clothes to get wrinkled	1	2	98	99
f.	The seat belt is uncomfortable	1	2	98	99
g.	The probability of being in a crash is low	1	2	98	99
h.	The people I am with are not wearing seat belts	1	2	98	99
i.	I don't like being told what to do	1	2	98	99
j.	The seat belt is broken	1	2	98	99
k.	I do not need a seat belt	1	2	98	99
l.	Are there any other reasons why you sometimes do not wear your seat belt? What are they? **RECORD**	1	2	98	99

Q13 Is there anything that you particularly dislike or find annoying about wearing your seat belt?

1	Yes	**GO TO Q13A**
2	No	**GO TO Q14**
98	Don't know	**GO TO Q14**
99	Refused	**GO TO Q14**

Q13A What do you dislike or find annoying about wearing your seat belt?
RECORD RESPONSE.

X	RESPONSE
98	Don't know
99	Refused

PERCEPTIONS OF SEAT BELT USE TECHNOLOGY (PART-TIME USERS AND NON USERS ONLY)

Q14 I am going to describe different things your vehicle might do if you were not wearing a seat belt. Please tell me if you would be more likely, just as likely, or less likely to buckle up if your vehicle...
RANDOMIZE ORDER.

		More likely	Just as likely	Less Likely	Don't Know	Refused
a.	Prevented you from using in-vehicle entertainment systems (video, radio, CD)	1	2	3	98	99
b.	Made the gas pedal more difficult to push	1	2	3	98	99
c.	Only allowed the vehicle to travel at low speeds, like less than 15 miles per hour	1	2	3	98	99
d.	Chimed, presented a warning light or text display, or gave you a physical cue like a seat vibration	1	2	3	98	99
e.	Prevented the car from starting	1	2	3	98	99

Q15 If you were not wearing a seat belt, would it be acceptable, unacceptable, or would you have no opinion if your vehicle ...
RANDOMIZE ORDER.

		Acceptable	No opinion	Unacceptable	Don't Know	Refused
a.	Prevented you from using in-vehicle entertainment systems (video, radio, CD)	1	2	3	98	99
b.	Made the gas pedal more difficult to push	1	2	3	98	99
c.	Only allowed the vehicle to travel at low speeds, like less than 15 miles per hour	1	2	3	98	99
d.	Chimed, presented a warning light or text display, or gave you a physical cue like a seat vibration	1	2	3	98	99
e.	Prevented the car from starting	1	2	3	98	99

Q16 Many vehicles have a seat belt reminder that uses a chime and/or warning light or text display to get people to wear a seat belt.

Have you ever experienced a seat belt reminder?

1	Yes	**GO TO Q16A**
2	No	**GO TO Q17**
98	Don't know	**GO TO Q17**
99	Refused	**GO TO Q17**

Q16A Does your car have a reminder system that chimes or shows a warning light or text display for longer than 8 seconds after you start the car?

1	Yes
2	No
98	Don't know
99	Refused

Q17 Do you ever fasten your seat belt because of the reminder system in your car?

1	Yes
2	No
98	Don't know
99	Refused

Q18 I am going to ask you a few questions about the ways a seat belt reminder system might remind you to buckle up.

If you were <u>not</u> wearing your seat belt, please tell me if you would be more likely, just as likely, or less likely to buckle up if the reminder was ...
RANDOMIZE ORDER.

		More likely	Just as likely	Less likely	Don't Know	Refused
a.	A continuously lit or flashing warning light	1	2	3	98	99
b.	A buzzer or chime	1	2	3	98	99
c.	A voice message that says "Buckle up" or "Fasten Seat Belt"	1	2	3	98	99
d.	A text display that says "Buckle up" or "Fasten Seat Belt"	1	2	3	98	99
e.	A physical cue like a vibration in the seat	1	2	3	98	99
f.	An illuminated seat belt buckle	1	2	3	98	99

Q19 If you were <u>not</u> wearing your seat belt, please tell me if you would find it acceptable, unacceptable, or have no opinion, if the seat belt reminder was…
RANDOMIZE ORDER.

