Louisiana Transportation Research Center

Final Report 572

Factors Influencing Seatbelt Utilization in Louisiana and Strategies to Improve Usage Rate

by

Helmut Schneider
Emily Pfetzer
William Black
Jeff Dickey

Highway Safety Research Group, LSU

4101 Gourrier Avenue | Baton Rouge, Louisiana 70808
(225) 767-9131 | (225) 767-9108 fax | www.ltrc.lsu.edu

TECHNICAL REPORT STANDARD PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FHWA/LA.16/572		

4. Title and Subtitle	5. Report Date
Factors Influencing Seatbelt Utilization in Louisiana and Strategies to Improve Usage Rate	April 2017
	6. Performing Organization Code LTRC Project Number: 14-2SA State Project Number: 300-0-1662

7. Author(s)	8. Performing Organization Report No.
Helmut Schneider, Emily Pfetzer, William Black, and Jeff Dickey	**41237-3**

9. Performing Organization Name and Address	10. Work Unit No.
Departments of ISDS and Marketing Louisiana State University Baton Rouge, LA 70803	11. Contract or Grant No.

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
Louisiana Department of Transportation and Development P.O. Box 94245 Baton Rouge, LA 70804-9245	**Final Report** **June 2014 - August 2016**
	14. Sponsoring Agency Code

15. Supplementary Notes

Conducted in Cooperation with the U.S. Department of Transportation, Federal Highway Administration

16. Abstract

Seat belts are credited with saving thousands of lives each year, yet a significant portion of the US population (about 13%) does not use a seat belt every time they are in a moving vehicle. Belt-use rates vary considerably from state-to-state. In 2014, seat belt use ranged from a low 68.9% in South Dakota up to a high 97.8% in Oregon. Nineteen states have belt use rates above 90%, but a majority of states, including Louisiana, have belt-use rates below the national average, which is about 87%. Previous efforts to increase seat belt use among part-time and non-users have had limited success among high-risk groups. Understanding why a motorist is not using a seat belt, e.g., various motivational factors affecting belt-use, is critical for developing targeted communication strategies and effective countermeasure programs. Thus, the primary purpose of this project is to determine factors influencing seat belt use in Louisiana in order to provide belt-use information about targeted groups of motorists so that the Louisiana Highway Safety Commission (LHSC), the Louisiana Department of Transportation and Development (DOTD), and other agencies may develop more effective and efficient seat belt messaging to reach these groups. Using secondary data analysis of citation data, roadside survey data, and crash data, the existing nature of seat belt use and enforcement in Louisiana is examined. To better understand why some people do not use seat belts 100% of the time, primary data was collected via survey research methods. Various sampling techniques were employed to achieve an over-sample of people reporting imperfect belt use. Findings indicate that despite a large number of citations being issued since 2004, many drivers continue not to use seat belts; however, these individuals are not easily categorized by traditional demographic factors. Rather than categorizing individuals as "users" and "non-users," people tend to fall into one of four groups of belt users. Consistent belt use depends heavily on motivation, habit, and routine A multistate sample comparing Louisiana drivers with drivers in other states suggests individuals with less-than-perfect belt use are similar across states.

17. Key Words	18. Distribution Statement
	Unrestricted. This document is available through the National Technical Information Service, Springfield, VA 21161.

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

Project Review Committee

Each research project will have an advisory committee appointed by the LTRC Director. The Project Review Committee is responsible for assisting the LTRC Administrator or Manager in the development of acceptable research problem statements, requests for proposals, review of research proposals, oversight of approved research projects, and implementation of findings.

LTRC appreciates the dedication of the following Project Review Committee Members in guiding this research study to fruition.

LTRC Administrator

Kirk Zeringue
Special Studies Research Administrator

Members

April Renard
Marie Walsh
Autumn Goodfellow-Thompson
David Staton
Betsey Tramonte
Ken Trull

Directorate Implementation Sponsor

Janice P. Williams, P.E.
DOTD Chief Engineer

Factors Influencing Seatbelt Utilization in Louisiana and Strategies to Improve Usage Rate

by
Helmut Schneider, Emily Pfetzer, William Black, and Jeff Dickey

Highway Safety Research Group
Information Systems and Decision Sciences
Marketing Department
BEC, LSU
Baton Rouge, LA 70803

LTRC Project No. 14-2SA
State Project No. 300-0-1662

conducted for

Louisiana Department of Transportation and Development
Louisiana Transportation Research Center

April 2017

ABSTRACT

Seat belts are credited with saving thousands of lives each year, yet a significant portion of the US population (about 13%) does not use a seat belt every time they are in a moving vehicle. Belt-use rates vary considerably from state-to-state. In 2014, seat belt use ranged from a low 68.9% in South Dakota up to a high 97.8% in Oregon. Nineteen states have belt-use rates above 90%, but a majority of states, including Louisiana, have belt-use rates below the national average, which is about 87%. Previous efforts to increase seat belt use among part-time and non-users have had limited success among high-risk groups. Understanding why a motorist is not using a seat belt, e.g., various motivational factors affecting belt-use, is critical for developing targeted communication strategies and effective countermeasure programs. Thus, the primary purpose of this project is to determine the factors influencing seat belt use in Louisiana in order to provide belt-use information about targeted groups of motorists so that the Louisiana Highway Safety Commission (LHSC), the Louisiana Department of Transportation and Development (DOTD), and other agencies may develop more effective and efficient seat belt messaging to reach these groups. Using secondary data analysis of citation data, roadside survey data, and crash data, the existing nature of seat belt use and enforcement in Louisiana is examined. To better understand why some people do not use seat belts 100% of the time, primary data was collected via survey research methods. Various sampling techniques were employed to achieve an over-sample of people reporting imperfect belt use. Findings indicate that despite a large number of citations being issued since 2004, many drivers continue not to use seat belts; however, these individuals are not easily categorized by traditional demographic factors. Rather than categorizing individuals as "users" and "non-users," people tend to fall into one of four groups of belt users. Consistent belt use depends heavily on motivation, habit, and routine. A multistate sample comparing Louisiana drivers with drivers in three other states suggests individuals with less-than-perfect belt use are similar across states.

ACKNOWLEDGMENTS

This research was conducted at Louisiana State University (LSU) and sponsored funded by the Louisiana Transportation Research Center (LTRC). The authors would like to express their sincere thanks to McDowell Porter for supporting the data analysis and the staff of the Highway Safety Research Group at LSU for administrative support of the project. The authors also appreciate the guidance provided by the Project Review Committee Members for this research study during the two-year investigation.

IMPLEMENTATION STATEMENT

Implementation of some of the recommendations in 2017 will likely lead to a more efficient use of limited resources. There are several strategies to be implemented. (1) Change laws regarding penalties for 15- to 17-year-old drivers for not wearing a seat belt. License suspension is more effective for this group than a small fine. (2) Enforcement should be focused on night-time drivers, which are most likely at risk of not wearing a seat belt and also drive under the influence of alcohol. (3) Outreach programs to concentrate on high schools and universities will help to create habits of wearing a seat belt early on. (4) Messaging that addresses habit forming and consistency in wearing a seat belt need to be designed. (5) Laws need to be changed to significantly increase penalties for multiple offenders. (6) A program for collecting fines for seat belt tickets needs to be designed.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Seat belts are credited with saving thousands of lives each year, yet a significant portion of the US population (about 13%) does not use a seat belt every time they are in a moving vehicle. Belt use rates vary considerably from state to state. In 2014, belt use ranged from 68.9% in South Dakota up to 97.8% in Oregon *[1]*. Nineteen states have belt use rates above 90%, but a majority of states, including Louisiana, have seat belt use rates below 87%.

Increasing seat belt use remains a major national priority, as evidenced by modifications to the National Highway Traffic Safety Administration's (NHTSA's) highway safety grant program requirements and provisions in legislation such as the "Moving Ahead for Progress in the 21st Century Act" (MAP-21). States may qualify for grant funds as a "high seat belt rate state" or a "low seat belt rate state" by meeting the provisions outlined for the respective categories. NHTSA defines a high seat belt rate state as one with an observed belt-use rate at 90% or above. Anything below 90% is considered a "low" rate state by these new guidelines. Among the requirements, all states must maintain an occupant protection plan and participate in the national "Click it or Ticket" (CIOT) enforcement activities, but the low rate states must also meet at least three of six legal or programmatic criteria to increase seat belt use, such as conducting sustained enforcement activities, developing countermeasures for low-use (or high-risk) groups in the population, and passing primary enforcement seat belt laws.

National as well as state data show that as belt use nears 90%, it is harder to increase belt use among the low-use populations, who are most at-risk for fatal or serious injury crashes. People less likely to use seat belts are typically younger, unmarried, and of a lower socio-economic status (SES) both in education and income. In general, men are more likely to fall into this category, as are pickup truck drivers *[2]*. Individuals belonging to one or more of these demographic groups are already associated with having a higher crash risk. Un-belted vehicle occupants are disproportionally killed in fatal crashes and many of these are young drivers under the age of 25. Unbelted drivers are more likely to commit other moving violations such as speeding, running red lights, and following too closely than drivers who always use a seat belt *[3]*. Accordingly, it stands to reason that a meaningful increase in belt use among these known low-use groups would increase state belt use rates and by extension, decrease the number of roadway fatalities.

Existing data (e.g., crash statistics, observational surveys, and attitudinal surveys) indicate there are substantial demographic differences in belt use in Louisiana. Males are less likely to be belted than females (78.5% vs. 87%); African Americans are less likely to be belted than Caucasians (77.4% vs. 85%); nighttime occupants are less likely to be belted than day-time

occupants (76.3% vs. 85%); pickup truck occupants are less likely to be belted than occupants of cars (76.4% vs. 85%) and SUVs (76.4% vs. 86.1%). Drivers 24 years of age and younger are less likely to be belted than older drivers *[4]*. This latter finding is also corroborated by fatality statistics in the state, which show that a high percentage of young drivers killed were unbelted. For instance, in 2012, 63% of all killed occupants age 24 and younger were unbelted compared to 38% of seniors age 65 and older. The roadside survey also shows that there are regional differences in belt use, with a 12.9 percentage point spread between the region with the highest belt use and the region with the lowest belt use.

Previous efforts to increase seat belt use among part-time and non-users have had limited success among high-risk groups. Current trends indicate it may take 10 years before belt use in Louisiana reaches a 90% rate. In order to achieve a more rapid increase in belt use, either significantly more resources must be deployed for seat belt enforcement and media coverage or the current resource deployment has to be optimized using a more targeted approach. Understanding why a motorist is not using a seat belt, e.g., various motivational factors affecting belt use, is critical for developing targeted communication strategies and effective countermeasure programs. Implementing countermeasures for these high-risk populations is one way in which Louisiana can meet NHTSA's MAP-21 requirements to increase belt use in the state. Thus, the primary purpose of this project is to determine factors influencing belt use in Louisiana in order to provide belt-use information about targeted groups of motorists that can be used by the Louisiana Highway Safety Commission (LHSC), the Louisiana Department of Transportation and Development (DOTD) and other agencies for developing more effective and efficient seat belt enforcement and media coverage for the purpose of increasing belt use in Louisiana.

OBJECTIVE

The objective of this project is to determine factors influencing seat belt utilization in Louisiana and to suggest strategies to improve the belt use rate.

SCOPE

The scope of this project is to identify low-usage target groups based on demographic factors that affect seat belt use among occupants of cars, vans, pickup trucks, and SUVs in the state of Louisiana; identify attitudinal factors that affect seat belt use among occupants of cars, vans, pickup trucks, and SUVs in the state of Louisiana; identify socioeconomic factors that affect seat belt use among occupants of cars, vans, pickup trucks, and SUVs in the state of Louisiana; and review past program efforts and determine association with seat belt use.

METHODOLOGY

First, this literature review provides an overview of factors affecting seat belt utilization in states as well as research on the efficacy of the prevailing strategies to increase belt use, which include state laws, high visibility enforcement programs i.e., CIOT, mass communication/messaging, and penalties associated with non-compliance. Next, this literature review discusses factors affecting seat belt use among individuals and high-risk groups. Finally, the various data sources are identified and procedures used for survey design and data collection are discussed.

Literature Review

There is a great deal of existing research on seat belt use; however, most of this work relies on cross-sectional surveys, observational studies, and statistical analysis of large, existing datasets. While often practical (though not necessarily less expensive), this practice has the tendency to lead to an accumulation of findings that provide only limited insight into belt use behavior among low-use individuals and groups. It is rare to encounter belt-use research using experimental methods or longitudinal repeated-measure designs to obtain greater insight into the same individuals' belt-use behavior over time or across varying conditions. Belt use differences among the general population are typically found among demographic or social-group lines, which forms the context for much of the analysis of belt-use behavior.

With respect to belt-use estimates, there are only a handful of data sources that track seat belt use in the US. The main three sources of data include NHTSA's National Occupant Protection Use Survey (NOPUS) and its earlier formulations (e.g., Motor Vehicle Occupant Safety Survey/MVOSS), state belt use surveys conducted in accordance with Federal guidelines and NHTSA's Fatality Analysis Reporting System (FARS). NOPUS is handled by the National Center for Statistics and Analysis (NCSA), a division of NHTSA. With the exception of FARS, these data sources provide estimates for seat belt use using probability sampling and observation at specific locations. Due to the nature of the data collection, these studies are not designed to assess behavioral or attitudinal aspects surrounding seat belt use. Rather, these data provide an estimate of actual use in specific places and times, which can be very useful in analyzing geographic trends in belt use.

Seat Belt Laws and Law Enforcement

With the exception of New Hampshire, all states and the District of Columbia have a law requiring adults to wear seat belts. There are two versions: primary enforcement laws and secondary enforcement laws. In states with primary enforcement laws, drivers can be pulled over and receive a ticket specifically for failure to wear a seat belt; whereas, in secondary law states, unbelted drivers can only receive a citation if they have been pulled over for some other moving violation. NHTSA strongly encourages states to pass primary enforcement laws. As Preusser and Pruesser explain, primary enforcement works by creating a "direct relationship between failure to comply with the belt law and possible enforcement actions *[5]*. Seat belt use has generally increased in both primary and secondary enforcement states over time, but there is evidence that primary laws are more effective. Seat belt use tends to be higher in states with primary enforcement laws as opposed to secondary enforcement laws *[6 - 8]*. States with primary enforcement laws have belt-use rates that are (on average) 9.1% higher than states with secondary enforcement *[9 - 11]*. As of 2014, 33 states plus the District of Columbia have primary enforcement seat belt laws. Studies comparing states suggest primary enforcement laws are effective at increasing belt use in and of themselves. For example, moving from a secondary to a primary seat belt law results in a relatively immediate increase in seat belt use statewide *[5], [8], [12], [13]*. Case studies on states upgrading from secondary to primary laws over the past 10 years indicate very little public opposition or hostility to the primary laws once they were in force *[14]*.

Individuals associated with a number of high-risk factors are generally more compliant with seat belt use in states with primary laws *[15]*. Socio-demographic disparities in belt use between groups are smaller in states with primary enforcement laws *[16 - 18]*. Racial disparities are significantly reduced or absent in states with primary laws *[17]*. Using 2005 FARS data, Briggs et al. investigated the effect of type of state law enforcement in the state on racial disparities in belt use and find that black-white disparities are lessened in states with primary enforcement laws *[19]*. The effect of the primary law appears to increase belt use across racial groups; however, even in the primary law states, black-white seat belt use disparities were more pronounced at opposite ends of the age spectrum, with young African American drivers (aged 16-19) and older African American drivers (65 and older) being significantly less likely to have worn a seat belt.

Research indicates when states upgrade from secondary to primary enforcement seat belt laws, belt use increases regardless of race *[17], [18]*. This is primarily due to increased enforcement surrounding the implementation of the law; however, NHTSA also credits its

high-visibility enforcement (HVE) mobilization programs like CIOT, in increasing awareness about enforcement and safety as playing an instrumental role in this process. The increase may also have something to do with the increase in use among those socio-demographic groups overall *[17]*. Still, these groups are still less responsive to seat belt enforcement *[20]*. This may offer a partial explanation why demographic disparities still persist even as seat belt use increases for the state as a whole.

While primary laws may increase seat belt compliance in general, there is still a great deal of unexplained variance in belt use primary law states *[6]*. One aspect that might help to explain relatively low rates in primary law states is geography. Primary laws may have "diminished effectiveness" in regions with more rural roads *[6]*. Beginning from the position that seat belt use is a public health issue, Ash, Edwards, and Porter examined possible moderating state-population factors on seat belt compliance in primary law states compared to secondary law states *[6]*. They examined state academic achievement levels, economic prosperity (i.e., gross state product-GSP), violent crime, government effectiveness, proportion of men, and proportion of rural roads to see if any of these state population factors moderated the differences in seat belt compliance between primary and secondary law states. They found moderating effects on seat belt compliance for each factor except for proportion of men in the state and violent crime rates. Upon placing all significant moderators into a single model, everything but GSP explained unique variance between type of state law and compliance, suggesting primary laws vary in effectiveness by characteristics of state populations and geographic regions *[6]*. Specifically, the findings suggest primary seat belt laws seem most effective in areas with higher academic achievement, greater health, and less rural geography. While primary laws are associated with higher seat belt compliance regardless of government effectiveness, the same cannot be said for secondary laws in regions with low government effectiveness *[6]*.

The sheer impact of the law on belt use may also be overstated. Dee examined the effects of seat belt laws and enforcement status from 1985-1993 and found that standard estimations comparing pre- and post- law/enforcement on seat belt use have overestimated impact by about 60% *[20]*. Judging impact of the effectiveness by reduction in fatalities over the same amount of time, Dee found the real effect of the law and accompanying enforcement was limited by those individuals who were not responsive to the law *[20]*.

Despite the general consensus that primary enforcement laws ensure higher levels of compliance, a number of primary law states have belt-use rates below 90%. Nineteen states have belt use rates above 90% and only one of those states does not have a primary seat belt law (Nevada). Nine states, including two states with primary laws, have belt-use rates below 80%, and in general, longitudinal data indicate individual state rates are prone to fluctuation and may not remain stable over time. Louisiana, for example, passed a primary seat belt law in 1996 when the belt-use rate was only 59%. In 2013, Louisiana ranks 33rd in the nation in seat belt use with a rate of 82.5%. Over the past seven years, belt use in Louisiana has only increased by 7.7%. Other states, such as bordering state Mississippi, upgraded from a secondary to a primary law in 2006. The belt-use rate in 2006 was 73.6% and went down to 71.8% in 2007, down again in 2008 (71.3%) and didn't actually see an increase until 2009 where the rate improved to 76% *[1]*. After several years of steady rise, Mississippi's rate experienced an 8.8% decrease in belt use from 83.2% in 2012, essentially dropping to pre-primary law levels with a belt-use rate of 74.4% in 2013 *[1]*. Mississippi's belt-use rate in 2014 increased to 78.4% *[21]*.

High Visibility Enforcement Programs

Primary seat belt laws naturally lend themselves to increased levels of enforcement, however, the planned coordination of HVE programs is believed to be effective in and of itself at increasing state seat belt rates. NHTSA defines HVE as a "universal traffic safety approach designed to create deterrence and change unlawful traffic behaviors," via "highly visible and proactive law enforcement targeting a specific traffic safety issue" *[22]*. The enforcement effort takes place in conjunction with a larger publicity strategy intended "to educate the public and promote voluntary compliance with the law" *[22]*. NHTSA describes publicity as consisting of media time, messaging, and "enforcement enhancing elements" *[23]*. HVE programs are rooted in deterrence theory *[24 - 26]*. By emphasizing the threat of punishment, HVE aims to increase the public perception that punishment for breaking the law is imminent and by emphasizing the omnipresence of police on the roads, the goal is that people will be deterred from breaking the law.

HVE programs require considerable resources to carry out. In standard practice, enforcement waves typically last several weeks, with about one week reserved for ramped-up publicity about the increased enforcement. The waves, or "blitzes," are not sustained efforts to increase public awareness but short bursts of high intensity activity over a relatively short period of time. Publicity takes the form of paid or earned media. Earned media is basically "free" media coverage, such as news stories, or coverage of staged events or press conferences. Paid

media refers to strategically purchased commercial air time for crafted enforcement-specific advertisements, which are also referred to as "hard" messaging ads *[27]*. The paid media spots allow for the greatest level of control over the message and optimal placement or timing where the ads may be seen by the intended audience.

NHTSA's most well-known HVE effort is the annual CIOT national mobilization. NHTSA has previously stated that CIOT is "the cornerstone of NHTSA's seat belt communications program" *[28]*. The mobilization takes place in May each year within a four-week span of time, beginning with earned media spots, followed by paid media and then culminating in about two weeks of HVE *[29]*. National CIOT telephone surveys are conducted to assess the level of awareness and other message-related factors before and after the May mobilizations. NOPUS provides the official measure of observed seat belt use and data collection takes place following the CIOT mobilization. Incidentally, these are the estimates used to classify states into the high and low rate groupings. The first statewide CIOT campaign took place in North Carolina in 1993. The next state to join was South Carolina in 2000. More states continued to join in the years prior to 2003 when the CIOT campaign went nationwide. Per MAP-21, participation in the CIOT national mobilization is required for all states seeking occupation protection grants, regardless of the State's classification as a high or low rate state. NHTSA's Traffic Safety Marketing division assists state and local agencies by providing them with earned media outreach tools such as "fill-in-the-blank news releases, op-ed articles, letters to the editor, talking points, poster art, and fact sheets" to promote awareness about the mobilization *[30]*.

Mass Communication and Messaging

HVE communication/mass media campaigns serve three primary goals: 1) to counter beliefs that there is a marginal risk of being "caught" by police and to advise individuals that offenders will be; 2) to affirm the penalties and fines associated with non-compliance are not minor; and 3) to assure that the enforcement is justified *[25]*. Mass media campaigns are seldom, if ever, capable of producing powerful effects by virtue of content alone. They can be very effective at increasing awareness and topic salience. Therefore, the ultimate mission of the HVE program is to follow through on the threat of a ticket using a "boots-on-the-ground" approach where the physical presence of police enforces the content of the message. Thus both media messaging and increased police presence on the roads are necessary components of HVE.

Because the communications aspect is a critical component of the entire HVE strategy, one of the key determinants of success for HVE programs is the transmission and reception of the deterrence message. CIOT messages are targeted to reach high-risk males 18-34 years of age because they are statistically more likely to take risks while driving and less likely to use seat belts than women or older individuals. From the beginning, the CIOT campaigns have been deemed successful in delivering the message, but there isn't any clear explanation as to how or why. In a 2004 study, Chaudhary, Solomon, and Cosgrove explain, "The literature has assumed that the effectiveness of [HVE] programs, such as CIOT… is based on their ability to change drivers' perceptions regarding their likelihood of being ticketed for a belt violation. However, the validity of the assumed relationship [between perceived risk of being ticketed and belt use] has… not been thoroughly documented" *[31]*. Media expenditures have been the primary means of analyzing the effects of communications on belt use, though self-report attitudinal surveys are often conducted. Studies on the effectiveness of HVE programs are rarely longitudinal and almost never based on experimental methods that allow for isolating and testing for causal relationships. The vast majority of campaign evaluation studies are observational and take place shortly after (and sometimes also before) the mobilization takes place. Prior research finds campaigns revolving around health messages have relatively small effects on behavior change *[32], [33]*. However, a meta-analysis of public health campaign studies finds campaigns involving law enforcement are generally more effective than campaigns about "other" types of public health communication campaigns such as encouraging cancer screenings or adopting other pro-health behaviors *[32], [33]*. The general belief in the overall "effectiveness" of HVE campaigns may have something to do with the very real effect of the increased enforcement.

Milano, McInturff, and Nichols examined the effect of earned and paid media strategies in HVE campaigns on public awareness/support of enforcement, public perceptions and opinions by analyzing survey data gathered from surveys conducted by Public Opinion Strategies between May 1998 through May 2003*[27]*. In general, they found paid media to have a stronger impact than earned media only (though both are important). In states using paid media, respondents had a better recall of CIOT messages, and also a higher perception of police ticketing aggressiveness. The researchers found that the hard message/paid media strategy was much more effective on groups notorious for low belt use, such as young males, than earned media since they allow for more control over timing, placement, etc. *[27]*. Ultimately, the primary conclusion is paid media for hard enforcement messages, in conjunction with earned media and enforcement, can effectively enhance the potential influence of HVE campaigns.

In an effort to understand how states achieve high belt use rates, NHTSA sponsored a study where researchers compared low belt use states (n=15) to high belt use states (n=16) via statistical analyses, as well as case studies of 10 high seat belt use states *[34]*. They determined the primary difference between states with high belt use and states with low belt use is enforcement, not demographics or money spent on media. The researchers found that (1) during the 2005 CIOT mobilization, law enforcement in high use states issued twice as many seat belt tickets per capita as low use states; (2) states with low belt use spent about 40% more per capita in paid media than states with a high belt use during the mobilization; (3) states with high belt use also had a higher percentage of respondents in an attitudinal survey respond that seat belt enforcement was important and that the risk of getting a ticket for not using a seat belt was high *[34]*.

Tison and Williams examined the effects of enforcement and media expenditures on seat belt use and public awareness and attitudes surrounding use *[29]*. They also looked at primary law states versus secondary law states, based on the five states with the highest increase in reported belt use between 2003 and 2006 versus the five states with the least change over the same time period. These researchers found that the main difference between these groups of states was that the five states with the largest increase in belt use had higher levels of enforcement than the states with the lowest increase in belt use over this time span. They also concluded that there was no difference between these states with respect to expenditures for media alone; however, the combination of enforcement and media was positively related to increased belt use in states with primary seat belt laws. The 2005 to 2006 data also show a modest increase in belt use following the CIOT mobilization (specifically in June and July) followed by a gradual decline after the mobilization. Based on their analysis, "the weight of the evidence indicates that dollars spent for media is not as influential as enforcement in achieving improvements in belt use" *[29]*.

Despite the number of reports over the past several decades from states and NHTSA suggesting the CIOT mobilizations play a large part in increasing state belt use, most studies prior to 2004 only provide post-mobilization estimates *[35]*. This is an obvious limitation. According to Vasudevan et al., "because it was not mandatory for states to report such data to NHTSA, the details of surveys (of both campaigns and data collection methodology) for most states are not easily accessible" *[35]*. NHTSA set CIOT evaluation guidelines in 2005 requiring states to conduct surveys before and after mobilization, however, the guidelines for the pre-mobilization survey were less strict than for post-mobilization and submitting documentation or a report of the findings is not necessary *[35]*. This creates questions of

reliability for any year-to-year comparisons within states *[36]*. This also presents issues in assessing the impact of CIOT/ HVE mobilization across states in the US.

The US Government Accountability Office (GAO) assessed NHTSA's HVE programs (of seat belt use and alcohol-involved driving) and associated campaigns to examine the "extent to which NHTSA has implemented" the HVE programs and to investigate the impact of HVE campaigns in a selected number of states (i.e., seven) as well as identify challenges states may face in carrying out the campaigns *[37]*. In a report dated April 2008, the GAO finds that "NHTSA's evaluations of these campaigns have shortcomings that limit the extent to which NHTSA can determine the effectiveness of the campaigns" *[37]*. The report states that NHTSA's information about states' activities is "inconsistent and incomplete in part because states are not required to report such data" and therefore NHTSA cannot "fully account for state and local law enforcement campaign activity" *[37]*. Furthermore, the GAO finds that "NHTSA's ability to measure the campaigns' overall effectiveness is also hindered in part because the performance measures used to evaluate the campaigns are not comprehensive or consistent" such as observing seat belt use in the daytime even though people are less likely to use them at night. The report also cites issues with how NHTSA claims success in reaching their target audience to the exclusion of "other target audiences." The states selected for the study (see report for selection criteria) expressed difficulty staffing campaigns and increasing belt use (and reducing alcohol-involved driving) among resistant populations, like rural and pick-up truck drivers *[37]*. The GAO study took place after NHTSA enacted their 2005 evaluation/reporting guidelines.

Perceived Risk of Penalties and Fines

Logically, HVE programs must increase the perception of punishment for non-compliance with the law to if they are to prompt public-wide deterrence from breaking the law. For individuals, the key outcome of interest is their perception of, or likelihood of, getting pulled over and ticketed for not using a seat belt. While not logically inconsistent with the underlying goal of CIOT mobilizations, it isn't clear exactly what affect these perceptions of punishment have on behavior. It is often presumed that any increase in the individuals' perception (or fear) of getting caught is due to exposure to CIOT messages, but there is no way to test this relationship with existing data.

Similarly, CIOT messages are projected to act upon the individual's motivation to comply with the law. The underlying fundamental goal of HVE programs is to increase the

perception of punishment (in the form of penalties and fines) for breaking the law which is presumed to encourage seat belt use. Even though seat belt use is generally regarded as a matter of public health, contemporary HVE campaigns are not designed to create a positive association for performing desired behavior, i.e., using a seat belt is a good thing to do. Rather, the intention is to create a negative association with failure to perform that behavior. If the goal is to deter people from breaking the law rather than encouraging them to comply, it follows that the desire to avoid punishment is the presumed primary motivator for compliance with the law. Given the number of possible safety reasons for using a seat belt, all of which could be true motivators for individual seat belt use, this is a tenuous assumption.

Chaudhary, Solomon, and Cosgrove (2004) tested the hypothesis that individuals with high self-reported belt use will have higher perceived risk of getting a ticket than individuals who do not always use a seatbelt *[31]*. The researchers used data from self-administered questionnaires from six states' drivers licensing offices before and after the spring CIOT mobilization in May 2000. The states included in the study were part of the original CIOT observational study, and each state did experience an increase in belt use over that time. The researchers find support for their hypothesis, noting statistically significant increases in belt use and in perceived risk of being ticketed from pre- to post-mobilization. But because the assumed motivation behind the reported behavior is the fear of getting a ticket—which is tacitly and/or directly attributed to the HVE program itself—the primary conclusion that HVE "clearly" increases perceptions of getting a ticket which "leads to" increased seat belt use is problematic on conceptual and methodological grounds *[31]*.

Fines. The cost of a violation for non-belt use may have a more direct effect on behavior than the perceptions of being ticketed, though they are related. The cost of a violation has nothing to do with the CIOT messaging strategy, though for individual states, it could be emphasized along with the required NHTSA messages. The range of fines for a first offense varies a great deal across the US, ranging from $10 in Pennsylvania all the way up to $200 in Texas, with a median fine of about $25. Some research finds higher fines are associated with higher usage rates *[7]*. A 2010 NHTSA report examined the levels of fines as a predictor of seat belt use for 1997-2008 and found that increasing seat belt fines is associated with higher belt use among crash victims (FARS data) and increased observed use during the day (i.e., observation studies) but the relationship is "curvilinear, with decreasing marginal returns associated with increasing fines" *[10]*. Additionally, an increase in the state's average fine from the national average of $25 to $60 was associated with a four

percentage point increase in belt use. In a recent paper derived from the 2010 NHTSA report, Nichols et al. examined the relative impact of primary law and fines on belt use rates and reached a similar conclusion. Increasing the fine from $60 to $100 results in about a 3% increase, but a fine in excess of $100 did not appear to be more effective *[38]*.

Other estimates suggest states should impose fines of at least $50 to increase seat belt use *[9]*. Specifically, a 2005 study comparing time-series cross-sectional data for 47 states from 1991-2001 suggests the level of fine associated with noncompliance has a direct effect on the states' seat belt use rate independent of enforcement efforts, which were measured using state police and safety expenditures (in dollars) per capita for the period of 1982-1984 *[9]*. Measurement limitations notwithstanding, the median $25 fine is associated with about a 3.8% increase in state seat belt use independent of enforcement. Considering the costs of other violations for actions that carry far less safety risk, the $25 rate is probably too low. Raising the cost of a violation to at least $50 (combined with publicity about the increase) will more than likely have a positive effect on belt use.

Measuring Success of HVE Programs

Success is generally measured in terms of the level of public awareness of enforcement activities, slogan recognition, and the degree to which perceptions of enforcement and likelihood of being ticketed, as well as other quantitative factors such as the number of earned media stories, paid media expenditures, and the number of citations written. When public survey measures indicate increased awareness, perception, etc., and observed seat belt use also increases over the prior measurement and/or previous year, efforts are generally deemed related and thus successful. In other words, because the publicity occurs prior to observation, it is presumed to be the cause of the observed "effect" which, in this case, is the behavior of seat belt use.

Williams and Wells propose that "widespread, methodical, and sustained application of enforcement programs, augmented by the use of creative publicity" is necessary for increasing belt use rates to above 90% *[24]*. In order for these programs to be effective, they must be consistently and routinely continued over a period of time *[39]*. CIOT has become routinized in that it is an annual event; however, by design, CIOT is not a long sustained effort. By current practices, most (if not all) states simply do not have the kind of resources necessary to conduct a more sustained approach. This makes it very difficult to know for sure exactly how or why CIOT/HVE appears to work. A cursory glance at state belt use rates

published by NHTSA indicates that any effects that may be attributed to the programs cannot be considered uniform across states. Since NHTSA's NOPUS and accompanying CIOT telephone surveys are conducted in the weeks surrounding the mobilization, it is not possible to know what observed seat belt use was in the months leading up to the mobilization or whether or not the observed belt use drops off in the months after the mobilization. A much less precise mode of evaluation of HVE success is to compare estimates obtained in the most recent year to years prior, which is generally how it is done. Comparing belt use rates or awareness of enforcement activities among the general population (in the US and in states) to past estimates may provide some general indication of progress, however it is not necessarily a valid means of evaluating the program's "success."

Beyond increased awareness and perceptions, it is unclear how individuals process and respond to the communications in practice, i.e., their actual behavior. For the past several years, CIOT has been heavily marketed to men aged 18-34 because data consistently indicate they are less likely to use seat belts. An evaluation of the 2011 CIOT program at the national level indicates that while young men tended to have greater awareness of seat belt messages, special enforcement, checkpoints and the like than the general population, they were less likely to perceive non-users would be ticketed *[36]*.

In order to more accurately assess the impact of consistent messaging on behavior, researchers would need to employ a more comprehensive research design using appropriate methodologies. Ideally, the study would take place over a longer span of time. If the objective is to determine causality, the study would need employ experimental methods, but even having more data points would allow for a better analysis than what currently exists. Unfortunately, there has not yet been such a complete study on the impact of CIOT/HVE on changing behavior. Therefore, the entire research design must be taken into consideration when evaluating conclusions regarding HVE campaign effectiveness. Van Houten, Malenfant, Huitema and Blomberg's 2013 study examining the impact of HVE of pedestrian right-of-way yield laws on compliance and drivers' perceptions of enforcement at uncontrolled crosswalks may serve as a good example for an optimal research design for evaluating HVE programs *[40]*. The study was conducted throughout the city of Gainesville, FL over the course of a year. Even though this study is not directly related to seat belt enforcement, the study's longitudinal, natural experimental design combined with a stepwise, controlled sustained publicity/education effort and engineering elements (e.g., use of signage) mark a considerable improvement over prior HVE research studies.

Enforcement was staged in four waves over the span of the year, each lasting two weeks at a time. Public perception of enforcement was measured also in four waves, with the first survey being conducted before the enforcement took place to establish the baseline of awareness and the final three being conducted in the weeks following the first, second, and final enforcement waves. Media and education included fliers sent to parents and schools (among others) and a combination of paid and earned media. At the time the study began, Gainesville had not previously enforced pedestrian right-of-way laws. During the first wave, police issued over 1150 warnings. Tickets were not issued until the second wave of enforcement, during which police wrote 188 citations (the fine was $154 for a violation). As the experiment continued, the number of tickets written continued to decline through the second to third waves. During the fourth wave, only 66 tickets were written. Public perceptions of enforcement increased significantly throughout the duration of the study, with statistically significant increases following each of the four waves. Behavior change among drivers yielding to pedestrians at controlled and uncontrolled crosswalks also significantly improved in a similar pattern. These observed effects support HVE programs. Van Houten et al. conclude the study's results "suggest that local agencies can produce a culture shift" in the percent of driver compliance with pedestrian yielding laws *[40]*. There are a number of factors that will ultimately impact the degree of success that the researchers deemed critical, such as the duration of the study itself and the consistent deployment of high visibility elements dispersed over the course of a year. For larger cities, the length of HVE may need to be longer than a year to achieve success *[40]*.

Increasing State Belt Use Rates: Best Practices and Challenges

There is no one-size-fits-all approach to increasing belt use. States have implemented the law and enforcement strategies discussed above and have experienced varying levels of success. A handful of states have high belt-use rates (above 90%) but most states hover around or fall below the national average. Since no state has 100% usage, all states must find ways to increase belt use using available resources. Regardless of a state's classification as a "high" or "low" belt-use rate state, yearly improvements (return on investment) are usually modest at best. A state may experience a spike in use rates upon introducing a new strategy (e.g., passing a primary law) but research shows neither legislative nor HVE strategies are likely to continue producing large effects years after implementation unless efforts are incrementally intensified or new methods are introduced.

An example of a state that appears to be doing all of the right things is North Carolina, the first state to participate in CIOT. North Carolina has a primary law and has maintained its

level of participation in the national mobilization, but the state has yet to achieve a belt-use rate of at least 90%. In North Carolina's FY14 Highway Safety Plan (HSP), the state reports the lack of improvement as "frustrating given the considerable time and resources devoted to this issue" *[41]*. North Carolina's belt use rate in 2013 was 88.6%, with relatively no change in the number of unbelted fatalities since 2002 and very little increase in the state's belt-use rate since about 2006, despite the state's "intense focus" on occupant protection *[41]*. A recent assessment of North Carolina's occupant protection plan outlines the state's strengths and weaknesses across seven different areas (e.g., program management, law enforcement, communication, etc.) to help the state determine how to better direct resources to reach their occupant protection program goals *[42]*. The key recommendations range from general to specific across the seven areas. In terms of program management, the assessment team recommends that the state:

> • Implement an occupant protection coalition or subcommittee that will focus on occupant protection issues and projects, provide collaboration and communication among existing partners, generate additional participation, and raise the visibility and priority of occupant protection in the State.
>
> • Develop and implement occupant protection programs that focus on high priority target audiences, particularly for those age groups that have been identified by the data as highly represented in the category of fatally injured passenger vehicle occupants. *[42]*.

Some of the other recommendations to increase seat belt utilization among low-use groups include hiring a full-service public relations consultant to help the state revitalize CIOT branding among males 18-34 and to establish a corporate outreach program (with risk managers, fleet managers, etc.) to promote seat belt use and disseminate materials among employees *[42]*.

Closing the gap between low-use and high-use segments of the population remains a national priority, even in characteristically "high" rate states like Hawaii that lead the nation in belt use but struggle sustaining high use throughout the entire state *[43]*. The smaller the percentage the more precision is needed to understand where opportunities for interventions exist. Kim et al. identified spatial patterns in seat belt use throughout the state *[43]*. Logistic regression analysis suggests significant differences in use based on road types, geography, vehicle, and environmental characteristics. Areas of low seat belt use at the state level are fairly rural, low income, and relatively isolated locations, and in a comparison of counties,

roads with lower volume traffic and lower posted speed limits tended to have less seat belt use. The lower-use locations may indicate a higher percentage of part-time users. The researchers conclude that there is a need for greater place-based outreach and enforcement, a better understanding of non-use in general with particular attention paid toward underlying social, economic, and cultural issues in addition to the spatial disparities, and a need to ascertain the percentage of part-time use. Rather than place greater emphasis on enforcement, the researchers indicate community-based programs and educational campaigns in low-use areas would be beneficial *[43]*.

Georgia, another high-use state in 2013 (95.5%), has lower belt use in rural areas as well, particularly among rural teens. Davidson et al. conducted observational surveys of 12 rural high schools in southeast Georgia *[44]*. The region where this study took place is characterized as being among the poorest counties in the state, and with the exception of one county with a large state university, below average for education. Geographically, the region is comprised of small towns surrounded by sparsely populated rural land. Researchers stationed at the various high schools observed students entering and exiting parking lots over a 16-month period (ending in January 2011). They found the belt use rate among the teen drivers and front seat passengers to be extremely low, i.e., 38.6%. The high school seat belt use rate was highest among females (48.4%) and lowest among males (35.6%). To put these estimates into context, in 2011 Georgia's rural belt use rate was estimated at 88.2%. The report does not contain estimates by age group, leading the researchers to conclude the "state level data is not appropriate or applicable for local interventions" *[44]*. Furthermore, they conclude that the extremely low rate among rural teens is so far below average, it is unlikely that national rural-safety initiatives (like NHTSA's Rural Seatbelt Use Demonstration Project) are going to have much of a measureable impact when there is a real need for programs tailored to sub-populations and interventions at the local level. To this end, field observation at the community level is critical *[44]*.

Alabama recently went from 89.5% in 2012 to 97.3% in 2013, placing it third in the country behind Oregon and California for high-seat belt use that year. While there is little information available online documenting exactly how Alabama achieved nearly an 8% increase in a single year, Alabama's FY14 SHSP indicates the state implemented a data-driven enforcement program (DDEP) *[45]*. Upon determining that the failure to use seat belts was clearly a critical factor in fatal crashes, the state continued the "problem identification" process by analyzing data to "determine the who, what, where, when, and why of crashes involving non-restrained occupants" *[45]*. The state analyzed data from 2010-2012 to

identify “restraint-deficient (RD) hotspots” and “child restraint deficient (CRD) hotspots” associated with the highest number of unrestrained fatal crashes occurring along specific types of roads and meeting certain criteria (such as there being greater than 4 crashes at an intersection). The total number of hotspots identified was 389. Of these, 98 road segments (10 miles long) where 20 or more RD/CRD crashes occurred.

Detailed problem identification analysis examined geographic, time, crash causal factors, severity, and driver demographics factors to determine what elements are over-represented in RD/CRD crashes. From there, regional coordinators for the Community Traffic Safety Program and Law Enforcement Liaisons (CTSP/LEL) were instructed to make the hotspot locations a focal point for their plans. Like the other states mentioned in this section, many of these crashes occurred in rural areas and country highways, often involving certain risk factors like speeding and DUI. Males were over-represented and account for 69.6% of unrestrained crashes *[45]*. Given the centrality of the DDEP to Alabama’s occupant protection goals, combined with sustained enforcement, it is likely the program played a direct role in Alabama’s seat belt improvement. Longitudinal analysis is needed to estimate the actual impact of Alabama’s data driven strategy on fatalities and whether or not Alabama is capable of sustaining such a high rate, but most states would probably benefit from using data-driven approaches to identify areas where unbelted fatalities are particularly high.

Data-driven approaches to identifying an area of interest allows states to deploy targeted countermeasures on a local community or regional scale. Iowa, for example, had a belt use rate in 2013 of 92.5% but over 40% of statewide fatalities of the same year were unrestrained occupants. Most of these occurred on rural roads. In 2014, Iowa implemented a new data-driven countermeasure program called “High Five Rural Traffic Safety Program” (High Five) in which the state identified five rural counties where seat belt use is low and rural unrestrained fatalities are high. Iowa also created an education-based pilot program targeted at teens attending rural high school called Seatbelts Are for Everyone (SAFE) that covered a number of safety issues but made seatbelts the primary focus. Iowa has experienced a 23.44% decrease over the past five years in fatalities of drivers 20 years of age or younger, but because traffic fatalities are one of the leading causes of death for young people, Iowa continues working to reduce the number further. Some of the other things the state implements are desktop driving simulators which provide an interactive learning experience for young drivers. These programs and their auxiliary components are detailed in Iowa’s SHSP FFY2015 *[46]*.

