2017

STRIDE | Southeastern Transportation Research, Innovation, Development and Education Center

Final Report

Technology Transfer: Distracted Driving – Overview Summary of Ways to Alleviate

(Project # 2016-013)

NC STATE UNIVERSITY
THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

UAB THE UNIVERSITY OF ALABAMA AT BIRMINGHAM

Georgia Institute of Technology

MISSISSIPPI STATE UNIVERSITY

AUBURN UNIVERSITY

UF FLORIDA UNIVERSITY of FLORIDA

FIU FLORIDA INTERNATIONAL UNIVERSITY

Authors: Robert Peters, Ph.D., and Despina Stavrinos, Ph.D. (University of Alabama at Birmingham)

June 2017

Disclaimer

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the information presented herein. This document is disseminated under the sponsorship of the U.S. Department of Transportation's University Transportation Centers Program, in the interest of information exchange. The U.S. Government assumes no liability for the contents or use thereof.

Acknowledgment of Sponsorship

Authors

Dr. Robert W. Peters, Ph.D., P.E.; Professor, UAB Department of Civil, Construction, and Environmental Engineering; 1075 13th Street South, Birmingham, AL 35294-4440; Phone: (205)-934-8434; Fax: (205)-934-9855; E-mail: rwpeters@uab.edu

Dr. Despina Stavrinos, Ph.D.; Assistant Professor and TRIP Lab Director, UAB Department of Psychology; 916 19th Street South, Birmingham, AL 35294-2916; Phone: (205) 934-7861; Fax: (205) 205-975-2295; E-mail: dstavrin@uab.edu

Acknowledgments

Additional acknowledgements for this project are indicated below:

STRIDE | Southeastern Transportation Research, Innovation, Development and Education Center

UAB SCHOOL OF ENGINEERING
Knowledge that will change your world

UAB SUSTAINABLE SMART CITIES RESEARCH CENTER
Knowledge that will change your world

Tim Barnett, ALDOT

UAB COLLEGE OF ARTS AND SCIENCES
Department of Psychology

TRIP
Translational Research for Injury Prevention LABORATORY

Workshop Participants

Table of Contents

List of Figures

List of Tables

Nomenclature Section

Listing of Acronyms and Abbreviations

ADHD	Attention deficit/hyperactivity disorder
CDC	Center for Disease Control and Prevention
CLRP	Cornell Local Roads Program
DD	Distracted driving
DOT	Department of Transportation
HHS	Health and Human Services
HMHW	Harvard Men's Health Watch
LED	Light-emitting diode
MVC	Motor vehicle crashes
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NYPD	New York Police Department
NY	New York
NMVCCS	National Motor Vehicle Crash Causation Survey
NSC	National Safety Council
RPM	Raised pavement markers
STRIDE	Southeastern Transportation Research, Innovation, Development and Education Center
TRIP	Translational Research for Injury Prevention
UAB	University of Alabama at Birmingham
USDOT	U.S. Department of Transportation
VTTI	Virginia Tech Transportation Institute

Abstract

This comprehensive report provides final findings from a technology transfer project aimed to describe the state-of-the-art addressing prevention efforts for distraction, particularly with regard to infrastructure solutions. The specific tasks for this project were as follows: Task 1) Conduct an extensive literature review related to infrastructure solutions for distracted driving; Task 2) Survey state Departments of Transportation regarding their existing and planned infrastructure for alleviating distracted driving; Task 3) Conduct a workshop enabling participants to test various distracted driving infrastructure solutions in an interactive driving simulator; Task 4) Survey workshop participants regarding the pros and cons of various distracted driving infrastructure approaches; Task 5) Conduct a webinar to highlight results of this project; and Task 6) Prepare a final report for project. Overall, findings suggested various approaches can be used to help prevent distracted driving crashes and fatalities, including use of the following: Rumble strips/rumble stripes, Signage, Text stops, Driver training programs, Educational campaigns (e.g., websites, school programs, etc.), and Legislation/law enforcement. Rumble strips are the most common infrastructure implemented by various state Department of Transportations to minimize distracted driving crashes and fatalities. Implications and future directions are discussed.

Executive Summary

Distracted driving (DD) remains costly and burdensome to society. A number of prevention approaches have been implemented, but none have significantly reduced the mortality and morbidity resulting from distracted-driving related motor vehicle crashes.

The goal of this project was to develop a synthesis report describing the state-of-the art addressing prevention efforts for distracted driving, particularly with regard to infrastructure solutions. Specific objectives were three-fold: (1) Identify relevant published research in distracted driving-related infrastructure prevention efforts; (2) Describe existing and planned infrastructure across the U.S. for preventing distracted driving fatalities; (3) Present the results of this investigation in a final report, workshop, and webinar.

To accomplish this goal, we surveyed state Departments of Transportation and hosted a workshop with various stakeholders to gain insight into planned and existing infrastructure solutions, as well as perception regarding various distracted driving prevention approaches. Findings suggested that various approaches can be used to help prevent distracted driving crashes and fatalities, including use of the following: Rumble strips/rumble stripes, Signage, Text stops, Driver training programs, Educational campaigns (e.g., websites, school programs, etc.), and Legislation/law enforcement. Rumble strips are the most common infrastructure implemented by various state Department of Transportations to minimize distracted driving crashes and fatalities.

Several recommendations are put forth to further develop infrastructure technologies aimed at reducing crashes and fatalities resulting from distracted driving. The performance of the various infrastructure technologies needs to be better ascertained and quantified through further interactions with state Department of Transportations (DOTs); if possible, pilot demonstrations should be conducted on the various infrastructure techniques; the performance of these infrastructure techniques should be ascertained in both rural and urban environments (and their performance should be compared and contrasted); and the interactions of distracted driving and distracted pedestrians needs to be investigated.

In conclusion, in an effort to save lives on U.S. roadways, all forms of DD strategies are supported, e.g., legislation, cell phones disabling technology, improve road design, systematic intervention, and awareness/public efforts. Combining these efforts have been shown as an effective and comprehensive approach to combat, diminish and eradicate distracted driving and improve roadway safety, although, further research is warranted as DD continues to be a major problem on U.S. roadways and worldwide.

CHAPTER 1 BACKGROUND

Problem Statement

The goal of this project was to develop a synthesis report describing the state-of-the art addressing prevention efforts for distracted driving, particularly with regard to infrastructure solutions. The deliverables for this project include a comprehensive final report and results presented in an interactive, on-site workshop as well as a webinar. The main focus of this technology transfer project addresses distracted driving mitigation.

Research Objective

The research objectives were three-fold: (1) Identify relevant published research in distracted driving-related infrastructure prevention efforts; (2) Describe existing and planned infrastructure across the U.S. for preventing distracted driving fatalities; (3) Present the results of this investigation in a final report, workshop, and webinar.

Scope of Study

The tasks for this project were as follows:

Task 1. Conduct an extensive literature review related to infrastructure solutions for distracted driving;

Task 2. Survey state DOTs regarding their existing and planned infrastructure for alleviating distracted driving;

Task 3. Conduct a workshop enabling attendees to test various distracted driving infrastructure solutions in an interactive driving simulator;

Task 4. Survey workshop participants regarding the pros and cons of various distracted driving infrastructure approaches;

Task 5. Conduct a webinar to highlight results of this project;

Task 6. Prepare the final report for the project.