		Acceptable	No opinion	Unacceptable	Don't Know	Refused
a.	A continuously lit or flashing warning light	1	2	3	98	99
b.	A buzzer or chime	1	2	3	98	99
c.	A voice message that says "Buckle up" or "Fasten Seat Belt"	1	2	3	98	99
d.	A text display that says "Buckle up" or "Fasten Seat Belt"	1	2	3	98	99
e.	A physical cue like a vibration in the seat	1	2	3	98	99
f.	An illuminated seat belt buckle	1	2	3	98	99

Q20 If you were not wearing your seat belt, please tell me if you would be more likely, just as likely, or less likely to buckle up if the seat belt reminder ...
RANDOMIZE ORDER.

		More likely	Just as likely	Less likely	Don't Know	Refused
a.	Came on for a few seconds and did NOT come on again	1	2	3	98	99
b.	Repeated every 15 seconds until you buckled up	1	2	3	98	99
c.	Repeated every minute until you buckled up					
d.	Became more intense the longer you remained unbuckled	1	2	3	98	99
e.	Became more intense as the car went faster	1	2	3	98	99

Q21 If you were not wearing your seat belt, please tell me if you would find it acceptable, unacceptable, or have no opinion, if the seat belt reminder…
RANDOMIZE ORDER.

		Acceptable	No opinion	Unacceptable	Don't Know	Refused
a.	Came on for a few seconds and did NOT come on again	1	2	3	98	99
b.	Repeated every 15 seconds until you buckled up	1	2	3	98	99
c.	Repeated every minute until you buckled up					
d.	Became more intense the longer you remained unbuckled	1	2	3	98	99
e.	Became more intense as the car went faster	1	2	3	98	99

SEAT BELT USE TECHNOLOGY FOR CHILD PASSENGERS (AGES 8-15)

IF Q5 = 1, THEN GO TO Q22, ELSE GO TO Q43
(Selects drivers that drive at least once per week to ask about their passengers)

Q22 Do you have a child 8-15 years old who rides with you at least once a week?

1	Yes	**GO TO Q22A**
2	No	**GO TO Q31**
98	Don't know	**GO TO Q31**
99	Refused	**GO TO Q31**

Q22A Do you have more than one child 8-15 years old?

1	Yes	**GO TO Q23**
2	No	**GO TO Q23**
98	Don't know	**GO TO Q23**
99	Refused	**GO TO Q23**

IF Q22A = 1, THEN READ:
"For the next series of questions please answer for your oldest child between 8-15 years old"

Q23 How old is the child?

8	8 years old	
9	9 years old	
10	10 years old	
11	11 years old	
12	12 years old	
13	13 years old	
14	14 years old	
15	15 years old	
98	Don't know	**GO TO Q40**
99	Refused	**GO TO Q40**

Q24 Think about all the times this child rode with you in the past month. Would you say that the child rides in the back seat or front seat more often?

1	Back seat
2	Front seat
98	Don't know
99	Refused

Q25 When you are driving, does the child primarily use a seat belt or booster seat?

1	Seat belt	
2	Booster seat	**GO TO Q40**
98	Don't know	**GO TO Q40**
99	Refused	**GO TO Q40**

IF Q24 = 1 THEN GO TO Q25A
IF Q24 = 2 THEN GO TO Q25B

Q25A When you are driving and the child is riding in the back seat, does the child use a seat belt all of the time, most of the time, some of the time, rarely or never?

1	All of the time	**GO TO Q27**
2	Most of the time	**GO TO Q26**
3	Some of the time	**GO TO Q26**
4	Rarely	**GO TO Q26**
5	Never	**GO TO Q26**
98	Don't know	**GO TO Q40**
99	Refused	**GO TO Q40**

Q25B When you are driving and the child is riding in the front seat, does the child use a seat belt all of the time, most of the time, some of the time, rarely or never?