Socio-Cultural Considerations

Lastly, the socio-cultural "identity" of a state may be an important factor. Researchers at the University of Michigan's Transportation Research Institute find state-to-state differences in belt use are partially explained by political party identification, religiosity, and racial composition *[7], [47]*. These factors were significant in a model that also included "urbanicity," the level of fine, type of law, age, gender, and vehicle type *[47]*. A follow-up study by the same team of researchers conducted multivariate analyses of five cultural factors including education (percent of high school population), racial composition (percent Caucasian), median household income, political leaning (percent Democrat) and a measure for religiosity (percent of people responding 'yes' to a Gallup poll question asking if religion is an important part of their life). The researchers obtained measurements from other data sources which they combined with FARS data. While there are known limitations with this approach and population-level data does not allow for exploration of factors at smaller units of analysis (namely, regions, subpopulations, or individuals) the findings suggest potential important macro-level cultural differences in state belt use with regard to racial composition, religiosity and political leaning, but not income or education. Specifically, results suggest that a higher percentage of Democrats is positively associated with higher statewide belt use but religiosity and a greater percentage of Caucasians are negatively associated statewide belt use. The effect of racial composition is interesting considering prior research suggests seat belt use is higher among Caucasians than minorities. This could be a measurement artifact and/or possibly having something to do with the fact that Caucasians make up the racial majority in all of the states. Given the limitations with measurement and preliminary nature of the findings, it is not possible to explain why these factors in particular might be related to seat belt use; however, both studies conclude that understanding more about these factors is important and could potentially be useful in developing targeted countermeasures *[7], [47]*. The next part of this literature review focuses on research examining seat belt use among individuals.

Factors Affecting Individual Seat Belt Use

A statistical analysis of existing observational and self-report survey data provide insight into individuals' seat belt use patterns and identify "who" (age, gender, race, vehicle type) does not regularly use seat belts; "where" seat belt use is low (zip code, region, etc.) and "when" (time of day, day of week, month) people are less likely to use seat belts. These categorical or descriptive factors are consistently observed in seat belt use studies. These factors have been referred to throughout the literature review. In summary, low seat belt use is associated with

being younger in age, male, lower socioeconomic status (based on education and income), driving older and less expensive vehicles and/or pick-up trucks, racial and ethnic minorities, heavy alcohol drinkers, tobacco smokers, and high-crash drivers *[2]*. Rural and urban teens, especially inner-city minorities of low SES background are particularly low-use *[48]*.

These factors have also been observed in crash data (i.e., FARS) which provides insight into serious crashes involving unrestrained occupants. Rural areas have a higher number of fatal crashes involving unrestrained vehicle occupants than urban areas and these tend to occur close to home, with rural crashes usually involving rural residents and vice versa *[49], [50]*. Fatal crashes on rural roads usually involve one or more of the characteristics discussed above, such as a male driver, younger drivers, alcohol consumption and vehicle ejections due to lack of occupant restraints *[50]*. Seat belt use is generally lower at night than in the day-time *[51], [52]*. Observation studies conducted at night time indicate this, as well as crash data *[53]*. Research has considered how individual differences in belt use might vary as a result of attitudinal factors, such as the perceived likelihood of being ticketed, personal beliefs, or their attitudes toward risk, to name a few. The following discussion provides an overview of individual factors impacting belt use.

Risk Propensity and Perceptions of Risk in Decision-making

Speeding, texting while driving, and not using a seat belt are examples of risky driving. Research consistently finds gender differences in risky driving, with males (young males, in particular) being significantly more likely than females to engage in risky driving *[54]*. Not using a seatbelt is associated with a greater propensity to take risks, as well as past history of engaging in antisocial and "criminal" behavior *[55], [56]*. Studies have shown that not using a seat belt is associated with other maladaptive or unlawful driving behaviors like speeding, following too closely, and running red lights *[3]*.

A willingness to take risks, or risk propensity has been linked to personality *[57], [58]*. Nicholson et al. conducted a study to examine the relationship of personality to risk taking. Personality was measured using the Big-Five factorial model *[59]* and risk was looked at generally, as well as in specific domains (i.e., health & safety; social & recreational; career & finance) *[59]*. They find risk behavior is patterned: "Some people are likely to be consistent risk takers; others will be consistently risk averse, while a third group have domain-specific patterns of risk behavior" *[57]*. Ulleberg and Rundmo looked at the relationship of personality, attitudes, and risk perception to self-reported risky driving behavior in young

drivers (aged 16-23) in Norway *[58]*. The researchers examined attitudes that generally corresponded to driving behavior like breaking rules, speeding, and self-assertiveness (as a function of peer influence). They find that personality traits have indirect effects on risk-taking driving behavior via attitudes toward traffic safety. This suggests a "causal relationship, where personality traits…are exogenous variables influencing attitudes, which in turn affect behavior" *[58]*. This makes sense considering the enduring nature of personality traits over the course of a person's lifetime, but changing people's personalities is not possible from a traffic safety perspective. The context of the situation also matters.

In addition to risk propensity, there is the perception of risk on a person's decision or choice to use a seat belt (and comply with the law). Seat belt use is a primary means of reducing risk of injury in the event of a crash. Disutility costs related to seat belt use (e.g., temporary physical discomfort, inconvenience) are fairly minor and by all rational accounts, the potential benefits of seat belt use (i.e., protection in the event of a serious crash) are well-worth the cost. The probability of being involved in a serious crash at any given time and place is uncertain, but also relatively low. Most people perceive their chances as very low, despite the fact that automobile crashes are one of the leading causes of death *[60]*.

Decision-making is typically regarded as the outcome of a rational process, though this is contingent on how information is processed. Dual-process models of information processing have been applied to decision making contexts. There are two primary routes in which decisions are made: one based on rational analysis and the other based on affective or intuitive "short cuts" which are essentially automatic routes. Likewise, Slovic et al. explain two basic ways risk is perceived and acted upon: risk as feelings which "refers to individuals' fast, instinctive, and intuitive reactions to danger" and risk as analysis, "which refers to the logical reasoning and deliberative judgment in regards to risk management" *[61]*. Rhodes and Pivik suggest males and teen drivers may be "particularly reliant on an experiential affectively based decision style as they drive" *[54], [62]*. People are also more likely to use affective routes when they are pressed for time or otherwise make a decision quickly *[54], [63]*.

Not using a seat belt has been associated with the inability to accurately perceive the risk associated with not using a seat belt. The way a decision is framed has a tendency to change the criteria on which the decision is based, but not necessarily the outcome. Slovic, Fischhoff, and Lichtenstein examined the effect of framing accident probabilities on

individuals' decision to use a seat belt using experimental methods *[64]*. At the time of the study, seat belt use was voluntary and used by only a small percentage of the population, even though research demonstrating the efficacy of seat belts already existed. Also, media campaigns about seat belts were focused on persuading people to use seat belts for safety reasons, but the messages were generally deemed ineffective. The researchers likened seat belt use to purchasing insurance, which people are also not usually willing to do without added pressure. When making decisions about insurance people tend to have a "disinclination to worry about low-probability hazards" and a "propensity to view insurance as an investment" *[64]*. When people are deciding whether or not to purchase insurance (or what kind of policy to take out) they are more "willing to insure against small losses with relatively high probabilities than against large but unlikely losses" *[64]*. The researchers found that when people were asked to think of probabilities in the long term they were more likely to purchase insurance against rare events.

The researchers applied the findings about insurance decisions to seat belt use. They tested the effect of information about seat belt use and accident probabilities. Participants were randomly assigned to one of two conditions, where one was presented information stating statistical probabilities for having a crash over the course of one's lifetime (40,000 trips) and a pro-belt use statement and the other condition was presented with the statistical probabilities of having a crash in a single trip and a statement concluding seat belts aren't necessary. Upon exposure, participants were asked about the likelihood of their belt use increasing in the future based on the information they received. Participants exposed to the short trip probabilities and statements did not report that they were likely to increase belt use as a result (less than 10%), compared to 39% in the lifetime condition who were also more likely to favor mandatory seat belt laws (78%) than the short term condition (54%). All participants were later shown information about both single-trip and long term probabilities along with the pro- and anti-seat belt arguments and asked to choose the most convincing argument. A significant majority (80%) found the pro-seat belt argument based on lifetime trips most convincing. Slovic et al. concluded "the small probability of accidents, continually reinforced by safe experiences, in conjunction with people's limited capability to attend to rare threats, helps explain the non-use of seat belts" which is, at least, somewhat rational *[64]*. Changing the perception from a single-trip to a long term view could help encourage seat belt use because it changes how people think about it.

From a purely economic rational theory perspective, Hakes and Viscusi looked at the rationality of seat belt use by examining individuals' value of statistical life (VSL) and other

risk factors and seat belt use *[65]*. VSL refers to the "costs" that individuals are willing to accept in order to reduce risk of dying in a crash for one year. Hakes and Viscusi find that individuals with high VSL who do not smoke and have highly elastic risk beliefs in relation to actual risks are more likely to use seat belts *[65]*. Moreover, individuals appear to make seat belt use decisions consistent with their "stated preferences" for improved traffic safety which is, essentially, rational *[65]*.

Goudie et al. explored the connection between life-satisfaction and risk avoidance, suggesting that individuals dissatisfied with life tend to be less "conscientious" seat belt users (controlling for other factors), and longitudinally, are more likely to experience involvement in a crash some point in the future *[65]*. Using two large data sources (one of which is a longitudinal study) and employing various methodological approaches (including Bayesian methods), the researchers show the connection between life-satisfaction and numerous other health indicators and demonstrate the relationship between life-dissatisfaction and crash-involvement later in life. In other words, the researchers find a "happier" person is more likely to use seatbelts than an unhappy person. A person's positive subjective well-being, i.e., their life-satisfaction, is associated with risk-avoidance behavior. Prior work advanced the idea that individuals who do not use a seat belt are inherently drawn to risk-taking behavior like drug and alcohol use and smoking, as well as other antisocial behavior *[56]*. In contrast, the researchers find seat belt use is affected by life-satisfaction and reason that, unlike smoking or drinking, seat belt use is a life-preserving behavior that is "probably habitual rather than addictive," thus making it "less likely that current seatbelt-wearing behavior is strongly affected by long-past attitudes to risk" *[66]*. The key finding, i.e., the less-satisfied a person is in life, the less likely they are to engage in life-preserving behaviors like seat belt use, has probable implications for policy designed to change behavior of non-users.

Attitudinal Factors

Most people recognize that seat belts have many safety benefits when used, even if they do not always use them *[67]*. The segment of people who *never* use a belt is very small. Thus, the majority of non-users in observational studies are probably better classified as part-time or situational seat belt users. A 2006 NHTSA report suggests situational users have unconscious psychological "barriers" or defense mechanisms in place (i.e., repression, fatalism, denial and rationalization) that serve to "rationalize" not using a seat belt or undermine conscious consideration of the potential consequences *[68]*. Fatalistic beliefs (e.g., "when it's your time to go, it is your time to go, seat belt or not") for example, downplay the role of individual agency in preventing injury. Some drivers have negative

evaluations of seat belt use because they associate use with physical discomfort (e.g., seat belts are uncomfortable, wrinkle clothing, etc.). Traffic safety research has not established exactly how or why these factors impact belt use, only that they appear to manifest in some groups (or individuals) but not others.

Prior research finds individuals of lower SES and racial minorities are more likely to express fatalistic beliefs than Caucasian and higher SES individuals *[48], [68]*. Nevertheless, the degree to which fatalistic beliefs impact belt use directly is probably very small. Bryd et al. conducted an observation/interview study in Texas investigating the link between seatbelt use and belief in destiny among Hispanic and non-Hispanic drivers *[69]*. Participants' actual belt use was observed unobtrusively as they entered the site (convenience store parking lots at 12 randomly selected locations) and they were invited to participate in an interview. Most participants did not endorse fatalistic beliefs and even though Hispanics were more likely to express such beliefs, the researchers found no evidence that these beliefs play a significant role in non-use.

Chaudary and Northrup investigated interaction effects among demographic and attitudinal variables associated with low belt use *[70]*. The goal for this study was to better understand how the factors may operate together to impact belt use. Using NHTSA's biennial MVOSS for years 1998 and 2000, two models were constructed employing logistic regression analysis and validation procedures. The first model (i.e., demographic) model predicted belt use by demographic factors related to users and non-users; the second model (i.e., attitudinal) examined the effects of several attitudinal factors on belt use to gain insight into "why." They did not combine models because they did not have a large enough sample to test five-way interactions (and even if they could have, the findings would be very hard to interpret) so the models were deemed "functionally separate." The demographic model indicated main effects for: state law type, SES, population density and interaction effects for gender with law type and a three-way interaction between age, marital status and vehicle-type. The attitudinal model indicated main effects for "perceived effectiveness" of seat belts, fatalistic beliefs, and an interaction between "perceived effectiveness" and "perceived risk of being ticketed." The interaction is explained "by the fact that [perceived risk of ticket] has a greater effect" on those who perceive the effectiveness of seat belts lower rather than higher. The attitudinal model was tested using multinomial logistic regression to predict category of belt use (i.e., always, part-time, and infrequent) which resulted in different likelihood ratios for each predictor that were all significant *[70]*.

There are a number of implications for seat belt research associated with these findings. First, "seat belt use" is complex multidimensional construct that is neither easily explained nor clearly understood. The interaction effects among the variables provides a more complete—and complicated—picture of belt use than prior research has acknowledged. Second, looking at belt use as a dichotomy, i.e. always use vs. not always, "oversimplifies" the behavior *[70]*. There are part-time users, occasional or situational users, people who usually use them but forget and people who usually don't but might if someone asks them to. Individuals who use seat belts part-time (i.e., occasional or situational belt use) might have qualitatively different behavioral and attitudinal orientation than individuals who hardly ever or never use a seat belt. This information is not attainable from observation studies where a person is recorded as either using a seat belt or not. Third, individuals are "differentially affected" by a range of factors that interact with each other in meaningful ways; it is the interactions that may affect belt use most *[70]*.

Attitude-Behavior Relationship

An "attitude" basically refers to a person's favorable or unfavorable evaluation of an attitude object, which may be material (e.g., a seat belt, person, or thing) or abstract (e.g., concept, idea, wearing seat belts save lives). Attitudes are not actually observable, but can appear in related behaviors, beliefs, and feelings *[71]*, *[72]*. This is the "classic" or tripartite view of attitudes, which suggests a person's attitudes toward something is exhibited in their thoughts, feelings, and behaviors, which can be observed. The tripartite view has been criticized for its underlying assumptions about attitude formation, thought-feeling-behavior consistency, and for its assumptions regarding attitude-behavior relations. A full discussion of attitudes is beyond the scope of this literature review (see *[71]* for an overview) but the general assumption that attitudes are good predictors of behavior is problematic for a number of reasons.

Research has shown that the degree to which attitudes can predict behavior varies considerably *[73]*, *[74]*. In research, some of the variance may be attributed to a "lack of specificity" between the measured attitude and the measured behavior *[71]*. Attempting to predict specific behavior from a general (global) attitude, for example, is problematic if the general attitude is not a good predictor for the particular behavior of interest. Moreover, the relationship between a given attitude and behavior may be mediated or moderated by any number of conditions. Attitudes are more likely to affect behavior under certain kinds of conditions. A meta-analysis of attitude-behavior relation research suggests attitudes were more likely to predict behavior when they were easily accessible (salient) and stable over

time; and these factors combined with others like personal encounters with the attitude object and frequent reporting of attitudes allow for stronger prediction *[73]*. Individuals may also hold inconsistent attitudes or ambivalent attitudes, which further complicates the attitude-behavior relation.

Individuals may hold similar attitudes about an attitude-object such as seat belts, but behave differently due to having different reasons for holding them. The processes through which attitudes form are complex. They may form through cognitive routes such as information processing; affective routes, which include classical and operant conditioning as well as simple exposure to a stimulus; and behavioral routes which involve self-perceptions *[71]*. Attitudes perform important functions for individuals like motivation (via utilitarian behavioral principles), ego-defensiveness/protecting the self-concept, value-expression/self-expression, and knowledge, or the need for individuals to make sense of the world *[75]*. Additionally, attitudes may serve more than one function at a time for an individual. While attitudes can provide important insight into understanding how one feels or thinks about a given object or action, there are other factors that must also be examined to understand behavior in context. These include the role of prior behavior, routine, habit, and motivation, as well as situational factors. Hence, predicting seat belt use based on attitudes toward seat belts is challenging.

The Role of Prior Behavior: Routine and Habit

A majority of Americans use a seat belt several times a day. For most people, regular seat belt use is a fairly mundane behavior, much like flossing one's teeth or drinking adequate water. The more frequently a person travels in a motor vehicle, the more opportunities they have to use a seat belt (or not). Routines are a form of learned behavior where "solutions" to particular "problems" are recognized as options for action *[76]*. A person may or may not "choose" the act on the solution that comes to mind; they may actively process other options, but the point is the "script" is called to mind from memory. Prior choices are called to mind more readily than novel solutions when the problem is encountered.

Routines influence human behavior and decision-making in important ways. The stronger the routine, the more likely it is to be activated in problem situations. Routines can simplify the decision-making process by presenting applicable solutions quickly. When it comes to "mundane decision-making… routinized decision making is the rule rather than the exception" *[76]*. Once a routine has become established as a solution multiple times, the

routine can grow stronger. Thus, when individuals encounter the problem of driving or traveling in a motor vehicle (with the presumed goal of arriving at a particular destination) seat belt use is one component of the driving routine. Fastening one's seat belt falls somewhere in the process which includes "steps" like starting the vehicle, adjusting temperature/radio, putting the car in gear, etc.

When a routine has become automatic in that it is performed outside of conscious awareness, it has become a habit. The more frequently the behavior is performed, the more likely it is to become habitual, but frequent performance is not enough to form a habit in and of itself *[77]*. Habitual behavior is distinguished from other forms of behavior due to the lack of awareness surrounding the performance in the act itself. Many of the regular behaviors people perform every day are done out of habit and therefore do not require active intention. In order for a behavior to become a habit, the behavior must be performed consistently and for the same purposes, which depends on the stability of the context in which the behavior is performed *[78]*. The habitual behavior is "cued" by the environment/conditions under which it is performed.

Habits and routine decisions both have ties to the performance of past behavior which may be recalled instantaneously. The primary difference is that the habit lacks awareness while being performed in course of carrying out the act. With routine, it can become easier for individuals to "ignore" other potential solutions or acquire additional information that might impact their decision. In goal-oriented behavior, the role of intention, i.e., one's own subjective probability that he or she will perform a given behavior, has often been found to be a good predictor of behavior, though there are many intervening factors that complicate the relationship (such as self-efficacy). The "force of habit" can easily undermine or advance an intention. When habitual behavior is desired and the intention to perform is present, the habit may be considered "pro-intentional." A "counter-intentional habit" is operating when a person who intends to use a seat belt but forgets to under certain circumstances *[77]*.

Situational Factors and Importance of Habit for Seat Belt Use

There are many factors that can affect belt use on a situational basis. Some of the most commonly cited reasons for non-use include: driving a short distance, being in a hurry, and forgetting *[79]*. With the exception of "driving a short distance" which implies some type of decision process is at play, these reasons do not suggest a general disregard for belt use. A 2008 study in the UK explored numerous contexts and situations that make people more or

less likely to use a seat belt *[80]*. From interviews, the researchers determined three "broad" categories for the explanations people provide for not using a seat belt: habit failure, perceived reasons not to use a seat belt, and a lack of convincing reasons to use a seat belt *[80]*. In a series of workshops, researchers discovered that "there are clear situation and person-related factors that have a direct influence on the choice" to use or not use a seat belt *[80]*. Another important finding was not that there was this uncompromising group of consistent non-users, but that there was a sizable minority of people (est. about 14%) who they define as "inconsistent seat-belt wearers," that is, they will use a seat belt in certain situations or under certain circumstances. Many of the reasons people provide for not using a seat belt could be considered habit failure, in that they typically use a seat belt but for some reason or another, they get distracted and/or forget. Habit failure also suggests a relative "lack of habit" as the behavior hasn't been performed consistently enough under stable contexts to develop the automaticity associated with a true habit. Along the same lines, a person who seldom uses a seat belt may possess a habit of non-use. In each of these conditions, behavior is performed outside of conscious attention. *[80]*

Research examining the attitude-behavior relationship as it relates to prior and habitual behavior indicates that both past behavior performance and attitudes can predict behavior. Mittal examined the attitude-behavior relationship in seat belt use among adults and found that pro-intentional habits have a main effect on behavior but the lack of habit, or a habit of non-use, interacts with attitudes and intentions *[77]*. When habit is established, attitudes become less salient to the behavior itself. The habit of non-use operates the same way—with attitudes becoming less salient in the behavior (but they can be recalled). There is an interaction effect between non-use habits and attitude/intention because "the question of forgetting to put on the seat belt is meaningless when one doesn't want to wear it in the first place" *[77]*. Having pro-seat belt attitudes and intentions promote behavior in a pro-intentional way *[77]*.

Knapper, Cropley, and Moore observed opinion and attitudes about seat belt efficacy and other beliefs related to use in a cross-lagged panel study on university students and found that the primary reason for non-use had to do with the failure to acquire the actual habit of use rather than being driven by negative or irrational beliefs *[67]*. The researchers tested the Fishbein and Ajzen model based on the theory of reasoned action (a later version of the theory is called the theory of planned behavior) which rests on the premise that most "social actions" fall under a person's volitional control and intention is the primary force driving the behavior *[67]*. Even though habit is not included in the Fishbein and Ajzen model, the

researchers included it. The factors considered include: subjective norm, intention, attitude, behavior (frequency), and habit. Cross-lagged correlations indicated non-spurious relationships where norm influenced intention, intention influenced attitude, attitude influenced subjective norm, attitude influenced behavior and behavior influenced habit, suggesting all factors "play an important role in seat belt usage" *[67]*. Often, behavior is generally consistent with prior attitudes but once the behavior can be performed without any conscious thought or effort, attitudes are less salient. Regression analysis results indicate habit accounted for the most variance. Thus, the study found support for the theory of reasoned action but due to the inclusion of habit, findings suggest that "some behaviors are best understood as not being under volitional control" *[67]*.

Danner et al. examined the differences between habit and intention in predicting future behavior in a series of three separate studies *[78]*. Results from the first two correlational studies indicated that intentions are predictive of goal-directed when behavior is performed infrequently and/or in unstable contexts but not when the behavior has become a habit (via frequency and context stability). A third correlational study confirmed that the accessibility of the behavior cued from context (i.e., automatically) is enough to moderate the relationship of intention to behavior *[78]*. Context stability plays a crucial role in establishing strong habits, which in turn predicts future behavior better than a person's intentions. Intentions are most likely to guide behavior when it is not frequently performed in a stable context.

The Role of Motivation

Nilsen et al. explain that the relationship between intention, i.e., "an individual's motivation concerning the performance of a given behavior" and future behavior is moderated by the role of habit *[81]*. Because habit makes any intention or attitude less salient in the actual performance of the behavior, it follows that intention is most important when a person is actively seeking to change or to adopt a new behavior. People have varying degrees of motivation to use seat belts. The source of motivation matters. In the quantitative final phase of the seat belt study in the UK, Christmas et al. conducted a survey where they asked drivers and non-drivers to tell their level of agreement with the following two statements: "Wearing seat belts is something 'I have to do'" and "Wearing seat belts is something 'I want to do'" *[80]*. They found three primary segments: (1) people who strongly agree they have to and want to; (2) people who strongly agree they have to but do not strongly agree they want to; and (3) people who do not strongly agree that they have to or want to wear a seat belt. Strongly agreeing to both statements was the greatest predictor of belt use.

Christmas et al. hypothesized that seat belt use is "dictated" by the individual's motivations, which may be intrinsic or extrinsic *[80]*. By having people tell how much they agree that using a seat belt is something they feel they have to do and something they want to do, motivation is essentially captured in two distinct forms: extrinsic and intrinsic, respectively. An action is intrinsically motivated if it is performed by a person for some inherently personal interest or reason for the action itself and not some other outcome. An action is extrinsically motivated if it is performed simply for the sake of attaining some other outcome *[82]*. The extent to which something might be intrinsically or extrinsically motivated depends on the "underlying attitudes and goals that give rise to action" *[82]*. When a person is acting on the basis of intrinsic motivation, they are, in a sense, deriving satisfaction from performing the act in and of itself. In other words, they want to do it. They may want to perform the behavior for any number of reasons, such as reaching a goal, improving health, etc. however, it is the *motivation* that provides the drive to change. Intrinsic motivation is generally more effective because it tends to carry greater positive associations than extrinsic motivation which may be against a person's will. This tends to be the case even when rewards are offered. Motivating people to change behavior with no apparent immediate impact or benefit is hard to do, which is why the threat of punishment may not be received in such a way as to inspire behavior change.

Social Context and Health Disparities

Individuals' attitudes and behavior regarding seat belt use do not form in a vacuum. Individuals are differentially affected by their environment and immediate contexts in which behavior is learned and attitudes are formed. The persistent demographic, SES, and geographic differences in belt use across the US (and other countries) are indicative of systemic—rather than individual—differences. According to Glass and McAtee, "behavioral science within public health, especially in the US, has focused primarily on individual health-related behaviors (or ''life styles''), without due consideration of the social context in which health behaviors occur and become socially patterned" *[83]*. Individuals are differentially exposed to a host of environmental and social stressors, but these are not evenly distributed across the population. While exposure may occur via different pathways and processes, "the extent to which racial, gender, and SES groups are differentially exposed to common social influences is striking" *[84]*. In the aggregate, the differential exposure ultimately contributes to the patterns observed at the population level.

Burke et al. define social context as "the sociocultural forces that shape people's day-to-day experiences and that directly and indirectly affect health and behavior" *[85]*. These forces

consist of economic, "historical, political, and legal structures and processes (e.g., colonialism and migration); organizations and institutions (e.g., schools, clinics, and community); and individual and personal trajectories (e.g., family and interpersonal relationships)" among others *[85]*. These forces make up the social context in which people come to understand who they are in relation to others. It is not possible to separate the effects of any particular force because they are "formed in relation to and by each other" *[85]*.

Social context is critical to understanding how individuals' decisions and behavior amount to patterned disparities in public health in the population. As Arah noted, the relationship between individuals and the population health is "largely relative and dynamic" *[86]*. Lower seat belt use correlates with a number of health risk indicators such as drinking and drug use, unsafe sexual and driving behaviors, poor dietary and physical health, obesity, chronic diseases like diabetes and heart disease, among others. Strine et al. find seat belt nonuse is negatively linked with a number of adverse health behaviors, including obesity *[87]*. Braveman et al. identified clear and "profound" differences in health among racial/ethnic minorities and "pervasive" disparities among lower socioeconomic classes across a series of child and adult health indicators *[88]*. While seat belt use was not among the specific indicators included in this particular study, their findings are consistent with other studies looking at similar health factors that also include seat belt use and/or other traffic safety factors. Most importantly, they find that those people at the bottom in terms of income and education are the least healthy among the population and the healthiest people are those at the top and Caucasian. These patterns of disparity have been observed across different societies and have persisted at similar levels over time, from the early 19th century *[89-91]*.

Understanding how SES affects specific attitudes and behavior is not a straightforward process, especially for something like seat belt use which takes very little effort to perform. Shavers examined the measurement of SES in health disparities research, which was defined in 1981 by Mueller and Parcel as "the relative position of a family of individual on a hierarchical structure, based on their access to or control over wealth, prestige, and power" *[92], [93]*. SES usually consists of measures of a person's income (current or annual), affluence, educational attainment, occupation, and composite indices. Research has identified SES as the "cause" of the health disparities across the population or between groups but there has been "little, if any, discussion of the specific manner in which SES might have exerted its influence within the context of the study outcomes" *[92]*. SES variables are often used as controls when investigating other outcomes of interest. This can result in misleading if not inaccurate interpretations of results in the course of a research study *[92]*. There are common

limitations known with SES indicators in survey research such as imprecision of measurement and difficulty obtaining complete information (individuals are notoriously reluctant to provide income in research). Braveman et al. point out that these factors also have a tendency to be oversimplified, "despite the expert consensus that SES is complex and multifactorial" *[94]*. This affects how data are interpreted and can often result in inconsistent or contradictory findings that cannot be explained (such as one study finding education doesn't impact belt use but another does).

Socio-economic disparities in the population are indicative of systemic and structural forces that directly and indirectly affect behavior in part, because socio-economic indicators are intrinsically tied to a person's psycho-social development via the conditions in which they live. Lower SES individuals and minorities are more likely to experience chronic stress and face other difficult circumstances that require a significant amount of their energy to cope. Consequently, these individuals may have less motivation to adopt healthy or preventative behaviors *[48], [95]*. Children growing up in stressful, low SES environments are less likely to have role models to help them adopt healthy or preventative behaviors. One study looked at high school students in three types of schools (inner-city, middle-class, and private) and found that students attending the poor inner-city school not only reported lower belt use than students at the other schools, they were also significantly less likely to receive instruction and encouragement from parents to use seat belts *[48]*. In addition, the parents of these students were less likely to model appropriate use than were parents of students at the other schools *[48]*.

Members of "non-dominant" minority groups, that is, ethnic/racial minorities and individuals of lower SES are more likely to engage in a number of high-risk and adverse health behaviors than the dominant groups (i.e., Caucasian, higher SES) in society *[84], [89], [96], [97]*. These behaviors are linked to chronic diseases and mortality. Previous explanations for the disparity have rested on macro-structural conditions in society or micro-agentic perspectives of individual choice. The latter places much greater emphasis on individual choices independent of the structural conditions whereas the former places greater emphasis on structural conditions affecting behavior *[96]*. Factor et al. developed the integrative social resistance framework (SRF) to explain why non-dominant minorities are more likely to engage in risky or unhealthy behavior *[89]*. The SRF suggests that the power relations in society (past and present) combined with the relative position of non-dominant minority groups may "encourage" individuals belonging to those groups to "actively engage, consciously or unconsciously, in different everyday resistance behaviors" including those

that adversely impact health, which ultimately affect these groups at higher rates disproportionate to the dominant or majority groups *[89]*.

The social norms that influence behavior in low-SES groups and poor communities are often at odds with the culturally-dominant social norms that shape law and policy. Pampel, Krueger, and Denny identified nine general "mechanisms" that underlie the relationship between SES and health behaviors, which include (1) deprivation, inequality, and stress; (2) fewer benefits of health behaviors for longevity; (3) latent traits; (4) class distinctions; (5) lack of knowledge and access to information about health risks; (6) efficacy and agency; (7) aids for healthy behavior; (8) community opportunities; and (9) social support, social cohesion, and peer influence *[98]*. SES can affect a person's motivations, means, and opportunity to engage in healthful behaviors *[98]*.

Summary of Conclusions Drawn from Literature

This literature review has identified the range of factors and population characteristics affecting seat belt utilization at the state level, as well as the predominant strategies states have employed to increase seat belt use statewide. Most of these strategies focus on laws and law enforcement in some way. To the extent that enforcement-based strategies are capable of producing lasting, long-term effects, they appear to have very little impact on low-use groups. There is no singular explanation for why certain groups in the population are less likely than others to use seat belts. Demographic differences can account for the variation of belt use within states but they cannot explain non-use. Thus, there is no one-size-fits-all approach to increasing and sustaining high seat belt use at the state level.

In order to see a meaningful increase in seat belt use among low-use groups, individuals making up these groups must change their behavior. Using a seat belt is not unlike other mundane health-promoting behaviors such as flossing one's teeth, hand-washing, or taking a daily multi-vitamin. These types of repetitive behaviors, once adopted, typically become a habitual part of one's daily routine. Habits are performed automatically in response to environmental cues in stable contexts. When any behavior—pro-health or not— becomes a force of habit, it is naturally resistant to change. Changing existing behavior requires goal-directed intention as well as disruption of the existing routines that unconsciously "trigger" the undesired behavior. This process usually takes considerable effort and individuals may or may not have the motivation or desire to do so.

Research indicates intrinsic or positive motivation is more likely to result in lasting behavior change. Previous mobilization efforts emphasizing deterrence (from not using a seat belt) or punishment in the form of a ticket are not designed to produce positive motivation for behavior change and thus are unlikely to achieve lasting results among those lacking intrinsic motivation to change their behavior. Rather than never using a seat belt, less-motivated individuals may reluctantly perform the behavior, but they may do so on a conditional, situational, or part-time basis. At the individual level, there are many factors that impact a person's motivation to change their behavior, such as attitudes, beliefs, social context, health and life satisfaction, and other primarily psycho-social conditions. There are also a host of internal and external factors that can affect behavior outside of positive motivation. Differences have been observed across demographic groups and geographic regions, however, less is known about how these factors relate to individual motivation, prior behavior, habit formation, and actual use. It is important to gain new insight into how these factors might vary between 100% seat belt users and those who use them less.

Data Collection

This section describes the data sources, collection, processes, and methodologies used in analysis for this project. Several objectives of this study revolved around identifying low-usage target groups based on demographic, attitudinal and socioeconomic factors identified in the literature review. The survey methods and administration are described following the overview of secondary sources.

Overview of Secondary Data Sources

Several secondary sources of data related to seat belt use in Louisiana were analyzed. The sources are briefly described below:

OMV Seat Belt Violation Data. The Office of Motor Vehicles (OMV) database has recorded some of the seat belt violations in the state since 2004. This database contains drivers' license information as well as sex, age, race, the number of violations, and other information. In order for the violation to be recorded on the OMV file, the ticket must be paid for and processed through the court system.

Police Reported Seat Belt Violations. Data regarding occupant protection (OP) enforcement efforts conducted by police in Louisiana between 2013 and 2015 are reported to the state by police agencies that received 402 funding from the state for overtime enforcement and other efforts. These reports, compiled by the LHSC in a yearly report, summarize information about OP enforcement, specifically, hours spent on overtime, regular time, seat belt citations, contacts made at checkpoints, press releases and other efforts.

Seat Belt Roadside Survey. Annual roadside survey data over the past three years (2013-2015) containing observations of 142,464 vehicles may provide insight into the relationship between belt use, vehicle type, gender, race, and location. In 2013, a new revised seat belt survey design was used following the 2012 NHTSA requirement to submit to NHTSA a study and data collection protocol for an annual state survey to estimate passenger vehicle occupant restraint use *[99]*. There are a total of 64 parishes in the state, 38 of which account for about 86% of the passenger vehicle crash-related fatalities occurring in the years 2006-2009, according to the FARS data averages, which served as a baseline for the new design. The sampling for the design is based on a listing of parish road segments using 2010 Topographically Integrated Geographic Encoding and Referencing (TIGER) data developed by the U.S. Census Bureau and the Louisiana road file containing vehicle miles traveled (VMT) for non-local roads, which have been identified by road function classification (Interstate, US & State routes, and Local) and by traffic volume. All passenger vehicles with a gross vehicle weight up to 10,000 pounds were included in the survey. This includes small commercial vehicles. The target population is all drivers and right front seat passengers (excluding children harnessed in child safety seats) of these vehicles who travel on public roads between the hours of 7 AM and 6 PM. The selected approach includes a stratified systematic Probability Proportional to Size (PPS) sample of data collection sites (See Appendix A for details). For details regarding the 38 parishes selected for the survey, as well as the sampling design layout, please refer to Appendix B.

Crash Data. The crash data are a census of all crashes occurring in Louisiana, from 2005 to 2014. The data are collected and maintained by the Highway Safety Research Group (HSRG) at Louisiana State University (LSU). On the crash report seat belt usage is recorded in the field "OCC PROT SYS." Relevant values are: A-NONE USED, B-SHOULDER BELT ONLY USED, C-LAP BELT ONLY USED, D-SHOULDER AND LAP BELT USED, G-HELMET USED, Y-RESTRAINT USE UNKNOWN. In the crash data this value is stored in the field "DR_PROTSYS_CD". To calculate a seat belt usage rate the usage codes were converted to a binary format with "A" = 0 and all other codes = 1.

Survey Methods and Administration

Upon developing a questionnaire based on factors identified in the literature review, the team conducted two preliminary studies: a pilot study which allowed for questionnaire testing as well as validation of seat belt usage/motivation measures and a pretest to confirm all measures and assess applicability to wider population. The preliminary studies also informed the stratified sampling design used in the primary study. Details about achieved samples and sampling approach for the preliminary studies appear in Table 1 below.

Table 1
Preliminary study samples 2014 and 2015

November, 2014 Pilot Study	February, 2015 Pretest
LSU students (N=632)	Adults residing in Louisiana (N=303)
76% were 100% SB users	83% were 100% SB users
Age–98% between 18 and 25	Age–ranged from 30 to 88
Gender–40% male, 60% female	Gender–40% male, 60% female
Convenience sample–non-probability sample of LSU students enrolled in Business courses	Snowball sample–non-probability sample with LSU students recruiting adult subjects

Results from the preliminary studies suggested the importance of several less-examined factors affecting seat belt use among individuals, which served as the foundational elements of the primary study. These factors include: 1) Motivation: a person's drive to do something that includes internal and external forces that influence seat belt use; 2) Routine: a sequence of actions performed on a regular basis; the *process* established by a driver when entering their vehicle for a typical trip to work or school. Note: the term "process" refers to "routine" throughout the report; and 3) Habit: Recurring behavior performed outside of conscious awareness in a stable context, or in other words, the routinized nature of the driving process facilitates the development of automatic seat belt use. These three fundamental concepts informed the final questionnaire design as well as the stratified sampling plan for the primary study (which also includes age). For achieved sample details, see Appendix C.

Questionnaire Construction and Measurement of Fundamental Concepts

Data collection began with a random telephone survey of Louisiana drivers aged 18-45 and several months later, an online survey of drivers also 18-45 from multiple other states. A copy of the final questionnaire used in the multistate survey is attached in Appendix C. Please refer to this copy for question wording and ordering details. With the exception of some questions exclusive to the multistate online survey as well as some method-specific question formatting, the questionnaire was essentially the same as the one used in the

telephone survey. This allowed for pooling both samples of Louisiana drivers into one larger sample for the primary analysis. In general, the questionnaire contains multiple measures of seat belt usage as well as measures of habit and motivation, i.e., general attitudinal commitment to seat belt use, including primary motivators and beliefs impacting seat belt usage as well as barriers to seat belt usage. It was important ask about reasons why some individuals have increased seat belt use over time as well as the perceived impact of driver education on seat belt use. The final set of questions asks about media and online media usage and demographic characteristics. Summary details about measurement appear below. For full question wording and response options, please refer to the questionnaire itself.

Motivation or General Attitudinal Commitment. The survey included two items to measure individuals' overall motivation surrounding belt use, or in other words, their "general attitudinal commitment" to using a seat belt. These items, originally proposed in a 2008 UK Transport Study, measure the degree to which a person feels they HAVE TO and WANT TO use a seat belt *[80]*. Specifically, the question asks: "There are actions some people feel like they have to do and other people feel they want to do when driving. To what extent do you feel like using a seat belt is something you HAVE TO do; and WANT TO do?" Respondents were offered three choices for answers: absolutely, somewhat, and not at all. Operationally, HAVE TO refers primarily the result of external forces, whether it be enforcement efforts (e.g., "Concern for getting a ticket") or social pressures (e.g., "Others ask me to do it"), where WANT TO refers to the more internal forces of motivation (e.g., "Want to avoid serious injury") or social responsibility (e.g., "Want to set a good example").

Seat Belt Use. The survey included two items to measure seat belt use. The first item, a binary measure for sample stratification purposes, asks: "How would you describe your seat belt use, generally? There is no right answer. Please select the statement that honestly reflects your experience."

- There are occasions or situations when I might not have worn my seat belt.
- I never drive anywhere without always wearing my seat belt.

The second measure of seat belt use appears a little later in the survey as a five-category typology item: "People have different patterns of seat belt use, ranging from using it habitually 100% of the time to not using a seat belt at all. Thinking about your typical seat belt usage, please indicate which of the statements below best describes you:"

□ I never use a seat belt. It's something I normally don't even think about.

□ I tend to not use a seat belt, but I do when prompted by someone or in certain circumstances.

□ I generally use a seat belt, but there are times or situations where I don't think it is necessary.

□ I intend to use a seat belt all the time, but sometimes I get distracted and/or forget.

□ I use a seat belt 100% of the time without thinking about it. It is a true habit for me.

Seat Belt Use Groups. Responses to the five-category item were recoded so that only respondents who selected "I use a seat belt 100% of the time…" were categorized as having "100% use," while all other respondents were categorized as having "Non-100% use." Seat belt use groups were computed based on the recoded typology item and the motivation items, (i.e., HAVE TO and WANT TO wear seat belt). Respondents were classified into one of two motivation groups: those who responded "Absolutely" to both items and those who did not respond "Absolutely" to both items. Thus, the seat belt use groups used in analysis reflect Use (100% or Non-100%) and Motivation (Absolutely HT and WT or Not Absolute).

Process. One item asks respondents to tell at what point in their driving routine they routinely fasten their seat belt. Respondents were presented with a series of ordered response options ranged from "Immediately after getting in the vehicle" to "After I'm already on the road" and finally, "Typically don't use a seat belt."

Primary Motivators and Factors Influencing Seat Belt Use. These include reasons for use (i.e., primarily personal/ social, impersonal/ practical, and habit) and attitudes and beliefs (i.e., toward the law, police, enforcement, seat belts in general, and crashes) related to factors expected to affect belt use.

Exceptions to 100% Use. An additional set of questions was presented to drivers reporting less than 100% seat belt use. These items asked about commonly provided reasons for non-use (i.e., overconfidence in vehicle features or driver ability, physical and/or psychological discomfort, fatalistic/false or otherwise irrational beliefs, and social/ fit-in with others).

Situational/Environmental Factors. Drivers reporting less than 100% seat belt use, were also asked about particular conditions or situations (road type, night time, vehicle occupants/presence of others, trip type/duration, emotional state, backseat) where seat belt use might change (decrease, increase or stay the same).

External Factors. A series of questions about driver education, laws, cost of fines, and enforcement (perceptions of strict enforcement, perceptions of ticket likelihood) were included to examine how these factors relate to individuals' seat belt use.

Driver Characteristics. Respondents were asked to provide basic information about their personal vehicle characteristics (i.e., type/age) as well as demographic characteristics.

Sample Coverage

Figure 1 shows the distribution of Louisiana survey respondents, mapped by zip code and displayed by parish. Multiple respondents at the same zip code are displayed with offset and overlapping symbols, color coded and numbered according to a classification scheme developed from the survey responses, which will be discussed in the Results section. The distribution of respondent location throughout the state indicates thorough coverage.

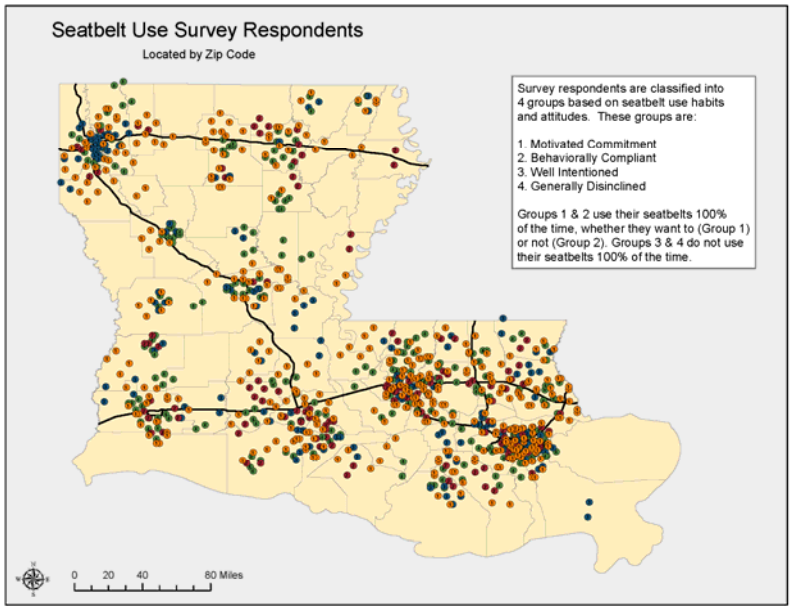


Figure 1
Survey sample geographic coverage

DISCUSSION OF RESULTS

Secondary Data Analysis

Analysis of OMV Seat Belt Violation Data

As much of the information describing demographic characteristics of drivers who do not use seat belts comes from yearly observational roadside surveys, some factors such as age are typically unknown. Seat belt violations can provide insight into demographics of drivers not using a seat belt provided they are given to violators without bias. While OMV began recording seat belt violations in 2004, only a portion of seat belt violations issued have been recorded in the OMV database. In order for a seat belt violation to be recorded on the OMV driver file, it has to be processed through the court system or paid by the violator. It is not known exactly how many seat belt violations are missing from the database, but analysis of police-reported citations presented later in the report suggests OMV records less than half. One possible reason for the low percentage of recorded tickets may be related to the relatively low fine of $25, which is comparable to a parking ticket that is not pursued by prosecutors, but may be held against a driver if he/she is arrested for other reasons. Figure 2 shows that the number of recorded seat belt violations has, for the most part, steadily increased from 2004 until 2011, where the number of recorded violations peaked at 70,327, and has been declining each year since 2012. There are no known reasons for the decline.