Task 1: Literature Review

Since the industrial revolution, valuable progress has been made but at what cost? Societal toll of these technologies are now being realized. One such technology that has been detrimental to mankind is the mobile phone, specifically, the use of the cellular phone while driving. Though several mobile devices exist, e.g., television screen, global positioning system (GPS), radio, etc., texting on the cell phone while driving is the most lethal. Specifically, texting while driving is the most dangerous use of the cell phone because the task of texting causes three forms of distractions - cognitive, visual, and manual. Moreover, research has shown that texting while driving is a major cause of motor vehicle crashes (MVC) and fatalities which is a serious problem on U.S. roadways (Leone, 2010; National Highway Traffic Safety Administration, 2010; Cruz et al., 2009; Madden and Lenhart, 2009). Consequently, this crisis is what prompted Ray LaHood, the former Secretary of Transportation, to declare a nationwide effort to end distracted driving (DD) (Leone, 2010). Hence, the U.S. Department of Transportation (USDOT) and numerous other organizations have researched safety measures that could mitigate dangerous

behaviors behind the wheel thus, creating such DD countermeasures as, legislative policies, education, road design, infrastructure, and technology. The following is an overview of DD, its impacts, and countermeasures.

Overview of Distracted Driving (DD)

The ability to communicate anytime, anywhere, and under any condition has been transformed by the use of cell phones and other mobile devices, which in turn, influences ones' focus while driving. As such, the National Highway Traffic Safety Administration (NHTSA) defines driver distraction as a specific type of inattention that occurs when a driver's attention is diverted from the task of driving to focus on a non-driving activity (NHTSA, 2010). Thus, their research (NHTSA, 2008) showed that nearly 6,000 lives were lost and more than half a million people were injured in motor vehicle crashes involving drivers that were distracted (Leone, 2010). As a result of this phenomena, distracted driving has been considered a public health epidemic as early as 2009 when Ray LaHood made a call to action. Thus, this literature review summaries numerous distracted driving (DD) research articles that highlight the impacts, strategies and future work required to find effective ways to reduce DD.

Impact of Distracted Driving (DD)

In the wake of easily accessible digital media for all ages, an understanding of the DD phenomena is critical. Consequently, DD resulting from the use of a cell phone has climbed to epic proportions and has reached crisis levels. Some startling facts on the use of cell phones while driving include:

- 660,000 drivers use cell phones at any given daylight time,
- 1.6 million DD related crashes occur each year,
- 330,000 DD related injuries occur each year,
- DD causes 25% (1 out of every 4) car accidents in the United States,
- DD is 6 time more likely to cause an accident than drunk driving,
- Texting is the most dangerous cell phone-related task (i.e., uses all three forms of distractions – visual, manual and cognitive),
- 94% of drivers support a ban on texting while driving,
- 74% of drivers support a ban on hand-held cell phone use (National Safety Council (NSC), 2013).

Moreover, NSC (2010) studied the use of hands-free cell phones while driving and the hazards imposed by DD. Their research found that vision was the most important sense for driving and that distracted drivers experienced 'inattention blindness' while on the cell phone and were not aware of 50% of what was occurring in their surroundings (NSC, 2010). Further, research estimates showed that more than one in four crashes were the result of cell phone use and 11 percent of drivers indicate using the cell phone while driving (NSC, 2010). Additionally, this report found that the number one cause of deaths in the U.S. of 16 – 34 year olds was motor vehicle crashes. Even more concerning, this report found that since 1994, between 39,000 and 46,000 people were killed every year in motor vehicle crashes which accounted for more than 650,000 deaths in the past 15 years (NSC, 2010). Moreover, NSC estimated that in 2008, 25 percent of all crashes involved cell phones which accounted for 1.4 million crashes which was an almost 10,000–fold increase in 10 years (NSC 2010). Consequently, cell phone use has been deemed as a major public health hazard.

Although there are facts that highlight the growing danger and the need to implement behavior modification of cell phone usage while driving, this behavior continues to persist. In 2009, Madden and Lenhart. reported that 28% of adult drivers used cell phones while driving which subsequently, in 2013, was also supported by a study conducted by Virginia Tech Transportation Institute (VTTI). In Madden and Lenhart's (2009) study, analysis was done on a variety of tasks that drew a drivers' attention away from the roadway and found that cell phone text messaging was among the highest crash risk factor of all cell phone-related tasks observed among drivers. As such, survey results showed that 75% of teenagers between the ages of 12 -17 own a cell phone, and 66% used cell phones to send or receive text messages; 34% (one in three) texting teenagers ages 16-17 reported texting while driving which translates into 26% of all American teenagers ages 16-17; 52% (nearly half) of teenagers who own a cell phone (ages 16-17) reported talking on a cell phone while driving. This translates into 43% of all American teenagers ages 16-17; 48% of all teenagers ages 12-17 reported being in a car when the driver was texting; and, 40% of teenagers indicated being in a car when the driver used a cell phone in a way that put themselves or others in danger (Madden and Lenhart, 2009).

In addition, Edger Snyder & Associates (2013) found that the statistics for teen drivers texting or using their cell phone while driving were still very alarming. These facts included:

- 11 teenagers die every day,
- 94% of teenagers acknowledge the dangers yet 35% do it anyway,
- 21% of teenagers involved in fatal accidents were distracted by their cell phones,
- Teenagers are 4 times more likely than adults to get into car crashes or near-crashes,
- Fatality from MVC for teenagers doubles and is 5 times more with two or more passengers.

Furthermore, Edger Snyder & Associates (2013) found that the use of cell phones while driving accounted for 3,154 fatalities and 424,000 injuries caused by distraction-related crashes.

Similarly, research by Auto Safety (July, 2013) found that among teenagers, texting while driving was the leading cause of premature death, surpassing drinking and driving. Some of their findings were that:

- More than 3,000 teenagers die each year in crashes caused by texting while driving;
- Approximately 2,700 teenagers are killed in drunk driving accidents; and
- More than 50 percent of teenagers admit to texting while driving.

Overall, this research found that drivers were 23 times more likely to be in an accident if texting while driving.

Moreover, the Virginia Tech Transportation Institute's (VTTI, 2013) naturalistic driving study showed that distracted driving was a tangible threat. Results from VTTI's simulated (naturalistic) driving study revealed that DD continued to be problematic among drivers. This study showed that subtasks (reaching for phone, texting, dialing) associated with cell phone usage increases

3

motor vehicle collisions three-fold and found that the longest duration of drivers taking eyes off the road is associated with text messaging, browsing, and dialing. In addition, this research showed that text messaging increased the risk of a crash or near-crash by two times and resulted in drivers taking their eyes off the road for a total average of 23 seconds. Overall, VTTI concluded that the use of a cell phone is riskier when driving because of the required tasks involved when using a hand-held cell phone, e.g., visual-manual tasks of locating the phone, looking at the phone and touching the phone, etc.

Additionally, NHTSA (2013) conducted research on the use of cell phones while driving. This research involved a national survey of more than 6000 participants who were asked questions regarding public attitude, knowledge and self-reported behavior on texting and cell phone usage. This DD survey was the second one conducted by NHTSA and results showed that fewer respondents made calls or answered cell phone while driving, e.g., declined from 33% in 2010 to 28% in 2012. However, there was a 2% increase of drivers sending text messages, 12% in 2010 to 14% in 2012 (NTHSA). Likewise, there was an increase in support of banning cell phones while driving which was 68% in 2010 and rose to 93% in 2012 (NHTSA). In general, participants perceived DD to be common and felt there was no difference in their driving abilities. Thus, the following are strategies used to change DD outcomes and the mindset of drivers while emphasizing the dangers of DD.