1	All of the time	**GO TO Q37**
2	Most of the time	**GO TO Q35**
3	Some of the time	**GO TO Q35**
4	Rarely	**GO TO Q35**
5	Never	**GO TO Q35**
98	Don't know	**GO TO Q40**
99	Refused	**GO TO Q40**

Q26 I'm going to read a list of reasons why your child might be unbuckled in the back seat. As I'm reading, tell me yes or no whether each reason applies.

When the child is riding in the back seat of a vehicle unbuckled, it is because….
RANDOMIZE ORDER OF A - H.

		Yes	No	Don't Know	Refused
a.	The child took off the seat belt	1	2	98	99
b.	A seat belt was not available in the vehicle	1	2	98	99
c.	It was a short trip	1	2	98	99
d.	The seat belt did not fit the child properly	1	2	98	99
e.	The child did not like the seat belt	1	2	98	99
f.	It is not required by law	1	2	98	99
g.	The child does not need a seat belt	1	2	98	99
h.	The child never fastened the seat belt at the start of the trip	1	2	98	99
i.	Are there any other reasons why the child would be unbuckled? **RECORD**	1	2	98	99

Q27 I'm going to read a list of statements about your child's belt use when he or she is in the back seat. Please tell me if you agree or disagree with each.
RANDOMIZE ORDER A - C.

		Agree	Disagree	Don't Know	Refused
a.	I would like my vehicle to tell me if my child is unbuckled	1	2	98	99
b.	I would like my vehicle to encourage my child to buckle up on their own	1	2	98	99
c.	I am responsible for my child's belt use in my vehicle	1	2	98	99

IF Q27a = 1, THEN GO TO Q28, ELSE GO TO Q30

Q28 Imagine if your vehicle could tell you when your child was not wearing a seat belt while in the back seat.

Please tell me, yes or no, if you would want your vehicle to tell you your child is unbuckled in the back seat by...
RANDOMIZE ORDER A – C.

		Yes	No	Don't Know	Refused
a.	Flashing or illuminating a warning light or text display telling you your child is unbuckled	1	2	98	99
b.	Playing a chime or buzzer	1	2	98	99
c.	Showing a visual diagram of the seats in the vehicle and highlighting the seat where the unbuckled child is sitting	1	2	98	99

Q29 How long should your vehicle tell you that your child is unbuckled in the back seat during a trip?

1 It should last until the child buckles up
2 It should be moderately long and last several miles into the trip, or until the child buckles up
3 It should be brief and end shortly after the vehicle starts up
4 It should not tell me at all
98 Don't know
99 Refused

Q30 Please tell me if you agree or disagree with the following statement. I would like my vehicle to prevent the use of rear in-vehicle entertainment systems (video, radio, CD) when my child is unbuckled in the back seat.

1	Agree	**GO TO Q43**
2	Disagree	**GO TO Q43**
98	Don't know	**GO TO Q43**
99	Refused	**GO TO Q43**

SEAT BELT USE TECHNOLOGY FOR RIGHT FRONT SEAT PASSENGERS

Q31 Do you drive with a right front-seat passenger at least once a week?

1	Yes	**GO TO Q32**
2	No	**GO TO Q40**
98	Don't know	**GO TO Q40**
99	Refused	**GO TO Q40**

Q32 Please answer the next series of questions about the individual riding in the right front-passenger seat of your vehicle most often.

What is the age of the passenger?

1	Younger than 8
2	8-15
3	16-19
4	20-24
5	25 or older
98	Don't know
99	Refused

Q33 Does this passenger use a seat belt all of the time, most of the time, some of the time, rarely or never?

1	All of the time
2	Most of the time
3	Some of the time
4	Rarely
5	Never
98	Don't know
99	Refused

Q34 Is this passenger related to you, yes or no?

1	Yes
2	No
98	Don't know
99	Refused

IF Q25B >=1 AND <=5, THEN FOR Q35-Q40 REPLACE THE WORD "passenger" IN Q35-Q40 QUESTIONS AND ANSWERS WITH "child passenger", AND AUTO COMPLETE Q31-Q34 WITH THE FOLLOWING ANSWERS:
Q31: 1
Q32: 2
Q33: COPY ANSWER FROM Q25B
Q34: 1

IF Q25B = 1, THEN AUTO COMPLETE Q35 AND Q36 WITH N/A

Q35 If this passenger is not wearing a seat belt, are you likely or unlikely to encourage him or her to buckle up?