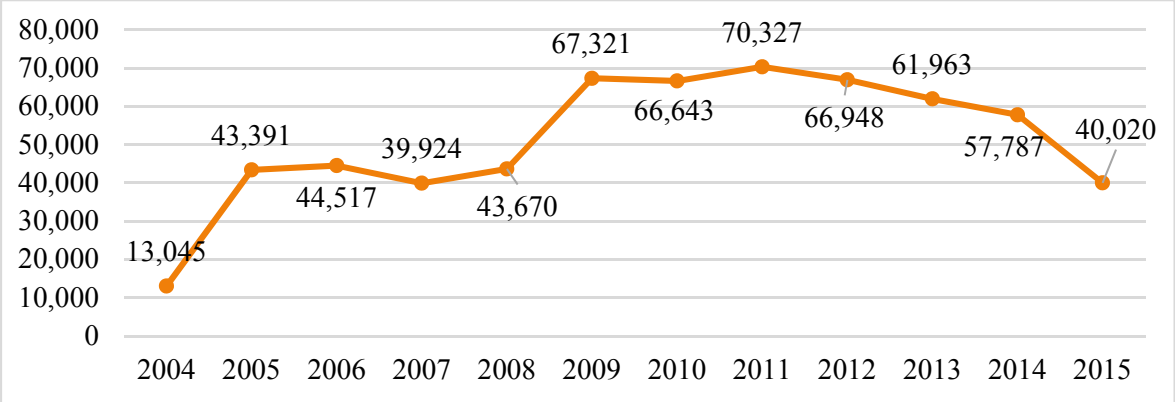


Figure 2
Number of recorded seat belt violations, 2004-2015

Since the seat belt violations recorded on the driver license file make up about less than half of issued seat belt citations, there could be a number of reasons for the decline unrelated to

actual enforcement. Looking more closely at the previous three years, 2013-2015, there is clearly a higher number of seat belt violations recorded during May (when the seat belt HVE is carried out) than any other month out of the year; however, there is less disparity by month in 2015 than in the two years prior. Figure 3 displays the number of seat belt violations by month. While there is no clear explanation for the drop in 2015, it is important to remember that only tickets that have been paid and processed are recorded. In general, it may take several months for a ticket to be recorded on the OMV file. Still, the May 2015 data should have been recorded at the time this data was received in March 2016.

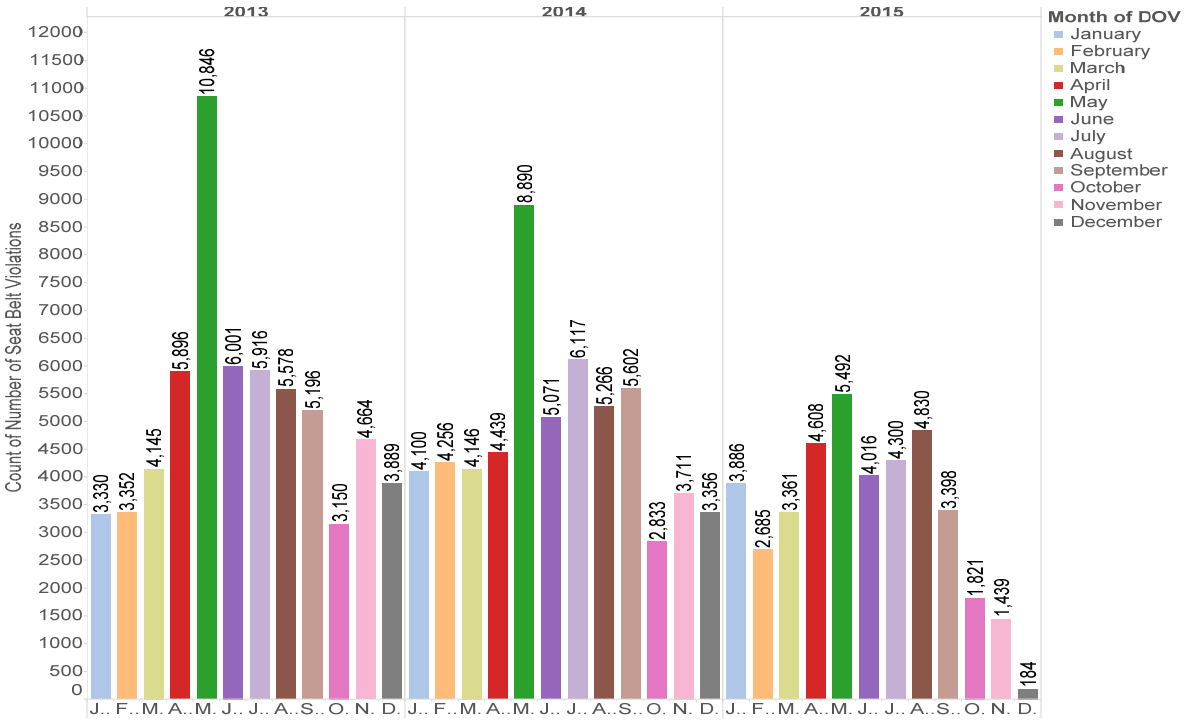


Figure 3
Number of OMV recorded violations by month, 2013-2015

The total number of violations per year includes drivers receiving their first citation for not using a seat belt as well as drivers receiving their second, third, fourth, etc. citation. Figure 4 illustrates the number of drivers receiving multiple violations. For example, 75,265 received two seat belt violations during this period, 22,232 received three, 7,509 received four seat belt violations and the numbers continue to decline as the number of violations increase. This indicates that there are a significant number of drivers who continue to drive without a seat belt even after they received a seat belt violation.

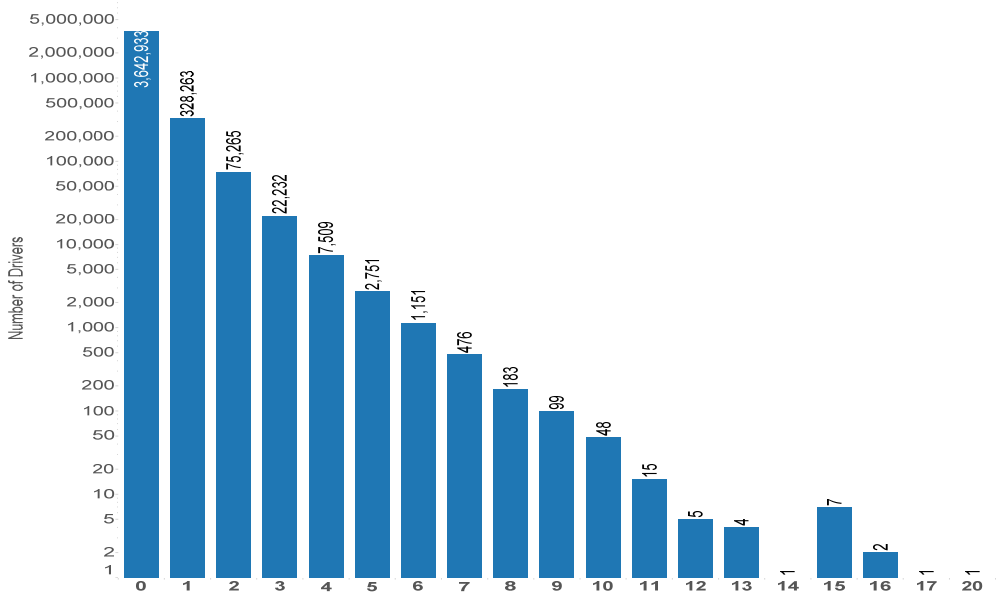


Figure 4
Number of drivers with recorded seat belt violations
(Number of Drivers on log Scale)

Figure 5 shows that about two thirds of drivers receiving at least one seat belt violation are male. Also, about 80% of drivers who received 5 or more seat belt violations are male.

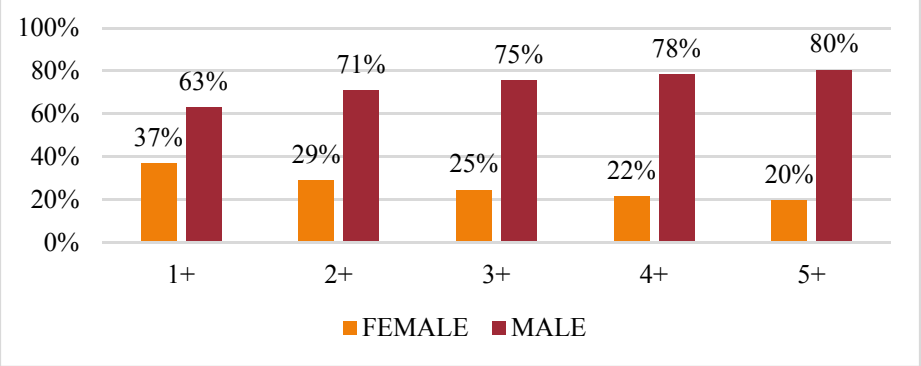


Figure 5
Number of recorded violations by sex

In total, 438,013 drivers have received at least one seat belt violation between 2004 and 2015 which is 11% of all 4,080,945 licenses on file, as shown in Table 2. These licenses include

valid (VAL), cancelled (CAN), expired (EXP), suspended (SUS), and temporary (TMP) driver licenses on file.

Table 2
Driver licenses by status in 2016

Personal Status	Licensed Drivers	Seat Belt Violations	% of Row
CAN	437,510	14,918	3.4%
EXP	430,657	21,696	5.0%
OTH	2,845	812	28.5%
SUS	254,138	45,371	17.9%
INV	22	1	4.5%
TMP	881	183	20.8%
VAL	2,954,892	355,032	12.0%
Total	4,080,945	438,013	10.7%

To approximate the reach of enforcement, the recorded violation data on file from OMV was used to calculate the estimated percentage of drivers who do not wear a seat belt and received at least one seat belt violation. The file includes licensed drivers, recorded seat belt citations, and data from the road side seat belt survey. Table 3 displays this information for the years 2004 to 2015 and is explained column-by-column to aid in interpretation. Column 1 contains the years. Column 2 displays the number of drivers receiving seat belt violations recorded on the OMV driver file; Column 3 displays the number of licensed drivers (1,000), which was recorded in the middle of the year. Column 4 contains the percentage of drivers using seat belts (i.e., seat belt use-rate). Column 5 displays an estimate of the total number of drivers not using seat belts, which is computed as the product of the data in Columns 3 and 4. This is a simplification of reality because the driving population consists of drivers who use seat belts all the time, drivers who use a seat belt some of the time, and drivers who do not use a seat belt at all. Nevertheless, the estimated number of non-users is based on the observed annual use rates for the total population.

From 2004 to 2015, the driving population has for the most part steadily increased, while the seat belt-use rate has been prone to fluctuate in the mid-70% range until 2013. The estimated number of non-belt-using drivers in column 5 which is computed as the product of column 3 times the complement of column 4 times 1,000, has declined from 717,000 in 2004 to 416,501 in 2015. Column 6 provides the number of new drivers on the OMV file by year. Column 7 shows the estimated number of non-seat belt users among new drivers, which is

computed by the product of column 4 and 6. This is also a simplification due to previously mentioned reasons.

Table 3
OMV recorded seat belt violations and estimated reach of enforcement

1	2	3	4	5	6	7	8	9
Year	Drivers Rec. SB Violations	Licensed Drivers (1000)	% Belt Use	Est. Non-Users	New Drivers	Est. Non-Users w/in New Drivers	Total % Rec. SB Violation	*Cumulative* Est. total non-Users *
2004	13,045	2,868	75.0%	717,000	102,274	25,569	1.8%	
2005	43,391	2,869	77.7%	639,787	96,749	21,575	6.8%	738,575
2006	44,517	2,856	74.8%	719,712	100,249	25,263	6.2%	763,838
2007	39,924	2,838	75.2%	703,824	103,596	25,692	5.7%	789,530
2008	43,670	2,851	75.5%	698,495	102,798	25,186	6.3%	814,715
2009	67,321	2,860	74.5%	729,300	99,570	25,390	9.2%	840,105
2010	66,643	2,869	75.9%	691,429	98,890	23,832	9.6%	863,938
2011	70,327	2,902	77.7%	647,146	104,219	23,241	10.9%	887,179
2012	66,948	2,927	79.3%	605,596	98,628	20,406	11.1%	907,585
2013	61,963	2,941	82.5%	514,675	91,134	15,948	12.0%	923,533
2014	57,787	2,941	84.1%	467,507	100,039	15,902	12.4%	939,436
2015	40,020	2,958	85.9%	416,501	108,329	15,253	9.6%	954,689
Total Drivers:	615,556**	4,080,923					*% with Ticket:*	46%

* Note: Cumulative estimates of total non-user population in Louisiana are calculated from 2005-2015, beginning with the estimated number of non-users (Col. 5) in 2004 as a baseline. Subsequent years' estimates are reached by adding the estimated number of non-users among new drivers to the previous year's total. The total % with ticket 438,013/954,689, which rounds to 46%.
** This number is the sum of all numbers in col. 2, however, because some drivers have multiple tickets, this number is higher than the actual number of unique drivers with tickets, which is 438,013

In addition, this estimate assumes that new drivers have the same use-rate as all drivers, which may not be the case. Column 8 displays the total percentage of drivers receiving a ticket, which is computed by dividing the number in column 2 by column 5. Column 9 shows the total cumulated number of estimated non-belt users over all prior years. To estimate this number of non-belt users over the previous 10 years, starting from the baseline estimate of non-users (i.e., 738,575) in 2004 and beginning in 2005, the estimated number of new non-belt using drivers is added to the previous year's total. So, in 2006, the cumulative estimated total of non-users in Louisiana is 763,838. The cumulative total number of drivers who did not use a seat belt at some time between 2005 and 2015 adds up to an estimate of 954,689 drivers.

The main objective in Table 3 is to estimate the percentage of drivers who do not wear a seat belt and received a seat belt violation. Since 438,013 distinct drivers had received a seat belt

ticket between 2004 and 2015, an estimated 46% (438,013/954,689) of drivers who did not wear a seat belt have received at least one seat belt ticket sometime over the past decade. Note: there is a difference between observed seat belt usage and the percentage of licensed drivers using a seat belt for several reasons. First, the observational survey includes out-of-state drivers and some drivers that may use a seat belt sometimes but not always. When taken into consideration, these may lead to a lower estimate. Second, some drivers leave the state and should not be included in the years after leaving, which could lead to a higher estimate than 46%. Despite the estimate's shortcomings, it is reasonable to conclude that, approximately one out of two drivers not using a seat belt has received a seat belt citation.

On the one hand, this analysis indicates that seat belt enforcement may have reached nearly one half of all non-users in the state and thus the increase in seat belt use over the past 12 years may be attributed to seat belt enforcement. One the other hand, the statistics for drivers receiving multiple seat belt citations also demonstrates there are limits to the effectiveness of enforcement. If enforcement continues at the level seen over the past 7 years, it is likely that almost all non-users will have received a seat belt ticket at some point. Yet, as evidenced by the number of drivers with multiple violations, there still remains a relatively small holdout group that does not wear a seat belt despite receiving multiple tickets. Thus, there are limits to enforcement as a primary strategy to increase seat belt use in the state.

To understand a bit more about how the tickets are distributed throughout the state, Figure 6 displays the density of recorded seat belt tickets by Zip Code of the drivers' residence. Although it does not show where the driver received the ticket, it is likely that drivers received the tickets near their residence. Looking at Figure 6, there are areas where there are a greater number of recorded violations, identified by the darker shades of green. This could be a reflection of higher densities of non-users at these locations, or it could be a reflection of greater enforcement efforts. This finding has potential implications for reducing roadway fatalities via increased seat belt use. While using a seat belt protects in a crash against severe injuries, the risk of being in a severe crash is not evenly distributed among drivers. Crash risk is higher among drivers who do not always use seat belts, as these are also the drivers who generally exhibit high risk behavior such as drinking and speeding. Therefore, the number of fatalities does not decrease as fast as one would expect from an increase in seat belt use over the past years. The holdout group may be as small as 3% to 5%, which translates to between 90,000 to 150,000 drivers at high risk of being killed in a traffic crash.

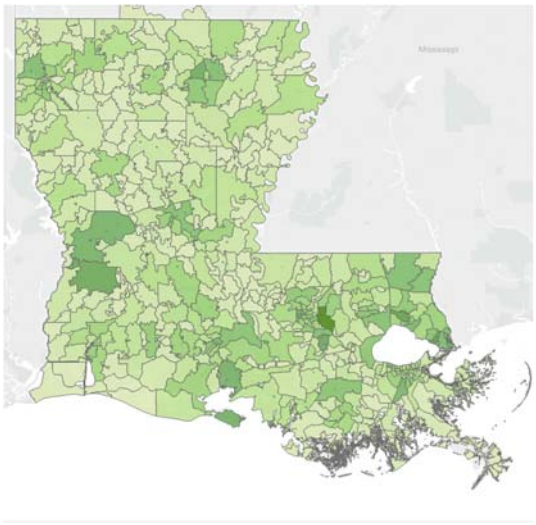


Figure 6
Seat belt ticket density by driver zip code (2004-2015)

This analysis was based on OMV-recorded seat belt tickets only. The next portion of analysis examines the statistics of reported seat belt tickets by police agencies, which is about twice the number of tickets recorded on the OMV driver file.

Analysis of Police-Reported Citations during Regular and Overtime Hours

The following analysis provides insight into the OP enforcement efforts conducted by Louisiana police agencies between 2013 and 2015. The data were collected from police agencies that received 402 funding from the state for overtime enforcement and other efforts. The data are reported to the Louisiana Highway Safety Commission (LHSC) and compiled into a yearly report which summarizes information regarding OP enforcement, specifically: hours spent on overtime, regular time, seat belt citations, contacts made at checkpoints, press releases, and other efforts. The police-reported OP citations are in the form of summary statistics. With the exception of Louisiana State Police (LSP), these statistics can be analyzed by parish. These statistics differ from the number of seat belt violations recorded in the OMV database because not all citations are recorded. Thus, OP citations are those which police report to LHSC, which may or may not be recorded on the OMV driver license file. For a ticket to be recorded on the OMV driver license file, a driver must either pay the fine voluntarily or receive a conviction processed through the court system. Because of the low amount of the fine, it is likely that many seat belt tickets are not paid or processed through the court system.

The table in Appendix D shows the adult OP citations reported by police agencies for the year 2015. This data includes citations reported by sheriff offices and police departments by parish, however, LSP citations are only reported for the entire state. Column 2 displays the number of licensed drivers, Column 3 shows the total number of adult OP citations reported in 2015 for regular and overtime hours, and Column 4 shows the number recorded on the OMV driver license file (all violations with a missing parish code are omitted from this total). Column 5 shows reported citations per 1000 licensed drivers and Column 6 contains recorded citations per 1000 licensed drivers. For instance, the East Baton Rouge Sheriff Office and police department (PD) reported 10,447 adult seat belt citations were issued in 2015, with a rate of 39 citations per 1000 licensed driver, but only 10 per 1000 drivers based on recorded tickets.

Figure 7 shows the (rounded) number of adult citations per licensed driver in 2015 by Parish, excluding LSP-reported citations. According to this analysis, Bossier Parish, Washington Parish and East Baton Rouge Parish had the highest number of seat belt tickets per licensed driver in 2015. Although the police reported seat belt tickets are for the federal fiscal year and the OMV records are for the calendar year, the differences are striking.

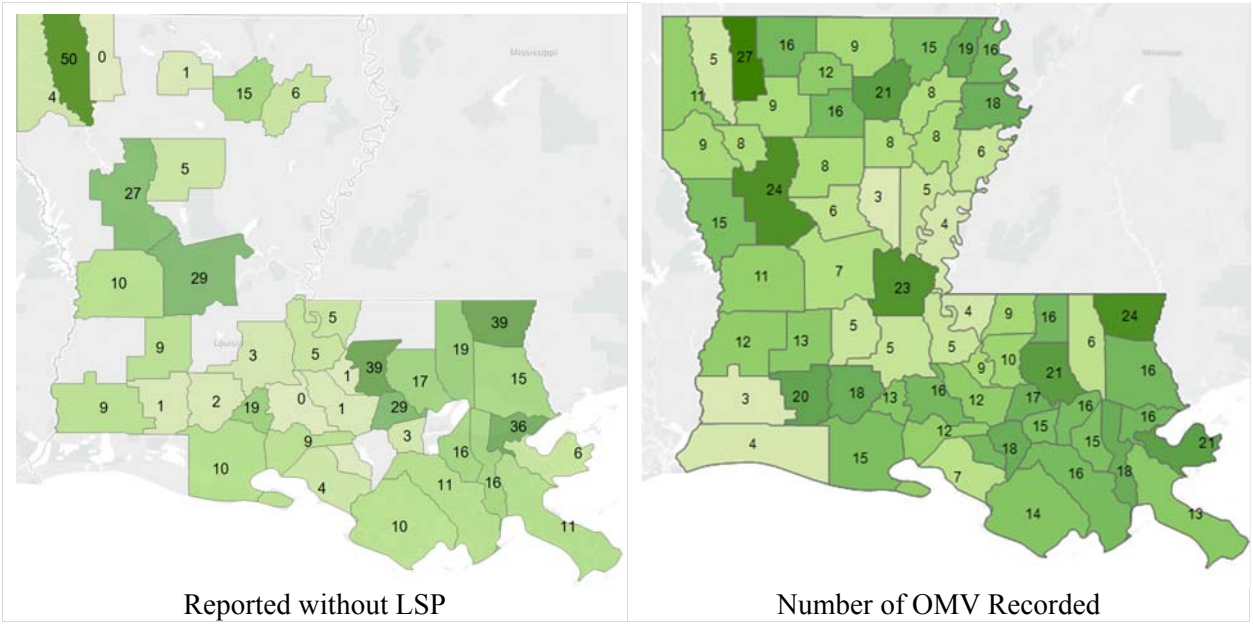


Figure 7
Adult citations per 1000 licensed drivers by parish 2015 reported and recorded

Part of the difference may be due to the location where the ticket was issued versus where the driver lives. For instance, Livingston Parish, which is next to East Baton Rouge Parish, has a rate of 21.5 of recorded violations, but only a rate of 17.1 of reported violations. Similarly, Bossier Parish has a low recorded rate (4.7), but high reported rate (49.6), while adjacent Webster Parish has the opposite (reported rate is .1, recorded rate is 27.3). Nevertheless, efforts should be made to ensure that violators pay the fine on time in order to record all seat belt citations on the OMV file. Also, the reasons for the lack of processing of seat belt violations should be studied, which is beyond the scope of this research project.

Attempts to identify a relationship between enforcement efforts or other public outreach programs and seat belt use were not successful. For instance, a scatter plot of observed seat belt use at roadside surveys versus number of seat belt tickets issued by parish shows little correlation. This relationship is illustrated in Figure 8. Because citations issued by LSP are not known on a parish level, little can be said about the relationship between belt use and enforcement at the parish level. Citation data should be collected at the parish level or, at a minimum, troop level, if parish level is not available from the state police. Even if the data were available, any attempt to link observed seat belt use with enforcement data is faced with the chicken-and-egg dilemma, i.e., are the number of seat belt citations high because of low belt usage or high enforcement? This represents a closed loop system where it is impossible to identify cause and effect.

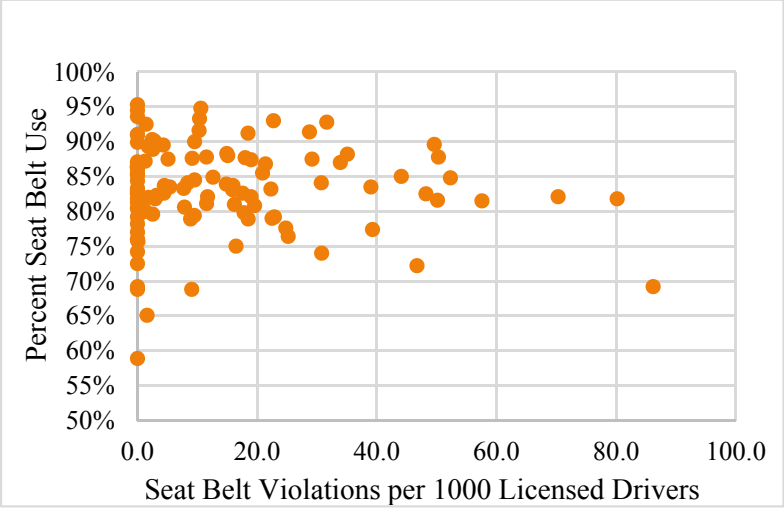


Figure 8
Seat belt use versus seat belt violations per 1000 licensed driver

The police reported data show that over the past three years (2013-2015), 371,047 adult citations were given to drivers and 43,594 child citations were issued. The seat belt usage rate was 82.5% in 2013 and increased to 85.9% in 2015. The number of licensed drivers ranged from 2.94 million to 2.96 million

The adult citation rate was compared to the rate of child citations (per licensed driver) in order to examine to what extent the rates are proportionally related. These results are shown in Figure 9. As expected, the child citation rate increased proportionally with the adult rate, and this is especially high in East Baton Rouge, Bossier, Tangipahoa, Natchitoches, and Orleans Parishes. These parishes all have child citation rates of over 15 per 1000 drivers. This comparison demonstrates that either child protection varies significantly among parishes or it is not uniformly enforced.

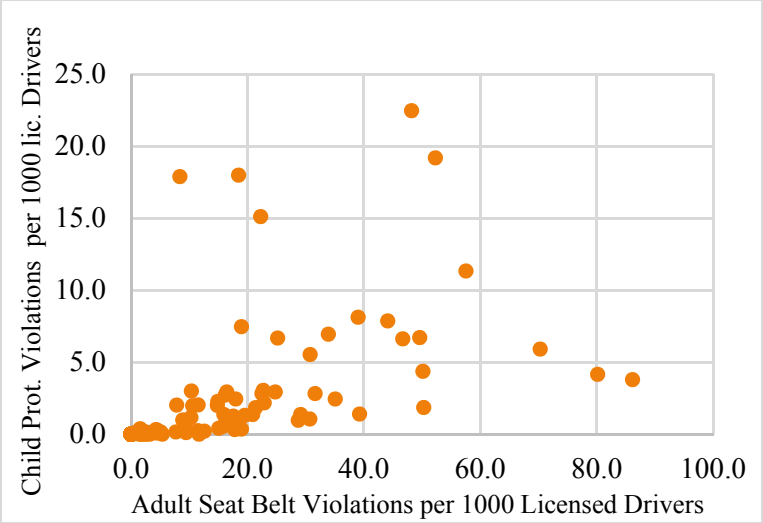


Figure 9
Child citation rate versus adult citation rate (per 1000 drivers)

Using the number of police reported seat belt citations, which is over twice the OMV recorded number of citations, the estimated percentage of drivers not wearing a seat belt is likely much higher than the 46% estimate based on OMV-recorded citations, namely about 66%. This does not indicate that the citations are very effective in discouraging the holdout group of drivers from driving without a seat belt

Analysis of License Age as a Factor of Belt Use

Of particular interest in analyzing the OMV-recorded seat belt violation data is driver age, since the roadside surveys do not provide driver age information. Specifically, the data were analyzed to obtain insight into patterns of seat belt violations among young drivers, which are those who received their license before the age of 18 (i.e., teens aged 15-17. Table 4 displays the count of seat belt violations by seat belt violation age versus license age. The average citation rate for all drivers ranged from 1.35% to 2.41% over the past 12 years.

Table 4
Count of seat belt violations at ages 15-21, by teen license age

	Age of Licensing		
Seat Belt Violation at Age	Age 15	Age 16	Age 17
15	218		
16	2,707	871	
17	4,983	2,515	4,149
18	4,513	2,439	4,717
19	3,434	2,062	3,906
20	2,444	1,532	3,188
21	1,505	1,079	2,389

Since different ages have a different number of applicants for licenses, the raw data has been adjusted for the number of new licenses at the respective age. Table 5 depicts the count as percent of the cohorts of drivers licensed at age 15, 16, 17 between 2004 and 2015.

Table 5
Percent of cohort receiving seat belt violation

Age of First Seat Belt Violation	Age of Licensing					
	License Age 15		License Age 16		License Age 17	
	Estimate	STD Error	Estimate	STD Error	Estimate	STD Error
17	3.27%	0.05%	3.37%	0.07%	3.51%	0.06%
18	3.37%	0.05%	3.69%	0.07%	4.30%	0.06%
19	3.00%	0.05%	3.51%	0.08%	3.85%	0.06%
20	2.54%	0.05%	3.02%	0.08%	3.53%	0.06%
21	1.91%	0.05%	2.50%	0.08%	3.08%	0.06%

Table 5 is also graphically depicted in Appendix E. The data show that there are clear differences between the percentages of violations at different ages for the three groups of drivers receiving license at age 15, 16 and 17. While all three groups start out at the same violation rate at age 17, the percentage of drivers who receive a license at age 17 have a 0.93 percentage point higher violation rate at age 18 than drivers receiving their license at age 15. The differences persist throughout the age 21. The differences are statistically significant at a level of $p<0.0001$. Since drivers at the aged 18 to 21 have one of the highest fatal crash rates, these differences in the rate of belt use are also of practical significance. Also, the violation rates by license age are about one percentage point higher for male drivers than for female drivers.

The underlying causes for these observed cohort differences are not clear. There may be multiple explanations for this relationship. For instance, drivers starting at age 15 with a learner permit must drive with supervision, usually their parents, which may instill the habit of using a seat belt in young drivers. Drivers who start driving at age of 16 have less supervised driving and drivers receiving their license at 17 have usually no supervised driving. Another possible explanation is that drivers who are receiving their license at age 17 may come from a different socio-economic background that may be linked to not wearing a seat belt. There was, however, little difference with respect to race, although Caucasian drivers receiving their license at 17 had slightly higher number of violations than African American drivers.

Regardless of what is causing the differences with respect to the rate of seat belt violations at different licensing ages, the results indicate that programs should address seat belt use of young drivers. For instance, a law revoking the driver license for six months for drivers ages 15-17 might be more effective than a $25 violation. Some other observations can be made based on the violation data when linked to the crash data. Between 2005 and 2015 there were 71 drivers killed that had received a seat belt violation in the past. Of these 71 drivers, only 16 had been known to have worn a seat belt at the time of the fatal crash. Twelve of the 71 drivers killed had received two seat belt citations in the past. This indicates that many drivers are not swayed by a $25 fine to wear a seat belt, which signifies the limitations of enforcement for increasing seat belt use among a declining group of non-users.

Analysis of Belt Use 2013-2015 from Roadside Surveys

The roadside survey over the past three years (2013-2015) has observed 142,464 vehicles. This data provides insight into the relationship between belt use, vehicle type, gender, race and location. While seat belt use in Louisiana has increased by 3.4% from 2013 to 2015, the difference in belt use with respect to vehicle type, gender and race remains largely the same. For instance, there has been about a 10 percentage point gender gap in seat belt use over the past three years although the gender gap declined to about 8% in 2015. To better examine this data in terms of location, all three years of data were combined to obtain a larger sample size for each parish and weighted to obtain an average for this time period. Figure 10 displays the weighted average percentage of belt use for all front-seat occupants for each parish, color coded so that shades of green indicate higher use, shades of red indicate lower use. Orleans, Union, and Iberia Parishes had the lowest belt use in the state over the past three years. Note that the seat-belt survey is not conducted in every parish as explained in the methodology chapter of this report. The highest belt use was in Terrebonne Parish and parishes along the Texas border.

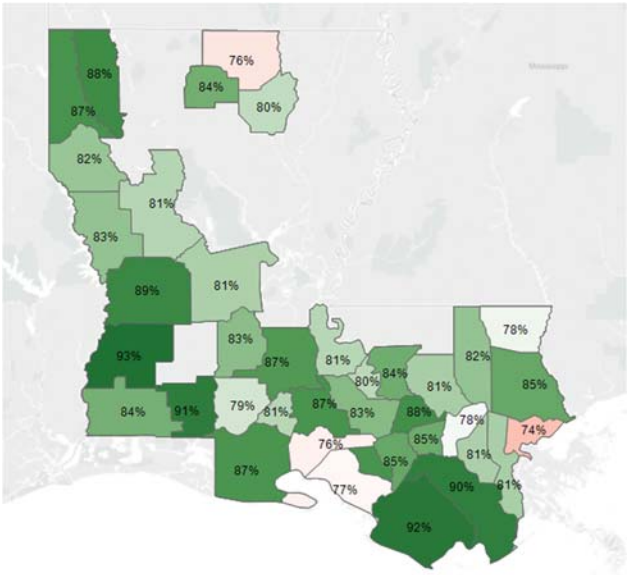
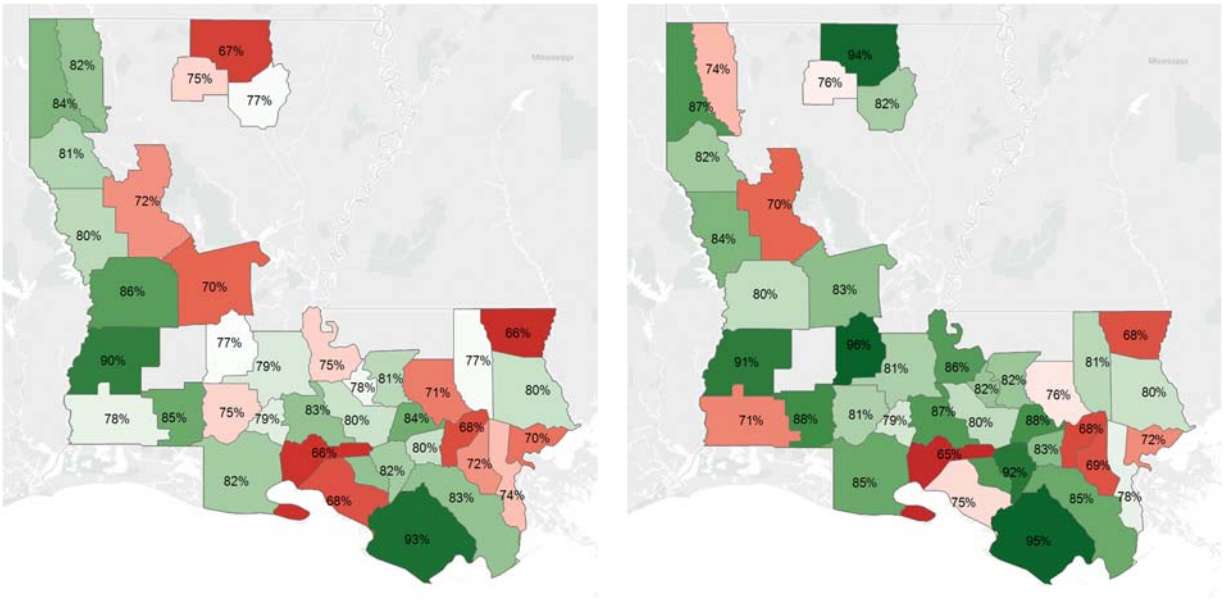


Figure 10
Weighted average of front seat belt use in Louisiana by parish, 2013-2015

Figure 11 shows the belt use estimate by parish during the same time period for pickup-trucks (front seat occupants only) as well as the belt use estimate for just the year 2015. Again, Terrebonne and the parishes along the Texas border have the highest belt use for

pickup truck drivers. It is important to note that many of the other parishes that have average belt use above 80% have lower belt use for pickup trucks. To supply a comparison, Figure 11 shows seat belt use among pickup-trucks in 2015 only. As illustrated, some parishes have improved over the years, however, the seat belt use rate is still considerably lower for pickup-trucks than other vehicles in 2015.



2013-2015 2015 Only

Figure 11
Seat belt use for pickup trucks, front-seat occupants 2013-2015 compared to 2015

Parish observations are made at specific pre-determined sites. Figure 12 below shows the belt use by site for the years 2013-2015. The size of the circle indicates the number of vehicles surveyed at the site, with larger circles representing a larger number of vehicle observations. The color code indicates seat belt usage. Dark red indicates lowest observed seat belt usage (60%) and dark green indicates highest seat belt usage (>90%). The lighter shades of red and green represent seat belt usage rates in-between 70% and 90%. Sites with lower seat belt use are generally outside population centers, with New Orleans being the exception.

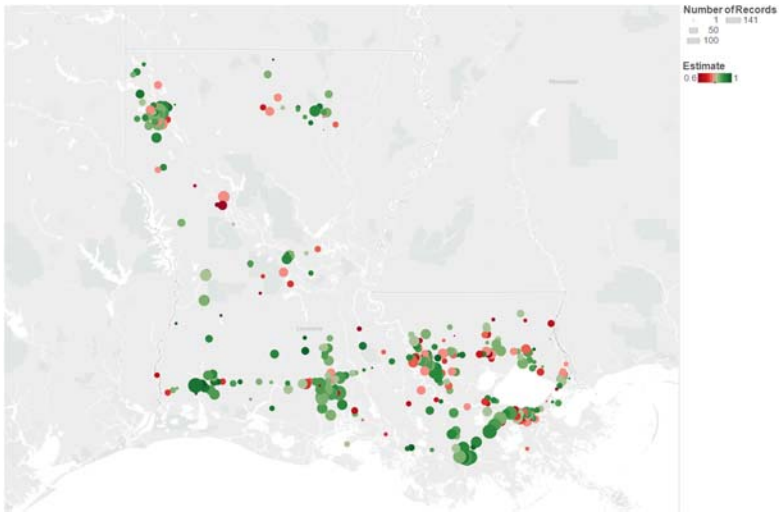


Figure 12
Belt use by survey site, 2013-2015

Race differences have been identified in previous years, with African American drivers, especially males, having lower belt use. According to the data, race appears to be a factor for seat belt use in several parishes. This is especially the case for African American male drivers, who are behind in belt use in many parishes, as shown in Figure 13. While they are on par with Caucasian drivers in several other parishes, race may be interacting with some other variable such as vehicle type to lead to this result.

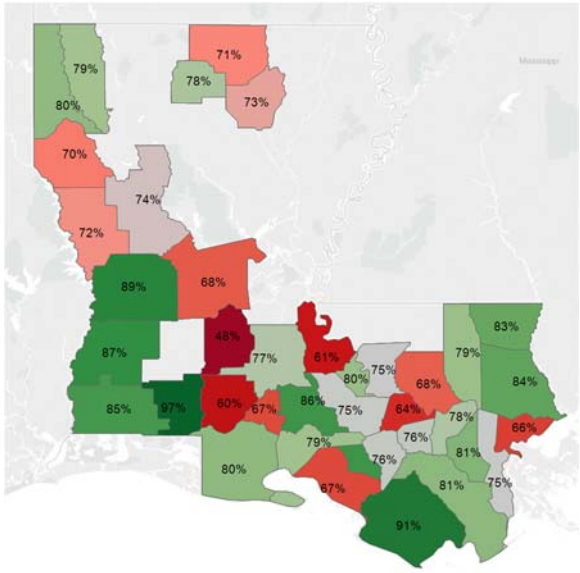


Figure 13
Seat belt use of African American drivers, 2013-2015

Male drivers tend to have lower belt use than females, especially on local roads. In 2015, there was about an 8% difference in the use rate of male drivers compared to female drivers in Louisiana, but on interstates, this difference is only about 3%. There is only a 1% difference between female driver use rate on interstates versus on local roads, but the difference for males is 6%. Female drivers are more consistent in their use, which suggests males may be more likely to find exceptions for not wearing a seat belt on local roads than females. This difference between local roads and interstates is larger (10.2%) for African American male drivers, whose seat belt use on local roads was only 72.8% versus 83% on interstates. The data indicate African American males make up a disproportionately high percentage of "holdout" drivers not wearing a seat belt. While there were 14.1% African American male drivers observed on roads during the roadside survey in 2015, 20.6% of the driver fatalities in 2015 were African American males. By comparison, the percentage of Caucasian male drivers observed during the roadside survey was 40.8% in 2015 and they made up 46.2% of the driver fatalities in that year. African American male drivers have a fatality rate that is 1.48 times the average fatality rate of all drivers while Caucasian male drivers have a fatality rate that is 1.13 times the average fatality rate. In contrast, female African American and Caucasian drivers have a fatality rate of only 0.74 and 0.72 times that of the average fatality rate of Louisiana drivers, respectively.

Summary of Findings Regarding Seat Belt Use and Citations

The three data sources (road side surveys, OMV citations, aggregated citation statistics from claims to the LHSC) analyzed suggest some important implications for enforcement, drivers receiving seat belt tickets, and age of licensing. There are challenges associated with analyzing seat belt violation data that must be taken into consideration. First, it is difficult to measure the total number of citations written by parish because the state police citations are not compiled by parish. Attempts to identify a relationship between enforcement efforts or other public outreach programs and seat belt use were not successful. It would enhance the ability to correlate enforcement efforts with observed seat belt use if state police enforcement efforts were available by parish. At a minimum, the data should be compiled by troop so that regions of the state may be analyzed. Even if data were compiled into one central data source and could be analyzed by parish or troop, any attempt to link observed seat belt use with enforcement would still be limited in that it is not possible to identify relationships of cause and effect.

Looking at the available citation data only, it would appear that seat belt enforcement is quite effective at ticketing drivers who do not wear a seat belt. According to the data, one out of two drivers who do not wear a seat belt has likely received a seat belt citation. This number is even higher if the citations reported by police agencies are included. Where enforcement appears to have limits, however, is in encouraging these drivers to change their behavior. If every driver who received a seat belt violation began using a seat belt as a result, the belt use rate would be likely over 90%. As this is not the case, enforcement at the current level is only likely to convert some drivers. There is a hold-out group that is not persuaded by a small fine, especially if there is not much penalty associated with not paying the fine. To make them compliant, harsher punishments may be necessary. For instance, seat belt violations could be shared with insurance companies so that insurance premiums are adjusted to account for the risk of severe injury and cost associated with these injuries. Given that the lack of seat belt use is one of the most (if not the most important) factors causing a crash to be fatal, increased prosecution of seat belt violations might be required. Although this could burden the court system, the increased court costs could be added to the fine.

Youths who receive their license at age 17 are at higher risk of not wearing a seat belt. Youths of age 15 and 16 are likely to drive under supervision of parents for some time which may instill the habit of wearing a seat belt. The most effective way of increasing overall belt use rates over time is in working with young drivers. More emphasis should be placed during driver education on the pros of wearing a seat belt and the cons of not wearing a seat belt. Also, license suspension for minors should be considered given the risk of severe injury associated with not wearing a seat belt. The roadside survey indicates demographic differences in belt use, with males (especially African American males) having lower and/or greater inconsistent use than female drivers. African American male drivers are disproportionally killed in crashes. While there are likely a number of potential factors that could explain this, the primary reason may come down to them having a less consistent seat belt use rate, higher on interstates but lower on local (i.e., rural) roads. While enforcement has diminishing effect on the increasingly small percentage of drivers not wearing a seat belt, strategies to assist drivers for developing a habit may achieve more consistency among drivers who are already wearing a seat belt some of the times, i.e., while traveling on interstates.