Distracted Driving Strategies

Technology advances has contributed to the growing number of distraction among drivers. As research points out, 72% of people in the US 18 years or older, own a cell phone and reported cell phone use while driving (Garner *et al*., 2011). However, cell phone usage is not the only distraction while driving and any activity which distracts the driver from the main task of driving is a DD activity. Nonetheless, cell phone use plays a major role in motor vehicle collisions (MVCs) and is the main factor in MVCs among adolescents. As such, the Centers for Disease Control and Prevention has listed DD as one of the 20th century's major public health hazards and has enforced efforts to achieve increased motor vehicle safety (Garner *et al*., 2011) The authors found that endeavors to mitigate DD included such things as the manufacturing of safer cars (e.g., shatter-resistant windshields), improvement of roadways (e.g., edge and centerline stripes) and changes in the drivers' behavior (e.g., seat belt use). Further, research showed that the implementation of these safety mechanisms reduced or prevented injury. However, the authors suggest that addressing risky distractive behaviors would require more aggressive approaches, such as cellphone mitigation devices and legislation. Thus, these tools along with education to stress the dangers of cellphone use, especially among adolescents, are seen as key factors for reducing DD.

In addition, research conducted by NHSTA (2010) and Ferguson (2014) suggest that the first order of attack was to understand DD, i.e., any activity that diverts ones' attention from the primary task of driving. Thus, the author considered DD as any form of drivers' inattentiveness which included such activities as: eating; drinking; smoking; cell phone use; grooming; navigation system use; adjusting a radio; CD player, or MP3 player; temperature control adjustment; disciplining or attending to passenger; and adjusting the rear or side mirror (Ferguson, 2014). Furthermore, Ferguson (2014) research showed that there were many distractions faced by a driver and are dangerous on the road; however, mobile interactive devices were shown to be the most prolific in crash risk studies and accidents which, has been the main

focus of legislation to mitigate DD. Ferguson (2014) also suggested that with the growth of available technology, distraction will increase and research should not only focus on sources of DD but research why and under what circumstances drivers disengage while driving. Similarly, research performed by Parr *et al.* (2016) evaluated DD behavior and drivers' personality and suggest identifying traits as a way to understand and combat DD. Thus, addressing more behavioral research questions and trait identification are seen as viable ways to target education and assist in the efforts to diminish DD.

Moreover, research performed by Angell (2014) also suggested that there are crucial questions needed to be researched to understand drivers' activities and subsequent distractions. The author's research questions include: Which activities lead to distraction? What are their occurrences during driving? Which activities promote crash risk? And, what are the ways through which some activities affect driving? Thus, methods to address these questions have ranged from naturalistic driving studies (NDS - an approach among already applied traffic research methods where drivers' behavior is observed unobtrusively in a natural setting for a long period of time), experiments conducted in laboratories, simulators, tracks, epidemiological analyses of crash data (produce a valid estimate of a relative risk under certain conditions) and roadways (Angell, 2014). However, the author indicated that the challenge and future work would be to integrate the varying datasets associated with the different methods as they are rarely unified and would require extreme cooperation to find the convergence (Angell, 2014). Nonetheless, the author suggests that an integration of all the sources would facilitate a better understanding of DD, be a robust source for scientific analysis and make meaningful strides in the area of DD, thus, providing the necessary data to adequately define issues and develop effective countermeasures to curtail DD and improve safe driving.

Similarly, research results from a NHSTA (2010) survey showed how the role of understanding inattention (behavior) in crash occurrence was important in developing and implementing crash prevention measures. Specifically, between 2005 and 2008, NHTSA's National Center for Statistics and Analysis conducted the National Motor Vehicle Crash Causation Survey (NMVCCS). This survey was done in an effort to understand the relationship between inattention and crash occurrence. The research focused on specific distraction, which involved critical reasoning and associated factors, based on non-driving internal source activities (e.g., cell phone usage) and cognitive activities (e.g., personal problems and loss of thought). Thus, analysis of 14 internal sources of distraction were performed and were based on an estimated 2,188,970 NMVCCS crashes for which, an estimated 3,889,775 drivers were involved in these crashes. Hence, 57% of drivers reported being distracted by one or more internal sources such as use of the cell phone (NHTSA, 2010). Consequently, distraction was found to be more common with drivers involved in internal source activities compared to drivers engaged in cognitive activities. NHTSA (2010) suggested that these results further supported the need for awareness and education of DD in order to mitigate motor vehicle collisions (MVC).

Likewise, a Harvard University (HMHW, 2012) article suggested that MVCs were predictable; therefore, they could be preventable. This article points out that distractive behavior falls into three major categories: visual distraction (drivers' eyes off the road), manual distraction (driver's hands off the steering wheel), and cognitive distraction (driver's mind off the complex task of driving). All are important factors of DD and when these forms of DD occur simultaneously, crash risk multiplies exponentially. Thus, the author indicated that an example of this would be

texting (HMHW, 2012). Moreover, the article indicated that knowing the hazards of DD, such as cell phone usage and other mobile devices, were key elements in preventing automobile accidents (HMHW, 2012). Similarly, empirical research results support the impact of DD cell phone usage and negative traffic congestion (Stavrinos et al., 2013). Consequently, the author also suggests education, hence awareness, as a tool to combat DD.

Although many view DD as normal driving behavior and that DD does not diminish ones' ability to drive and focus on the road, 421,000 injuries have occurred and 3,179 people have been killed as a result of distracted driving (NHTSA, 2014). Moreover, DD is the number one killer of teen in the United States. As reported by Auto Safety (2013), distracted driving kills more young drivers under the age of 20 than drunk driving. Even though young drivers continue to text while driving (especially driving alone), surveys show that DD is becoming more socially unacceptable (Auto Safety, 2013). Thus, research found that 71% of 2,000 young drivers said reading, receiving and emailing unacceptable while driving – however, 45% are doing it. Moreover, 95% of these teenagers read texts and emails when alone – 32% do when with friends or parents; More than 90% post on a social media site – but 29% do when with others. Similarly, 5% of teenagers watch a video when alone – 45% do so when with others (Auto Safety, 2013). Consequently, studies have shown that new collision avoidance technologies would help solve the problem of DD (Auto Safety, 2013).

Moreover, State Farm (2015) conducted research to examine behaviors and attitudes of teenage drivers towards DD. This survey was given to 1000 teenagers between the ages of 16 to 19. Among the distractions listed by teenagers were cell phone/smart phone usage, interacting with a navigation system/GPS, searching for music, and talking with passengers (State Farm, 2015). However, survey results indicated that teenagers were supportive of legislation aimed at restricting cell phone usage as a measure for reducing automobile accidents (State Farm, 2015). In addition, the results also indicated that an important factor of a teen's behavior and perception of DD is the environment. For instance, teenagers are more likely to use their cell phone while stopped at a red light (State Farm, 2015). In general, State Farm (2015) found that teenagers were aware of DD behaviors and suggest the implementation of educational, legislative and technological (e.g. cellphone shuts off if motion is detected) solutions to diminish teen DD behaviors.