1	Likely	**GO TO Q37**
2	Unlikely	**GO TO Q36**
98	Don't know	
99	Refused	

Q36 I'm going to read a list of reasons why you might not encourage your front-seat passenger to wear a seat belt.

As I'm reading, tell me yes or no whether each reason applies to you. I might not encourage my front-seat passenger to buckle up because…
RANDOMIZE ORDER A - E.

		Yes	No	Don't Know	Refused
a.	Wearing a seat belt is their responsibility	1	2	98	99
b.	I do not want to be a nuisance	1	2	98	99
c.	I do not pay attention to my passengers' seat belt use	1	2	98	99
d.	Seat belt use is a personal choice	1	2	98	99
e.	It is not required by law	1	2	98	99
f.	Are there any other reasons why you might not encourage your front-seat passenger to buckle up? **RECORD**	1	2	98	99

Q37 I'm going to read a list of statements. Please tell me if you agree or disagree with each.
RANDOMIZE ORDER A - C.

		Agree	Disagree	Don't Know	Refused
a.	I would like my vehicle to let me know when my front-seat passenger is unbuckled	1	2	98	99
b.	I would like my vehicle to encourage my front-seat passenger to buckle up on their own	1	2	98	99
c.	I am responsible for the belt use of my front-seat passenger	1	2	98	99

IF Q37a = 1, THEN GO TO Q38, ELSE GO TO Q43

Q38 Imagine if your vehicle could tell when your front-seat passenger was not wearing a seat belt.

Please tell me, yes or no, if you would want your vehicle to tell your passenger they are unbuckled by...
RANDOMIZE ORDER A – C.

		Yes	No	Don't Know	Refused
a.	Flashing or illuminating a warning light or text display telling the passenger he or she is unbuckled	1	2	98	99
b.	Playing a chime or buzzer	1	2	98	99
c.	Showing a visual diagram of the seats in the vehicle and highlighting the seat where the unbuckled passenger is sitting	1	2	98	99

Q39 How long should your vehicle tell your front-seat passenger that he or she is unbuckled during a given trip?

1 It should last until the passenger buckles up
2 It should be moderately long and last several miles into the trip, or until the passenger buckles up
3 It should be brief and end shortly after the vehicle starts up
4 It should not tell the passenger at all
98 Don't know
99 Refused

GO TO Q43

GENERAL QUESTIONS FOR DRIVERS WITH PASSENGERS THAT ARE NOT IN TARGET GROUPS

Q40 I'm going to read a list of statements. Please tell me if you agree or disagree with each.
RANDOMIZE ORDER A - D.

		Agree	Disagree	Don't Know	Refused
a.	I would like my vehicle to let me know when a passenger is unbuckled	1	2	98	99
b.	I would like my vehicle to encourage passengers to buckle up on their own	1	2	98	99
c.	I am responsible for the belt use of adult passengers in my vehicle	1	2	98	99
d.	I am responsible for the belt use of child passengers in my vehicle	1	2	98	99

IF Q40a = 1, THEN GO TO Q41, ELSE GO TO Q43

Q41 Imagine if your vehicle could tell when a passenger was not wearing a seat belt.

Please tell me, yes or no, if you would want your vehicle to tell your passenger they are unbuckled by...
RANDOMIZE ORDER A – C.

		Yes	No	Don't Know	Refused
a.	Flashing or illuminating a warning light or text display telling the passenger he or she is unbuckled	1	2	98	99
b.	Playing a chime or buzzer	1	2	98	99
c.	Showing a visual diagram of the seats in the vehicle and highlighting the seat where the unbuckled passenger is sitting	1	2	98	99

Q42 How long should your vehicle tell the passenger that he or she is unbuckled during a given trip?