Exploratory Spatial Analysis of Seat Belt Use Rate in Crashes

Observational belt use surveys suggest seatbelt use varies across the state and may be lower in central, rural Louisiana than in other parts of the state. To determine if there were

significant patterns or associations, the spatial characteristics of seatbelt use in crashes were examined using crash data from 2005 to 2014. The analysis includes Louisiana drivers involved in a fatal, serious injury, or moderate injury crashes, parsed by the driver's home zip code. Driver's home zip code was selected for analysis as opposed to crash location because the choice to use a seatbelt is made at home when entering or starting a vehicle or engaging the transmission. From there, a seat belt usage rate was calculated for each zip code for each year, summed for 2005-2009 and 2010-2014, and then calculated for a grand total. Zip codes with fewer than 10 total crashes were merged into surrounding or adjacent zip codes. The data was joined to a Geographic Information System (GIS) file by zip code using the zip code tabulation area (ZCTA) in the GIS file. In Esri's ArcMap the seatbelt GIS file was analyzed using the Getis-Ord Gi* Hot Spot Analysis tool. Figure 14 shows the seat belt use rate in crashes that led to at least a moderate injury by ZCTA, which are roughly equivalent to zip codes. Each ZCTA is color coded to show the rate of seat belt use in crashes based on the driver's home zip code. Red areas have a seat belt use rate of 0-50%. Dark green areas have a rate of 91-100%. Thick black lines are interstates added for reference. Note the generally high rates associated with large metropolitan areas, found at the junction of interstates. The east central part of the state had lower rates.

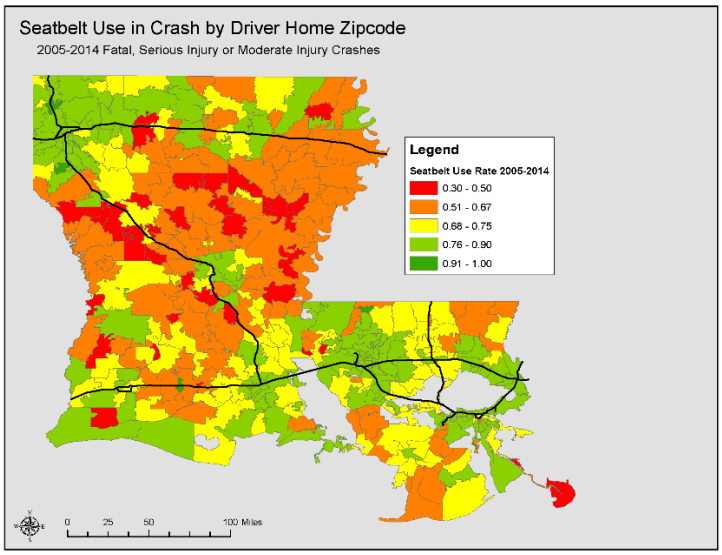


Figure 14
Seat belt use in crashes by driver's home zip code

Figure 15 displays the correlation of high and low seat belt use rates in crashes that led to at least a moderate injury, by the driver's home zip code. Figure 15 differs from Figure 14 in

that it shows the spatial correlation, or grouping, of seat belt rates. If two adjacent areas have similar values, then they are spatially correlated. Blue represents a cold spot, i.e., an area of lower seat belt use, and red indicates a hot spot, i.e., an area of higher seat belt use. The darker the color, the higher the confidence in the statistical correlation. Note the large area of spatially correlated low rates in the center part of the state and the higher rates in the northwest and southeast parts of the state

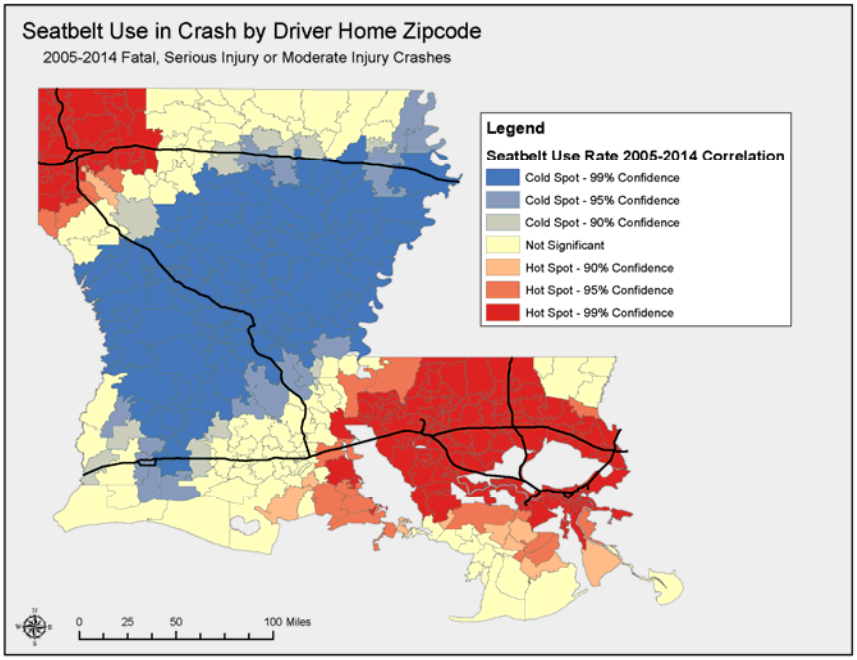


Figure 15
Seat belt use in crashes by driver's home zip code

It should be noted that the seat belt use rate in crashes with at least a moderate injury suffers from a selection bias, i.e., dependent on a crash having a driver moderately injured. Generally, observed seat belt use in crashes with injury is much lower than the roadside survey shows because vehicle occupants that wear a seat belt are less likely to be injured and thus are underrepresented in the statistics. The findings displayed in Figures 14 and 15 corroborate with observations in the roadside surveys that seat belt use is lower inside the state (Alexandria and Monroe), but they do not show the higher rates in Calcasieu and Terrebonne Parishes observed in the roadside surveys. The reason for this could be that drivers not using seat belts have a higher risk of being in a crash in the first place. Additionally, seat belt use rates at night are generally much lower at night than during the

day and they are especially low for crashes involving alcohol. As reported in Figures 16 and 17, the lower seat belt use rate observed in injury crashes occurring in Troop C may be explained by higher alcohol use. Figure 16 shows the percentage of drivers injured (moderate to fatal) in crashes involving alcohol between 9 pm and 3 am by Troop for years 2005-2015. The percentage of alcohol-involved crashes varies across state police troops. As illustrated, Troop C (which had the highest belt use rate in the roadside surveys) had the highest rate of alcohol involved moderate to fatal injury crashes (53%).

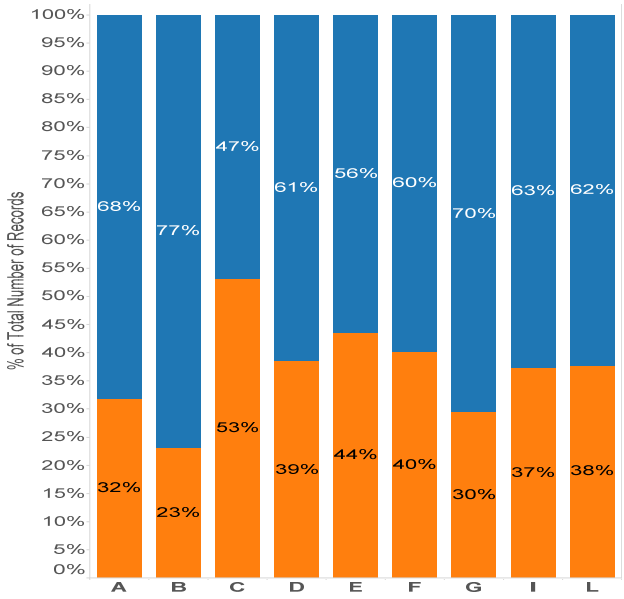


Figure 16
Drivers in moderate to fatal injury crashes involving alcohol between 9 pm and 3 am by troop

Figure 17 shows the seat belt use rate in crashes where the driver was moderately to fatally injured for alcohol related and non-alcohol related crashes between 9pm and 3am by Troop. While seat belt use rate among sober drivers in these injury crashes was 84%, the seat belt use rate among drivers using alcohol who were moderately to fatally injured in the crash was only 47%. Similarly, in Troop D, alcohol may be a factor in injury crashes with lower seat belt use rates than the rates observed during roadside surveys. Alcohol is related to lower seat belt use and drivers who do not wear a seat belt at night have a higher probability of being under the influence of alcohol compared to drivers wearing a seat belt. These findings indicate seat belt enforcement at night between 9 pm and 3 am may be the most effective way of reducing drunk driving and increasing belt use.

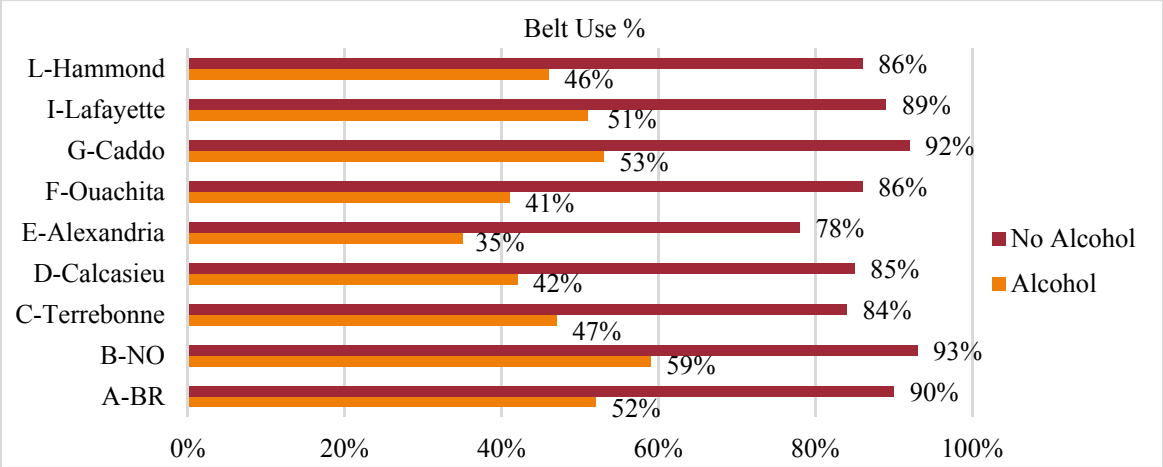


Figure 17
Seat belt use in nighttime moderate-fatal injury crashes with and without alcohol by troop

Survey Results

The primary set of results emerge from the analysis of Louisiana residents (pooled sample) which includes respondents from the phone survey (N=358) and the online multi-state survey (LA=246). The demographic profile of the pooled sample is described, followed by an examination of the three fundamental concepts critical to understanding seat belt use differences among individuals, i.e., motivation, habit, and process. These three concepts provide the key context for examining differences in SB use among the four SB use groups (determined by reported usage and motivation). The four SB use groups are compared across five basic types of variables that may influence SB usage: (1) motivation, habit and process; (2) primary motivators for SB use, including personal/social reasons and impersonal/practical reasons; (3) associated attitudes and beliefs about obeying the law, enforcement, seat belt use and possible crash involvement; (4) vehicle use and type; and, (5) demographic factors. Next, the reasons for increasing SB use over the driver's lifetime are examined, followed by an assessment of the potential impact of driver education and parental involvement have on SB use, motivation, habit, and process. The analysis continues by making specific comparisons among groups: (1) Groups 1 and 3 – both highly motivated, but differing on belt usage; (2) Groups 2 and 4 – not highly motivated, but differing on belt usage; and (3) Groups 3 and 4 – non-100% users. Next, Louisiana residents are compared to drivers in three other states, i.e., Washington, Texas, and New Hampshire on a selected set of factors to establish any basic similarities or differences. The last section returns to Louisiana (pooled sample) to discuss findings about typical-day media usage and access to online content.

Louisiana Residents – Pooled Sample

The pooled sample (N=604) is about 59% female, 71% Caucasian/ 21% African American. About 31% have some college and 47% have college (or advanced) degrees. The sample underrepresents people with less than a high school education. About 45% are married. All are under the age 46 per the sampling plan. All data reflects this sample only and cannot be extrapolated to the general population. As of most recent estimates, only about 16% of the state does not use a seat belt every time they are in a motor vehicle and these drivers were oversampled for this study. Thus, while estimates to the overall population are not possible, comparisons can be made within-groups and between-groups on any variable.

Examination of Three Fundamental Concepts

The first set of results focuses on the three fundamental concepts underlying SB use: Motivation, Habit, and Process. First, respondents were asked to identify to what extent using a seat belt is something they "Want to" do and something they feel they "Have to" do. There were three possible answer choices for each item (i.e., Not at all, Somewhat, Absolutely). Table 6 displays a cross-tabulation comparison of (percent) responses to the Have to/Want to items. As displayed, 59.3% of the sample reported "absolutely" to both items. Note that percentages have been rounded up.

Table 6
Cross-tabulation of motivation responses (Louisiana)

		WANT TO			
		Not at All	Somewhat	Absolutely	Total
HAVE TO	Not at All	3.6%	0.3%	2.3%	6.2%
	Somewhat	2.3%	5.8%	4.1%	12.2%
	Absolutely	6.8%	15.4%	59.3%	81.5%
	Total	12.7%	21.5%	65.7%	100.0%

Habit. Respondents were asked two different questions to examine the concept of habit in seat belt use. Both items asked respondents to tell whether they agree or disagree with the statement. One of the statements is provided as a potential reason for seat belt use, "It's a habit" and the other statement is behavior-oriented: Seat belt use is "Something I do automatically." About 83% reported that seat belt use is a habit; however, only 67.8% agreed that seat belt use is something they do automatically. Automaticity is a necessary component of habitual behaviors; thus it is not clear if these respondents have a true seat belt habit. While self-reported information about one's behavior and attitudes is useful, it is inherently

biased by the individual's understanding of his or her self as well as their understanding of the question. Table 7 displays the cross-tabulation of the two habit measures. Note that percentages have been rounded.

Table 7
Cross-tabulation of habit measures (Louisiana)

		It's a habit		
		No	Yes	Total
SB use is something I do automatically	Disagree	13.6%	18.6%	32.2%
	Agree	3.3%	64.4%	67.7%
	Total	16.9%	83%	100.0%

The discrepancy between these two items led to the creation of a single composite measure that reflects response consistency in three categories: Not a habit, Mixed, and Definitely a habit. If individuals reported they strongly agreed with using a seat belt out of habit and affirmed that seat belt use is something they do automatically, then they would fall under the category of "Definitely a habit." Likewise, disagreement between the two habit items would place the respondent's behavior into the category of "Mixed." A significant majority of respondents had consistent responses to the habit items, with 64.4% having a "definite habit" and 13.6% of respondents answered consistently that they do not have a habit of belt use. The remainder of the sample, about 22%, had mixed responses to the habit items.

Process. Most people have a fairly routine process when putting on their seat belt. Given the routinized nature of seat belt use, respondents were asked to think about at what point they typically will fasten their seat belt when setting out on a typical trip in their vehicle. Answer choices follow a logical progression of activities from getting into the vehicle to driving on the road and are ordered as follows:

1. Immediately after getting in the vehicle
2. Right after starting the vehicle
3. After making vehicle adjustments
4. After putting the vehicle in gear
5. When the vehicle is moving, but prior to getting on road
6. When the seat belt alert system starts beeping
7. After I'm already on the road
8. I'm not sure, but I do it at some point
9. Typically don't buckle/use/wear my seat belt
10. Other

Figure 18 displays the cumulative percentage of responses for the pooled Louisiana sample. As illustrated, about 80% of the sample fastens their seat belts earlier (i.e., before putting the car in gear), rather than later, in the process.

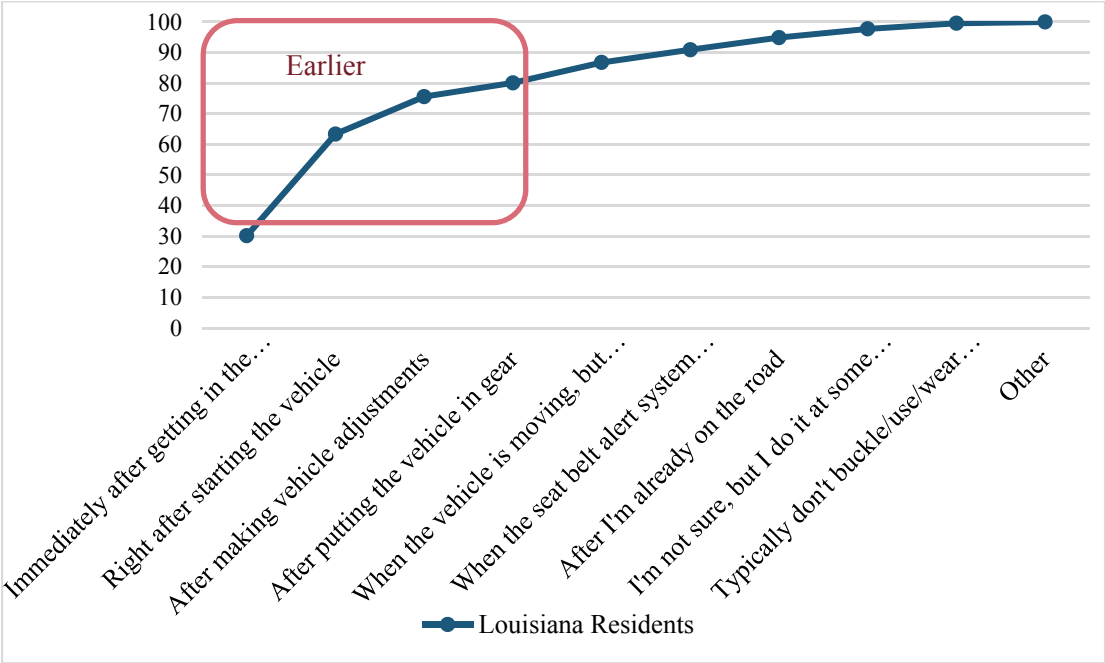


Figure 18
Process (cumulative percentages) – Louisiana pooled sample

Seat Belt Usage Groups

SB usage groups were determined by sorting respondents into one of four possible quadrants based on their answers to the Have To/Want To (HT/WT) belt use items and the five-category self-selected typology item where individuals describe their SB use in general. The HT/WT items had three possible responses: absolutely, somewhat, and not at all. The typology item had five possible responses and asked respondents to categorize their belt use generally. As a reminder, the sampling plan limited the inclusion of 100% SB users to allow for an over-sample of non-100% users and thus does not reflect the actual driving population. Figure 19 illustrates the percent distribution of the self-selected typology item for the pooled sample.

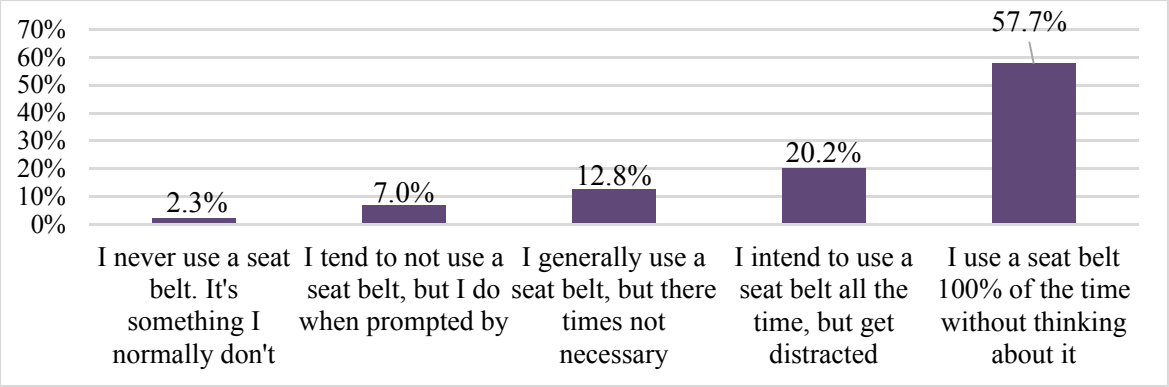


Figure 19
Seat belt use typology – Louisiana pooled sample

A primary objective was to classify respondents into descriptive groups that reflected their overall motivation surrounding SB use and actual reported seat belt use. Two binary measures were created from the previously mentioned items. Motivation items were condensed into one item, with 1=absolutely WT and HT and 0=mixed or otherwise. The five-category SB use typology item was recoded so that 1=100% SB Use and 0=less than 100% use. This created four groups which are described in Figure 20. The descriptive names for the SB use groups provide a generalized depiction of individuals' seat belt use behavior and overall motivation. Group 1, "Motivated Commitment" maintains the highest commitment to seat belt use among the four, both in attitudinal motivation and in actual use. Group 4, "Generally Disinclined" maintains the lowest commitment to seat belt use, relative to the other groups.

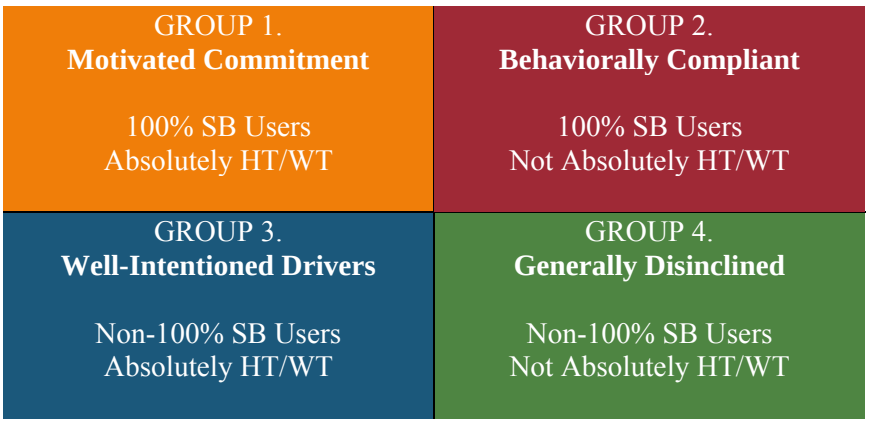


Figure 20
Seat belt usage groups

The primary difference between a person in Group 1 and a person in Group 2, "Behaviorally Compliant" is in their attitudinal motivation, whereas the difference between a person in Group 1 and Group 3, "Well-Intentioned Drivers" is in their actual use. In terms of behavior, Groups 3 and 4 do not use their seat belt 100% of the time and are thus members of the target population for increasing seat belt use statewide.

Spatial analysis of driver zip code indicates good coverage for the state (refer to Figure 1 for coverage by SB use group). Figure 21 displays the percentage of non-100% respondents in Groups 3 and 4 by LSP Troop. Because there are no clearly delineated regions in the state from which meaningful geographic comparisons of SB use groups can be made, LSP troop serves as a proxy. The percentages are calculated by comparing the proportion of respondents belonging in Groups 3 and 4 to those in Groups 1 and 2 from each troop region. As Figure 21 shows, Troop E in the central part of the state had the highest proportion of Group 3 & 4 respondents. In other words, of the total number of respondents residing in the Troop E region of the state, 59.3% are in Groups 3 and 4. This finding corroborates the findings presented earlier that display the rate of seat belt usage in crashes mapped to the driver's home zip code (see Figures 14-15).

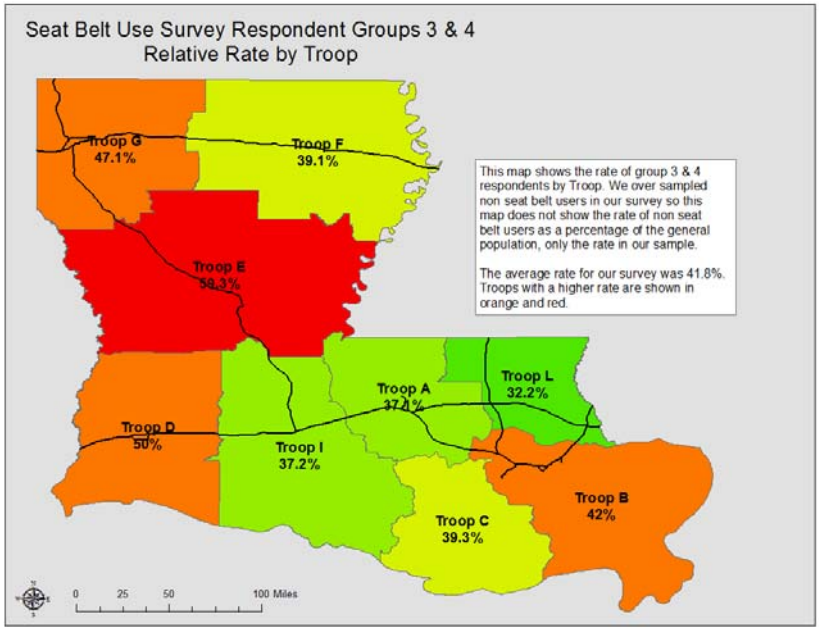


Figure 21
Percentage of non-100% groups by location using LSP troops

Troops B, D and G also have a relative high number of respondents in Groups 3 and 4. However, Troops G and D have relative high seat belt use rates in roadside surveys. This could be explained by the difference in the populations sampled. The phone and internet surveys were conducted for Louisiana residents only while the roadside survey includes potentially a significant number of drivers from Texas in the Troops G and D.

Seat Belt Group Comparisons-Louisiana Residents

The SB use groups were determined in part by the binary variable created from respondents' answers to the HT/WT seat belt items (1=absolutely to both, 0=mixed). As a result, two groups (1 and 3) are at 100% on the motivation measure and the other two groups (2 and 4) have mixed responses to the HT/WT items. Figure 22 shows the percent breakdown by SB use group. In comparing groups 2 and 4, Group 4 has a higher percentage (39.2%) of individuals answering "Not at all" to both items than does the "Behaviorally Compliant" Group 2, where only 10% answered neither and a substantial majority of respondents answered "absolutely" to the HT item.

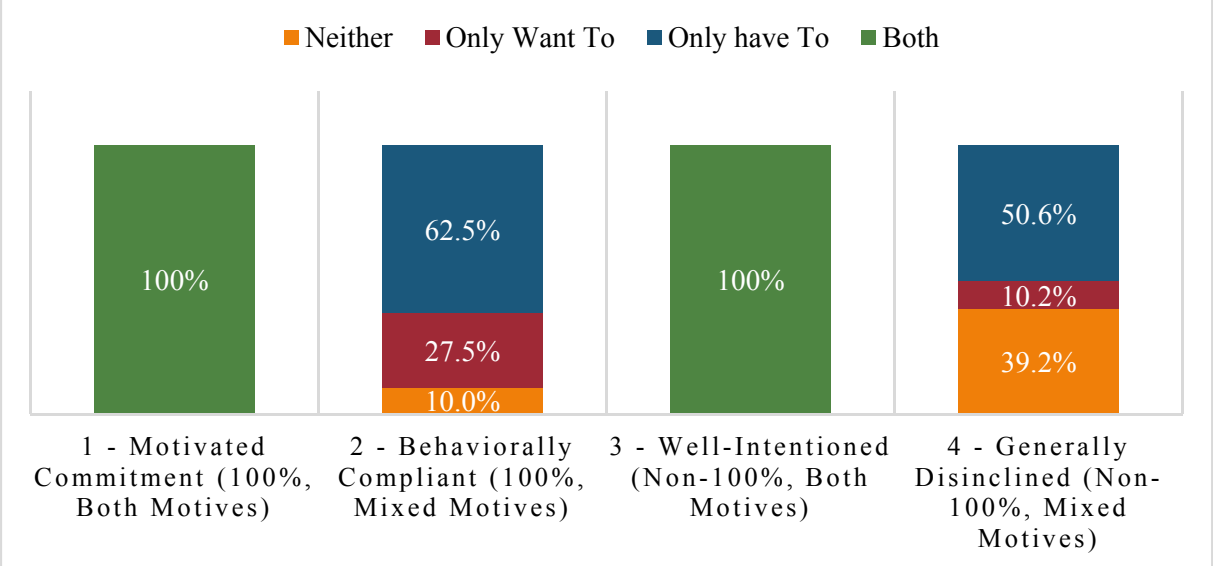


Figure 22
Seat belt motivations by group

Seat Belt Typology by Seat Belt Use Group. A closer look at the two groups with less than 100% belt use is provided in Figure 23, which illustrates percent responses to the five category typology item by seat belt use group. Those who answered "I use a seat belt

100% of the time without thinking about it" are represented in Groups 1 and 2. These groups differ only by motivations, not seat belt use. There are differences between the non-100% seat belt groups. As illustrated in Figure 23, just over 74% of individuals in Group 3 reported that they intend to use their seat belt all the time, but get distracted and/or forget, compared to just 33.7% of individuals in Group 4, where over 30% reported either tending not to use seat belts (22.9%) or never using seatbelts (8.4%).

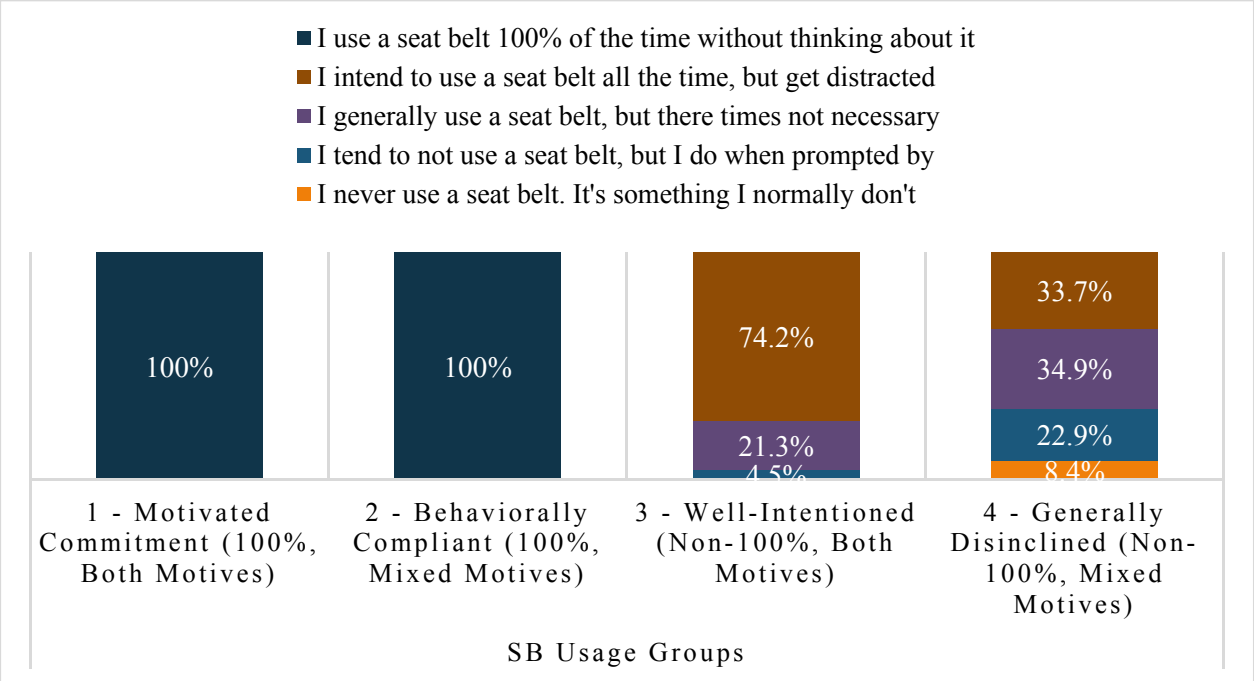


Figure 23
Seat belt use typology by seat belt use groups

Habit. The habit composite measure suggests there are differences across groups in the expected direction. As Figure 24 illustrates, individuals clearly responding they do not use their seat belt habitually are confined to the non-100% seat belt use groups. While respondents who do not clearly have a habit of belt use are in each of the three groups, the "Motivated Commitment" group has the lowest percentage of these respondents than the other three groups. Additionally, the non-100% groups contain individuals whose responses indicated they do not have a habit. Within the "Well-intentioned Drivers" group, 8.9% do not have a habit. The "Generally Disinclined" group has the highest number of drivers who do not have a habit, 44.6%.

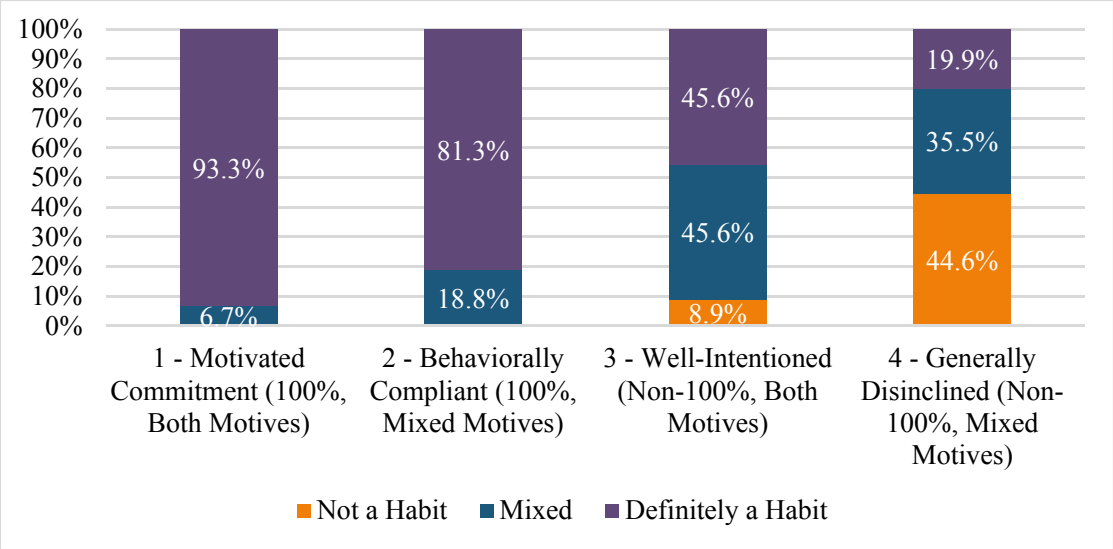


Figure 24
Habit by seat belt use group

Process. There are also significant group differences with respect to the point at which individuals typically fasten their belts in their driving process. Between-group and within-group response differences are shown in Figure 25 (See Appendix F for an additional illustration of cumulative percent differences for each SB use group for comparison). In general, those who use a SB 100% of the time typically fasten their belts much earlier, rather than later, in the process. In regards to the illustration in Appendix F, there appears to be no difference between individuals in Groups 1 and 2, with about 80% in each group fastening their SB either right when they get in or right after starting their vehicle. Group 3 tends to resemble Groups 1 and 2 with respect to the shape of the curve however the primary difference in the process between Group 3 and the 100% groups is that they tend to buckle up later in the process. Less than 17% of respondents in Group 3 fasten their SB immediately after they get in their vehicle, and an additional 41% do so right after starting the vehicle. Cumulatively, just under 58% of "Well-Intentioned Drivers" fasten their belt early in their process, compared to the 80% in Groups 1 and 2. Despite cumulative percent differences, Group 3 appears to be more like the 100% groups than Group 4. Figure 25 best illustrates the variation of process within each group for comparison. As shown, there is considerable variation in process for both non-100% groups.

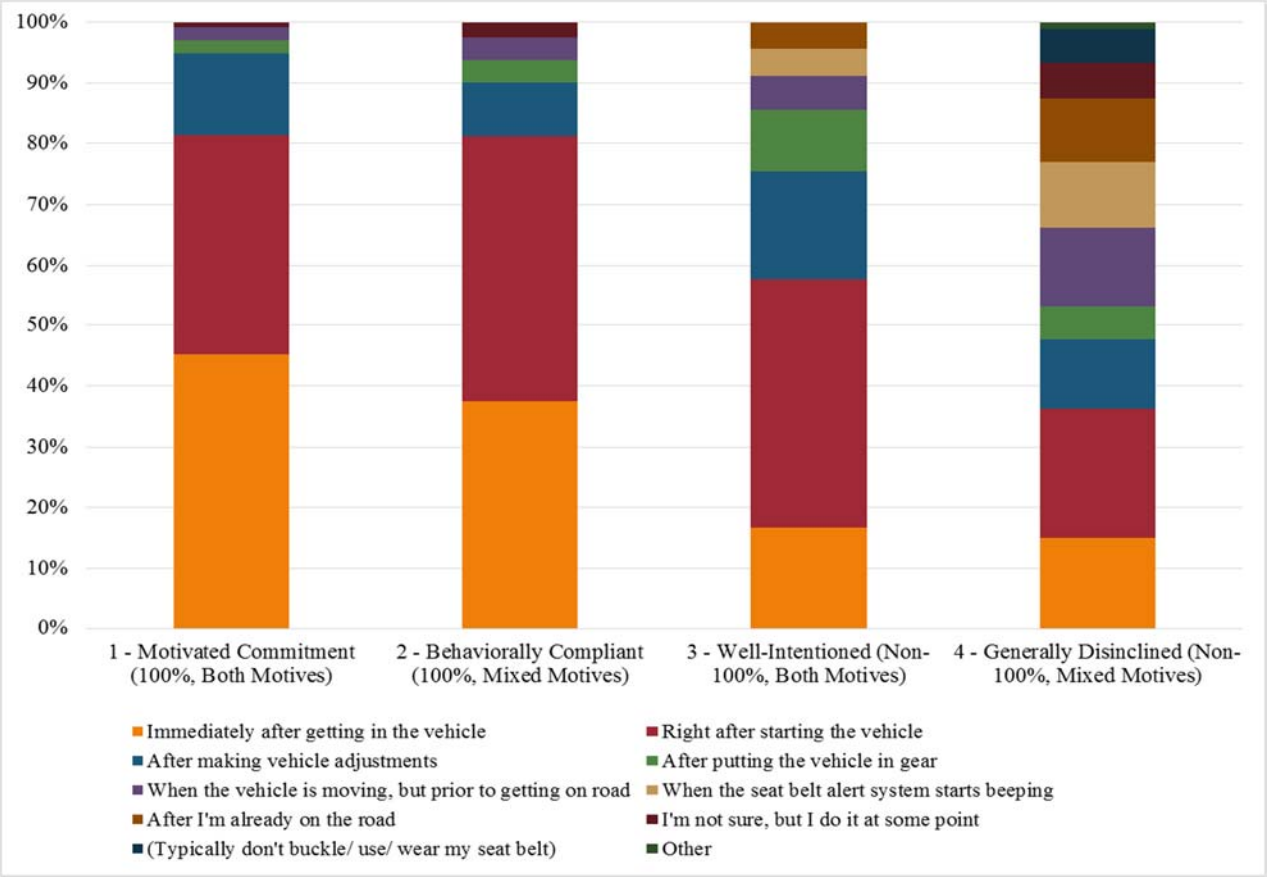


Figure 25
Differences in process by seat belt use group

Relationship of Habit and Process

Figure 26 illustrates the relationship of habit (composite) to process for the sample overall. As illustrated, individuals with a definite habit of SB use tend to fasten their belt early in the process, with 88.4% doing so before putting the vehicle in gear.

Primary Motivators for SB Use

As mentioned earlier in this report, attitudinal motivation (i.e., HT/WT) is a person's generalized motivational commitment to using or not using a SB. There are many possible reasons why people may or may not WT or believe they HT use a seat belt. Respondents were asked a series of questions to measure attitudes that have been previously identified in seat belt use studies. These include personal and/or social reasons, impersonal and/or practical reasons, beliefs about obeying the law and enforcement, as well as beliefs about seat belt use and future potential crash involvement.

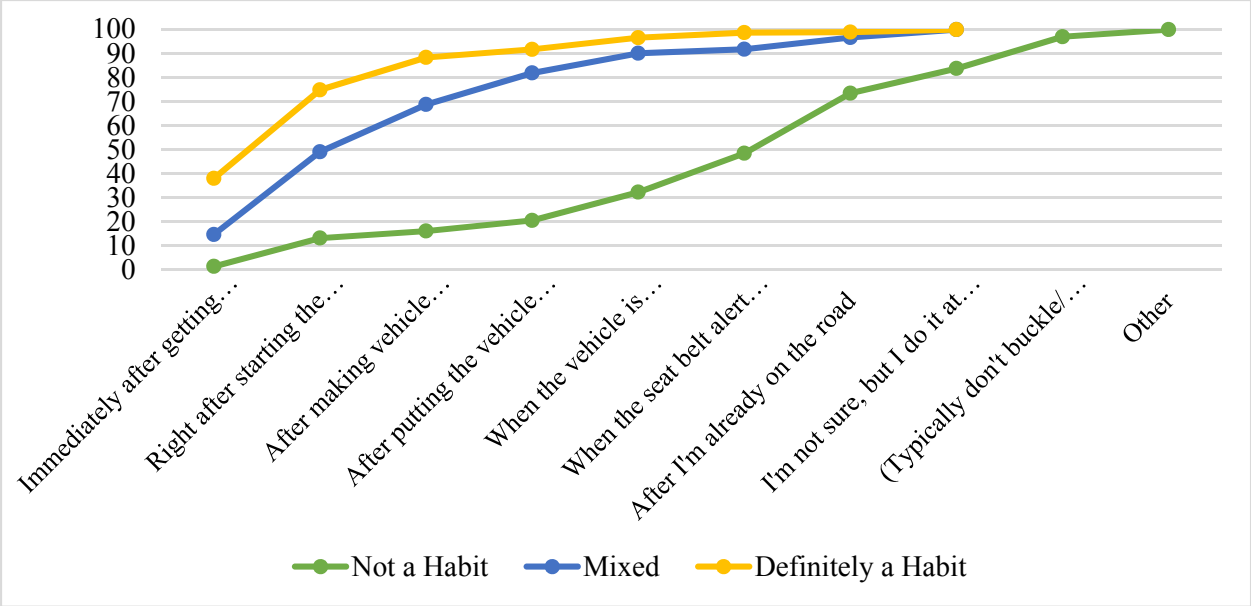


Figure 26
Habit by process

The researchers compared these factors across the four groups in order to understand their general relationship to attitudinal commitment and seat belt use. On a methodological note, group comparisons were made on the basis of the respondents in each group selecting a statement (in the case of items with binary responses – Yes/No) or indicating strong agreement (selecting Strongly Agree on a Likert agree-disagree response format). The values in each chart represent the percentage of respondents within each group. All significant differences are summarized at the end of this section.

Personal and/or Social Reasons. There are statistically significant differences among the four groups on six out of seven items. Figure 27 displays the percent of agreement with each statement, by group. As illustrated, individuals with both motivations to use SBs (groups 1 and 3) have higher percent agreement with each of the statements than groups 2 and 4, however, difference in agreement with the statement "People I am with are using seat belts" is not statistically significant. In the case of "Others want me to use it," individuals in the non-100% groups (3 and 4) have higher percent agreement than those who use SBs 100% of the time.

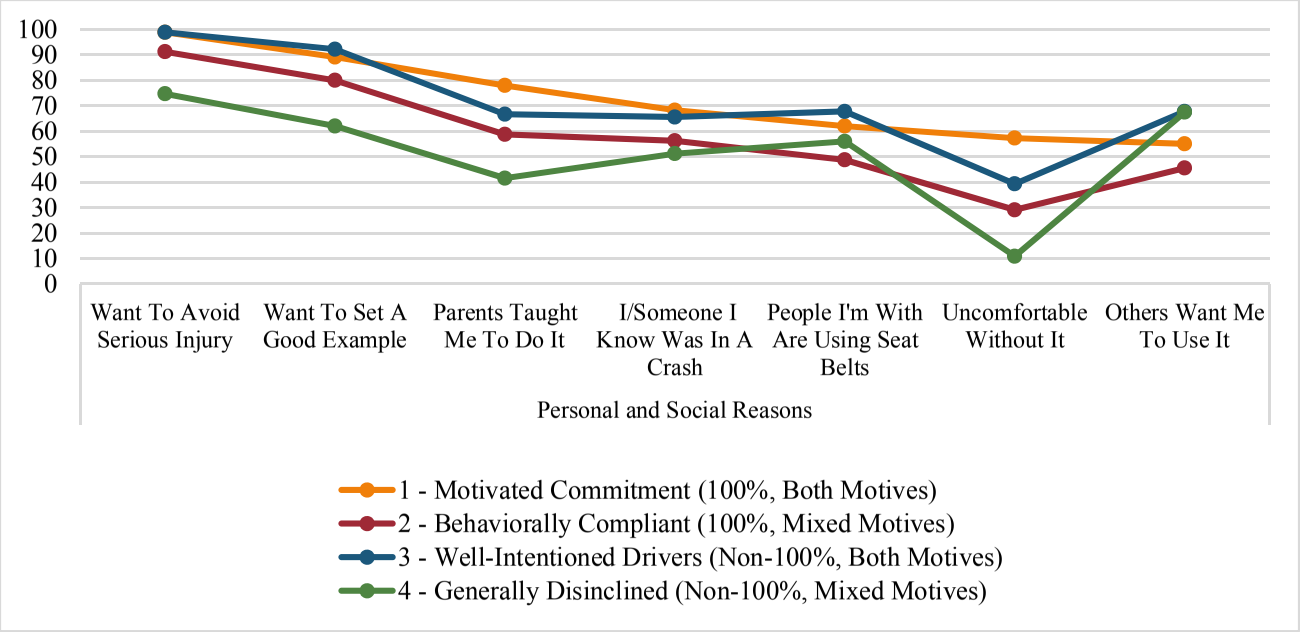


Figure 27
Personal and/or social reasons by seat belt use group

Impersonal or Practical Reasons. There are statistically significant differences among groups in two out of four items "It's the law" and "My vehicle has a buzzer." As shown in Figure 28, Groups 1 and 3 (Both Motives) show higher agreement with the reason "It's the law," while Group 3 appears to rely on the buzzer more than the other groups.