Similarly, Atchley et al. (2011) research revealed that an understanding of social norms was key to mitigating distractive activities. Atchley et al. (2011) reported that as much as 95% of young adult cell phone users text while driving. Furthermore, teens were aware of this unsafe distractive activity that it is a major culprit of DD for which, 1 in 5 crashes are caused by teen cell phone usage (Zhang et al. 2015). This DD awareness was confirmed by survey results. Specifically, survey results from 171 students, at the University of Kansas and Louisiana State University, indicated that they were aware of unsafe DD behaviors and laws regarding cell phone use and texting but still engaged in this activity. Thus, using drunk driving as a benchmark, data supports that the implementation of stiff laws to cut down on drunk driving has worked, therefore the authors suggests similar legislation to penalize DD. However, the authors caution that these efforts may affect or change drivers' behavior, though evidence has shown that it is the social norms that will be required to change attitudes which effects behavioral activities necessary to mitigate DD. Hence, additional risk behavior and other risk factors such as attention-deficit/hyperactivity disorder (ADHD) research along with campaigns would help change DD

norms. Specifically, Winston *et al.* (2013) research indicated that reducing contributing risk factors such as ADHD and developing measures to combat ADHD risky behavior traits would help reduce young adult MVCs and fatalities.

Therefore, targeted adolescent campaigns have been implemented to prevent and decrease injury among young drivers. For instance, a program geared at minimizing risk-taking behaviors among this age group was developed and results of this program was analyzed based on data gathered from a survey which was distributed to 167 high school students. Stewart *et al.* (2015) results showed that the content contained in the DD program was rated comprehensive (93%) and texting while driving was seen as routine among the respondents (81%). Respondents' comment "If you don't (text and drive), you either don't have a phone or don't have a driver's license" may be interpreted as a social norm which, was uncovered as a factor in many DD-related reports (Stewart *et al*., 2015). Thus, Stewart *et al*. (2015) suggest that visual elements such as videos and personal stories, be integrated into the DD program as an effort to reinforce the consequences of risk-taking behavior among adolescent drivers.

Furthermore, pedestrians and bicyclists are especially vulnerable to acute injury and death resulting from DD on roadways. The Center of Disease Control and Prevention (CDC, 2017) reported that pedestrian incidents accounted 4,735 fatalities from MVCs and 150,000 were treated for MVC related injuries. Education and use of roadway safety to include design features such as traffic-calming devices, raised medians, sidewalks, and crosswalks were suggested as safety enhancements for pedestrians and bicyclists (Smith *et al*., 2011).

Moreover, NHTSA has many years of documented road hazards of cell phone usage and by 2009, 17 state had banned texting while driving and 7 states outlawed use of handheld communication devices. Despite cell phone laws, a 2008 Nationwide Mutual Insurance survey found that drivers still used their phones (only 63% abide by laws). Thus, this fact supports known data that drivers' habits do not necessarily change (Cruz *et al*., 2009). Although study results showed that texting and dialing led to greater accidents, participating in a phone conversation, e.g., talking or listening, did not necessarily lead to an increase in risk (Cruz *et al*., 2009). Hence, this has led to the development of technological products that minimized drivers' distraction, such as, the automatic log incoming calls/text, and the phone motion sensors that shut off while the car is in motion.

Although cell phones are a part of todays' society, stiff legislation have been implemented to ban or mitigate use of cell phones while driving. Likewise, the Senate has considered a cell phone bill which would provide federal funding to states that enact cell phone laws. These laws would include such restrictions as the ban of all texting and talking, which has been implemented in states such as California, Connecticut, Washington, DC and Oregon. Consequently, President Obama signed an executive order that forbids federal workers from texting while driving government vehicles or their own vehicles while on military installations (Madden and Lenhart, 2009). Likewise, in an effort to mitigate DD, New York's governor Cuomo aggressively enforced non-DD practices which resulted in a 365% increase in DD tickets issued in the summer of 2013. Specifically, in the summer of 2013, NY police gave 21,580 tickets for DD as opposed to 5,208 in 2012. Additionally, to cut down on DD-cell phone usage and other mobile device usage, New York has designated 91 locations as 'texting zones.' These locations are places where drivers could safely pull-off the road and use their mobile devices. Thus, there were

no added cost or need for new infrastructure as existing park-n-ride facilities, rest stops and parking areas along the roads were utilized. Additionally, NY roadways were equipped with texting zone signage. Thus, with the development of text stops and strong DD enforcement, NYPD has encouraged drivers, especially iPhone users, to download their app which provides text zone locations and stop the habit of DD.

Moreover, research suggests that a combination of DD strategies and physical roadways designs are excellent tools to prevent MVC's (FHWA, 2015). Hence, rumble strips, which are grooves or rows of dents in the pavement that causes vibration and audible rumblings transmitted through the wheels into the car body, are roadway countermeasures used to combat DD. Since more than 53% of fatal crashes result from drivers crossing the centerline or edge of a roadway, use of rumble strips have been shown to reduce crashes. This fact was supported by the FHWA's (2015) study of 11 states which implemented centerline rumble strips and analyzed the effectiveness of this infrastructure solution. Results indicated an average of 40%-60% in crash reduction, for which, responses ranged from 18%-64% and an average crash reduction with shoulder strips of 30%-40% with responses in the 14%-80% range. In addition, three states limited their crash analysis to DD crashes caused by drowsiness and the implementation of rumble strips indicated crash reduction ranged from 40%-80%. Moreover, due to rumble strips reflective ability, this infrastructure solution would be a viable option in rural areas where there is less road visibility and 67% (two-third) of crashes occur in rural areas (FHWA 2015).

In addition, the National Cooperative Highway Research Program (NCHRP) conducted a study which showed that rumble strips reduced single-vehicle run-off road injury crashes by 24% on rural freeways and 46% on two-lane rural roads. Similarly, NCHRP's (2010) research showed that the use of centerline rumble strips reduced single vehicle run-off road injury related crashes on rural highways by 50% and urban two-lane road crashes by 91%.

Furthermore, centerline rumble strips have been shown to be an effective mechanism to assist distracted, drowsy or inattentive drivers who stray over the center line as reported by the Cornell Local Roads Programs (CLRP, 2016). As such and according to the Federal Highway Administration (FHWA, 2015), rumble strips have been shown to reduce crash injury by 38%-50% on rural two lane road and 37%-90% on urban two-lane roads. Therefore, rumbles strips are advertised as an excellent safety solution for crashes as more than 57% of traffic fatalities occur after a driver has crossed over the edge or centerline of the road (CLRP, 2016).

In summary, the earliest form of DD, i.e., drunk driving, was viewed as a mistake and not punishable, until the early 1980s when drunk driving became legally and socially unacceptable and severe consequences resulted. Today, texting and cell phone use behind the wheel share the stage with other DD behaviors such as drunk driving, speeding, road rage, drugged driving, and drowsy driving (Lerner 2011). DD, particularly the use of cell phones causes more fatalities than drunk driving and in 2009, 32 states banned texting behind the wheel. And, as of February 2017, 50 states have employed stringent teenagers driving laws by implementing graduated drivers' license and 42 states have banned texting behind the wheel. Thus, in an effort to save lives on U.S. roadways, research supports all forms of DD strategies, e.g., legislation, cell phones disabling technology, improved road design, systematic intervention, and awareness/public efforts. As such, combining these efforts have been shown as an effective and comprehensive approach to combat, diminish, and eradicate distracted driving and improve roadway safety,

although, future research is warranted as DD is still a major problem on US roadways and worldwide (CDC, 2014).