1 It should last until the passenger buckles up
2 It should be moderately long and last several miles into the trip, or until the passenger buckles up
3 It should be brief and end shortly after the vehicle starts up
4 It should not tell the passenger at all
98 Don't know
99 Refused

FINAL PASSENGER QUESTIONS, DEMOGRAPHICS, AND DRIVING HABITS

Q43 Imagine that you are driving and one of your passengers is not buckled up. Tell me whether you would or would not tell the passenger to buckle up if they were ...

READ LIST. RANDOMIZE ORDER.

		Would	Would not	Don't Know	Refused
a.	6 years old	1	2	98	99
b.	11 years old	1	2	98	99
c.	16 years old	1	2	98	99
d.	21 years old	1	2	98	99
e.	40 years old	1	2	98	99
f.	60 years old	1	2	98	99
g.	80 years old	1	2	98	99

Q44 Would you support or oppose each of the following methods of increasing seat belt use?
RANDOMIZE ORDER A - D.

		Support	Oppose	Don't Know	Refused
a.	Preventing the vehicle from being started if the driver's seat belt were unfastened	1	2	98	99
b.	Preventing the vehicle from being operated at a speed faster than 15 mph if the driver's seat belt were unfastened	1	2	98	99
c.	Preventing the vehicle from being placed in drive or gear if the driver's seat belt were unfastened	1	2	98	99
d.	Preventing the use of the radio, CD player, and other in-vehicle entertainment and communication systems if the driver's seat belt were unfastened	1	2	98	99

Q45 Imagine an average trip you take in your vehicle. Do you or your passengers listen to the vehicle's audio system (e.g., radio, satellite radio, CD player, connected auxiliary device) all of the time, most of the time, some of the time, rarely or never during an average trip?

1	All of the time
2	Most of the time
3	Some of the time
4	Rarely
5	Never
98	Don't know
99	Refused

Q46 Now I need to ask you some basic information about you and your driving habits. What is your age?
RECORD.

_____	Years old
99	Refused

Q47 What state is your primary residence located in?
RECORD.

_____	State name
99	Refused

Q48 Do you consider yourself to be Hispanic or Latino?

1	Yes
2	No
98	Don't know
99	Refused

Q49 Which of the following racial categories describes you? You may select more than one.
READ LIST AND MULTIPLE RECORD.

1	American Indian or Alaskan native
2	Asian
3	Black or African-American
4	Native Hawaiian or Other Pacific Islander
5	White
6	Hispanic/Latino
7	Other (SPECIFY)
99	Refused

Q50 What is the highest grade or year of school you completed?
RECORD.

8	8th grade or less
9	9th grade
10	10th grade
11	11th grade
12	12th grade/GED
13	Some college
14	College graduate or higher
99	Refused

Q51 Which of the following categories best describes your total household income before taxes in 2011? (Includes the income of all persons in the household). Was your total household income….?
READ LIST.

1	Less than $5,000
2	$5,000 to $14,999
3	$15,000 to $29,999
4	$30,000 to $49,999
5	$50,000 to $74,999
6	$75,000 to $99,999
7	$100,000 or more
98	Don't know
99	Refused

Q52 How many years have you been driving?
READ LIST.

1 Less than 1 year
2 1 to 4 years
3 5 to 9 years
4 10 to 14 years
5 15 to 19 years
6 20 years or more
98 Don't know
99 Refused

Q53 On average, how many miles do you drive each year?
READ LIST.

1 Less than 5,000 miles
2 5,000 to 9,999 miles
3 10,000 to 14,999 miles
4 15,000 to 19,999 miles
5 20,000 miles or more
98 Don't know
99 Refused

Q54 Would you describe the area you live in as urban, sub-urban, or rural?

1 Urban
2 Sub-urban
3 Rural
98 Don't know
99 Refused

Q55 FROM OBSERVATION ENTER SEX OF RESPONDENT

1 Male
2 Female
98 Don't know
99 Refused

CONCLUSION OF SURVEY / THANK

Those are all the questions that I have. Thank you for contributing to our study. We value your feedback you seat belt use and seat belt use technology. Have a good day.