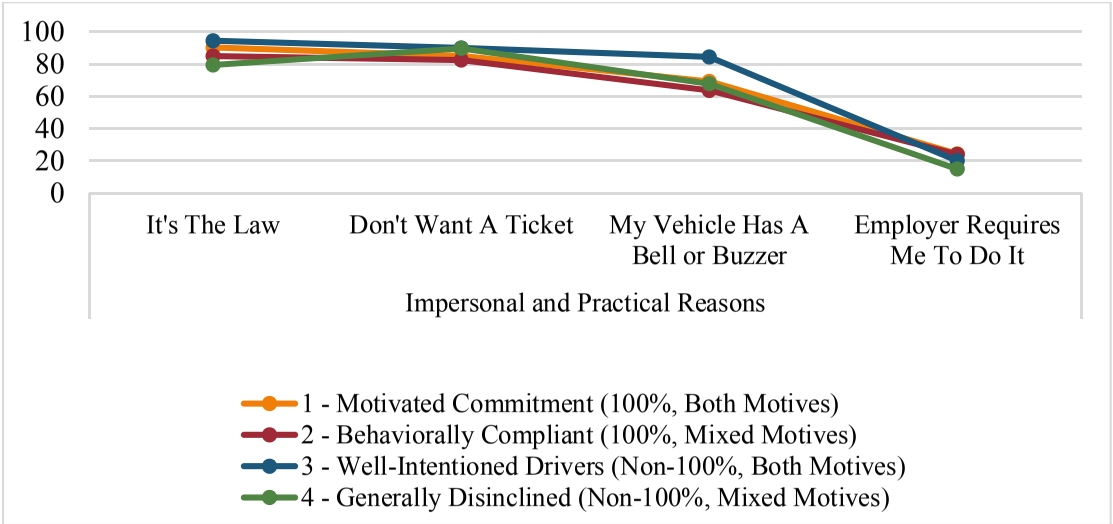


Figure 28
Impersonal and/or practical reasons by seat belt use group

Beliefs about Obeying the Law. There are significant differences among groups in three out of four items, as shown in Figure 29. Items with group differences include, "It is okay to disobey the law if not causing any harm," "you should accept decisions by police even if you think they are wrong," and "You should do what police tell you to do, even if you disagree." Individuals in Group 4 (Non-100%, Mixed Motives) tended to express less agreement than the other three groups with the two items about police, and higher agreement with the item "It is okay to disobey the law if not causing harm."

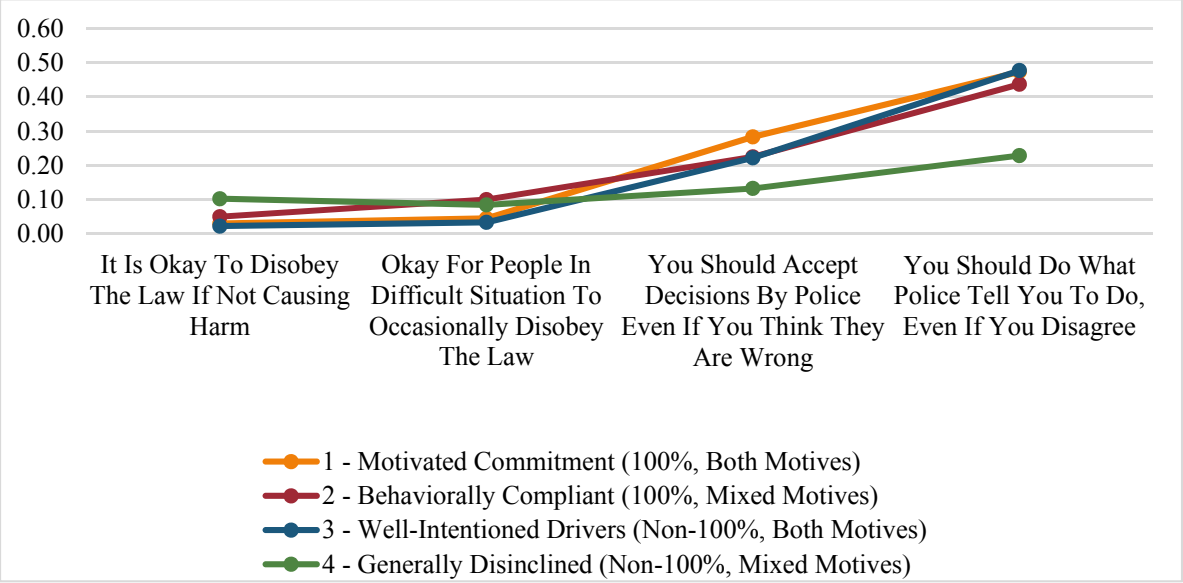


Figure 29
Beliefs about obeying the law by seat belt use group

Beliefs about Enforcement. Figure 30 displays the level of agreement to enforcement related items. While Group 4 has the lowest agreement on all three of the items relating to the likelihood of getting a ticket, it is only on the last item (i.e., likelihood of getting a ticket as a passenger in the front seat) that the difference is statistically significant. But, as with other factors, those groups with lower levels of motivation show lower levels of belief/agreement on the enforcement related factors associated with seat belt use.

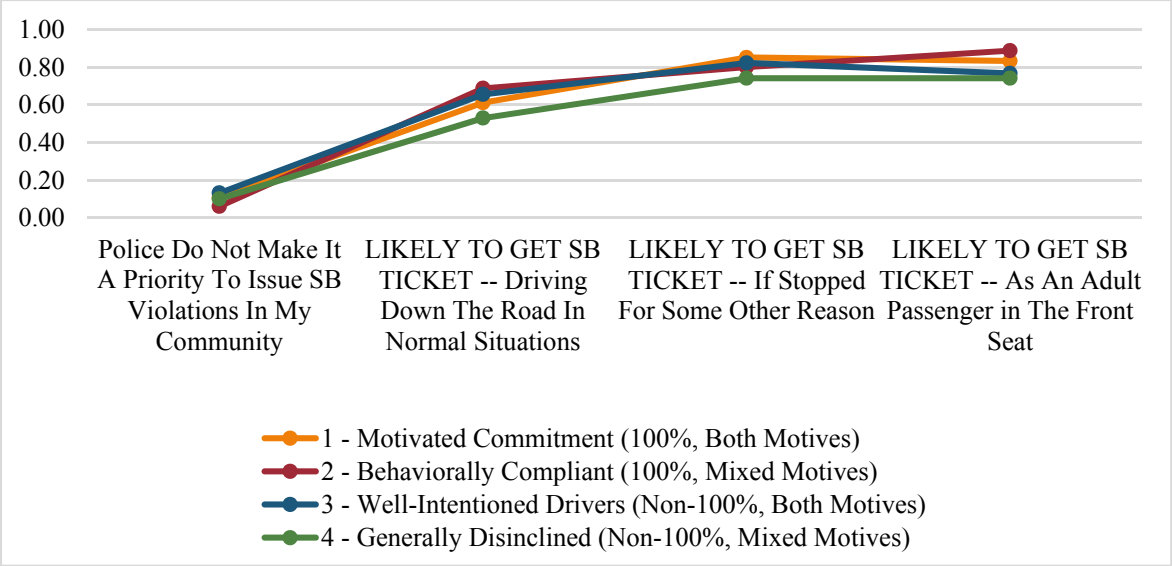


Figure 30
Beliefs about enforcement by seat belt use group

Beliefs about Seat Belt Use. Three of the four items addressing beliefs about actual seat belt use show significant differences across the four groups, illustrated in Figure 31. The only item not showing significant differences is the requirement of SB use at the workplace. Group 4 expressed much lower agreement with the statement "Would want a seat belt on in an accident" as well as higher agreement with "SBs are just as likely to harm as to help."

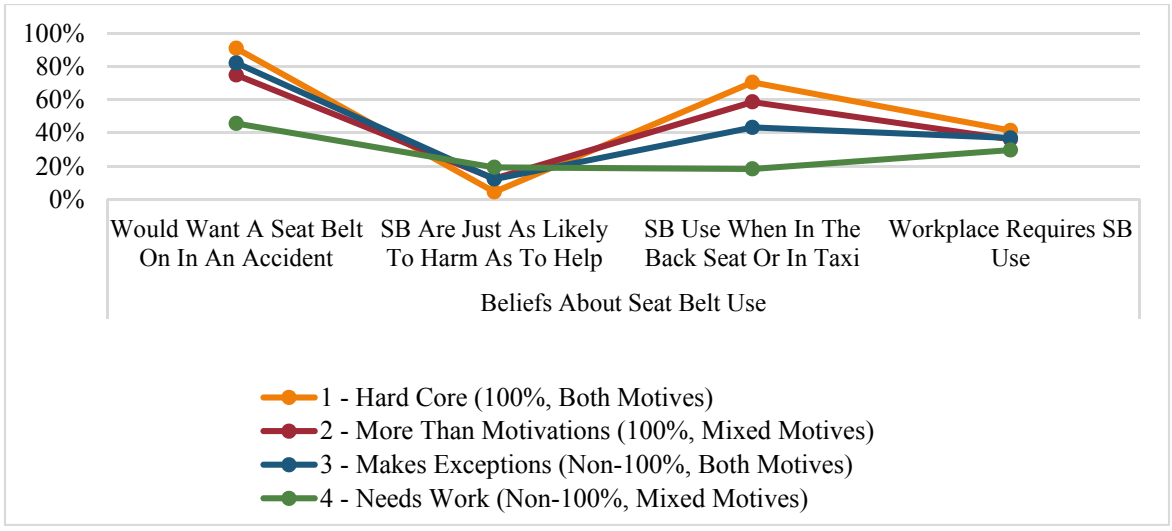


Figure 31
Beliefs about seat belt use by seat belt use group

Beliefs about Crash Involvement. The final set of beliefs include two items about the nature of accidents (Most accidents happen within 5 miles of home and Accidents close to home not as serious as further away) and two items concerning the role of seat belts in a future crash (SB could keep you from being injured and SB could keep you from being killed). As shown in Figure 32, there were no differences between groups on the first two items, but there were significant differences between the groups on the other two items. Group 4 was markedly lower on both items, reinforcing the earlier findings that Group 4 sees less benefits to using a SB than the other three groups.

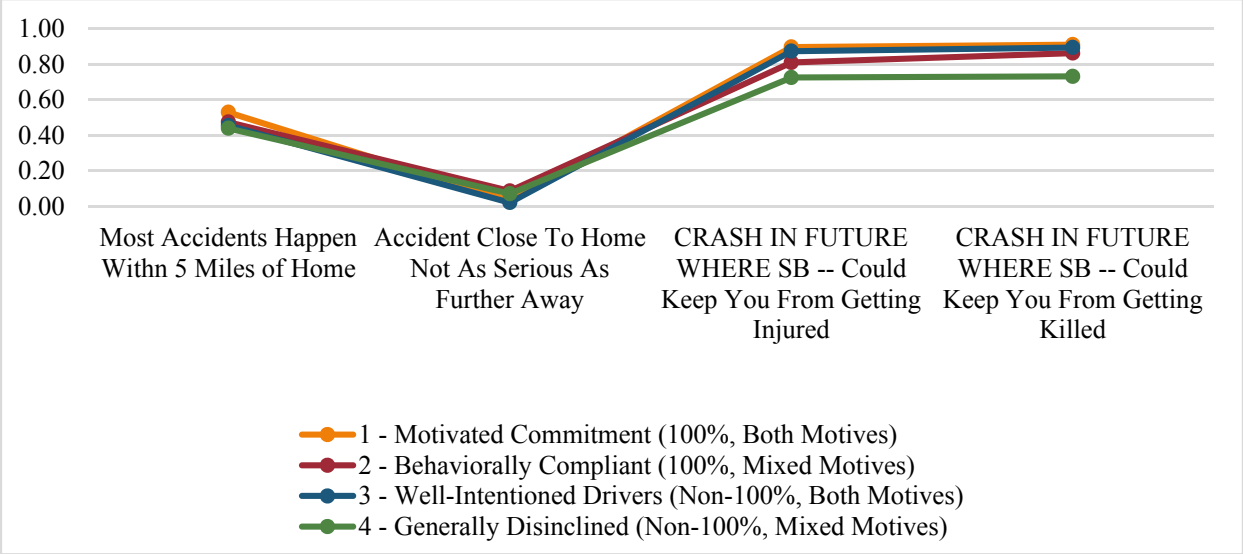


Figure 32
Beliefs about crash involvement by seat belt use group

Other Factors Related to Seat Belt Use

The final set of driving-related factors possibly impacting seat belt use are time spent driving on a typical weekday, vehicle type and age of vehicle.

Time Spent Driving. Respondents estimated the amount of time they spend driving on a typical weekday and there were no significant differences between groups. Across groups, between 49-60% of respondents reported driving an hour or more, while about 15-20% reported driving 30 minutes or less on a typical day. So, belt usage does not appear to be related to the amount of driving in an average weekday.

Vehicle Type and Model Year. The next item asked respondents two questions about their primary vehicle: vehicle type (car, pickup truck, SUV, or van/other) and model year. Overall, 42.5% have cars, 24.7% have pickup trucks, 26.7% have SUVs and 6.1% have a van or other vehicle type. Figure 33 displays vehicle type by SB use groups. As illustrated in the figure, all four vehicle types are represented in each group in similar proportions that only appear to differ slightly from the overall sample. While there is a proportionately similar percentage for each vehicle type within groups, there appear to be some slight differences across groups with respect to the relative proportions of vehicle type. For instance, Group 1 has the highest within-group percentage of vans (9%); Group 2 has the highest within-group percentage of cars (48.8%), Group 3 has the highest within-group percentage of SUVs (30%) and Group 4 has the highest within-group percentage of pickup trucks (31.9%).

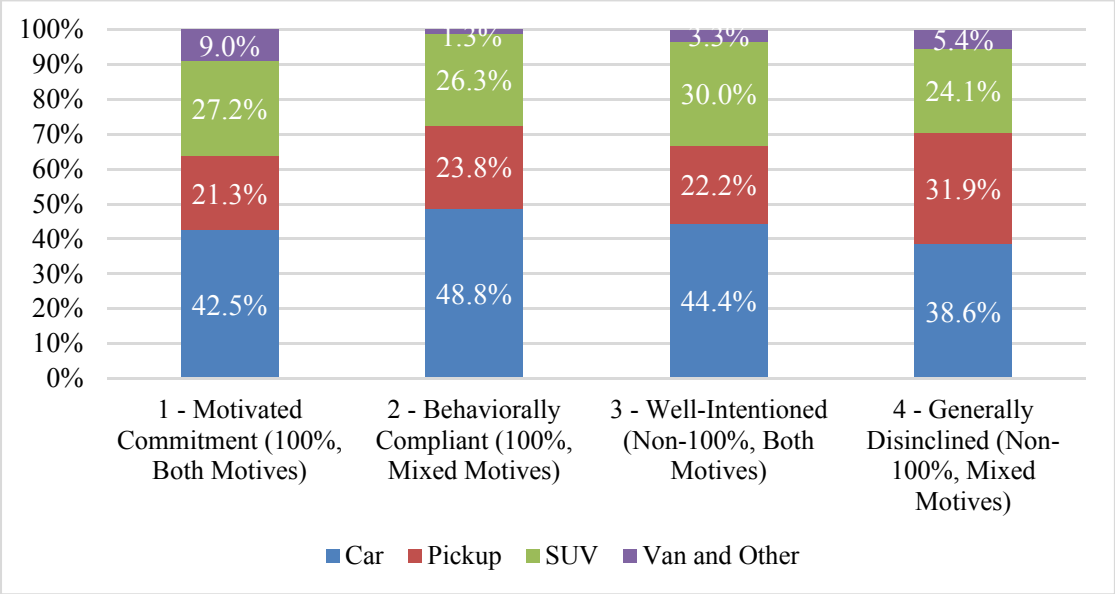


Figure 33
Vehicle type by seat belt use group

The model year of their vehicle was used to calculate vehicle age. In terms of the sample overall, only 8.3% have new vehicles. About 30% have vehicles 2-5 years old; 32.2% have vehicles 6-10 years old; and 29.2% have vehicles 10 or more years old. Figure 34 displays the proportional percentage of vehicle age categories across the four groups. Group 4 has the highest percentage of vehicles 10 years or older, 45.8%, followed by the other "mixed motives" group, compared to 22.1% in Group 1 and just 16.7% in Group 3.

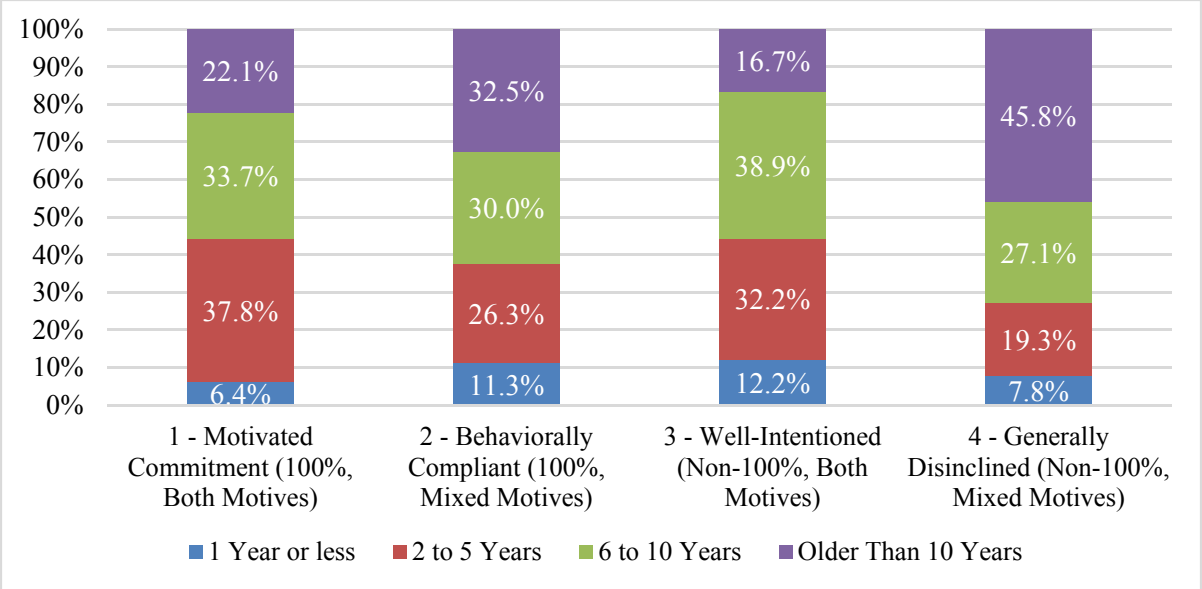


Figure 34
Vehicle age by seat belt use group

To examine vehicle age more closely, these categories were collapsed into a dichotomous variable to indicate whether the vehicle age is "newer" (up to 5 years) or "older" (6 years and older). Group differences across groups became pronounced (see Figure 39 in Appendix G). Two important observations stand out: first, Groups 1 and 3 are virtually indistinguishable in terms of general vehicle age; and second, compared to the other three groups, Group 4 has the highest percentage of older vehicles (72.9%), followed by Group 2 (62.5%). In other words, there are vehicle age differences between the non-100% groups, which suggests possible socio-economic differences may underlie this relationship.

Basic Demographics

Basic demographic information reflecting respondents' age, sex, race/ethnicity, education, income, and marital status was collected. Due to sampling limitations, it is not possible to pinpoint specifically where there are statistically significant differences across the four groups or within-groups. But, in general, demographic differences across SB use groups are not as pronounced or as straightforward as prior seat belt use studies have suggested, which makes for a more nuanced discussion of these factors in the context of belt use. Table 8 displays the descriptive statistics (i.e., within-group percentages) for demographic factors by SB use group. The final column displays percentages for the total sample for comparing within-group percentages to the sample overall, as well as between groups. Only a handful of demographic factors indicate differences across groups. Figures illustrating demographic

differences across groups are presented to assist in interpreting the statistics for factors where differences across groups are a matter of degree rather than kind.

Table 8
Demographic descriptive statistics by seat belt use group

		Seat Belt Usage Groups				
		1	2	3	4	
		Motivated Commitment (100%, Both Motives)	Behaviorally Compliant (100%, Mixed Motives)	Well-Intentioned (Non-100%, Both Motives)	Generally Disinclined (Non-100%, Mixed Motives)	Sample Total
Age Group	18 to 24	16.8%	12.5%	17.8%	18.1%	16.7%
	25 to 35	42.9%	51.3%	44.4%	55.4%	47.7%
	36 to 45	40.3%	36.3%	37.8%	26.5%	35.6%
Sex	Male	36.2%	47.5%	41.1%	45.2%	40.9%
	Female	63.8%	52.5%	58.9%	54.8%	59.1%
Race	Caucasian	70.5%	72.5%	57.8%	76.5%	70.5%
	African American	18.3%	23.8%	34.4%	16.3%	20.9%
	Hispanic	5.6%	2.5%	1.1%	0.6%	3.1%
	Other	5.6%	1.3%	6.7%	6.6%	5.5%
Education	< High School	1.1%	6.3%	2.3%	7.3%	3.7%
	High School	16.1%	20.3%	23.9%	16.5%	17.9%
	Attending or Some College	27.0%	31.6%	22.7%	42.1%	31.1%
	College Degree/ +	55.8%	41.8%	51.1%	34.1%	47.3%
Income	< $50,000	29.2%	43.8%	29.8%	47.2%	36.2%
	In-between	45.0%	38.8%	48.8%	41.5%	43.7%
	$100,000 +	25.8%	17.5%	21.4%	11.3%	20.1%
Marital status	Single	38.1%	30.0%	47.8%	40.4%	39.1%
	Married	47.4%	53.8%	38.9%	41.0%	45.2%
	Other	14.6%	16.3%	13.3%	18.7%	15.7%

Age. Because the sample consists of individuals 45 and under, respondents were placed into three age groups (18-24, 25-35 and 36-45) for analysis. Figure 35 displays the within-group percentages of age categories across the four SB use groups. As illustrated, there is very little difference in age for each of the SB use groups, with the exception of individuals 36-45 of age. The proportion of this age category is highest in Group 1 and lowest in Group 4. This may indicate that as age increases, so does commitment to seat belt use.

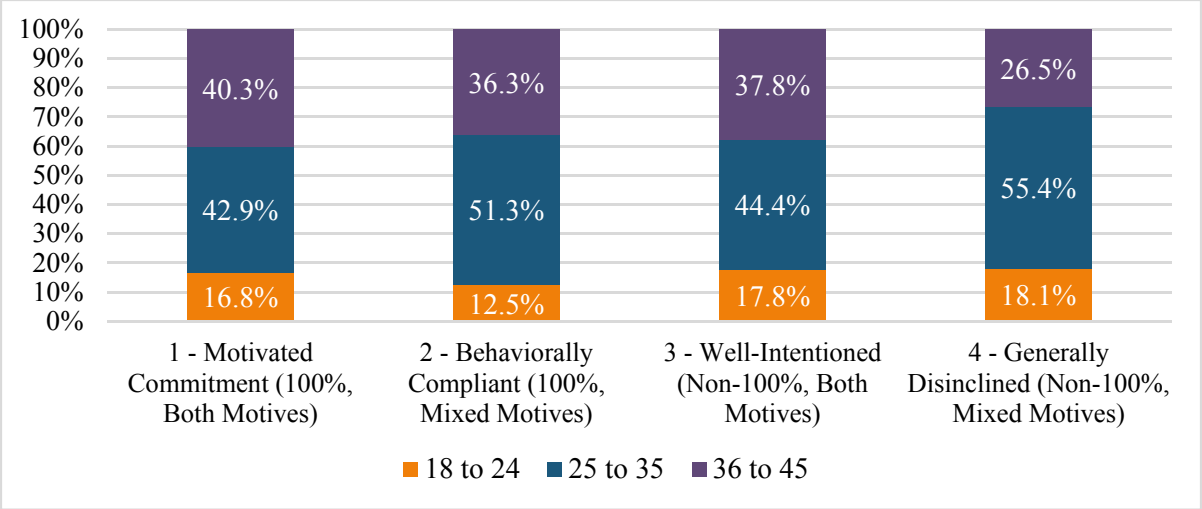


Figure 35
Age groups by seat belt use group

Sex. The sample is 59.1% female and 40.9% male. Interestingly, there are few differences in sex across the four SB use groups. The most notable difference is found in Group 1. Among the four groups, Group 1 contains a much greater percentage of females than do any of the other groups. Figure 36 displays the within-group percentages for males and females across all four groups. Looking at the two non-100% SB groups, i.e., Group 3 and Group 4, where conventional wisdom would expect to find a higher percentage of males than females, there appears to be very little difference. Of all of the groups, the "Behaviorally Compliant" Group 2 actually has the highest proportion of males.

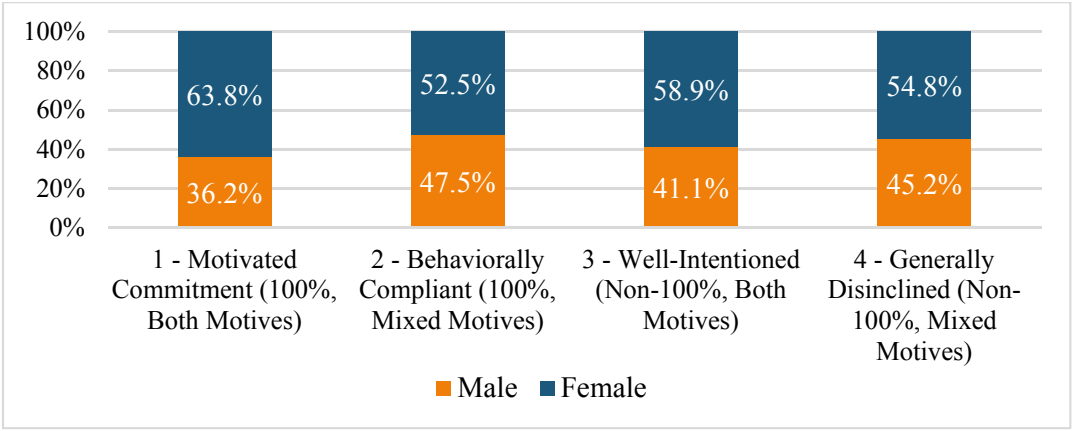


Figure 36
Sex by seat belt use group

Race/ Ethnicity. The sample overall is 70.5% Caucasian, 20.9% African American, and 8.6% Hispanic/other. There are some particularly noteworthy differences across the four groups. Figure 37 displays the within group percentages for race/ ethnicity for each group. Looking first at Group 1, its percentages are most similar to sample overall, followed closely by Group 2. The most interesting findings here are in the non-100% groups (Groups 3 and 4). In Group 4, there is a much greater proportion of Caucasians (76.5%) compared to African Americans and other minorities (23.5%) than in the other groups. Group 3 has a significantly higher proportion of African American (34.4%) and other minority (7.8%) individuals than the other three groups. In this group, only 57.8% of "Well-intentioned" individuals are Caucasian, compared to the 76.5% of "Generally Disinclined" individuals. The primary difference between the two non-100% groups is in general motivations: where one group believes seat belt use is absolutely something they have to and want to do, the other does not hold such intentions for belt use. This finding suggests that the relationship between seat belt use and race/ethnicity is complicated.

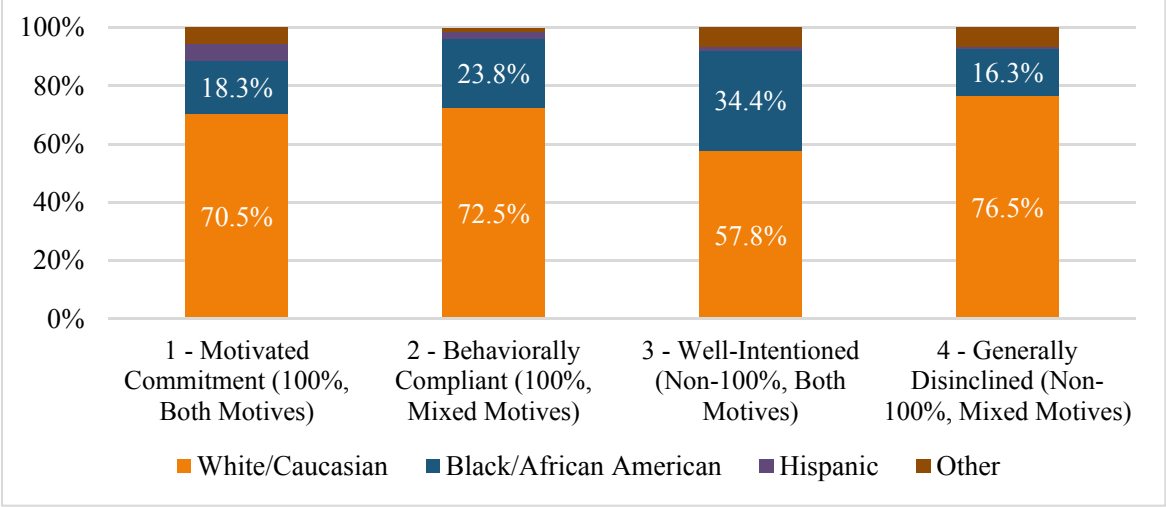


Figure 37
Race by seat belt use group

Income. Income was measured with three categories (less than $50,000, $50,000 to $100,000 and over $100,000). Figure 38 displays within-group percentages across groups. Here Groups 1 and 3 (both highly motivated) have differences with Groups 2 and 4 (less motivated). These two sets of groups have distinctly different income profiles and when Group 4 is examined individually, it even is somewhat distinct from Group 2. In general,

there is a greater proportion of individuals with lower income in Group 4 than in the other groups. This supports the finding of Group 4 having older vehicles than any other group.

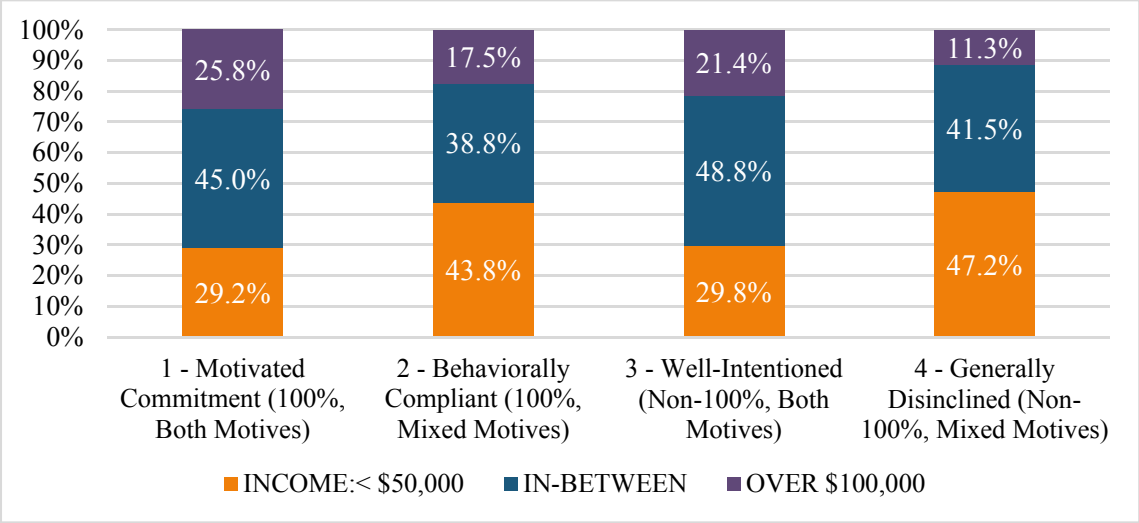


Figure 38
Income by seat belt use group

Assessing the Impact of Driver Education and Parental Involvement

Respondents were asked several questions about their experience with driver education. First, they were asked whether or not they took a driver education course. If the respondent answered "yes" to that item, they were asked two SB-related follow-up questions to assess the following: (1) whether or not the respondent thought there was a substantial emphasis placed on SB use and, (2) whether or not they thought their driver education course made a substantial impact of on their SB use. Responses to these items (which may be considered "steps") were compared across four key factors: Use (100% use), Motivation (Absolutely Have to and Want to), Routine (Fasten SB before putting car in gear), and Habit (Definitely a habit).

To assess the potential impact driver education has on these four factors, percent "increases" in these factors along the "steps" of driver education impact were calculated. The base rate is individuals who did not take a driver education course. Table 9 shows that the percentage of drivers indicating 100% SB use did not differ regardless of driver education. For those indicating a significant emphasis on SB use in driver education class, there was a 2% increase in 100% users. For those indicating a significant impact on their behavior, there was

an additional 6% increase. The cumulative impact is in total increase compared to those not taking driver education. To be sure, these estimates are not solely due to driver education and there are a number of other factors involved, however, they provide a measure of potential impact.

Table 9
Analysis of factors assessing potential impact of driver education on seat belt use

Steps in drivers education impact	Percent increase associated with Drivers Education			
	100% Use	Fasten SB Before Putting Car in Gear	Definitely a Habit	"Absolutely" Have to/ Want to
1. Take Drivers Education	0%	0%	2%	0%
2. Significant Emphasis on SB Use	2%	4%	3%	3%
3. Significant Impact on SB Use	6%	5%	9%	8%
4. Cumulative Impact	8%	9%	14%	11%

In a manner similar to driver education, the potential impact of parent involvement on the same four factors was assessed. Parental involvement is measured with the item "Parents taught me to do it," which appears in the set of personal and/or social reasons for using SBs. Figure 39 displays the percent increases associated with parental involvement. The estimates of impact cannot be attributed solely to parental involvement and there are likely other factors involved; however, values indicate the increase in each factor for those respondents indicating their parent was involved over those without this influence.

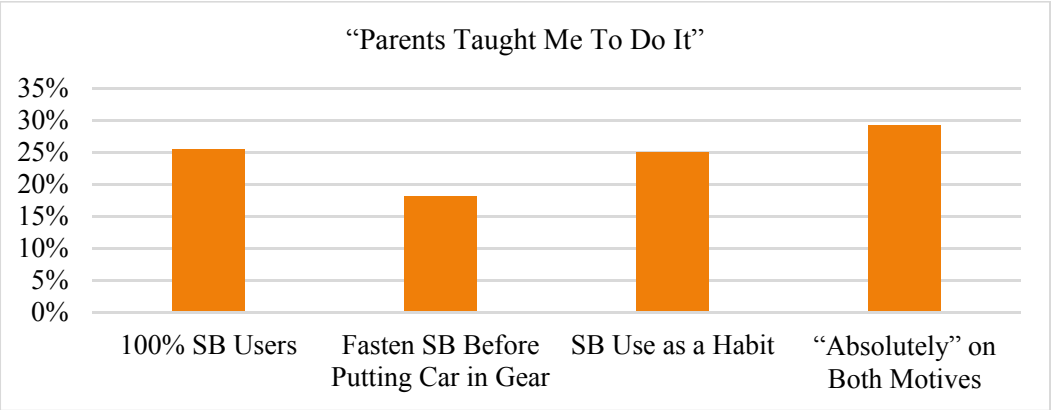


Figure 39
Assessing potential impact of parental involvement on seat belt use

Change in Seat Belt Use over time

Each respondent, no matter which group they were in, was asked about their SB use over time: "Looking back to when you started driving, has your use of seat belts when driving increased, decreased, or stayed the same?" About 58% (n=323) of the sample overall reported a change. Of those reporting a change, 53.5% indicated that they had increased their level of SB use at some time and only 4.6% indicated a decline in their SB use. The implication here is that a person's SB use is not "locked-in" at the start of driving and is subject to change depending on the person's experiences.

On an encouraging note, almost all of the drivers indicating that they had changed did so in the direction of increasing seat belt use. It is notable that a vast majority of those that declined in seat belt use were in Group 4. When evaluated by SB use group, as shown in Table 10, all groups had a substantial percentage of respondents who reported their SB has increased. Also notable is that the largest percentage for "increased" occurred in Groups 2 and 3, which may indicate individuals in these groups are relatively open to influence. It is possible individuals now in Group 2 are "migrants" from Group 4. For Group 3, they may have increased use levels, but not reached 100%.

Table 10
Change in seat belt use over time by seat belt use group

	Increased	Decreased	No Change	
1 - Motivated Commitment (100%, Both Motives)	48.9%	0.7%	50.4%	100.0%
2 - Behaviorally Compliant (100%, Mixed Motives)	60.0%	2.5%	37.5%	100.0%
3 - Well-Intentioned (Non-100%, Both Motives)	68.9%	4.4%	26.7%	100.0%
4 - Generally Disinclined (Non-100%, Mixed Motives)	49.4%	12.0%	38.6%	100.0%
Sample (Total)	53.5%	4.6%	41.9%	100.0%

Respondents indicating their SB use had increased over time were asked to tell some reasons for the change. Respondents were able to select more than one reason. The reasons are listed in Table 11, which also displays the percentage of mentions within each group for each reason.

Table 11
Reasons for increasing seat belt usage over time (percentage mentions within group)

	1 - Motivated Commitment (100%, Both Motives)	2 - Behaviorally Compliant (100%, Mixed Motives)	3 - Well-Intentioned (Non-100%, Both Motives)	4 - Generally Disinclined (Non-100%, Mixed Motives)
Got seat belt ticket or warning	3	13	10	11
Someone I know get a ticket	1	2	0	0
I or someone I know was in crash	30	23	40	13
Other people encouraged/ pressured me	5	0	3	4
Seat belt law	12	23	13	16
Did not want to get a ticket	4	6	8	10
Set good example for children	11	10	18	20
Became aware of safety issues	30	21	11	17
Drivers education	4	0	5	1
Employer requirement	5	4	2	4

Summary. Table 12 displays a summary of the significant differences found between the four SB use groups in their beliefs and attitudes regarding SB use. The number of significant differences indicates these groups vary across wide range of factors. Knowing where groups differ provides a better understanding of belt use among individuals. A closer examination of these differences, in most instances, suggests that the degree of motivation to use seat belts plays an important role in understanding seat belt behavior (i.e., Groups 1 and 3 compared to Groups 2 and 4).

It is interesting that the two non-100% groups (Groups 3 and 4) in this study appear to have less in common with each other than conventional wisdom would have us expect. Thus, the generalized motivational attitude towards seat belt use (i.e., absolutely having to and wanting to) seems to be an important distinction among individuals when it comes to belt use behavior. The next section explores these findings in greater detail by making comparisons between specific pairs of groups, highlighting differences in either motivations or seat belt use.

Table 12
Summary of statistically significant differences between seat belt use groups

	$p \leq .05$
Personal or Social Reasons	
Want to avoid serious injury	**X**
Want to set a good example	**X**
Parents taught me to do it	**X**
I/Someone I know was in a crash	**X**
People I'm with are using seat belts	
Uncomfortable without it	**X**
Others want me to use it	**X**
Impersonal or Practical Reasons	
It's the law	**X**
Don't want a ticket	
My vehicle has a bell or buzzer	**X**
Employer requires me to do it	
Beliefs About Obeying the Law	
It is okay to disobey the law if not causing harm	**X**
Okay for people in difficult situation to occasionally disobey the law	
You should accept decisions by police even if you think they are wrong	**X**
You should do what police tell you to do, even if you disagree	**X**
Beliefs About Enforcement	
Police do not make it a priority to issue SB violations in my community	
Likely to get SB ticket—Driving down the road in normal situations	
Likely to get SB ticket—If stopped for some other reason	
Likely to get SB ticket—As an adult passenger in the front seat	**X**
Beliefs About Seat Belt Use	
Would want a seat belt on in an accident	**X**
SBs are just as likely to harm as to help	**X**
SBs use when in the back seat or in taxi	**X**
Beliefs About Crash Involvement	
Most accidents happen within 5 miles of home	
Accident close to home not as serious as further away	
In crash in future where SB—Could keep you from getting injured	**X**
In crash in future where SB—Could keep you from getting killed	**X**
Note: X indicates statistically significant differences between seat belt groups, $p \leq .05$	

Specific Comparisons between SB Use Groups

In order to better understand the differences between the four groups, comparisons were made between Groups 1 and 3, Groups 2 and 4, and Groups 3 and 4. This discussion focuses primarily on those differences that are statistically significant ($p<.05$) to highlight issues/areas of possible further action.

Comparing Groups 1 & 3. Both Groups 1 and 3 are comprised of individuals who reported absolute motivations for (having to and wanting to) using a seat belt, yet differ in their actual use (Group 3 drivers do not use their seat belts 100% of the time they are in a motor vehicle). Across most of the reason/attitudinal measures, these groups differed very little. Figures 40 and 41 appear below to compare only Groups 1 and 3 across personal/social and impersonal/practical reasons for SB use. In Figure 40, there are statistically significant differences in group means in two items: "Parents taught me to do it" and "Uncomfortable without it." This suggests that parental influence may make a difference early on in a person's driving experience by helping to establish a habit of SB use, which may also have something to do with having a sense of discomfort without the seat belt as well.

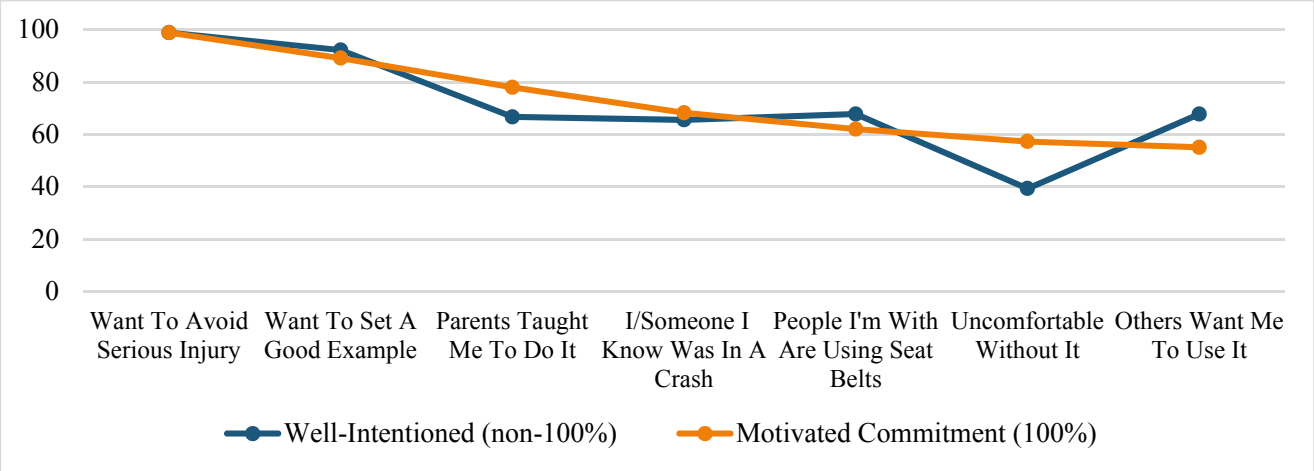


Figure 40
Comparison of seat belt use groups 1 and 3: personal and/or social reasons

As for the impersonal or practical reasons for SB use, there were significant differences on one item "My vehicle has a bell or buzzer." Figure 41 displays group means for these items. It is possible that the buzzer actually provides a necessary cue for the Well-Intentioned driver to fasten their SB when they may have forgotten to do so. It is also probably the case that because Group 1 has 100% SB use, they are less likely to encounter vehicle reminders. Groups 1 and 3 did not differ across beliefs about enforcement, obeying the law, or potential future crash involvement, but did differ on the belief that "Seat belts are just as likely to harm as to help," with individuals in Group 3 expressing more agreement than those in Group 1. Also, only 43% of individuals in Group 3 wear seat belts in the back seat or in a taxi, compared to 71% in Group 1.