CHAPTER 2 RESEARCH APPROACH

Task 2: Survey State DOTs

To gain a clearer understanding of currently implemented or planned infrastructure solutions aimed at reducing the morbidity and mortality resulting from distracted driving related motor vehicle crashes, we surveyed state safety engineers across state departments of transportation. After obtaining formal approval from our university's Institutional Review Board (IRB), we emailed a cover letter with a link to an online survey to state DOTs and also posted the cover email content to relevant list serves (including but not limited to): National Safety Engineers, subcommittees of the Transportation Research Board, AASHTO's Standing Committee on Highway Traffic Safety, and the Canadian Association of Road Safety Professionals (CARSP). Initially participants responded to the cover email by clicking on an embedded link that took them to additional information on the secure UAB-supported Qualtrics website (Appendix A). Participants read the information sheet which outlined the purpose of the study and individuals who expressed continued interest proceeded to complete the survey. No unique identifiers were collected. A copy of the online survey is provided in Appendix B and findings are highlighted in Chapter 3.

Task 3: Conduct a Workshop

With funds from the Southeastern Transportation Research, Innovation, Development and Education (STRIDE) Center, and support from the UAB School of Engineering, Department of Psychology, Sustainable Smart Cities Research Center, and Translational Research for Injury Prevention (TRIP) Laboratory, Dr. Robert W. Peters and Dr. Despina Stavrinos hosted an interactive workshop at the University of Alabama at Birmingham on March 3rd, 2017 from 1:00PM to 4:30PM at the Community Health Services Building, Room 207. Simulator tours were also provided to workshop attendees at the TRIP Lab during an interactive portion of the workshop in which workshop attendees had the opportunity to drive in a fully immersive, state-of-the-art, driving simulator made possible by Honda Manufacturing of Alabama and the Alabama Department of Transportation.

The workshop event was publicized to the Regional Planning Commission of Greater Birmingham, the Alabama Department of Transportation, the UAB Department of Psychology, and the Civil, Construction, & Environmental Engineering Department via e-mailed flyer (Appendix A) to each organizations distribution lists. The event was also publicized to UAB's Sustainable Smart Cities social media and events pages as well as via e-mailed flyer to their distribution list. Additionally, the event was publicized at the 2017 Transportation Conference, hosted by Auburn Engineering and to a distribution list created by Dr. Despina Stavrinos that included individuals from Auburn University, The University of Alabama, The University of Alabama at Huntsville, and the University of Alabama at Birmingham. We received a total of 16 RSVP's prior to the event and 28 individuals attended the workshop representing the University of Alabama at Birmingham, the Alabama Department of Transportation, Children's Hospital of Alabama, the City of Birmingham, Sain and Associates, Auburn University, The University of Alabama at Huntsville, and Jefferson County Schools.

Dean Iwan Alexander in the UAB School of Engineering, Dr. Fouad Fouad, Professor and Chairman in the UAB Department of Civil, Construction, and Environmental Engineering, and Mr. Tim Barnett, state safety operations engineer for the Alabama Department of Transportation, were invited to provide opening remarks at the beginning of the workshop. Dr. Robert W. Peters provided insight on the project goals, objectives, and tasks and his graduate student, Ms. Sandra Cutts, discussed the literature review for the project. Dr. Despina Stavrinos and her graduate student, Mr. Benjamin McManus, presented on the overview of distracted driving and the overview of the TRIP Lab driving simulator. After learning about the projects objectives, workshop attendees tested various distracted driving infrastructure solutions in the TRIP Lab driving simulator. The simulator scenario for this workshop was programmed to include the most popular existing and suggested infrastructure solutions according to data collected from 29 Department of Transportation Engineers across 9 of the 10 U.S. Health and Human Services regions. Based on the solutions suggested by various engineers to aid in mitigating distracted driving, the following infrastructure solutions were integrated into the simulator scenario: rumble strips, raised pavement markers (RPM's), flashing LED signs, and text stops. Each workshop attendee was invited to drive in the simulator scenario and then complete a post simulator drive survey (Appendix B) in which they were asked various questions on the effectiveness and advantages and limitations of these suggested infrastructure solutions for mitigating distracted driving. After completing the TRIP Lab simulator tours and post simulator drive surveys, workshop attendees were escorted back to the workshop to engage in an interactive activity about their simulator and workshop experience and the event concluded with results, acknowledgements, and closing remarks from Dr. Robert W. Peters. Workshop attendees were provided with a packet that included the workshop agenda, biographies of the workshop speakers, and notetaking presentation slides (Appendix C) and were given a take home USB flash-drive that contained all of the same information.

Task 4: Survey Workshop Participants

Towards the end of the workshop, following testing/demonstration on the driving simulator, the workshop attendees were urged to participate in completing a post-workshop survey. A copy of the post-workshop survey is provided in Appendix B. Questions asked on the survey included:

- What is your position title?
- What is the best way to eliminate distracted driving (aside from removing cell phones from vehicles)?
- What Department of Transportation, law enforcement, high school, university, etc. – sponsored distracted driving initiatives are you aware of that are currently implemented in your jurisdiction (other than infrastructure)?
- Rate how effective you believe infrastructure solutions (e.g., signs, texting lanes) can be in reducing injuries and fatalities related to distracted driving.
- What are the pros of using this approach?
- What are the cons of this approach?
- Rate how effective you believe behavioral interventions (e.g., driving training programs) can be is reducing injuries related to distracted driving.
- What are the pros of using this approach?
- What are the cons of this approach?

- Rate how effective you believe educational campaigns (e.g., websites, school programs) can be in reducing injuries and fatalities related to distracted driving.
- What are the pros of using this approach?
- What are the cons of this approach?
- Rate how effective you believe policy (e.g., laws against distracted driving) can be in reducing injuries and fatalities related to distracted driving.
- What are the pros of using this approach?
- What are the cons of this approach?
- Rate how effective you believe law enforcement can be in reducing injuries and fatalities related to distracted driving.
- What are the pros of using this approach?
- What are the cons of this approach?
- Rank in order how effective you think these approaches are for reducing injuries and fatalities related to distracted driving (1 = most effective, 5 = least effective).
- Rate how effective your believe **Rumble Strips** can be in reducing injuries and fatalities related to distracted driving.
- What are the pros of using this approach?
- What are the cons of this approach?
- Rate how effective you believe **Raised Pavement Markers (i.e., reflectors)** can be in reducing injuries and fatalities related to distracted driving.
- What are the pros of using this approach?
- What are the cons of this approach?
- Rate how effective you believe **LED flashing signs** can be in reducing injuries and fatalities related to distracted driving.
- What are the pros of using this approach?
- What are the cons of this approach?
- Rate how effective you believe **Billboards** can be in reducing injuries and fatalities related to distracted driving.
- What are the pros of using this approach?
- What are the cons of this approach?
- Rate how effective you believe **Text Stops** can be in reducing injuries and fatalities related to distracted driving.
- What are the pros of using this approach?
- What are the cons of this approach?
- Rank in order how effective you think the following infrastructure solutions are for reducing injuries and fatalities related to distracted driving (1 = most effective, 5 = least effective).
- Rate how effectively **Rumble Strips** were portrayed in the driving simulator in comparison to the real-world environment.
- Rate how effectively **Raised Pavement Markers (i.e., reflectors)** were portrayed in the driving simulator in comparison to the real-world environment.
- Rate how effectively **LED flashing signs** were portrayed in the driving simulator in comparison to the real-world environment.
- Rate how effectively **Billboards** were portrayed in the driving simulator in comparison to the real-world environment.

- Rate how effectively **Text Stops** were portrayed in the driving simulator in comparison to the real-world environment.

CHAPTER 3 FINDINGS AND APPLICATIONS

DOT Survey Results

A survey was developed which was sent to state Department of Transportation (DOTs). A copy of this survey is provided in Appendix B. The results from the surveys are described below.

Figure 1 below identifies the state DOT offices responding to the survey.
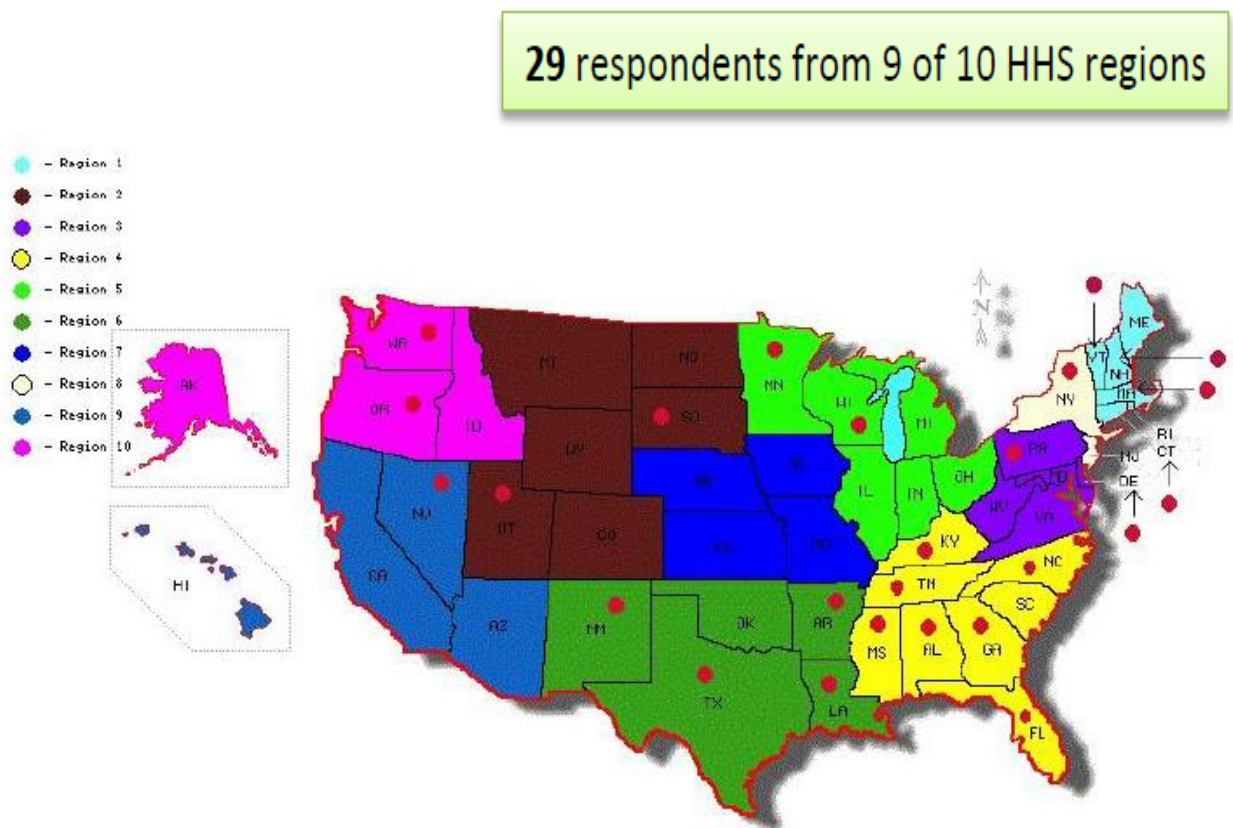
Figure 1. State Department of Transportation (DOTs) responding to the survey.

We had a 58% response rate for our surveys with the state DOTs. Typical response rates for external surveys is usually in the 10 to 15% range; internal surveys generally receive a 30 to 40% response rate. So, a response rate of nearly 60% is fantastic.

HHS Region Number
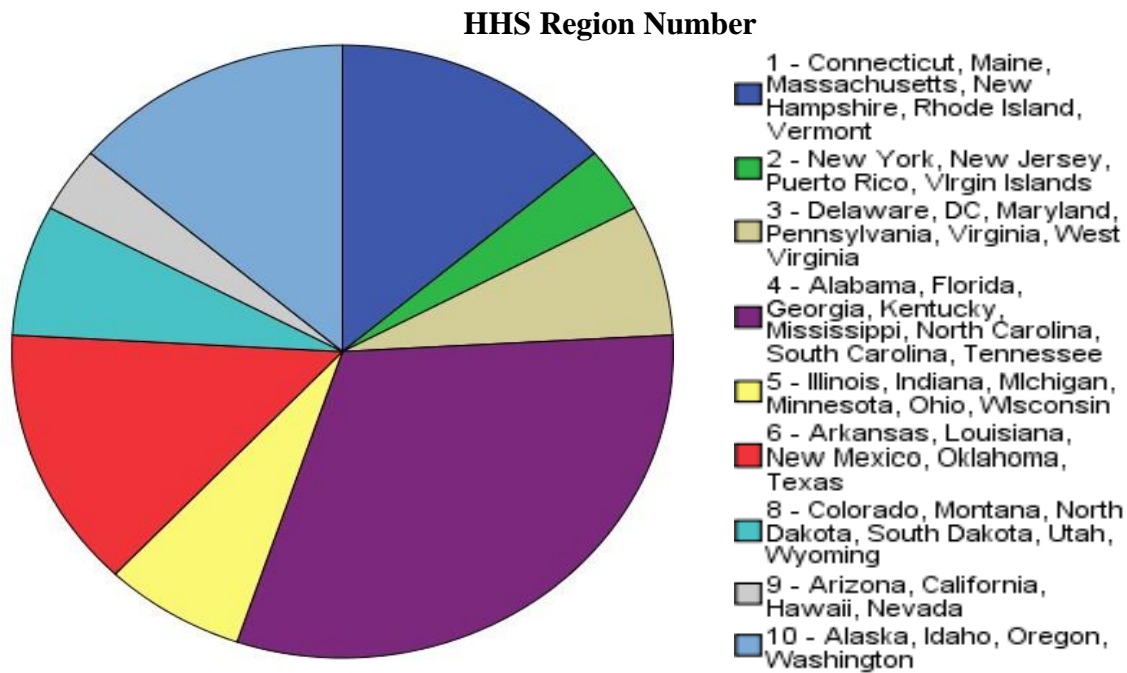
Figure 2. Response to survey by HHS regions.

Referring to Figure 2 above, the largest response was from Region 4 (southeastern U.S.); good response was also received from Regions 1, 6, and 10. All but one region provided feedback to our survey (Region 7), no response was received for the states of Iowa, Nebraska, Kansas, and Missouri.