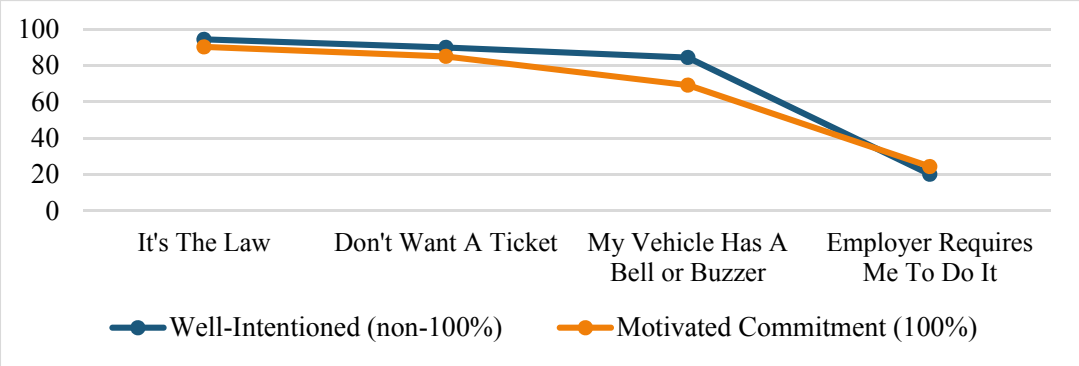


Figure 41
Comparison of seat belt use groups 1 and 3: impersonal and/or practical reasons

Where Groups 1 and 3 differ most is in habit and process. Table 13 displays the within-group percentages for the habit composite variable and a binary recode of the process variable. The responses were coded to reflect whether or not the respondent specified fastening their SB at any point before putting the car in gear. First, over 93% in Group 1 had consistent responses to the habit items and thus their SB use appears to be "definitely a habit," compared to only 45.6% in Group 3. This is something that has significant implications for process. Referring to Figure 25, nearly 95% of Group 1 fastens their SB sometime before putting the car in gear (45.1% do so immediately after getting in), compared to 75.6% of Group 3 (with only 16.7% doing so immediately after getting in).

Table 13
Comparing groups 1 and 3: process and habit

	Process			Habit			
	Before Car In Gear	After Car In Gear		Not a Habit	Mixed	Definitely a Habit	
1 - Motivated Commitment (100%, Both Motives)	94.8%	5.2%	100.0%	--	6.7%	93.3%	100.0%
3 - Well-Intentioned (Non-100%, Both Motives)	75.6%	24.4%	100.0%	8.9%	45.6%	45.6%	100.0%

These findings indicate having a habit of SB use is perhaps one of the most important factors related to belt use among individuals who absolutely believe they want to and have to use a seat belt. Thus, if individuals in Group 3 were to acquire a habit of fastening their SB at some point before putting their vehicle in gear, they may be able to increase their SB usage to 100%, like individuals in Group 1.

Comparing Groups 2 & 4. Both Groups 2 and 4 are comprised of individuals who have mixed (i.e., somewhat or not at all) general motivations for (having to and wanting to) using a seat belt, however, they differ on seat belt use. Individuals in Group 2 are "Behaviorally Compliant" and use their seat belts 100% of the time they are in a motor vehicle whereas Group 4 does not. Across many of the reason/ attitudinal measures, these groups differed considerably. Figure 42 compares only Groups 2 and 4 across personal/social reasons for SB use. As illustrated, there are statistically significant differences in responses to five out of seven items. Items where there is no significant difference include "I/Someone I know was in a crash" and "People I'm with are using seat belts." In general, there is about a 15-20% difference of means for Groups 2 and 4. In most of these cases, Group 2 has higher rates of agreement. The only item where Group 4 is significantly higher than Group 2 is "Others want me to use it."

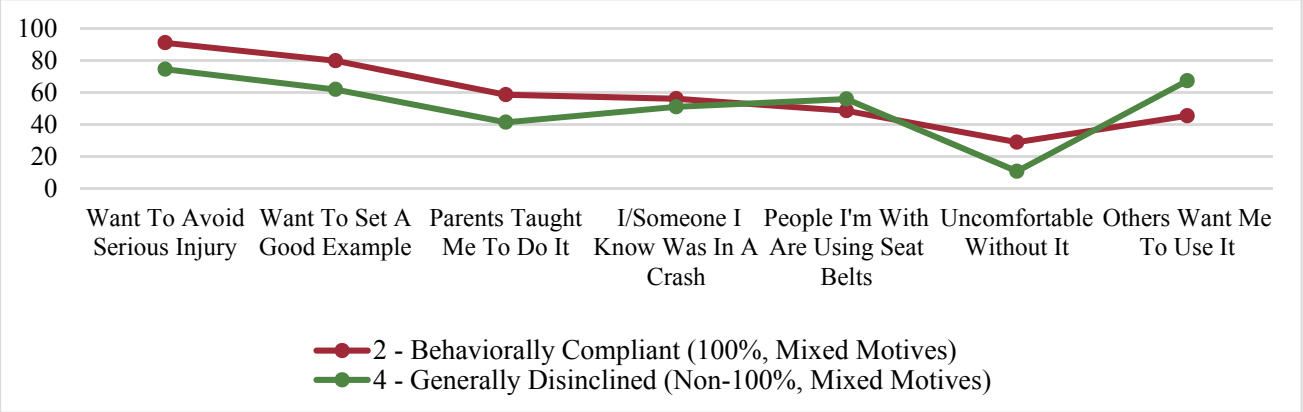


Figure 42
Comparison of seat belt use groups 2 and 4: personal and/or social reasons

Unlike Groups 1 and 3, these groups did not significantly differ on the impersonal or practical reasons; however, they did differ on some of their beliefs about enforcement, obeying the law, and other beliefs about SB use. For instance, there is a statistically significant difference between Groups 2 and 4 on the item "You should do what police tell you to do even if you disagree" with about 44% of Group 2 expressing agreement compared to 23% in Group 4. Groups 2 and 4 differed on two of three other beliefs about SB use. Specifically, Group 2 has significantly higher percentage agreement with "I would want a seat belt on in an accident" as well as "SB use when in the back seat or in a taxi" than does Group 4. Figure 43 displays Groups 2 and 4's beliefs about enforcement. There is a statistically significant difference of means between the two groups on two of the ticket

likelihood items (i.e., “driving down the road in normal situations” and “as an adult passenger in the front seat”).

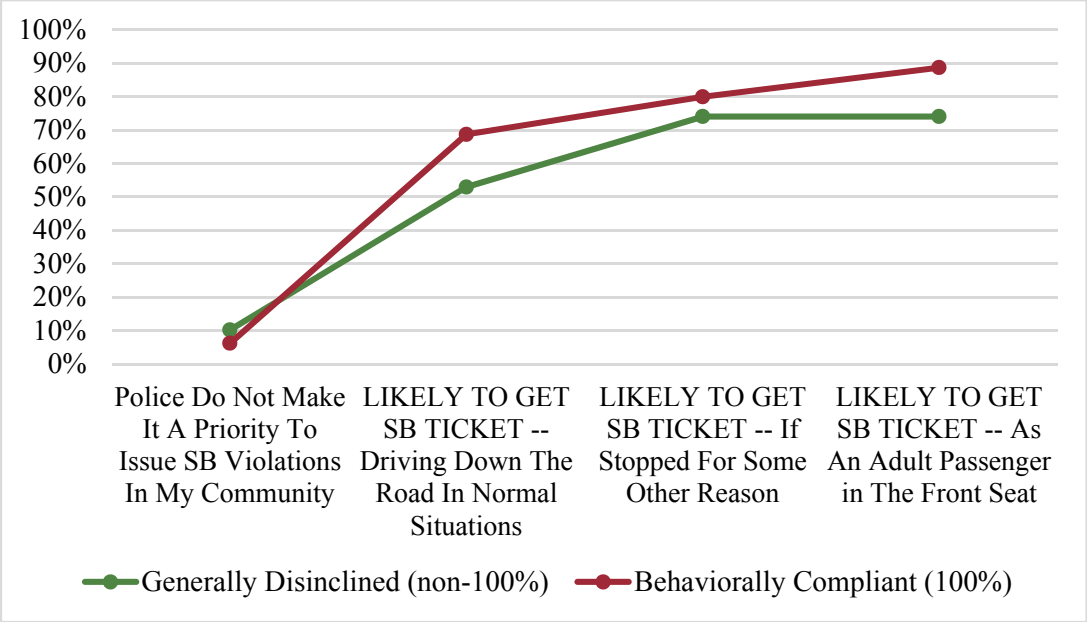


Figure 43
Comparison of seat belt use groups 2 and 4: beliefs about enforcement

Similar to the previous comparison of Groups 1 and 3, Groups 2 and 4 differ considerably in habit and process. Table 14 displays the within-group percentages for the habit composite variable and a binary recode of the process variable. As shown in Table 14, 81.3% in Group 2 had consistent responses to the habit items, compared to only 19.9% in Group 4. Likewise, 90% of Group 2 fastens their SB sometime before putting the car in gear, compared to only 47.6% in Group 4. Thus, the relationship between habit and process appears to be meaningful even in the absence of absolute motivations.

Table 14
Comparison of groups 2 and 4: process and habit

	Process			Habit			
	Before Car In Gear	After Car In Gear		Not a Habit	Mixed	Definitely a Habit	
2 - Behaviorally Compliant (100%, Mixed Motives)	90%	10%	100%	--	18.8%	81.3%	100%
4 - Generally Disinclined (Non-100%, Mixed Motives)	47.6%	52.4%	100%	44.6%	35.5%	19.9%	100%

Summary. The comparisons between pairs of seat belt groups (Groups 1 vs 3 and Groups 2 vs 4) provide a more in-depth look at the role of motivations and their associated beliefs and attitudes. Table 15 indicates items where significant differences between the paired groups were found.

Table 15
Summary of statistically significant differences: comparing groups 1 & 3 and groups 2 & 4

	Groups 1 & 3	Groups 2 & 4
Personal or Social Reasons		
Want to avoid serious injury		**X**
Want to set a good example		**X**
Parents taught me to do it	**X**	**X**
I/Someone I know was in a crash		
People I'm with are using seat belts		
Uncomfortable without it	**X**	**X**
Others want me to use it		**X**
Impersonal or Practical Reasons		
It's the law		
Don't want a ticket		
My vehicle has a bell or buzzer	**X**	
Employer requires me to do it		
Beliefs About Obeying the Law		
It is okay to disobey the law if not causing harm		
Okay for people in difficult situation to occasionally disobey the law		
You should accept decisions by police even if you think they are wrong		
You should do what police tell you to do, even if you disagree		**X**
Beliefs About Enforcement		
Police do not make it a priority to issue SB violations in my community		
Likely to get SB ticket—Driving down the road in normal situations		**X**
Likely to get SB ticket—If stopped for some other reason		
Likely to get SB ticket—As an adult passenger in the front seat		**X**
Beliefs About Seat Belt Use		
Would want a seat belt on in an accident		**X**
SBs are just as likely to harm as to help	**X**	
SBs use when in the back seat or in taxi	**X**	**X**
Beliefs About Crash Involvement		
Most accidents happen within 5 miles of home		
Accident close to home not as serious as further away		
In crash in future where SB—Could keep you from getting injured		
In crash in future where SB—Could keep you from getting killed		**X**
Note: X indicates statistically significant differences between seat belt groups, $p \leq .05$		

The comparison between Groups 1 and 3 suggests these groups actually differ very little from each other in terms of their attitudes and beliefs about SB use. The area where Groups 1

and 3 differ the most is in habit and process. Groups 2 and 4 differed considerably on many of the attitude and belief items as well as in habit and process. Again, the general motivational attitude towards seat belt use (i.e., absolutely having to and wanting to) is a very important factor when it comes explaining attitudinal differences. The next section compares both non-100% groups to better understand how these groups differ.

Examining Non-100% Seat Belt Use Drivers

The final group comparison involves SB Groups 3 and 4, which vary in motivations for SB use, but not their actual use. In the questionnaire, all non-100% SB users were given two additional sets of questions: "Exceptions to 100% SB Use" and "Situations where SB Use Decreases." The "Exceptions" response format is "Yes/No" and the "Situations" response format was "More likely/Less likely/ Would not matter." Before comparing groups 3 and 4, the results for all non-100% drivers in the sample are presented.

Exceptions. Exceptions are reasons (i.e., rationalizations) for not using SBs. Figure 44 displays the exception statements with the bars indicating the percentage of all non-100% drivers reporting "yes" for that item. Respondents were instructed to select all that apply.

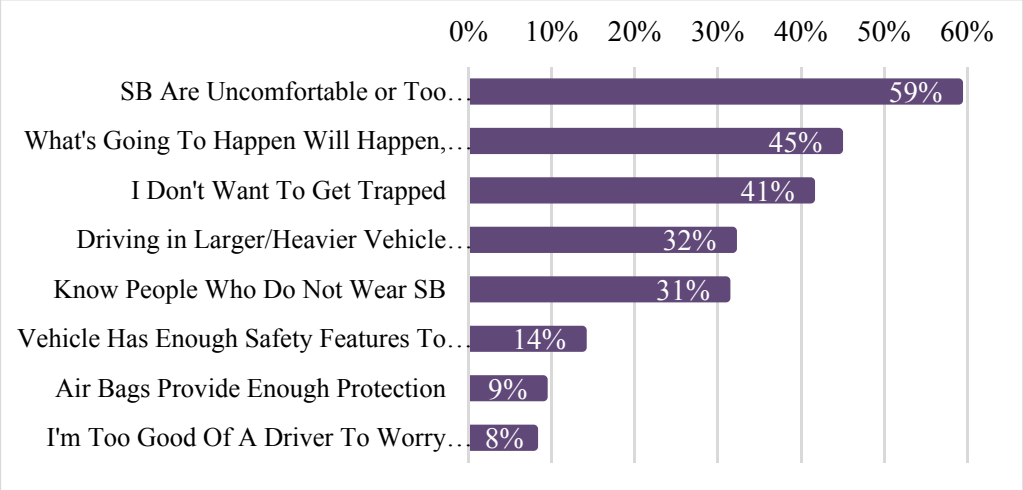


Figure 44
Exceptions to 100% seat belt use among all non-100% SB drivers

The most frequently selected reasons include personal comfort ("SBs are uncomfortable or too confining and tighten unexpectedly"), fatalistic beliefs ("What's going to happen will

happen, SB or not"), and fear ("I don't want to get trapped"). Figure 45 displays the percent of individuals within each group that reported "yes" to the corresponding exception. In general, individuals in Group 4 have higher percentages for these items. As illustrated, there is clearly a difference between the two groups on the top three selected exceptions, with over 50% of individuals in Group 4 responding "yes" to these items.

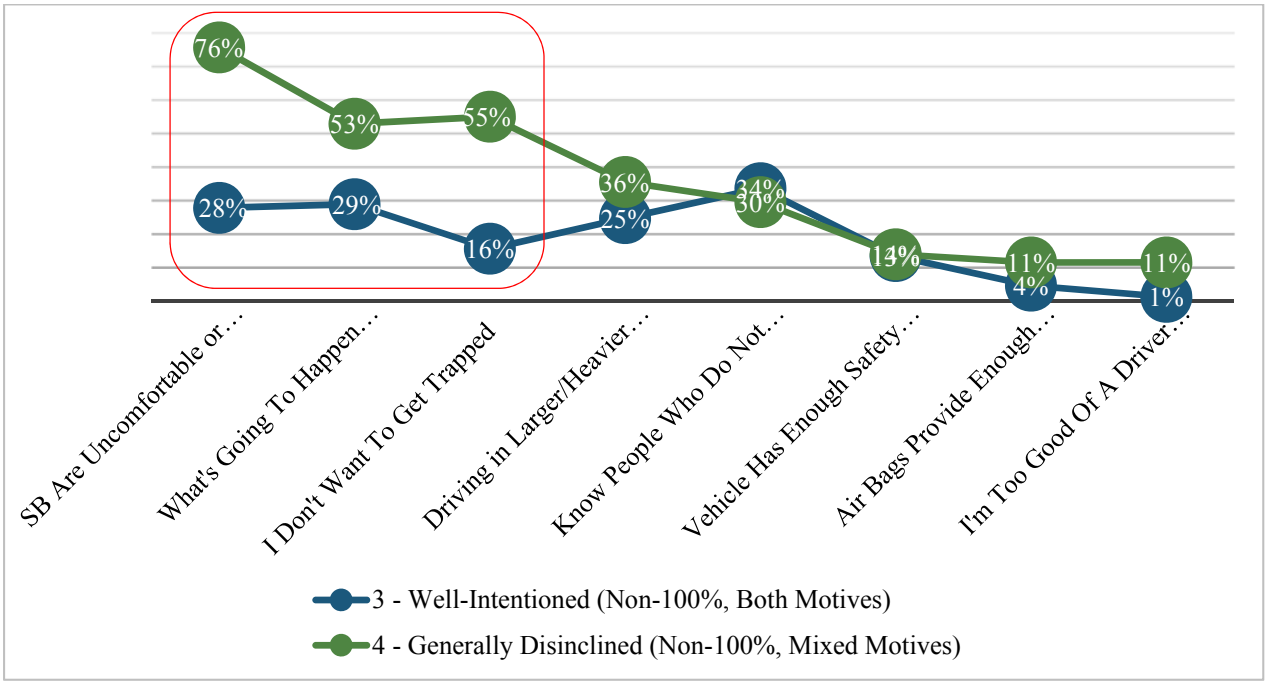


Figure 45
Exceptions to 100% use: comparing groups 3 and 4

Because respondents could select more than one reason, the total number of exceptions per respondent was compared across the two groups. On average, individuals in Group 3 selected 1.49 exceptions while individuals in Group 4 selected 2.85. Figure 46 displays the within-group percentages of respondents selecting zero, one, two, three, and four or more exceptions. As illustrated, nearly 34% of Group 4 selected four or more exceptions compared to just 10% in Group 3. Only 9% of Group 4 selected zero exceptions, compared to 34.4% in Group 3. The difference in the number of exceptions selected per individual in the two groups is indicative of differences in their general attitude towards SB use. The differences between Groups 3 and 4 on the number of exceptions selected, as well as the percent in agreement for individual items suggests Group 3 has significantly less barriers to 100% SB use than does Group 4.

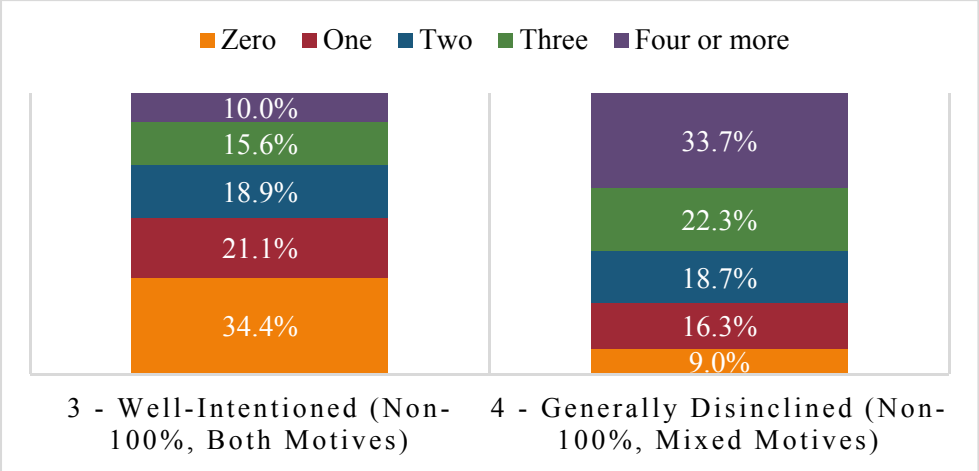


Figure 46
Number of exceptions selected: comparing groups 3 and 4

Situations. The next set of questions asked all non-100% drivers to indicate those situations where they might be likely to change their seat belt use. As respondents were presented with the situation, they were asked to tell whether their SB use would increase, decrease, or not change. It is worth noting that very few respondents mentioned situations where SB use increases (never above 5% for a situation), thus only situations where SB use is likely to decrease are examined. Figure 47 displays the percentage of mentions among non-100% individuals where seat belt use would decrease.

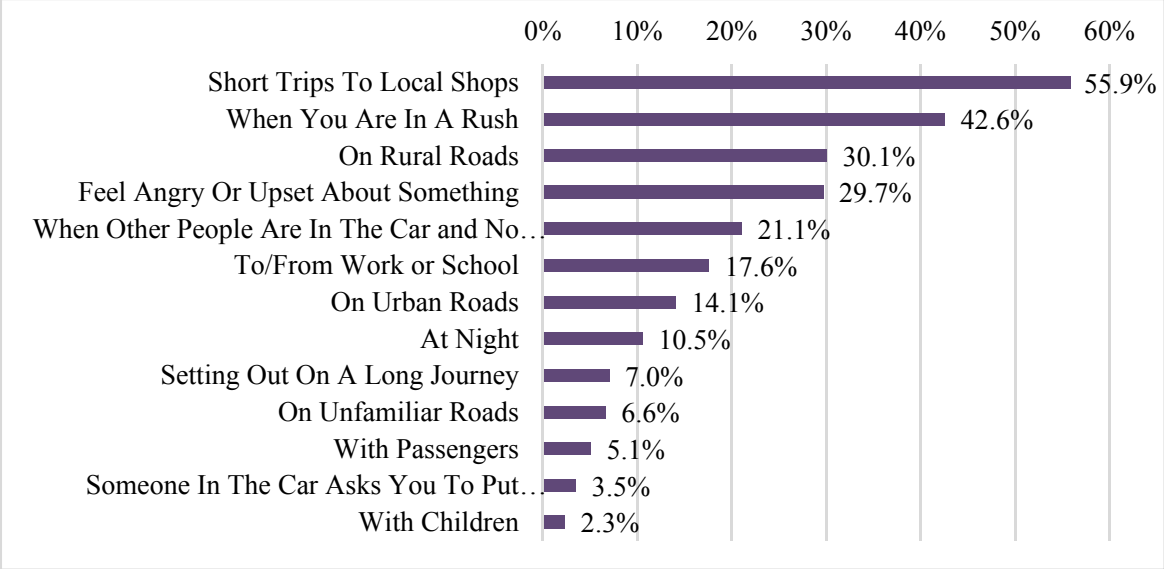


Figure 47
Situations among all non-100% drivers where seat belt use decreases

Figure 48 displays situations where SB use decreases, only this time comparing Groups 3 and 4. As illustrated, there are four situations where the groups differed: Short trips to local shops, on rural roads, to/from work or school, and at night. Note that among the more frequently mentioned items, there are no significant differences between groups in situations where they are in a rush or feel angry or upset about something. This suggests emotional factors may affect people's seat belt regardless of intentions or motivations.

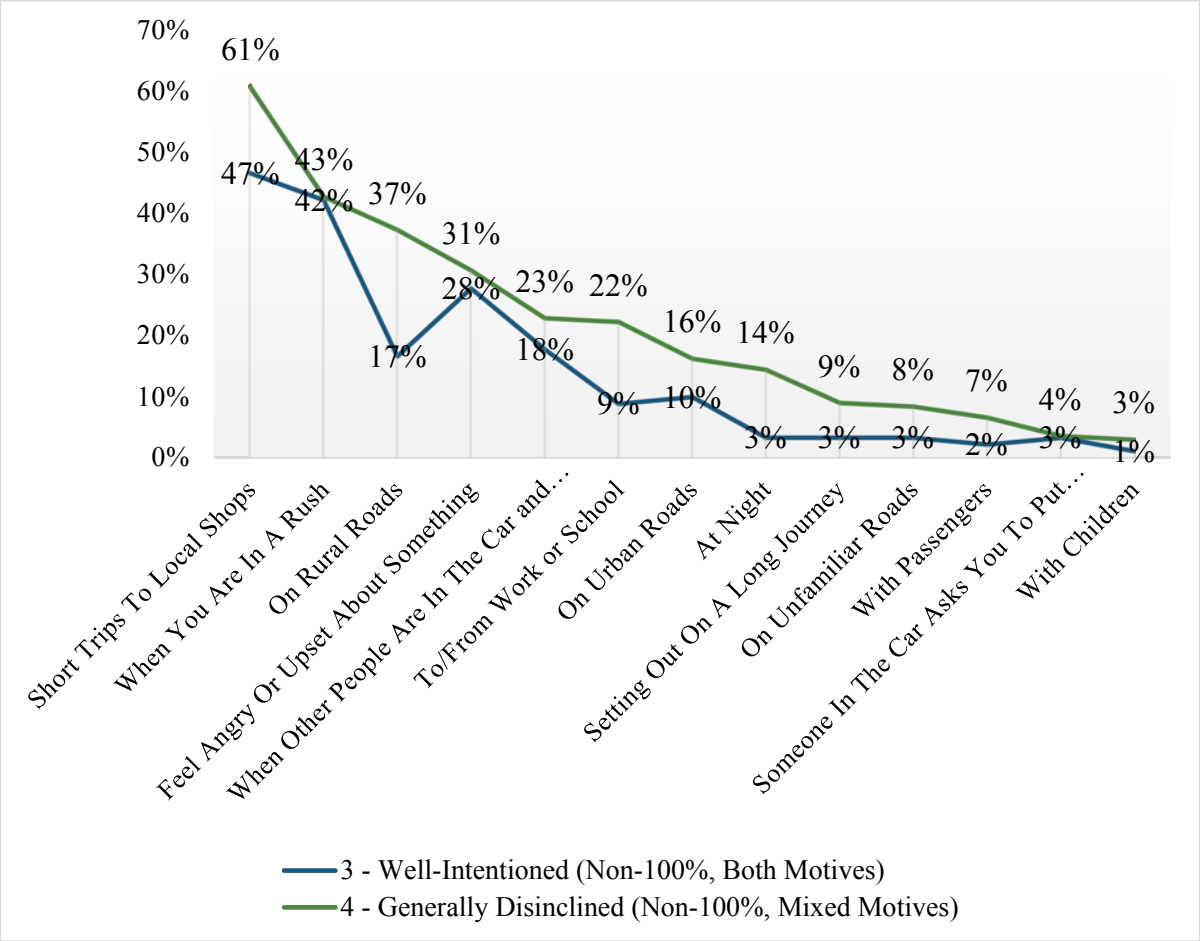


Figure 48
Situations where seat belt use decreases: comparing groups 3 and 4

Though Group 4 has a higher percentage of individuals who decrease their use across the situations, both groups are more inclined to decrease seat belt use when making short trips to local shops. Outside of emotional reasons, this particular circumstance seems to be the primary area where Group 3 is most likely to decrease seat belt use. Again, when totaling the

number of situations mentioned, drivers in Group 4 had a higher number of situations where their SB use decreases compared to Group 3. Figure 49 indicates the number of situations where SB use decreases for both groups. Looking first at Group 3, just under 40% did not mention any situations where their SB use specifically decreases, compared to about 15% in Group 4. About 30% of Group 4 reported 4 or more situations where they decrease SB use.

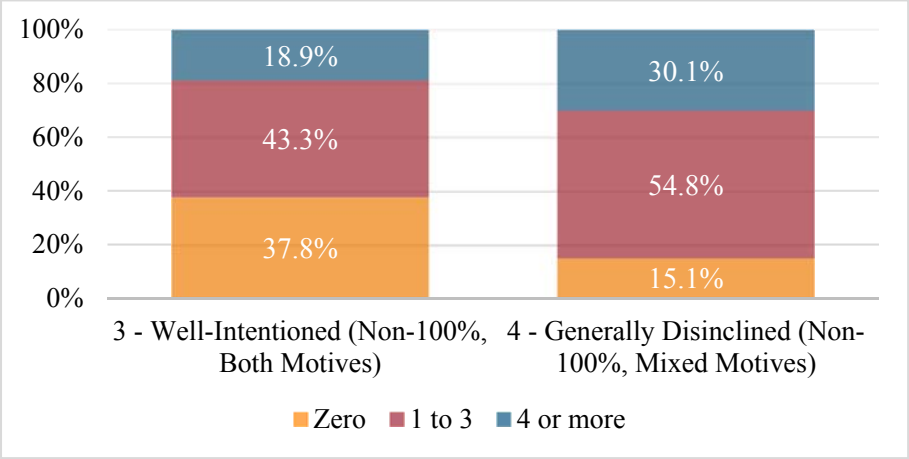


Figure 49
Number of situations mentioned: comparing groups 3 and 4

Summary. These results suggest clear differences in the groups in respect to the situations where SB use deceases as well as the exceptions to 100% use. These groups also differ across many other factors previously discussed in this report. Thus, there is a great deal of variation among individuals who lack 100% SB use. It is important to remember that the primary difference between the two groups is in their general motivational attitudes about SB use. So, while Group 3 feels they absolutely have to and want to use a SB, Group 4 does not feel this way. About 56% of individuals in Group 4 selected three of more of the available reasons as exceptions to 100% use. While there may be some validity to the exceptions individuals selected, it is important to remember that people are seldom aware of the unconscious factors influencing behavior and "exceptions" provide justification for actions on a level that seems sensible. Thus reasons are not sufficient in and of themselves to explain behavior. Situations suggest something else entirely. The number of situations where Group 4 decreases SB use are also greater than the number of situations for Group 3. Group 4 decreases SB use in situations where there are generally higher crash risks, such as at night, and on rural roads. Group 4 has about 37% reporting a decrease in seat belt use on rural roads, versus 17% in Group 3. Thus the higher rate of unbelted fatalities and serious injury

crashes in rural areas might be reduced if individuals are less willing to decrease seat belt use on rural roads.

Multistate Comparison

The multistate survey was conducted to examine whether or not non-100% users in Louisiana differ from non-100% users in other states, namely Washington, New Hampshire, and Texas. States were purposively selected for their specific qualities: Washington because it has one of the highest SB use rates in the US; New Hampshire because it has one of the lowest SB use rates and does not have a SB use law; and Texas for its high SB use rate and geographic proximity to Louisiana. Figure 50 displays the belt-use rates (as reported by NHTSA) for each state in the sample, from 2007-2014. For the most part, the states with higher use rates changed very little over time. Louisiana's rate has generally increased, even if just incrementally each year, while New Hampshire's rate has consistently fluctuated around 70%.

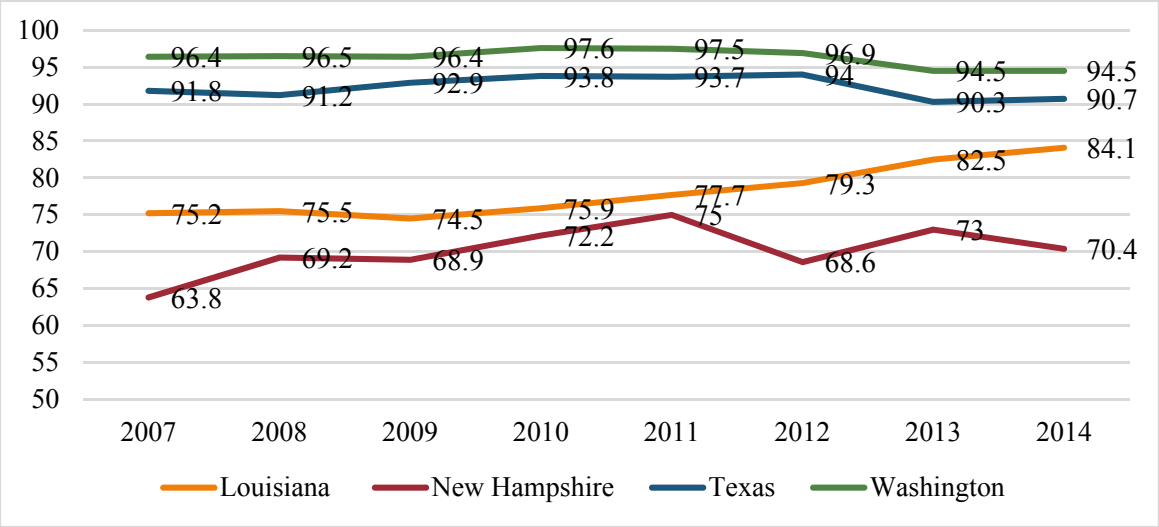


Figure 50
Seat belt use rates in Louisiana, New Hampshire, Texas, and Washington: 2007-2014

The multistate survey sample (N=1,053) was obtained through Qualtrics Panels. It was not possible to obtain a truly random sample for several reasons. First, Internet survey panels consist of individuals who have opted-in and are thus self-selected. Second, the quota sampling techniques previously explained in this report ensure an over-sample of non-100% drivers across the four states. To be eligible for participation, respondents had to be licensed

to drive in one of the four selected states and between the ages of 18-45. Finally, to preserve a 60/40 split between females and males, a sex quota was enforced. The only state where this ratio was not achieved is New Hampshire (males represent only 18.1% of the sample). There was no financial or material incentive offered in exchange for participating in this study. Table 16 displays summary statistics of demographic categorical factors for each of the states, the last column displays summary statistics for the multistate sample overall. There are some notable differences across the samples with respect to age, sex, race, and income. Some of these differences may be attributable to sample, whereas race is probably more reflective of actual population differences.

Table 16
Demographic descriptive statistics by state

		States				Sample Total
		Louisiana	New Hampshire	Texas	Washington	
Age	18 to 24	16.7%	19.0%	27.4%	15.2%	19.0%
	25 to 35	47.7%	48.1%	42.8%	55.2%	48.3%
	36 to 45	35.6%	32.9%	29.8%	29.6%	32.7%
Sex	Male	40.9%	18.1%	43.1%	39.6%	37.7%
	Female	59.1%	81.9%	56.9%	60.4%	62.3%
Race	Caucasian	70.5%	95.2%	59.5%	79.2%	73.7%
	African American	20.9%	0.5%	11.4%	3.7%	12.2%
	Hispanic	3.1%	2.4%	21.4%	5.4%	7.4%
	Other	5.5%	1.9%	7.7%	11.7%	6.7%
Education	< High School	3.7%	4.3%	1.7%	2.3%	3.1%
	High School	17.9%	22.4%	19.1%	18.5%	18.9%
	Attending or Some College	31.1%	26.7%	36.5%	34.6%	32.3%
	College Degree/ +	47.3%	46.7%	42.8%	44.6%	45.7%
Income	< $50,000	36.2%	53.3%	58.2%	57.0%	48.0%
	In-between	43.7%	33.3%	28.1%	32.6%	36.4%
	$100,000 +	20.1%	13.3%	13.7%	10.4%	15.6%

First, Texas has a higher percentage of respondents aged 18-24 than any of the other states, as well as a slightly lower percentage of 25-35 year-old respondents than the other states. Washington has a slightly higher percentage of respondents aged 25-35. States have similar ratios of females to males, with the exception of New Hampshire, which is also 95.3% Caucasian. Race is more or less consistent with population demographics in each state, therefore Caucasians are not over-represented in New Hampshire. The Texas sample is 21.4% Hispanic, which was expected based on state population data. The percentage of African American respondents is highest for Louisiana, which was also expected. Finally,

income differences exist across states, with Louisiana appearing to be slightly more affluent than the sample in the other three states. To account for differences across states, the data are weighted by seat belt group for drawing comparisons between states. Given the sampling plan, these results are descriptive of sample differences only.

Fundamental Concepts

State samples were compared across the three fundamental concepts to determine what if any differences exist among the four states. Figure 51 displays motivation differences across states. As illustrated, Texas and Washington have a higher percentage of respondents reporting they absolutely "Have to" but do not "Want to" use a SB. Louisiana has a significantly higher percentage of individuals reporting "absolutely" to both motivations than the other three states, however, Louisiana has the lowest percentage of individuals who only absolutely "Want to."

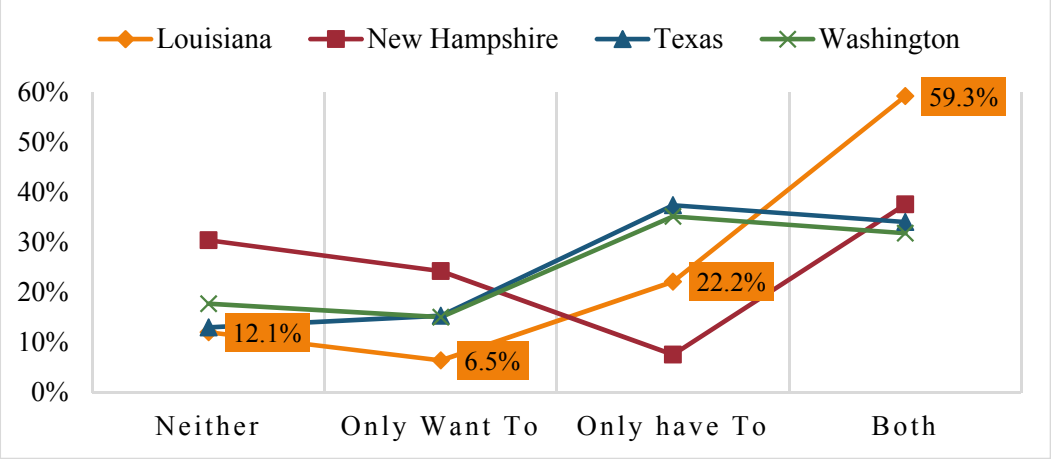


Figure 51
Motivations by state

Table 17 shows the habit composite measure by state. For the most part, the states are very similar across the habit composite measure, with only New Hampshire appearing to differ with respect to individuals who are not categorized as having a definite habit: 26.2% do not have a habit, and only 16.7% having mixed responses to the habit items. New Hampshire does not have a seat belt law and so these differences may be somewhat reflective of this. Note that percentages have been rounded.

Table 17
Habit composite by state

	Louisiana	New Hampshire	Texas	Washington	Total
Not a Habit	13.6%	26.2%	13.0%	11.7%	15.0%
Mixed	22.0%	16.7%	30.4%	30.5%	24.8%
Definitely a Habit	64.4%	57.1%	56.5%	57.7%	60.2%
	100.0%	100.0%	100.0%	100.0%	100.0%

States do not vary significantly across the process measure. Figure 52 displays process across states. The primary areas of difference occur in later phases of the process, after the vehicle is on the road. While 95% of individuals in Texas, Washington and Louisiana report fastening their SBs by this point, only 85% of individuals in New Hampshire report they do. Louisiana only slightly lags behind the other states with respect to the first three steps of the process, but this evens out before the point at which the vehicle is in motion.

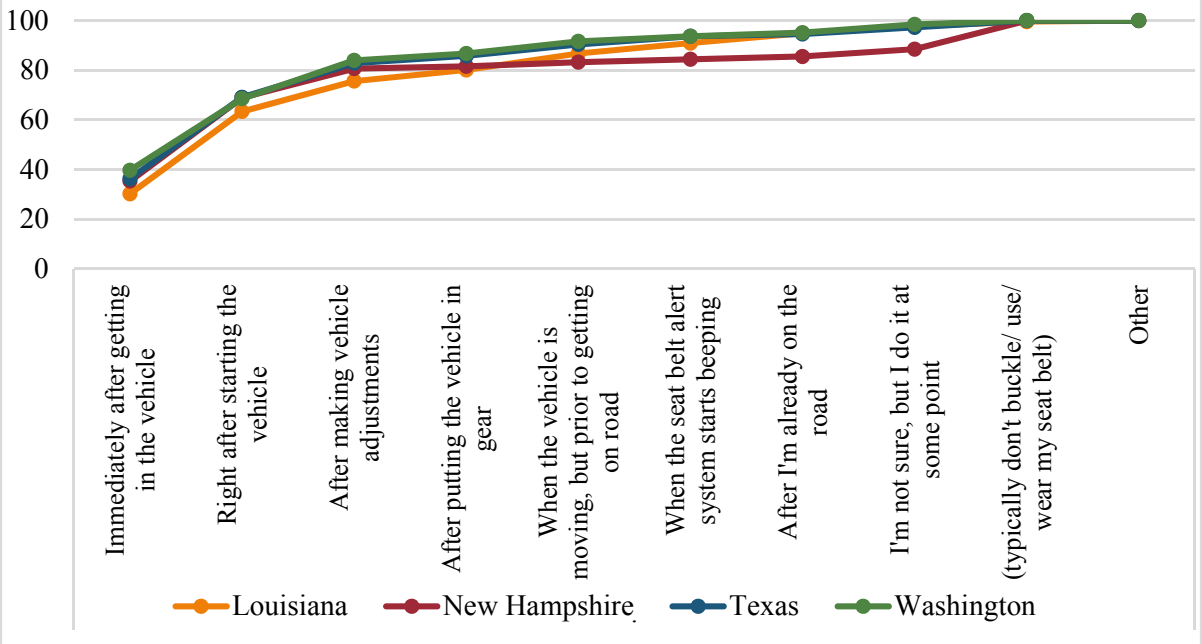


Figure 52
Process by state

States were compared across the process measure by SB use groups. Interestingly, among 100% users (i.e., Groups 1 and 2) there are no substantive differences across states with respect to process. Groups 1 and 2 across all states follow a nearly identical response pattern.

There appears to be differences by state among individuals in Group 3, however, there is also a great deal of variation in the earlier steps of the process that make it difficult to reach any meaningful interpretation. The variation levels out "when the vehicle is moving but prior to getting on the road." It is important to note that despite the variability in Group 3, each state follows a similar pattern, with about 90% fastening their SBs prior to getting on the road.

Despite sharing some similarities, there do appear to be substantial differences among individuals in Group 4 across states. As shown in Figure 53, individuals in Group 4 tend to buckle later in the process regardless of whether or not they are in a high or low-use state. In all four states, less than 16% of individuals in Group 4 fasten their SB immediately after getting in their vehicle. Differences across states become more apparent at the point "after making vehicle adjustments." Here, there is about a 20% difference between the high-use states (i.e., Texas and Washington) and the lower-use states. The high-use states follow a nearly identical pattern and in the earlier stages of the process, the lower-use states do as well. Louisiana separates from New Hampshire once the vehicle is already moving and joins Texas and Washington once the vehicle is on the road. About 33% of Group 4 in New Hampshire typically does not use their SB.

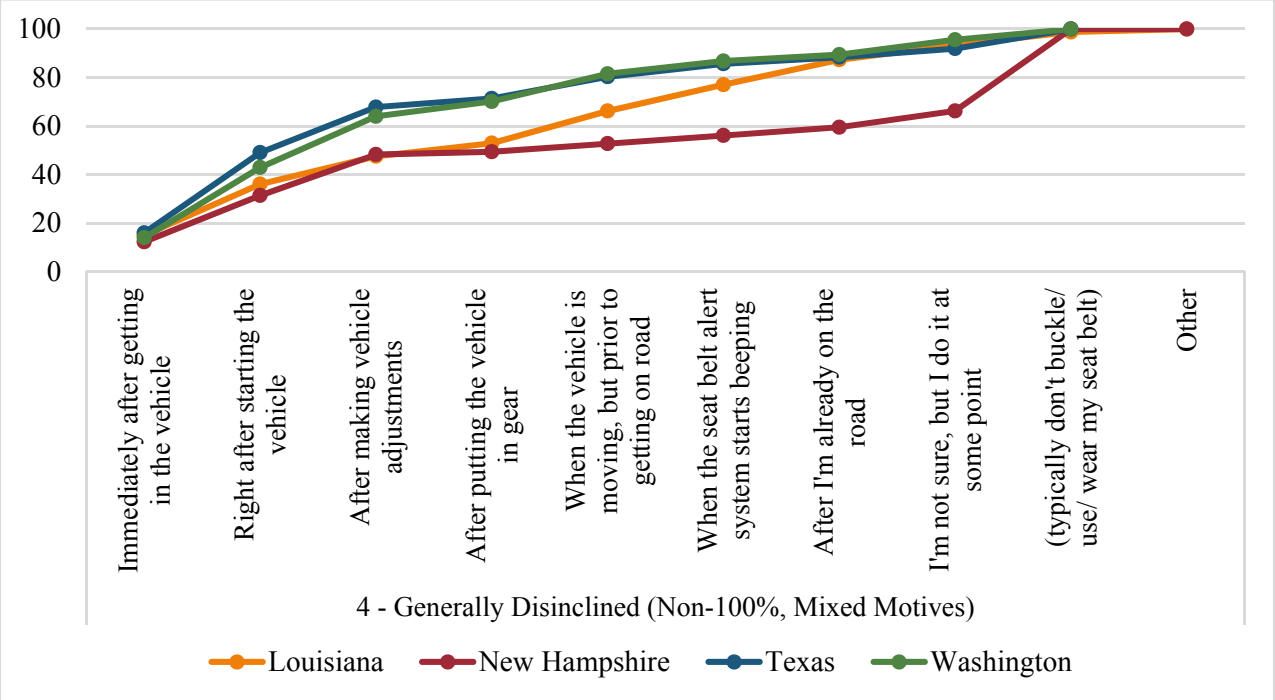


Figure 53
Group 4 process by state

Attitudinal Factors. Sample responses on the attitudinal items were compared by state. With only a few exceptions involving New Hampshire, there were very few substantive differences between states. Most differences observed were related to enforcement. SB use groups tend to be similar across states for the most part as well. In general, responses tend to follow a similar pattern, though there is some within-group variation that appears to differ between states. For a closer examination, results are displayed in Figures 54 and 55.