In response to the question "What is the single most productive infrastructure improvement (e.g., rumble strips, signage, text stops/rest stops, or other) your agency has implemented to mitigate distracted driving?", the following figure depicts the overall response received from the state DOTs.
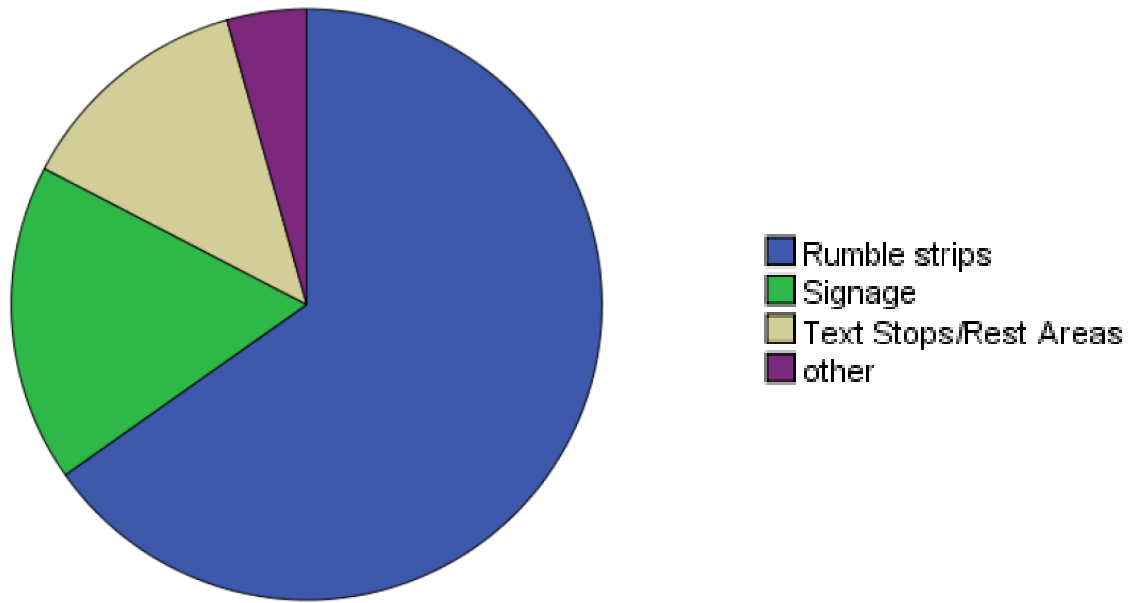
Figure 3. Single most productive infrastructure improvement (e.g., rumble strips, signage, text stops/rest stops, or other) the various state DOTs have implemented to mitigate distracted driving.

As evidenced by the above figure, rumble strips are the most common single approach used to mitigate distracted driving. In response to the question "Has any data on this infrastructure implementation been collected?", the following figure depicts the overall response received from the various state DOTs.
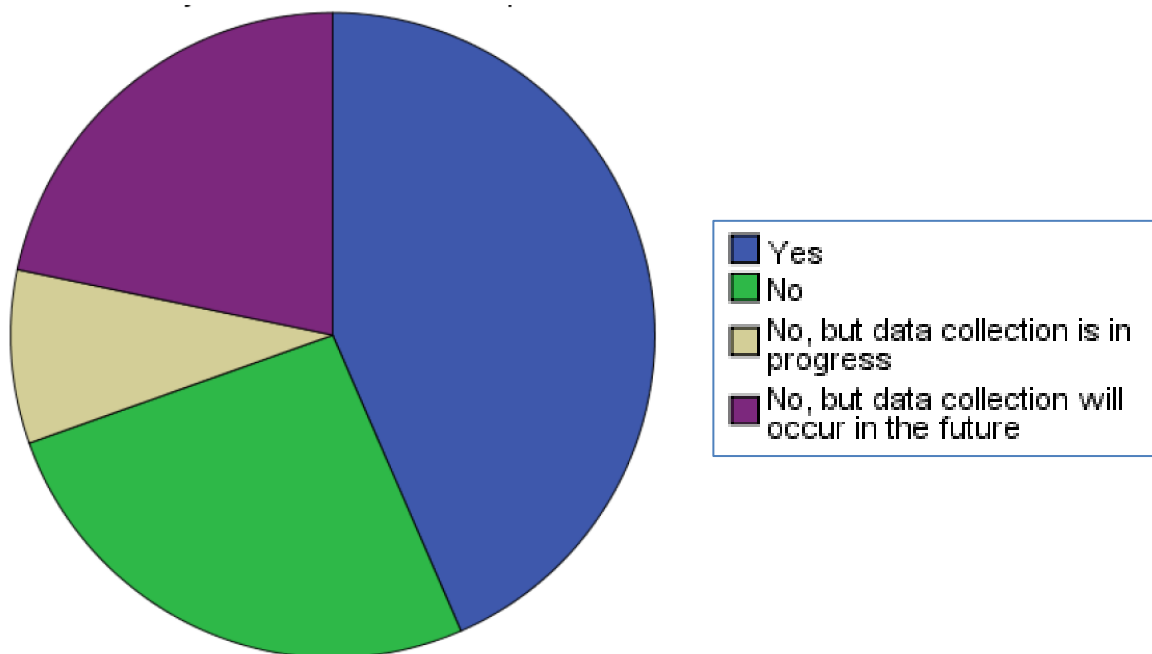
Figure 4. Indication of whether any data on this infrastructure implementation has been collected.

As evidenced by the previous figure, there is some evidence that data has been collected on the implemented infrastructure. In response to the question that if there has been data collected on the infrastructure implementation, then "Has this infrastructure implementation been effective in reducing distracted driving-related crashes (in the opinion of the various state DOTs), the response is depicted in the following figure.
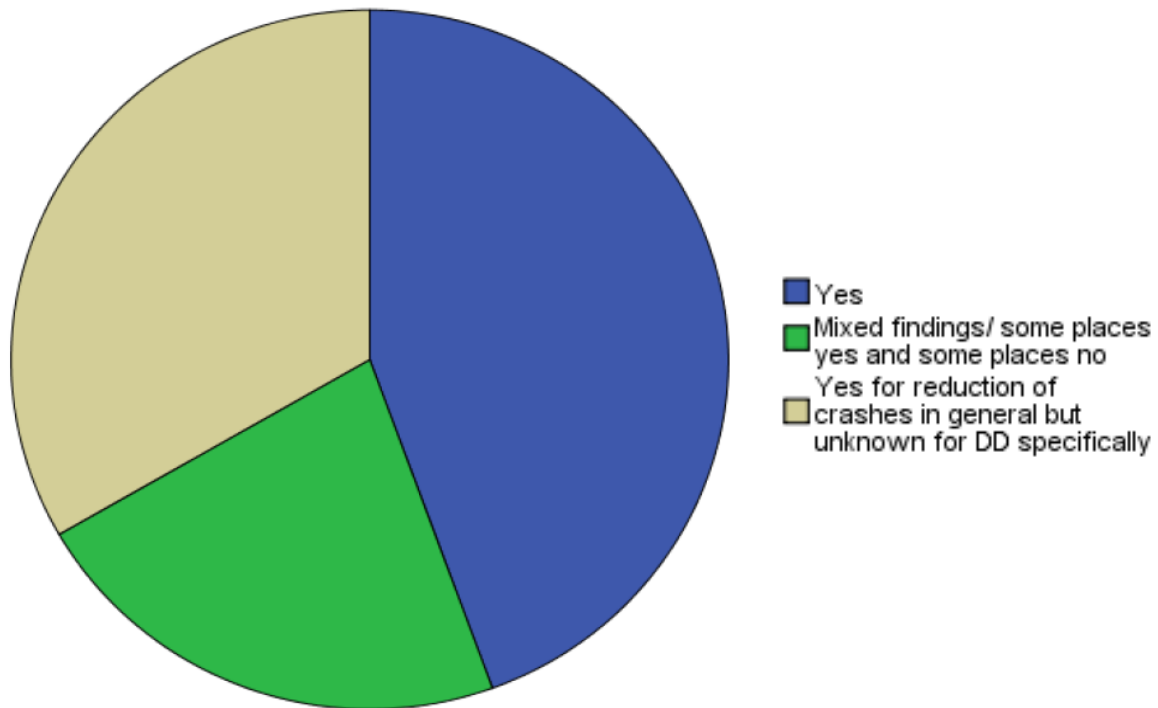
Figure 5. Indication of whether this infrastructure implementation been effective in reducing distracted driving-related crashes.