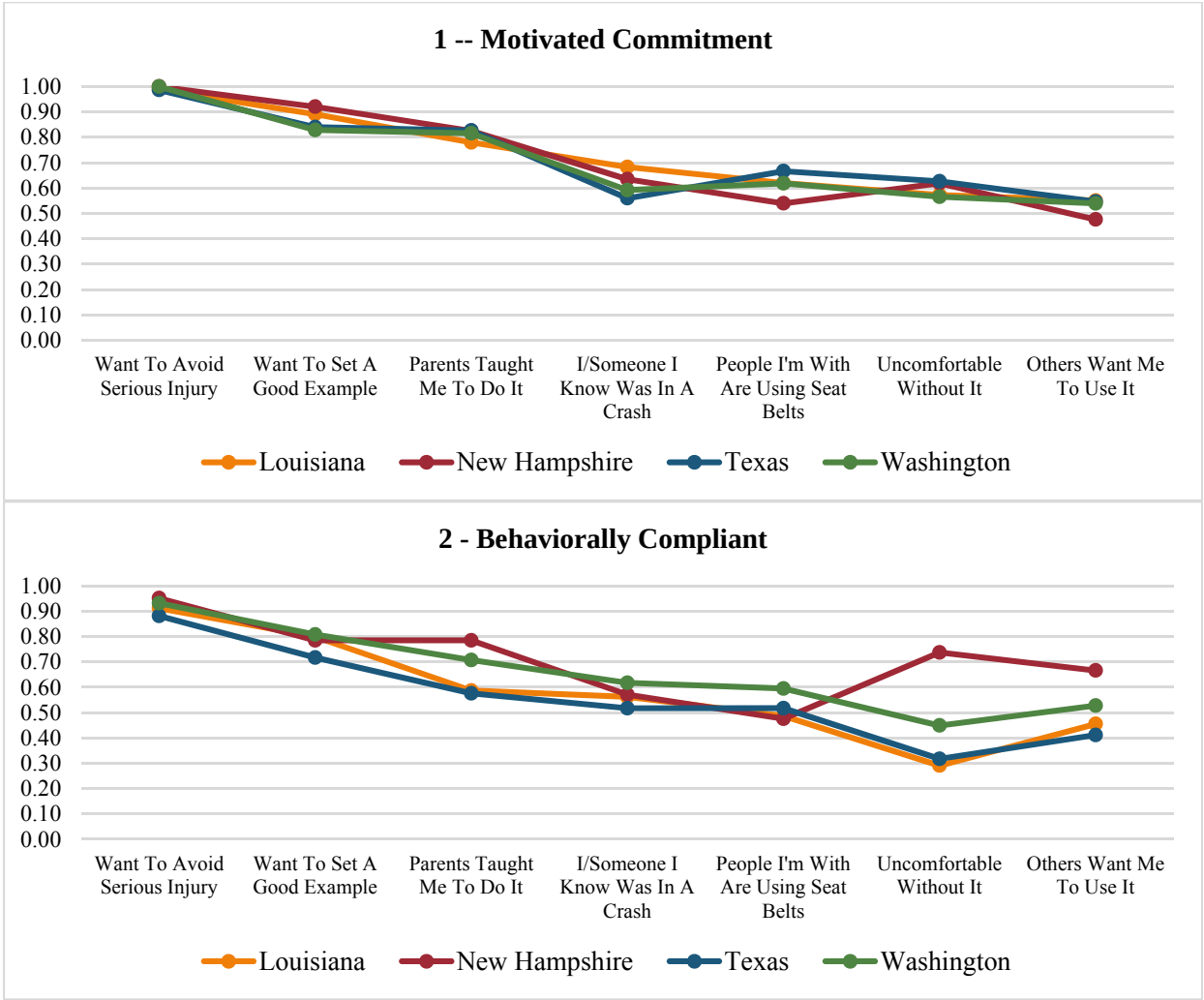


Figure 54
Seat belt attitudes for 100% seat belt use groups 1 and 2 by state

As shown in Figure 54, Group 1 respondents appear to be very similar across the four states. These individuals are motivated to use a SB and are committed to doing so. Compared to the

other groups, they tended to have higher percent agreement for many of the items, particularly the items "Want to avoid serious injury" and "Parents taught me to do it." In contrast, Group 2 uses SBs 100% of the time but lack strong motivations. As illustrated, there is very little difference between Texas and Louisiana. Respondents in Louisiana, Texas, and Washington tend to display similar response patterns, however, New Hampshire respondents tended to have about 10-40% higher percent agreement with three items, "Parents taught me to do it," "Uncomfortable without it," and "Others want me to use it" than the other three states. Considering that New Hampshire does not have a SB law, it is possible these social forces may encourage otherwise less-motivated people to "comply" with SB use.

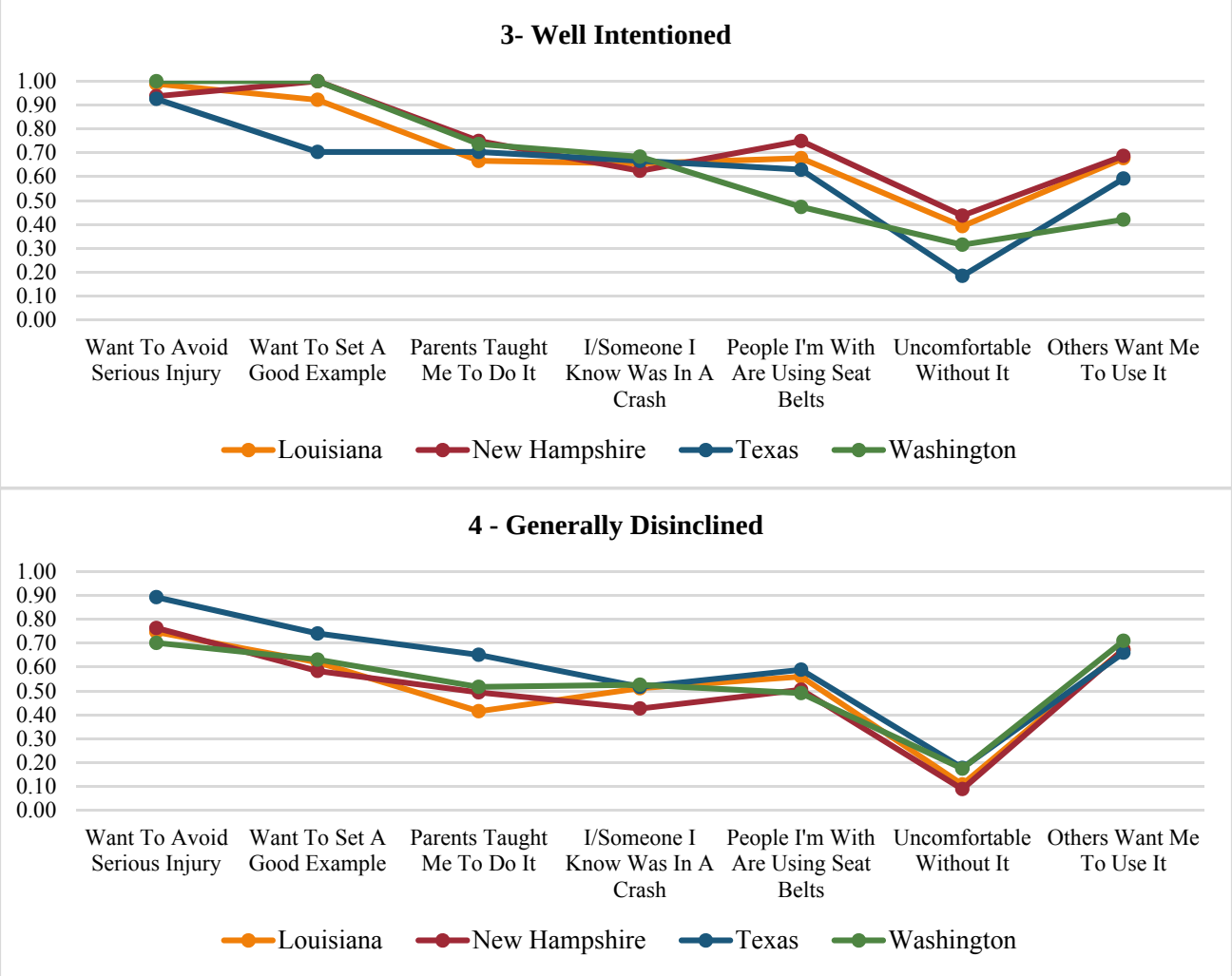


Figure 55
Seat belt attitudes for non-100% seat belt use groups 3 and 4 by state

Figure 55 illustrates Groups 3 and 4 responses to the attitudinal items for each of the four states. As shown, there appears to be considerable variation among Group 3 respondents in four items, but virtually no difference for items "Want to avoid serious injury," "Parents taught me to do it," and "I/ someone I know was in a crash." The items with highest percent agreement include "Want to avoid serious injury" and, with the exception of Texas, "Want to set a good example." Texas tends to have lower percent agreement for most items than the Group 3 respondents in the other states. Additionally, Louisiana and New Hampshire tend to have higher percent agreement than Washington and Texas on items "People I'm with are using SBs," "Uncomfortable without it," and "Others want me to use it." There is much less variation across states among Group 4 respondents, and this is especially the case for the three aforementioned items. The item, "Others want me to use it," has the least variation. Interestingly, within-state group comparisons suggest there is very little difference between Group 3 and Group 4 respondents in Texas. In general, Group 4 respondents in Texas have about an 11-20% higher agreement with items "Want to avoid injury," "Want to set a good example," and "Parents taught me to do it" than the other states.

Overall, Figures 54 and 55 illustrate consistent differences among SB use groups in their responses to many attitudinal items, i.e., personal social reasons for SB use, and to some degree, these differences appear to hold across states. With few exceptions, Groups 1 and 3 have relatively higher percent agreement with statements than Groups 2 and certainly, Group 4. This is consistent with previously reported analysis regarding motivation and its relation to SB use. For instance, the first item, "Want to avoid serious injury," has highest agreement among Group 1 (R=99-100%) and Group 3 (R=93-100%) respondents in all states, followed by Group 2 (R=88-93%) and Group 4 (R=70-76%, with Texas being an outlier at 89%).

Summary. The multi-state comparisons provide greater insight into individuals' belt-use behavior, in general. The analysis comparing the groups' aggregate responses to attitudinal and behavioral suggests there are few substantive differences between the states in the sample. New Hampshire differed from the other states on items regarding SB law enforcement and ticket likelihood, which is to be expected. Throughout the analysis, Texas and Washington share some similarities that may reflect characteristics of individual drivers in a high-use state. In these two states, non-100% drivers appear to have relatively higher use on a regular basis than they do in the two lower-use states. Looking at the overall motivations, Texas and Washington have a fairly high percentage of respondents who view their SB use as something they "Only Have to" do, and a relatively lower percentage of those viewing their SB use as something they "Only Want to" do. Individuals in these states also

appear to fasten their SB earlier in the process. This appears to be the case across all SB use groups, including Group 4. Given the fact that both Texas and Washington have had consistently high belt-use rates over the past decade, perhaps the cultural norms regarding SB use may play a role in establishing routine and process, even among those with lesser degrees of intrinsic motivation. These findings have important implications that will be discussed further in the Conclusions section of the report. The next section returns attention back to Louisiana (pooled sample) to report media usage results.

Media Usage of Louisiana Respondents

Louisiana respondents were asked about their media use on a typical day to provide insight into media use among the sample overall and to explore whether or not there are differences across the four SB groups. First, about 90% of respondents have a cell phone capable of accessing the Internet, about 82% have access to the Internet from a computer, and about 47% report having access to an additional Internet-enabled mobile device (e.g., iPad, Kindle Fire, another kind of tablet). There are no significant group differences in mobile device access. Respondents were asked to tell how much time they spend on a typical day: Watching TV; Reading a Print Newspaper; Listening to Local Radio; and Using the Internet. Response categories ranged from "No Time at All" to "More than 3 Hours." Figure 56 displays the time spent using various media for the sample overall.

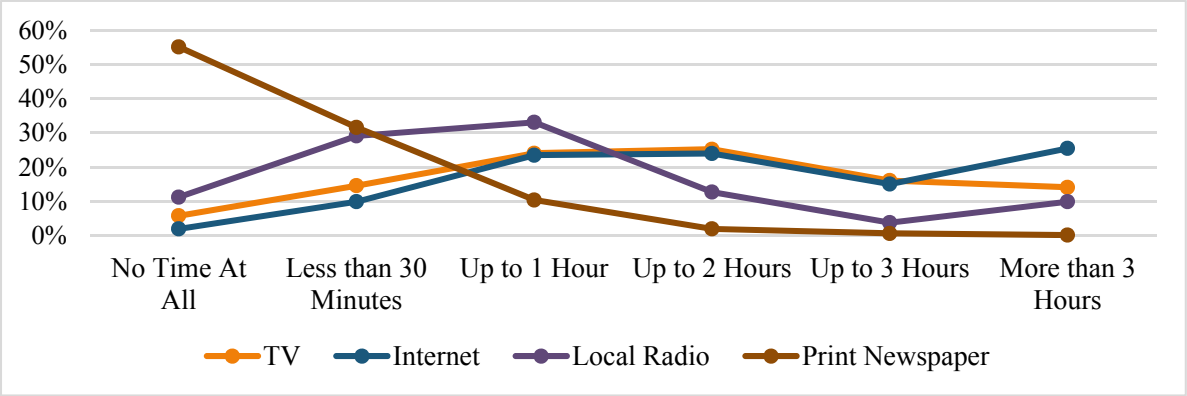


Figure 56
Time spent using various types of media

As illustrated, respondents spend considerably more time per day using Internet and/or watching TV than they do reading a print newspaper or listening to local radio. Given the 18-45 age range, it is not surprising that over half of the sample spends no time at all reading a

newspaper. In comparison, about 88% do report listening to at least some local radio on a typical day, possibly during their daily commute. Over half the sample spends one or more hours watching TV on a typical day and about 65% spend one or more hours using the Internet. About 30% watch TV for more than 2 hours a day, while 40.6% report using the Internet more than two hours a day. Figure 57 shows a comparison of time spent watching TV and using the Internet by SB use group. As illustrated, there do not appear to be any substantive differences in terms of the amount of TV or Internet use on a typical day.

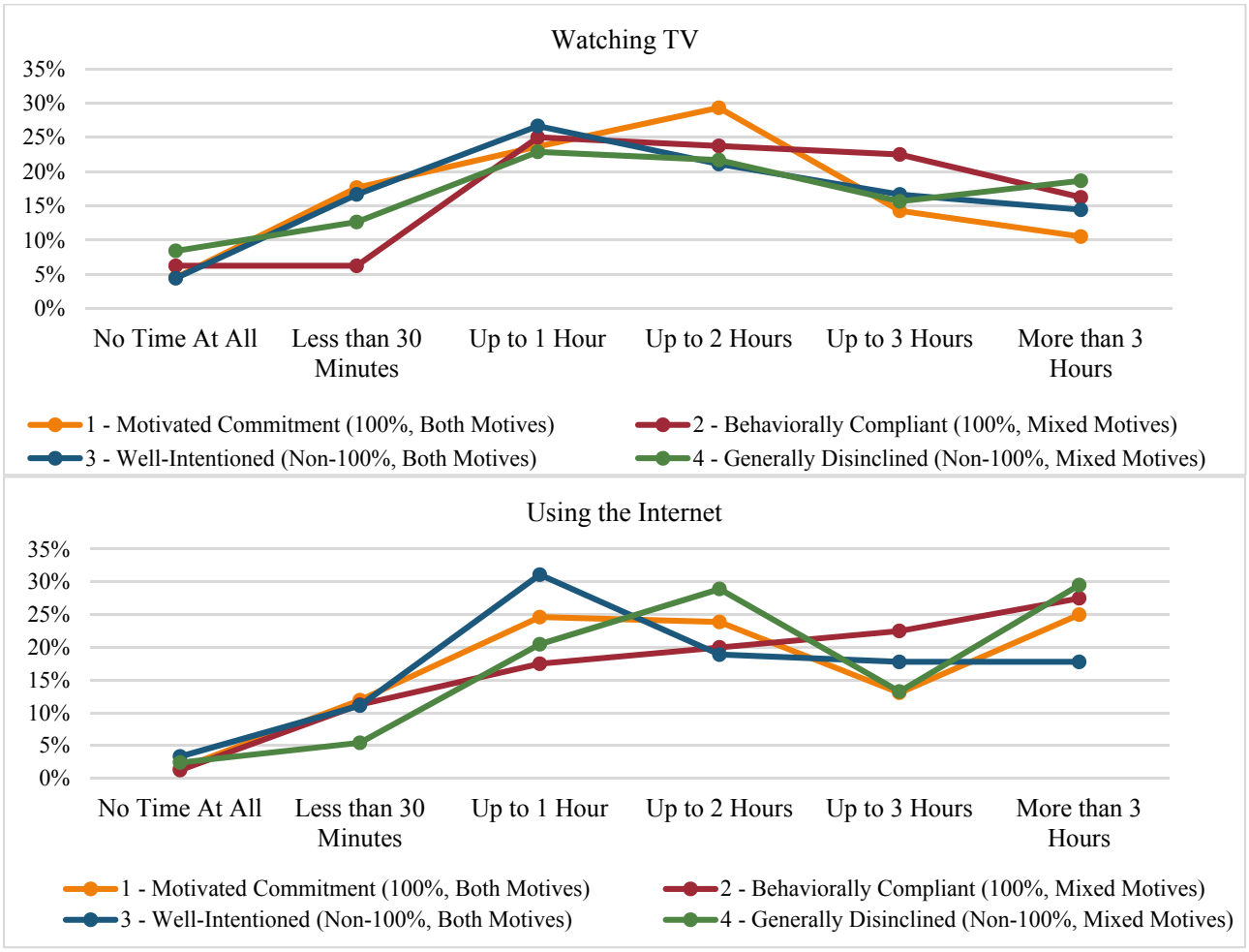


Figure 57
Time spent watching TV and using the Internet on typical day by SB use groups

Respondents were asked to elaborate on the kinds of activities they tend to engage in online. They were presented with a list of common Internet activities and were told check all that apply. Figure 58 displays respondents' usual online activities by SB use group. As illustrated,

there are few substantive differences. The most noteworthy finding with respect to group differences is in online gaming, which is highest among Group 4. Nearly 57% of Group 4 regularly plays online games. There is about a 20% gap between Group 1 and Group 4.

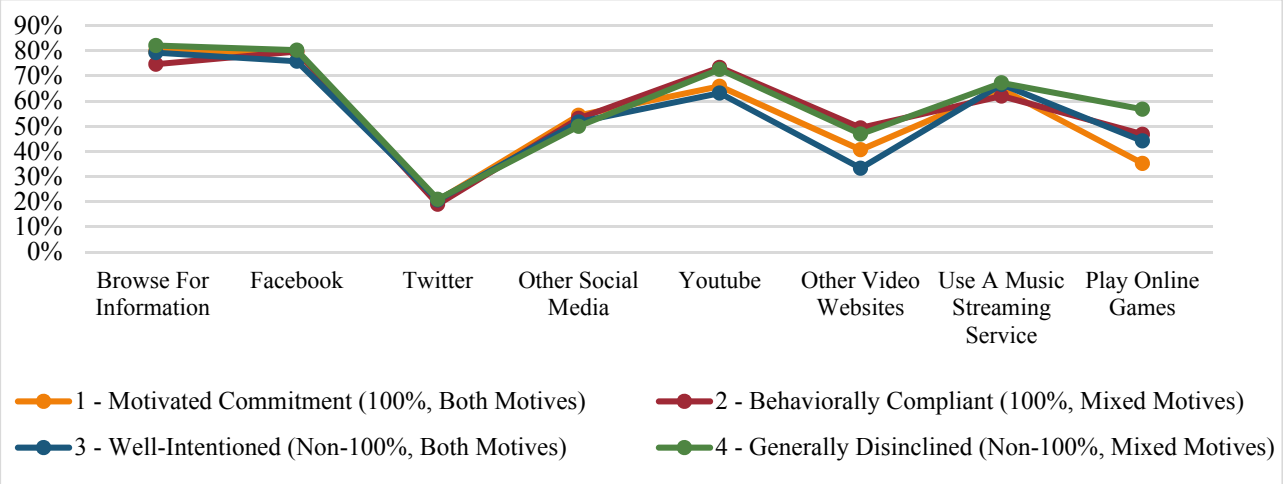


Figure 58
Online activities by seat belt use group

Summary. The findings regarding media use activities suggest television and online media would be ideal for disseminating targeted messaging. There do not appear to be any substantive group differences with respect to Internet access, time spent consuming specific types of media, or in usual online activities, for the most part. Facebook and information sources (i.e., news, sports, weather) experience the greatest use among the sample as a whole, followed by YouTube and music streaming services (e.g., Pandora, Spotify). Only 20% of the sample uses Twitter regularly. Online gaming is a fairly common activity for a sizable portion of the sample. About 57% of individuals in Group 4 report they regularly play online games and about 44% of individuals in Group 3 report this as well. This finding suggests it may be worthwhile to explore potential options for disseminating specific targeted messages/advertisements via popular online gaming sites to reach the non-100% population.

CONCLUSIONS

This report provides important insight into factors affecting belt use among individuals and groups in Louisiana and beyond. The conclusions from the study revolve around consistencies in the analysis that help shed insight into enforcement and human behavior elements of belt use.

First, prior research has long suggested particular demographic factors correlate with low-use. The roadside survey analysis also indicates demographic differences. While certain demographic profiles do have unique usage patterns (e.g., males in pickups), the generalized effects of demographics on seat belt use are less substantial than those of motivations, beliefs, attitudes and associated behaviors (i.e., seat belt process). Internal (Want To) and external (Have To) motivations, in combination, are highly associated with 100% seat belt use. Having a well-formed habit and its behavioral manifestation in a person's driving routine (i.e., fastening the seat belt much earlier in the process), are the best correlates with 100% seat belt use. This finding did not differ between states included in our sample, which suggests some degree of universality in routine belt use. These findings are consistent with prior research examining the relationship of habit to belt use.

Rather than viewing belt use as an all-or-nothing behavior, it should be viewed as a continuum of commitment, with people ranging from highly committed (i.e., exhibit strong habits, especially when combined with strong motivations) to those with less commitment to belt use, particularly when faced with certain situations or exceptional circumstances. For instance, individuals who fall into Group 3, the "well-intentioned" motorists, possess high motivational commitment to using a seat belt but lack the established habits and stable routine to ensure 100% use. These individuals are already attitudinally inclined to use seat belts, therefore messaging that encourages them to, e.g., "make seat belt use a habit by always buckling up before putting the vehicle in gear" may have great potential for increasing use. It is worth mentioning here that non-100% belt users in this study indicated less parental involvement than did 100% users. This finding is particularly notable among those who are well-intentioned but lack the habit and routine.

Individuals in Group 4 are noticeably different than Group 3 drivers in terms of attitudes and beliefs regarding use and are described as "generally disinclined." Individuals in Group 4 tended to cite three or more reasons/exceptions to 100% use, which more or less suggests they just do not want to use seat belts. The relative deficit of positive reasons to use seat belts

combined with many reasons not to, makes the goal of changing behavior more challenging from a state perspective. This group will require a series of targeted messages concerning specific beliefs as well as a disseminated via non-traditional media approach.

Social and geographic context also appears to be related to belt use in a general sense. The spatial analysis indicates there is a concentration of lower seat belt use in the middle section of the state. The roadside survey does not observe belt use in this region due to sampling restrictions, however, many crashes involving unbelted drivers and passengers occur here. Knowing the locations where belt use is less regular and crash rates are high provides an opportunity for developing focused outreach to rural populations, especially among rural teens and young adults, who are at greater risk of crash involvement.

From the roadside survey, it is possible to generally estimate how large the group of non-100% users might be. Both Group 3 and Group 4 use exceptions when they might not wear a seat belt. It is reasonable to suggest that drivers who do not use a seat belt on an interstate are not very likely to use a seat belt anywhere. So, the percentage of drivers not wearing a seat belt on an interstate is closely representing drivers who do not wear a seat belt at all. These are the drivers who would likely belong to Group 3 or Group 4, which may be referred to as the holdout group. The 2015 roadside survey shows that there were 10.4% of drivers on interstates not using a seat belt. Thus the holdout group may be about 10%, which would be about 300,000 drivers in Louisiana at high risk of being killed in a traffic crash.

Seat belt laws have been shown to be effective in raising belt use rates when enforced and thus reducing injuries and death, however, the CIOT approach as the primary strategy to increase belt use appears to have reached its limits. Attempts to identify a relationship between enforcement efforts or other public outreach programs and seat belt use were not successful for several reasons, the most important being that it isn't possible to isolate cause and effect without a randomized carefully-designed experiment. There is no central data source that tracks the seat belt violations for the entire state, and Louisiana State Police do not track citations at the parish level. At a minimum, this data should at least be compiled by troop. Even with this data, measuring the impact of enforcement efforts on belt use will be limited by default.

Looking at the available citation data only, it would appear that seat belt enforcement is quite effective at ticketing drivers who do not use seat belts. According to the data, one out of two

drivers who do not use a seat belt has likely received a seat belt citation. This number is even higher if the citations reported by police agencies are included. The analysis suggests that just receiving a violation is not particularly instrumental in encouraging these drivers to change their behavior. Also, the somewhat concentrated enforcement efforts (e.g., there are significantly more seat belt tickets written in May during the CIOT mobilizations) may also hinder more widespread driver response. From an enforcement perspective, it may be necessary to implement harsher penalties and/or impose higher fines to increase compliance. For example, seat belt violations could be shared with insurance companies so that insurance premiums are adjusted to account for the risk of severe injury and cost associated with these injuries.

Youths who receive their license at age 17 are at higher risk of not using a seat belt. Youths aged 15 and 16 are likely to drive under supervision of parents for some time which may instill the habit of belt use. The most effective way of increasing overall belt use rates over time is in working with young drivers. More emphasis should be placed during driver education on the reasons to use a seat belt and the consequences associated with not using a seat belt. Also, license suspension for minors should be considered given the risk of not wearing a seat belt.

There is no other single factor that increases the chances of survival in a crash than wearing a seat belt. Thus a seat belt violation should be recorded just as speeding tickets and DWI's. This is essential for assessing the factors relating to belt use such as age of driver, geographic distribution, and high risk behavior of drivers such as speeding and DWI.

RECOMMENDATIONS

There are many steps that can be taken to increase seat belt use in Louisiana. The recommendations are presented as follows:

Communication

Work with public communication practitioners to develop a comprehensive strategic communication plan to promote seat belt use year-round. The focus should be on creating positive messages to increase Motivation, Behavior-Awareness, and Routine-Awareness of seat belt use. Social media (especially Facebook), YouTube, and music streaming services provide affordable or low-cost opportunities to reach drivers in younger demographics. This may be accomplished by creating visually-compelling, relevant pro-seat belt messages that can easily be shared across social media platforms (e.g., memes, videos). Expanding the use earned media to include positive messaging is another lower-cost method to disseminate pro-seat belt messages.

To reach out specifically to part-time or situational non-users, messages should be crafted to counter common situational exceptions (e.g., quick trip to the store) with pro-seat belt messages that place an emphasis on "Every trip. Every time." Some people want to use seat belts but lack the contextual stability of routine to form a habit that ensures belt use. Such messages could emphasize behavior and routine awareness to remind Well-Intentioned drivers the easiest way to make their seat belt use a habit is by making it a point to always buckle up before putting their vehicle in gear.

The greatest communication challenge is in convincing drivers (especially young people) who neither believe they have to or want to use a seat belt that they should. These are drivers that are not persuaded by the threat of a ticket. One idea to reach these "generally disinclined drivers is to create compelling visual messages that counter widely-held beliefs regarding exceptions to 100% use with factual reasoning, e.g., "Seat belts might be uncomfortable, but not as uncomfortable as being in a wheelchair." The overall message intent should be on increasing individuals' motivation to use seat belts rather than deterrence from non-use (or breaking the law).

Education

Developing a SB use habit among the young is the BEST way to encourage 100% use. To this end, parents, peer networks, and driver education play a substantial role. There are many potential opportunities for education outreach that may be achieved by establishing partnerships at the local/community level and by reaching out to high schools, especially those in rural and lower-income communities in the middle of the state.

Penalties/Fines

Treat seat belt use violations as seriously as other moving violations especially for drivers under the age of 18. Potentially modify language in the law to increase penalty. There are many adults with multiple SB violations, which indicates some drivers are not likely to change their behavior. Fines under $50 are probably not going to impact the hold-out drivers much. It would be worthwhile to consider increasing the severity of the penalty for individuals getting multiple SB and/or child OP violations and add court cost when fines are not paid.

On a related note, the manner in which citation data is currently collected from police agencies makes it difficult to analyze by location in the state. To improve the quality of citation data analysis, it should be collected at the parish level or, at a minimum, troop level, if parish level is not available from the state police.

Research

Further research to generate greater insight into SB use behavior of individuals in Groups 3 and 4 would be particularly helpful. One way to do this would be to partner with State Universities and Colleges to examine seat belt use from multiple interdisciplinary perspectives and methodologies. This is especially important to the extent that young adults are of special interest. By reaching out to Universities across the state to form partnerships, the potential to carry out longitudinal and experimental research designs is enhanced. These types of methodologies provide greater understanding of human behavior. Longitudinal studies can shed insight on behavior and attitudes over time and investigate some of the less-

understood aspects of seat belt behavior. Experimental studies can isolate and test for causal relationships.

Another application for research is in the development and reception of targeted messages. Conducting focus groups in the message development phases may help generate important insight into what might work best to reach different segments in the target population. Messages can also be tested to determine what strategies have greatest appeal to the target populations.

ACRONYMS, ABBREVIATIONS, AND SYMBOLS

ADT	Average Daily Travel
CIOT	Click It or Ticket
CRD	Child Restraint-Deficient (hotspot)
CTSP	Community Traffic Safety Program
DDEP	Data-Driven Enforcement Program
DOTD	Louisiana Department of Transportation and Development
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
GAO	US Government Accountability Office
GIS	Geographic Information System
GSP	Gross State Product
HPMS	Highway Performance Management System
HSP	(State) Highway Safety Plan
HSRG	Highway Safety Research Group
HT	Have To
HVE	High Visibility Enforcement
LEL	Law Enforcement Liaison
LHSC	Louisiana Highway Safety Commission
LSP	Louisiana State Police
LSU	Louisiana State University
LTRC	Louisiana Transportation Research Center
MAP-21	Moving Ahead for Progress in the 21st Century Act
MVOSS	Motor Vehicle Occupant Safety Survey
NCSA	National Center for Statistics and Analysis
NHTSA	National Highway Traffic Safety Administration
NOPUS	National Occupant Protection Use Survey
OMV	Office of Motor Vehicles
OP	Occupant Protection
PD	Police Department
PPS	Probability Proportional to Size
QC	Quality Control
R	Range
RD	Restraint-Deficient (hotspot)
SB	Seat Belt
SES	Socio-Economic Status

SRF	Social Resistance Framework
STL	Surface-Type Log
TIGER	Topographically Integrated Geographic Encoding and Referencing
VMT	Vehicle Miles Traveled
VSL	Value of Statistical Life
WT	Want To
ZCTA	Zip Code Tabulation Area

REFERENCES

1. National Center for Statistics and Analysis. *Occupant Protection in Passenger Vehicles: 2014 Data.* Traffic Safety Facts, Report No. DOT HS 812 262. Washington, DC: National Highway Traffic Safety Administration. April 2016. https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812262.

2. Shinar, D. *Traffic Safety and Human Behavior.* Bingley: Emerald Group Publishing Limited. 2007.

3. Reinfurt, D., A. Williams, J. Wells, and E. Rogman. "Characteristics of Drivers Not Using Seat Belts in a High Belt Use State." *Journal of Safety Research*, Vol. 27, No. 4, pp. 209–215. 1996.

4. Preusser Research Group. "Seat Belt, Speeding, Impaired Driving, & Highway Safety Issues," Attitudinal Survey of Louisiana Drivers. 2013.

5. Preusser, D.F. and Preusser, C.W. "Evaluation of Louisiana's safety belt law change to primary enforcement." September 1997.

6. Ash, I.K., Edwards, A.L. and Porter, B.E. "An investigation of state population characteristics that moderate the relationship of state seat belt law and use in the United States," *Accident Analysis & Prevention*, Vol. 71, pp 129-136. October 2014.

7. Molnar, L. J., Eby, D. W., Dasgupta, K., Yang, Y., Nair, V. N., & Pollock, S. M. "Explaining state-to-state differences in seat belt use: A multivariate analysis of cultural variables," *Accident Analysis & Prevention*, Vol. 47(0), pp. 78-86. 2012.

8. Solomon, M.G., Preusser, D.F. and Nissen, W.J. "Evaluation of Maryland, Oklahoma and the District of Columbia's Seat Belt Law Change to Primary Enforcement," March 2001.

9. Houston, D.J. and Richardson, L.E. "Getting Americans to buckle up: the efficacy of state seat belt laws." *Accident Analysis & Prevention*, 37(6), 2005, pp.1114-1120.

10. Nichols, J.L., Tippetts, A.S., Fell, J.C., Auld-Owens, A., Wiliszowski, C.H., Haseltine, P.W. and Eichelberger, A. *Strategies to Increase Seat Belt Use: An*

Analysis of Levels of Fines and the Type of Law. Report No. DOT HS 811 413. Washington, DC: US Department of Transportation, November 2010.

11. Nichols, J.L., Tippetts, A.S., Fell, J.C., Eichelberger, A.H. and Haseltine, P.W. "The Effects of Primary Enforcement Laws and Fine Levels on Seat Belt Usage in the United States." *Traffic Injury Prevention*, Vol. 15, No. 6, 2014.

12. Ulmer, R.G., Preusser, C.W., Preusser, D.F. and Cosgrove, L.A. "Evaluation of California's Safety Belt Law Change from Secondary to Primary Enforcement." *Journal of Safety Research*, Vol. 26, No. 4, 1996, pp.213-220.

13. Nichols, J. L., Chaffe, R., and Solomon, M.G. *Impact of Implementing a Primary Enforcement Seat Belt Law in Florida: A case study*. Report No. DOT HS 811 656. Washington, DC: National Highway Traffic Safety Administration. August 2012.

14. St. Louis, R.M., Mercer, B.J., and Eby, D.W. *Documenting How States Recently Upgraded to Primary Seat Belt Laws*. DOT HS 811 524. September 2011.

15. Strine, T.W., Beck, L., Bolen, J., Okoro, C. and Li, C. "Potential Moderating Role of Seat Belt Law on the Relationship between Seat Belt Use and Adverse Health Behavior." *American Journal of Health Beh*avior, Vol. 36, No. 1, 2012, pp.44-55.

16. Harper, S., Strumpf, E., Burris, S., Davey Smith, G. and Lynch, J. "Do Mandatory Seat Belt Laws Affect Socioeconomic Inequalities in Seat Belt Use?" 2012. *Available at SSRN 2120120.*

17. Beck, L.F., Shults, R.A., Mack, K.A. and Ryan, G.W. "Associations between Sociodemographics and Safety Belt Use in States with and without Primary Enforcement Laws." *American Journal of Public Health*, Vol. 97, No. 9, 2007, pp.1619-1624.

18. Beck, L.F. and Shults, R.A. "Seat belt use in States and territories with primary and secondary laws--United States, 2006." *Journal of Safety Research,* Vol. 40, No. 6, 2009, pp.469-472.

19. Briggs, N.C., Schlundt, D.G., Levine, R.S., Goldzweig, I.A., Stinson, N. and Warren, R.C. Seat belt law enforcement and racial disparities in seat belt use. *American Journal of Preventive Medicine*, Vol. 31, No. 2, 2006, pp.135-141.

20. Dee, T. S. “Reconsidering the effects of seat belt laws and their enforcement status.” *Accident Analysis & Prevention,* Vol. 30, No. 1, 1998, pp.1-10.

21. Chen, Y. Y. Seat belt use in 2014–Use Rates in the States and Territories. Report No. DOT HS 812 149. Washington, DC: National Highway Traffic Safety Administration. June 2015.

22. National Highway Traffic Safety Administration. *High Visibility Enforcement Implementation.* Undated. http://www.nhtsa.gov/Driving-Safety/Enforcement-&-Justice-Services/HVE. Accessed on November 1, 2016.

23. National Highway Traffic Safety Administration. *High Visibility Enforcement-Publicity.* Undated. http://www.nhtsa.gov/Driving-Safety/Enforcement-&-Justice-Services/HVE%E2%80%93publicity. Accessed on November 1, 2016.

24. Williams, A.F. and Wells, J.K. “The role of enforcement programs in increasing seat belt use.” *Journal of Safety Research*, Vol. 35, 2004, pp. 175– 180.

25. Guttman, N. Communication, Public Discourse, and Road Safety Campaigns: Persuading People to be Safer. Routledge, 2014.

26. Van Houten, R., Reagan, I.J. and Hilton, B.W. “Increasing seat belt use: Two field experiments to test engineering-based behavioral interventions.” *Transportation Research Part F: Traffic Psychology and Behaviour*, Vol. 23, 2014, pp.133-146.

27. Milano, M., McInturff, B., and Nichols, J.L. “The Effect of Earned and Paid Media Strategies in High Visibility Enforcement Campaigns.” *Journal of Safety Research,* Vol. 35, No. 2, 2004, pp.203-214.

28. National Highway Traffic Safety Administration. *National Seat Belt Enforcement Mobilization May 19 through June 1, 2014*. Undated. https://web-beta.archive.org/web/20160306195002/http://www.nhtsa.gov/PEAK. Archived on March 6, 2016.

29. Tison, J., and Williams, A. F. *Analyzing the First Years of the Click It or Ticket Mobilizations.* Report DOT HS 811 232. Washington, DC, 2012.

30. Hinch, M., Solomon, M., and Tison, J. "The Click It or Ticket Evaluation, 2012" *Traffic Safety Facts Research Note*. Report DOT HS 811 989. Washington, DC: National Highway Traffic Safety Administration, 2014.

31. Chaudhary, N. K., Solomon, M.G., and Cosgrove, L.A. "The Relationship Between Perceived Risk of Being Ticketed and Self-Reported Seat Belt Use." *Journal of Safety Research*, Vol. 35, No. 4, 2004, pp.383-390.

32. Snyder, L.B. and Hamilton, M.A. "A Meta-Analysis of US Health Campaign Effects on Behavior: Emphasize Enforcement, Exposure, and New Information, and Beware the Secular Trend." *Public Health Communication: Evidence for Behavior Change*, 2002, pp.357-383.

33. Snyder, L.B., Hamilton, M.A., Mitchell, E.W., Kiwanuka-Tondo, J., Fleming-Milici, F. and Proctor, D. "A Meta-Analysis of the Effect of Mediated Health Communication Campaigns on Behavior Change in The United States." *Journal of Health Communication,* Vol. 9, No. S1, 2004, pp.71-96.

34. Hedlund, J., Gilbert, S. H., Ledingham, K. A., and Preusser, D. (2008, August). *How States Achieve High Seat Belt Use Rates.* Report DOT HS 810 962. Washington, DC. August 2008.

35. Vasudevan, V., Nambisan, S.S., Singh, A.K. and Pearl, T. "Effectiveness of Media and Enforcement Campaigns in Increasing Seat Belt Usage Rates in a State with a Secondary Seat Belt Law." *Traffic Injury Prevention*, Vol. 10, No. 4, 2009, pp.330-9.

36. Nichols, J.L. and Solomon, M.G. *Click It or Ticket Evaluation, 2010*. Report DOT HS 811 778. 2013.

37. U.S. Government Accountability Office. *Improved Reporting and Performance Measures Would Enhance Evaluation of High-Visibility Campaigns.* GAO-08-477. Report to Chairman, Committee on Transportation and Infrastructure, House of Representatives. April 2008. http://www.gao.gov/assets/280/274729.pdf. Accessed on June 20, 2016.

38. Nichols, J.L., Tippetts, A.S., Fell, J.C., Eichelberger, A.H. and Haseltine, P.W. "The Effects of Primary Enforcement Laws and Fine Levels on Seat Belt Usage in the United States." *Traffic Injury Prevention*, Vol. 15, No. 6, 2014, pp. 640-644.

39. Salzberg, P.M. and Moffat, J.M. "Ninety Five Percent: An Evaluation of Law, Policy, and Programs to Promote Seat Belt Use in Washington State." *Journal of Safety Research,* Vol. 35, No. 2, 2004, pp.215-222.

40. Van Houten, R., Malenfant, L., Huitema, B. and Blomberg, R. "Effects of High-Visibility Enforcement on Driver Compliance with Pedestrian Yield Right-of-Way Laws." *Transportation Research Record: Journal of the Transportation Research Board*, Vol. 2393, No. 1, 2013, pp.41-49.

41. North Carolina FY 2014 Highway Safety Plan, Executive Summary, July 2013. Raleigh, North Carolina: NC GHSP. http://www.nhtsa.gov/links/statedocs/fy14/fy14hss/nc_fy14hsp.pdf. Accessed on June 20, 2016.

42. Bryant, S.N., Cramer, G.M., Holestine, L.C., Kirk, A.M., Osterhuber, A.A. North Carolina Occupant Protection Program Assessment July 7-12, 2013. http://www.ncleg.net/DocumentSites/Committees/NCCFTF/Unintentional%20Death/2011-2012/Occupant%20Protection%20Assessment%20for%20NC%209-13.pdf. Accessed on June 20, 2016.

43. Kim, K., Yamashita, E., Pant, P. and Ghimire, J. "Sustaining Seat Belt Use in a High-Use State." *Transportation Research Record: Journal of the Transportation Research Board* Vol. 2425, No. 1, 2014, pp. 32-40.

44. Davidson, S., Barlament, J., Dawson, L. and Cotton, C. "Metrics for Local Community Planning and Evaluation: The Case for Observational Measurement of High Risk Rural Sub-Populations in Occupant Safety." *Western Journal of Emergency Medicine,* Vol. 14, No. 4, 2013, pp. 380-383.

45. State of Alabama FY2014 Highway Safety Plan. June 24, 2013. http://www.nhtsa.gov/links/statedocs/FY14/FY14HSPs/AL_FY14HSP.pdf. Accessed June 20, 2016.

46. Iowa FFY2015 Highway Safety Plan. Undated. http://www.dps.state.ia.us/commis/gtsb/pdfs/FFY%202015%20Highway%20Safety%20Plan.pdf. Accessed June 20, 2016.

47. Yang, Y., Dasgupta, K., Eby, D.W., Molnar, L.J., Nair, V.N. and Pollock, S. Explaining State-to-State Differences in Seat Belt Use: An Analysis of Socio-Demographic Variables. Report UMTRI-2011-07, Transportation Research Institute, University of Michigan, Ann Arbor, February 2011.

48. Shin, D., Hong, L. and Waldron, I. "Possible Causes of Socioeconomic and Ethnic Differences in Seat Belt Use Among High School Students." *Accident Analysis & Prevention*, Vol. 31, No. 5, 1999, pp. 485-496.

49. Blatt, J., and Furman, S.M. "Residence Location of Drivers Involved in Fatal Crashes." *Accident Analysis & Prevention*, Vol. 30, No. 6, 1998, pp. 705-711.

50. Rakauskas, M.E., Ward, N.J., and Gerberich, S.G. "Identification of Differences Between Rural and Urban Safety Cultures." *Accident Analysis & Prevention* Vol. 41, No. 5, 2009, pp. 931-937.

51. Chaudhary, N.K., Alonge, M., and Preusser, D.F. "Evaluation of the Reading, PA Nighttime Safety Belt Enforcement Campaign: September 2004." *Journal of Safety Research*, Vol. 36, 2005, pp. 321-326.

52. Chaudhary, N.K., and Preusser, D.F. "Connecticut Nighttime Safety Belt Use." *Journal of Safety Research*, Vol. 37, No. 4, 2006, pp. 353-358.

53. Chaudhary, N.K., Tison, J., and Casanova, T. "The Effects of Maine's Change to Primary Seat Belt Law on Seat Belt Use and Public Perception and Awareness." *Traffic Injury Prevention*, Vol. 11, No. 2, 2010, pp. 165-172.

54. Rhodes N. and Pivik, K. "Age and Gender Differences in Risky Driving: The Roles of Positive Affect and Risk Perception." *Accident Analysis & Prevention*. Vol. 43, 2011, pp. 923–931.

55. Hedlund J., Gilbert S.H., Ledingham K.A., Preusser D.F. *How States Achieve High Seat Belt Use Rates*. August 2008.

56. Vaughn, M.G., Salas-Wright, C.P., Piquero, A.R. “Buckle up: Non-Seat Belt Use and Antisocial Behavior in the United States.” *Annals of Epidemiology*, Vol. 22, No. 12 , 2012, pp. 825-831.

57. Nicholson, N., Emma, S., Fenton-O'Creevy, M. and Willman, P. “Personality and Domain Specific Risk Taking.” *Journal of Risk Research*, Vol. 8, No. 2, 2005, pp. 157-176.

58. Ulleberg, P. and Rundmo, T. “Risk–taking Attitudes Among Young Drivers: The Psychometric Qualities and Dimensionality of an Instrument to Measure Young Drivers’ Risk–Taking Attitudes.” *Scandinavian Journal of Psychology*, Vol. 43, No. 3, 2002, pp. 227-237.

59. Costa, P.T. and McCrae, R.R. NEO PI-R and NEO-FFI Professional Manual. Odessa, FLA: Psychological Assessment Resources, Inc., 1991.

60. Camerer, C.F. and Kunreuther, H. “Decision Processes for Low Probability Events: Policy Implications.” *Journal of Policy Analysis and Management*, Vol. 8, 1989, pp. 565–592.

61. Slovic, P., Peters, E., Finucane, M.L., and MacGregor, D.G. “Affect, Risk, and Decision Making.” *Health Psychology*, Vol. 24, 2005, pp. S35-S40.

62. Reyna, V.F., and Farley, F. “Risk and Rationality in Adolescent Decision Making Implications for Theory, Practice, and Public Policy” *Psychological Science in the Public Interest*, Vol. 7, No. 1, 2006, pp. 1-44.

63. Slovic, P., and Peters, E. “Risk Perception and Affect.” *Current Directions in Psychological Science*, Vol. 15, No. 6, 2006, pp. 322-325.

64. Slovic, P., Fischhoff, B., and Lichtenstein, S. “Accident Probabilities and Seat Belt Usage: A Psychological Perspective.” *Accident Analysis and Prevention*, Vol. 10, No. 4, 1978, pp. 281-285.

65. Hakes, J. K., and Viscusi, W.K. “The Rationality of Automobile Seatbelt Usage: The Value of Statistical Life and Fatality Risk Beliefs.” Harvard Law and Economics Discussion Paper No. 475, 2004.

66. Goudie, R.J., Mukherjee, S., Neve, J.E., Oswald, A.J., and Wu, S., "Happiness as a Driver of Risk-Avoiding Behaviour: Theory and an Empirical Study of Seatbelt Wearing and Automobile Accidents" *Economica*, Vol. 81, No. 324, October 2014, pp. 674-697, 2014.

67. Knapper, C.K., Cropley, A.J., and Moore, R.J. "Attitudinal Factors in the Non-Use of Seat Belts." *Accident Analysis and Prevention*, Vol 8, No. 4, 1976, pp.241-246.

68. Wheaton, B. "The Sociogenesis of Psychological Disorder: An Attributional Theory." *Journal of Health and Social Behavior*, 1980, pp.100-124.

69. Byrd, T., Cohn, L.D., Gonzalez, E., Parada, M., and Cortes, M. "Seatbelt Use and Belief in Destiny Among Hispanic and Non-Hispanic Drivers." *Accident Analysis and Prevention*, Vol. 31, No. 1, 1999, pp. 63-65.

70. Chaudhary, N.K., and Northrup, V.S. "Predictive Models of Safety Belt Use: A Regression Analysis of MVOSS Data." *Traffic Injury Prevention*, Vol. 5, No. 2, 2004, pp. 137-143.

71. Fazio, R.H. and Olson, M.A. "Attitudes: Foundations Functions and Consequences." *The Sage Handbook of Social Psychology*, pp.139-160, 2003.

72. Eagly, A.H., and Chaiken, S. *The Psychology of Attitudes*. Harcourt Brace Jovanovich College Publishers, 1993.

73. Glasman, L.R., and Albarracín, D. "Forming Attitudes that Predict Future Behavior: A Meta-Analysis of the Attitude-Behavior Relation." *Psychological Bulletin*, Vol. 132, No. 5, 2006, pp. 778-822.

74. Ajzen, I. "Nature and Operation of Attitudes." *Annual Review of Psychology*, Vol. 52, No. 1, 2001, pp. 27–58.

75. Katz, D. "The Functional Approach to the Study of Attitudes." *Public Opinion Quarterly*, Vol. 24, No. 2, 1960, pp. 163-204.

76. Betsch, T., Haberstroh, S., and Hohle, C. “Explaining Routinized Decision Making A Review of Theories and Models.” *Theory & Psychology*, Vol. 12, No. 4, 2002, pp. 453-488.

77. Mittal, B. “Achieving Higher Seat Belt Usage: The Role of Habit in Bridging the Attitude-Behavior Gap.” *Journal of Applied Social Psychology*, Vol. 18, No. 12, 1988, pp. 993-1016.

78. Danner, U.N., Aarts, H., and Vries, N.K. “Habit vs. Intention in the Prediction of Future Behaviour: The Role of Frequency, Context Stability and Mental Accessibility of Past Behaviour.” *British Journal of Social Psychology*, Vol. 47, No. 2, 2008, pp. 245-265.

79. Dissanayake, S., and Parikh, A. “Self-Reported Behavior, Perceptions, and Attitudes of Drivers Regarding Seat Belt Use: A Descriptive Study.” *Advances in Transportation Studies*, Vol. 26, 2012, pp. 5-16.

80. Christmas, S., Young, D., and Cuerden, R. *Strapping Yarns: Why People Do and Do Not Wear Seat Belts*. UK Department of Transport, 2008.

81. Nilsen, P., Roback, K., Broström, A., and Ellström, P.E. “Creatures of Habit: Accounting for the Role of Habit in Implementation Research on Clinical Behaviour Change.” *Implementation Science*, Vol. 7, 2012.

82. Ryan, R.M., and Deci, E.L. “Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions.” *Contemporary Educational Psychology*, Vol. 25, No. 1, 2000, pp. 54-67.

83. Glass, T.A., and McAtee, M.J. “Behavioral Science at the Crossroads in Public Health: Extending Horizons, Envisioning the Future.” *Social Science & Medicine*, Vol. 62, No. 7, 2006, pp. 1650-1671.

84. Williams, D.R. “Patterns and Causes of Disparities in Health.” *Policy Challenges in Modern Health Care,* Rutgers University Press, 2005.

85. Burke, N.J., Joseph, G., Pasick, R.J., and Barker, J.C. "Theorizing Social Context: Rethinking Behavioral Theory." *Health Education & Behavior*, Vol. 36, No. 5, 2009, pp. 55S-70S.

86. Arah, O.A. "On the Relationship Between Individual and Population Health." *Medicine, Health Care and Philosophy*, Vol. 12, No. 3, 2009, pp. 235-244.

87. Strine, T.W., Beck, L., Bolen, J., Okoro, C., and Li, C. "Potential Moderating Role of Seat Belt Law on the Relationship between Seat Belt Use and Adverse Health Behavior." *American Journal of Health Behavior*, Vol. 36, No. 1, 2012, pp. 44-55.

88. Braveman, P.A., Cubbin, C., Egerter, S., Williams, D.R., and Pamuk, E. "Socioeconomic Disparities in Health in the United States: What the Patterns Tell Us." *American Journal of Public Health*, Vol. 100, No. S1, 2010, pp. S186-S196.

89. Factor, R., Kawachi, I., and Williams, D.R. "Understanding High-Risk Behavior Among Non-Dominant Minorities: A Social Resistance Framework." *Social Science & Medicine*, Vol. 73, No. 9, 2011, pp. 1292-1301.

90. Phelan, J.C., Link, B.G., and Tehranifar, P. "Social Conditions as Fundamental Causes of Health Inequalities Theory, Evidence, and Policy Implications." *Journal of Health and Social Behavior*, Vol. 51, No. 1S 2010, pp. S28-S40.

91. Antonovsky, A. "Social Class, Life Expectancy and Overall Mortality." *The Milbank Memorial Fund Quarterly,* 1967, pp. 31-73.

92. Shavers, V.L. "Measurement of Socioeconomic Status in Health Disparities Research." *Journal of the National Medical Association*, Vol. 99, No. 9, 2007, pp. 1013-1023.

93. Mueller, C.W., and Parcel, T.L. "Measures of Socioeconomic Status: Alternatives and Recommendations." *Child Development*, Vol. 52, No. 1, 1981, pp. 13-30.

94. Braveman, P.A., Cubbin, C., Egerter, S., Chideya, S., Marchi, K.S., Metzler, M., and Posner, S. "Socioeconomic Status in Health Research: One Size Does Not Fit All." *JAMA*, Vol. 294, No. 22, 2005, pp. 2879-2888.

95. Williams, D.R. “Socioeconomic Differentials in Health: A Review and Redirection.” *Social Psychology Quarterly*, Vol. 53, No. 2, 1990, pp. 81-99.

96. Factor, R., Williams, D.R., and Kawachi, I. “Social Resistance Framework for Understanding High-Risk Behavior Among Nondominant Minorities: Preliminary Evidence.” *American Journal of Public Health*, Vol. 103, No. 12, 2013, pp. 2245-2251.

97. Factor, R., Mahalel, D., Rafaeli, A., and Williams, D.R. “A Social Resistance Perspective for Delinquent Behavior Among Non-Dominant Minority Groups." *British Journal of Criminology*, June 2013, doi:10.1093/bjc/azt035.

98. Pampel, F.C., Krueger, P.M., and Denney, J.T. “Socioeconomic Disparities in Health Behaviors.” *Annual Review of Sociology*, Vol. 36, 2010, pp. 349-370.

99. Schneider, H. “Seat Belt Use Survey Design for Louisiana, Sampling, Data Collection and Estimation Plan,” March 2013.

APPENDIX A

§ 1340.5 Selection of observation sites.

(a) Sampling frame requirements - (1) County coverage. The sampling frame from which observation sites are selected shall include counties or county-equivalents (including tribal territories), as defined by the U.S. Census Bureau, that account for at least 85 percent of the State's passenger vehicle occupant fatalities, provided that the average of the last three, four or five years, at the State's option, of available Fatality Analysis Reporting System (FARS) data or State fatality data approved by NHTSA shall be used to determine the State's passenger vehicle occupant fatalities.

(2) Road coverage. (i) States shall select observation sites from a database of road inventories approved by NHTSA or provided by NHTSA.

(ii) Except as provided in paragraph (a)(2)(iii) of this section, all roads in the State shall be eligible for sampling. The sampling frame may not be limited only to roads having a stop sign, stop light or State-maintained roads.

(iii) The sampling frame need not include: rural local roads, as classified by the Federal Highway Administration's Functional Classification Guidelines, in counties that are not within a Metropolitan Statistical Area (MSA), as published by the Office of Management and Budget; non-public roads; unnamed roads; unpaved roads; vehicular trails; access ramps; cul-de-sacs; traffic circles; or service drives.

(b) Sampling selection requirements. The set of road segments selected for observation sites shall be chosen based on probability sampling, except that -

(1) The specific observation site locations on the sampled road segments may be deterministically selected;

(2) An alternate observation site may be used to replace an observation site selected based on probability sampling if it is located in the same county or county-equivalent, and has the same roadway classification (e.g., local road segment, collector road segment) when using the protocol of substitution and rescheduling of observation sites pursuant to paragraph (c) of this section

APPENDIX B

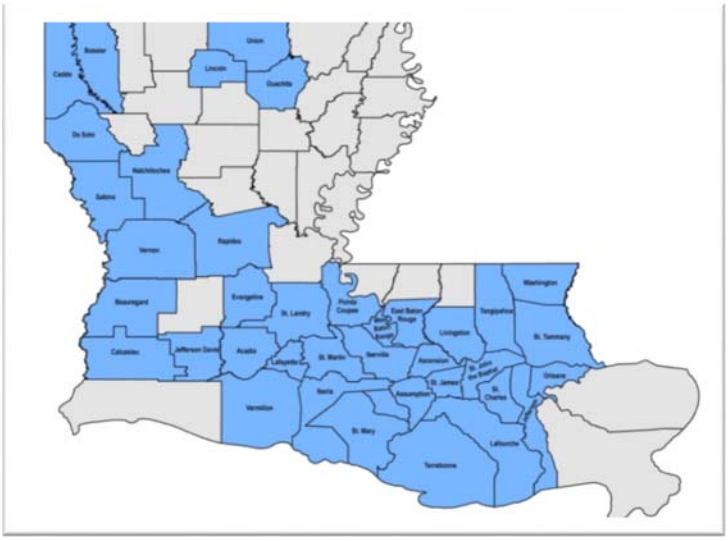


Figure 59
Selected parishes for seat belt survey

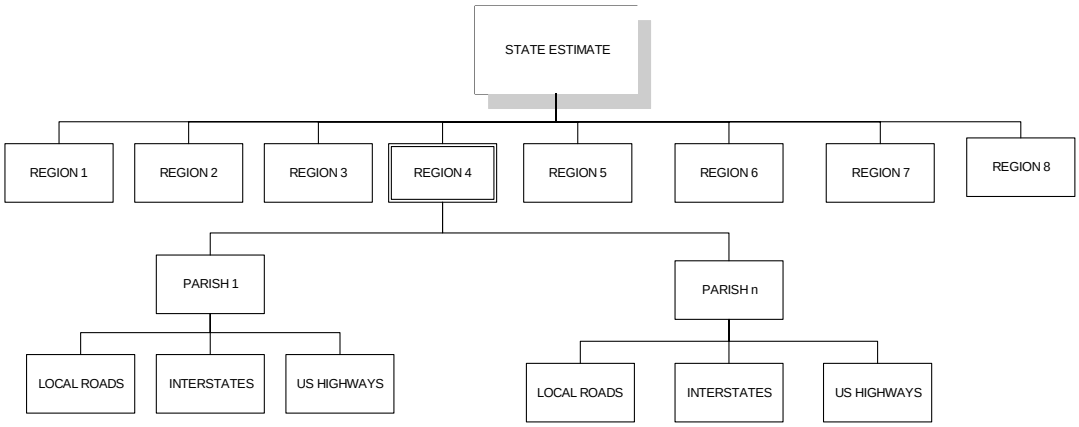


Figure 60
2013 roadside survey sampling design layout

APPENDIX C

Table 18
Primary study samples 2015 and 2016

Fall 2015 Phone Survey	Spring 2016 Online Panel Survey
Probability Sample	Non-Probability Sample
Licensed drivers in LA N=358	Licensed drivers residing in LA, NH, TX, & WA N=1,053 (*LA only N=246)*
Stratified SB use: 68% 100% users	Stratified SB use: 50% 100% users
Age (45 and under) – mean 33 years	Age (45 and under) – mean 31.5 years
Gender – 50% male, 50% female	Gender – 34% male, 66% female*
Stratified on 1) SB use (100% versus not) and SB Motivations and 2) Age – 45 and under	Stratified on 1) SB use (100% versus not) and SB Motivations and 2) Age – 45 and under
Sampling frame included both landline and cellphones	Additional quotas for gender were in place for majority of data collection period. *NH is the only state with <40% males

Survey Questionnaire

Are you male or female?
- ❍ Male
- ❍ Female

In what state do you currently live?

If Louisiana Is Selected, Then Skip To Are you a licensed driver?If New Hampshire Is Selected, Then Skip To Are you a licensed driver?If Texas Is Selected, Then Skip To Are you a licensed driver?If Washington Is Selected, Then Skip To Are you a licensed driver?

Thank you for your interest in this study. Unfortunately, your current state does not meet the specific criteria for participation. Please click on the continue box below to exit the questionnaire.

If Thank you for your interest... Is Displayed, Then Skip To End of Block

Are you a licensed driver?
- ❍ Yes
- ❍ No

If Yes Is Selected, Then Skip To What is your age in years (e.g., 18)?

Thank you for your interest in this study. Unfortunately, you must be a licensed driver to participate in this study. Please click on the continue box below to exit the questionnaire.

If Thank you for your interest... Is Displayed, Then Skip To End of Block

What is your age in years (e.g., 28)?

There are actions some people feel like they have to do and other people feel they want to do when

driving. To what extent do you feel like...

	Not at all	Somewhat	Absolutely
Staying within the speed limit is something I HAVE to do.	❍	❍	❍
Staying within the speed limit is something I WANT to do.	❍	❍	❍

To what extent do you feel like...

	Not at all	Somewhat	Absolutely
NOT using a mobile phone while driving is something I HAVE to do.	❍	❍	❍
Not using a mobile phone while driving is something I WANT to do.	❍	❍	❍

To what extent do you feel like...

	Not at all	Somewhat	Absolutely
Using a seat belt when I drive is something I HAVE to do.	❍	❍	❍
Using a seat belt when I drive is something I WANT to do.	❍	❍	❍

How would you describe your seat belt use, generally? There is no right answer. Please select the statement that honestly reflects your experience.

❍ There are occasions or situations when I might not have worn my seat belt
❍ I never drive anywhere without always wearing my seat belt.

About how many hours do you drive on an average weekday?

❍ Less than one-half hour
❍ Between one half hour to one hour
❍ More than one hour

What kind of vehicle do you drive most often?

❍ Car
❍ Pickup Truck
❍ SUV
❍ Van
❍ Other (please specify) _____

What is the model year of that vehicle?

Most people have a fairly routine process when putting on their seat belt. Thinking about all the things you typically do when you get in the vehicle, at what point during that process do you usually

put on your seat belt?

- ❍ Immediately after getting in the vehicle
- ❍ Right after starting the vehicle
- ❍ After making vehicle adjustments like turning on the air or heat, setting the GPS or radio
- ❍ After putting the vehicle in gear
- ❍ When the vehicle is moving, but prior to getting on the road
- ❍ When the seat belt alert system starts beeping
- ❍ After I'm already on the road
- ❍ I'm not sure, but I do it at some point
- ❍ Typically don't buckle my seat belt

Below are some reasons for using a seat belt that may or may not apply to you. There are no right or wrong answers. Please select the answer choice that accurately reflects your reasoning. When I use my seat belt, I do so because... (Yes or No?)

	Yes	No
Others want me to use it	❍	❍
I want to set a good example	❍	❍
I want to avoid a serious injury	❍	❍
It is uncomfortable without it	❍	❍
People I'm with are using seat belts	❍	❍
My vehicle has a bell, buzzer or light that reminds me	❍	❍
I don't want to get a ticket	❍	❍
It's the law	❍	❍
It's a habit	❍	❍
My parents taught me to do it	❍	❍
My employer requires me to use it	❍	❍
I or someone I know was in a crash	❍	❍

People have different patterns of seat belt use, ranging from using it habitually 100% of the time to not using a seat belt at all. Thinking about your typical seat belt usage, please indicate which of the statements below best describes you.

- ❍ I never use a seat belt. It's something I normally don't even think about.
- ❍ I tend to not use a seat belt, but I do when prompted by someone or in certain circumstances.
- ❍ I generally use a seat belt, but there are times or situations where I don't think it is necessary.
- ❍ I intend to use a seat belt all the time, but sometimes I get distracted and/or forget.
- ❍ I use a seat belt 100% of the time without thinking about it. It is a true habit for me.

There are many possible reasons why you may not use a seat belt all the time. Are any of the following statements reasons why you do NOT use a seat belt every time? Please select the answer

choice that accurately reflects your reasoning.

	Yes	No
I'm too good a driver to worry about getting in an accident.	❍	❍
Air bags provide enough protection in a crash.	❍	❍
Seat belts are uncomfortable.	❍	❍
I don't want to get trapped in case of an accident.	❍	❍
I believe what's going to happen will happen, whether I use a seat belt or not.	❍	❍
People that I know do not use seat belts.	❍	❍
Seat belts are too confining and tighten unexpectedly	❍	❍
When driving a larger, heavier vehicle that makes me feel safer	❍	❍
My vehicle has enough safety features that make me feel secure	❍	❍

Below are some situations in which you may be more or less likely to use a seat belt than you typically do when driving. For each of the following situations, please tell whether you would be "More Likely" or "Less Likely" to use a seat belt. If your seat belt use would not change, select "Would Not Matter."

	More Likely	Less Likely	Would Not Matter
Driving on urban roads	❍	❍	❍
Driving on rural roads	❍	❍	❍
Driving on unfamiliar roads	❍	❍	❍
Driving at night	❍	❍	❍
Driving with passengers	❍	❍	❍
Driving with children	❍	❍	❍
Driving to/from work or school	❍	❍	❍
Setting out on a long journey	❍	❍	❍
Short trip to local shops	❍	❍	❍
You feel angry/upset about something	❍	❍	❍
You feel in a rush	❍	❍	❍
When someone in the car asks you to put your seat belt on	❍	❍	❍
When there are other people in the car, but no one puts their seat belts on	❍	❍	❍
Select "Would not matter" for this item so we can screen out random responses.	❍	❍	❍

Looking back to when you started driving, has your use of seat belts when driving increased, decreased, or stayed the same?

❍ Increased
❍ Decreased
❍ Stayed The Same

What caused your use of seat belts to increase?

- ❍ I got a seat belt ticket or warning
- ❍ Someone I know got a ticket
- ❍ I or someone I know was in a crash
- ❍ Other people encourage/pressured me
- ❍ The seat belt law
- ❍ Didn't want to get a ticket
- ❍ Wanted to set a good example for children
- ❍ Became more aware of safety issues
- ❍ Drivers Education/Traffic School
- ❍ Employer Requirement
- ❍ I cannot recall specifically why I started using a seat belt
- ❍ Other: _____

Please tell your level of agreement/ disagreement with the following statements:

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
It is okay for people who are in a difficult situation to occasionally disobey the law.	❍	❍	❍	❍
It is okay to disobey a law if I'm not causing any harm to anybody.	❍	❍	❍	❍
You should accept decisions made by the police, even if you think they are wrong.	❍	❍	❍	❍
You should do what the police tell you, even if you disagree.	❍	❍	❍	❍
I would want a seat belt on in an accident.	❍	❍	❍	❍
Seat belts are just as likely to harm you as help you.	❍	❍	❍	❍
Most motor vehicle accidents happen within 5 miles of home.	❍	❍	❍	❍
An accident close to home is usually not as serious as an accident farther away.	❍	❍	❍	❍
Police in my community do not make it a priority to write tickets for seat belt violations.	❍	❍	❍	❍
When driving, using a seat belt is something I do automatically.	❍	❍	❍	❍
Select "Somewhat Disagree" for this item so we can screen out random responses.	❍	❍	❍	❍

Answer If In what state do you currently live? New Hampshire Is Selected

New Hampshire does not have a seat belt law that requires all adults to use a seat belt. Many states have primary seat belt laws that permit law enforcement officers to stop and ticket a driver specifically because he or she is observed not using a seat belt. Hypothetically, if NH were to enact a primary seat belt law, what (if any) affect do you believe the law would have on your personal seat

belt use?

If New Hampshire does not have... Is Displayed, Then Skip To End of Block

How strictly would you say seat belt laws are enforced in your state?

- ❍ Not at all strictly
- ❍ Only a little strictly
- ❍ Somewhat strictly
- ❍ Fairly strictly
- ❍ Extremely strictly

In your opinion, how likely would someone not wearing a seat belt be ticketed in the following conditions:

	Very Unlikely	Unlikely	Likely	Very Likely
Just driving down the road in normal situations	❍	❍	❍	❍
Stopped for some other reason	❍	❍	❍	❍
As an adult passenger in the front seat	❍	❍	❍	❍

Answer If How would you describe your seat belt use, generally? There is no right answer. Please select the statement that honestly reflects your experience. There are occasions or situations when I might not have worn my seat belt Is Selected And In what state do you currently live? Louisiana Is Selected

Do you think increasing the seat belt fine from $25 would do a lot, some, a little or nothing at all to get you to use your seat belt more often?

- ❍ A Lot
- ❍ Some
- ❍ A Little
- ❍ Nothing At All

Answer If In what state do you currently live? Texas Is Selected And How would you describe your seat belt use, generally? There is no right answer. Please select the... There are occasions or situations when I might not have worn my seat belt Is Selected

Do you know the fine associated with not using a seat belt (as an adult) in Texas?

- ❍ Yes
- ❍ No

Answer If In what state do you currently live? Washington Is Selected And How would you describe your seat belt use, generally? There is no right answer. Please select the... There are occasions or situations when I might not have worn my seat belt Is Selected

Do you know the fine associated with not using a seat belt (as an adult) in Washington?

- ❍ Yes
- ❍ No

When you are a back seat passenger in a car, taxi or shuttle do you always use your seat beat?

- ❍ Yes
- ❍ No

Do you think you will be in a least one crash in the future where a seat belt:

	Yes	No
could keep you from getting injured	❍	❍
could keep you from getting killed	❍	❍

Have you ever taken a driver's education course?
- ❍ Yes
- ❍ No

If No Is Selected, Then Skip To End of Block

Did you take that course within the past five years?
- ❍ Yes
- ❍ No

Did it include both classroom instruction and behind the wheel practice?
- ❍ Yes
- ❍ No

In that course, how much emphasis was placed on seat belt use as a safe driving behavior?
- ❍ A Lot
- ❍ Some
- ❍ A Little
- ❍ None At All

How much impact do you think the driver's education course had on your seat belt use?
- ❍ A Lot
- ❍ Some
- ❍ A Little
- ❍ None At All

On a typical day, about how much time do you spend doing the below activities:

	No Time At All	Less Than 30 Minutes	Up to 1 Hour	Up to 2 Hours	Up to 3 Hours	More than 3 Hours
watching television	❍	❍	❍	❍	❍	❍
reading a printed newspaper	❍	❍	❍	❍	❍	❍
listening to local radio stations	❍	❍	❍	❍	❍	❍
browsing the Internet	❍	❍	❍	❍	❍	❍

Answer If On a typical day, about how much time do you spend doing the below activities: browsing the Internet - No Time At All Is Selected

Even though you indicated you do not browse the Internet on a typical day, do you have access to a

device or computer that would allow you to do so?

- ❍ Yes
- ❍ No

Answer If On a typical day, about how much time do you spend doing the below activities: browsing the Internet - No Time At All Is Not Selected

When you browse the Internet, do you do that from:

	Yes	No
a computer either at home or from some other location	❍	❍
a cell phone	❍	❍
another mobile device like an iPad, Kindle Fire or another type of tablet	❍	❍

Answer If On a typical day, about how much time do you spend doing the below activities: browsing the Internet - No Time At All Is Not Selected

Excluding activities like checking your email or paying bills online, on a typical day when you access the Internet, do you:

	Yes	No
Browse for information like news, sports or weather	❍	❍
Log in to Facebook	❍	❍
Use Twitter	❍	❍
Use other social networking sites such as LinkedIn,Tumblr or Instagram	❍	❍
Watch videos on YouTube	❍	❍
Visit specific websites to watch videos	❍	❍
Use a music streaming service such as Spotify or Pandora	❍	❍
Play online games	❍	❍

Answer If On a typical day, about how much time do you spend doing the below activities: browsing the Internet - No Time At All Is Not Selected

Of all the places you visit on the Internet, where do you spend the most time?

- ❍ Browse for information like news, sports or weather
- ❍ Facebook
- ❍ Twitter
- ❍ Other social networking sites such as LinkedIn, Tumblr or Instagram
- ❍ YouTube
- ❍ Other websites to watch videos
- ❍ Music streaming service such as Spotify or Pandora
- ❍ Play online games
- ❍ Other: _____

This is the final section of this questionnaire.

What is your residential zip code?

How would you describe your residential environment?
- ❍ Rural
- ❍ Somewhat rural (e.g., small town)
- ❍ Suburban
- ❍ Urban

Do you have children under thirteen years of age?
- ❍ Yes
- ❍ No

What is your marital status?
- ❍ Single, Never Married
- ❍ Married
- ❍ Domestic Partnership
- ❍ Widowed
- ❍ Divorced
- ❍ Separated

What is your employment status? Select all that apply.
- ☐ Employed Full Time (40 hours a week or more)
- ☐ Employed Part Time (Fewer than 40 hours a week)
- ☐ Self-Employed
- ☐ Retired
- ☐ Out of Work
- ☐ Homemaker
- ☐ Student

Do you work at a place that requires using a seat belt while driving on the job or on the organization's premises?
- ❍ Yes
- ❍ No

Is the approximate annual income for all people in your household over under $50,000, over $100,000 or somewhere in between?
- ❍ Under $50,000
- ❍ Over $100,000
- ❍ In-Between

What is the highest level of education you completed?

- ❍ Did not graduate from high school
- ❍ Graduated high school or got GED, but did not attend college
- ❍ Attended college or university but did not get a degree
- ❍ Got an associated degree
- ❍ Graduated from a four year college or university
- ❍ Attended graduate school, but did not get a degree
- ❍ Graduated from graduate school

Please select your race/ ethnicity from the options below.

- ❍ Asian
- ❍ Black/ African American
- ❍ Hispanic
- ❍ Native American
- ❍ Pacific Islander
- ❍ White/ Caucasian
- ❍ Other (please specify) _____

APPENDIX D

Table 19
Police reported adult OP citations in 2015

1	2	3	4	5	6
Parish	**Lic. Dr.**	**Rep Cit.**	**Rec. Cit.**	**Rep. Rate**	**Rec. Rate**
Acadia	39504	74	709	1.9	17.9
Allen	13812	124	173	9.0	12.5
Ascension	78523	2,257	1,359	28.7	17.3
Assumption	13401		240	0.0	17.9
Avoyelles	26026		605	0.0	23.2
Beauregard	26473		312	0.0	11.8
Bienville	9479		81	0.0	8.5
Bossier	77841	3,862	362	49.6	4.7
Caddo	155567	673	1,785	4.3	11.5
Calcasieu	136635	1,216	456	8.9	3.3
Caldwell	7299		55	0.0	7.5
Cameron	2931		11	0.0	3.8
Catahoula	7048		37	0.0	5.2
Claiborne	8167		132	0.0	16.2
Concordia	12351		48	0.0	3.9
De Soto	18628		166	0.0	8.9
East Baton Rouge	267690	10,447	2,666	39.0	10.0
East Carroll	3530		57	0.0	16.1
East Feliciana	14312		130	0.0	9.1
Evangeline	21516		111	0.0	5.2
Franklin	12673		104	0.0	8.2
Grant	14138		88	0.0	6.2
Iberia	49770	452	573	9.1	11.5
Iberville	19478	26	233	1.3	12.0
Jackson	11312		178	0.0	15.7
Jefferson	284390	4,544	5,185	16.0	18.2
Jefferson Davis	20583	30	407	1.5	19.8
Lafayette	159265	2,948	2,149	18.5	13.5
Lafourche	62544	663	973	10.6	15.6
LaSalle	9625	0	32	0.0	3.3
Lincoln	26904	35	328	1.3	12.2
Livingston	89182	1,528	1,917	17.1	21.5
Madison	5207		92	0.0	17.7
Morehouse	17227		258	0.0	15.0
Natchitoches	23537	645	564	27.4	24.0
Orleans	195745	7,112	3,183	36.3	16.3
Ouachita	98140	1,457	2,068	14.8	21.1
Plaquemines	15329	174	196	11.4	12.8
Pointe Coupee	14821	80	80	5.4	5.4

(Cont'd)

Rapides	88332	2,577	653	29.2	7.4
Red River	5345		43	0.0	8.0
Richland	13484	81	104	6.0	7.7
Sabine	15499		232	0.0	15.0
St Bernard	25066	160	518	6.4	20.7
St Charles	37379	594	551	15.9	14.7
St Helena	4675		77	0.0	16.5
St James	14929	48	222	3.2	14.9
St John the Baptist	28214		443	0.0	15.7
St Landry	61468	158	335	2.6	5.4
St Martin	32600	2	522	0.1	16.0
St Mary	36126	160	241	4.4	6.7
St Tammany	180849	2,730	2,947	15.1	16.3
Tangipahoa	80614	1,532	518	19.0	6.4
Tensas	2867		16	0.0	5.6
Terrebonne	77077	737	1,060	9.6	13.8
Union	15928		146	0.0	9.2
Vermilion	38802	400	580	10.3	14.9
Vernon	30445	291	344	9.6	11.3
Washington	29099	1,143	709	39.3	24.4
Webster	28108	2	767	0.1	27.3
West Baton Rouge	17212	12	147	0.7	8.5
West Carroll	7587		141	0.0	18.6
West Feliciana	7476	40	31	5.4	4.1
Winn	8423	41	70	4.9	8.3
All Local & LA State Police	2958207	114,523	39520*	38.7	13.4
* Note: This total omits violations with a missing parish code.					

APPENDIX E

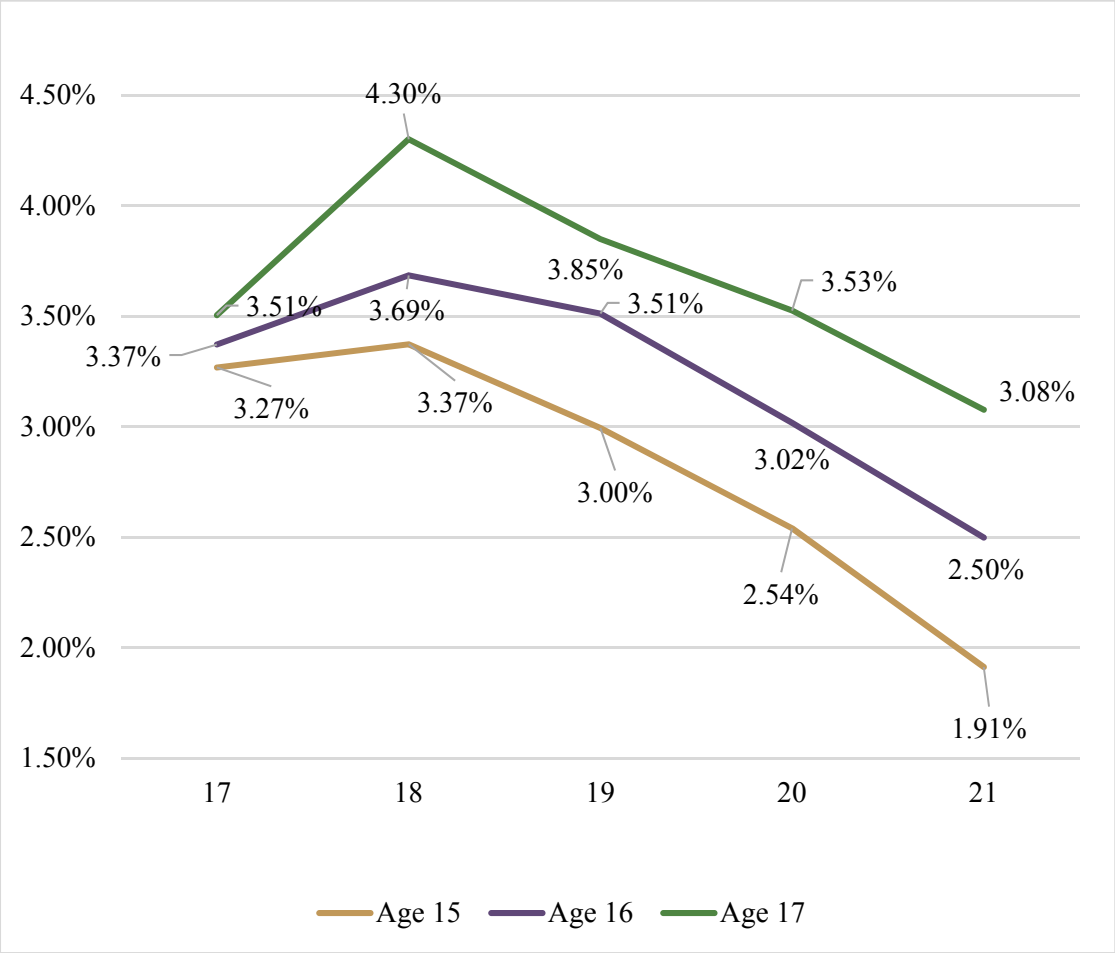


Figure 61
Seat belt violations by license age

APPENDIX F

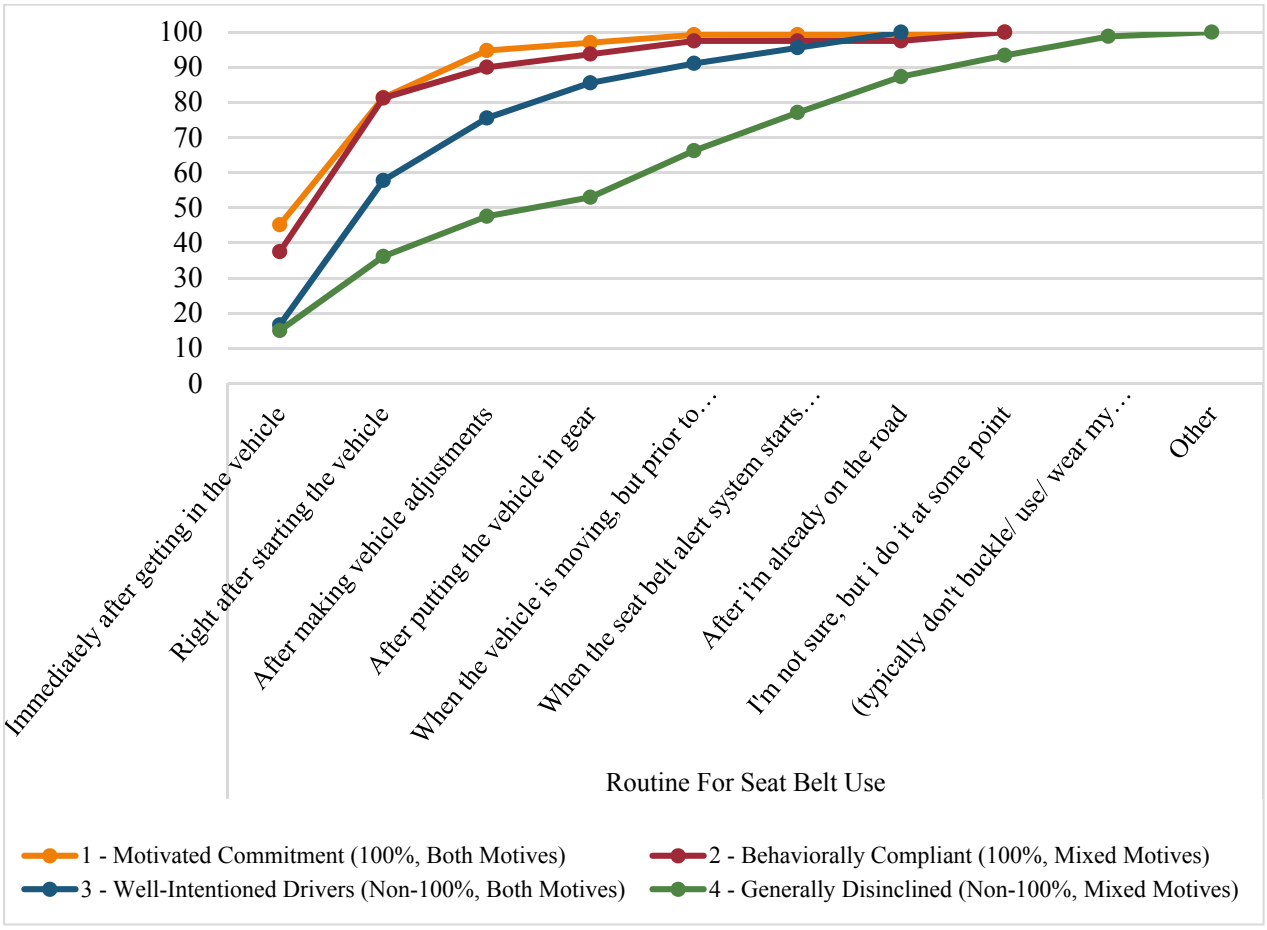


Figure 62
Process differences by seat belt use groups

APPENDIX G

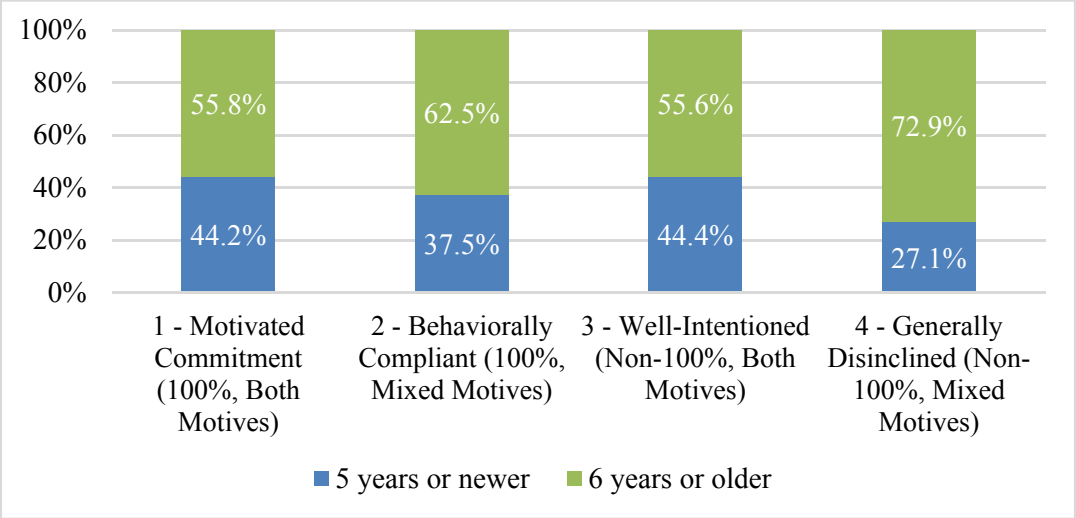


Figure 63
Comparison of older to newer vehicle age by seat belt use group

This public document is published at a total cost of $250
42 copies of this public document were published in this first printing at a cost of $250. The total cost of all printings of this document including reprints is $250. This document was published by Louisiana Transportation Research Center to report and publish research findings as required in R.S. 48:105. This material was duplicated in accordance with standards for printing by state agencies established pursuant to R.S. 43:31. Printing of this material was purchased in accordance with the provisions of Title 43 of the Louisiana Revised Statutes.