As evidenced by the feedback provided by the state DOTs (summarized in the figure above), the infrastructure implemented has been at least somewhat effective in reducing distracted driving-related crashes. In response to the question of "What infrastructure improvements does your state DOT office have planned to mitigate distracted driving?", the feedback provided by the various state DOT departments are summarized in the following figure.

15
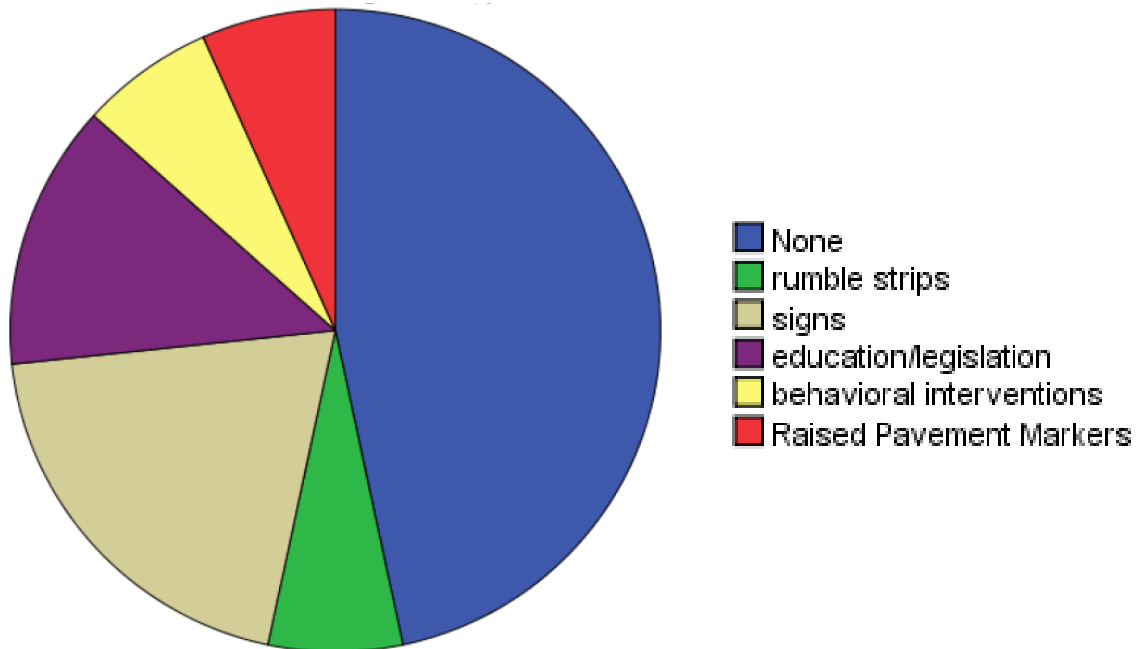
Figure 6. Indication of what infrastructure improvements are planned to mitigate distracted driving for the various state DOT departments.

As indicated in the above figure, the primary planned infrastructure improvements involve signage and education/ legislation. In response to the question of "What is the best way to eliminate distracted driving (aside from removing cell phones from vehicles)?", the responses provided by the various state DOT departments are summarized in the figure on the following page.
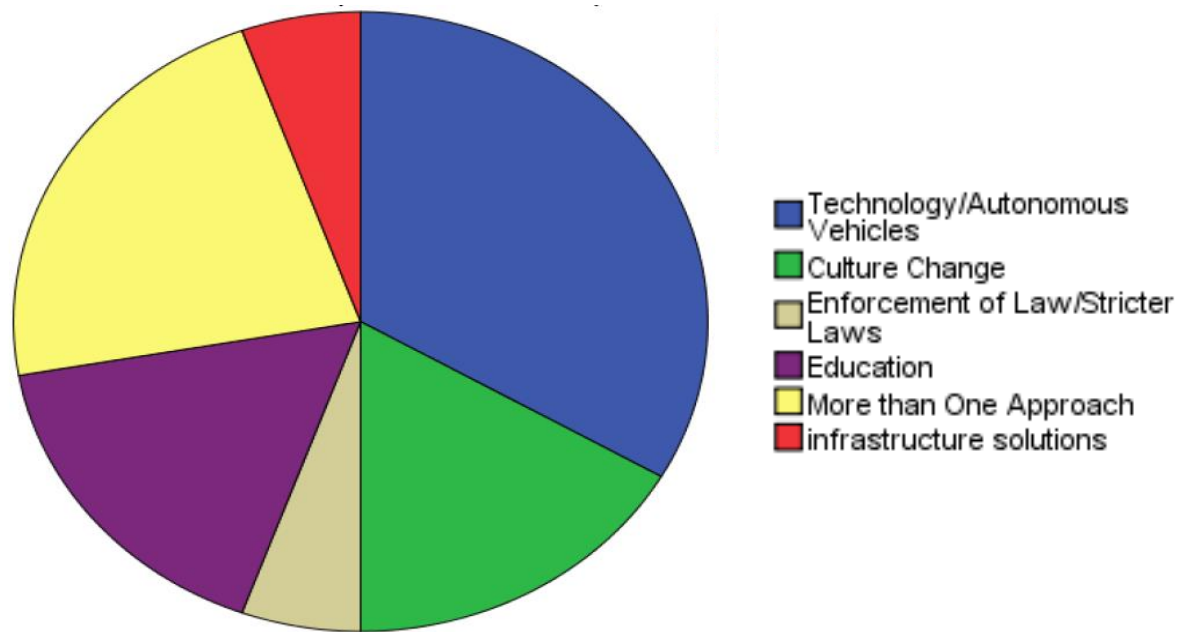
Figure 7. Indication of what is the best way to eliminate distracted driving (aside from removing cell phones from vehicles) provided by the various state DOT departments.

As indicated in the above figure, the various state DOTs felt technology/autonomous vehicles, law enforcement, and education will all help to eliminate distracted driving accidents. The various state DOT departments were asked to "Rate how effective you believe behavioral interventions (e.g., driver training programs) can be in reducing injuries and fatalities related to distracted driving". Their feedback is summarized in the following figure (presented both in bar chart and pie chart format).
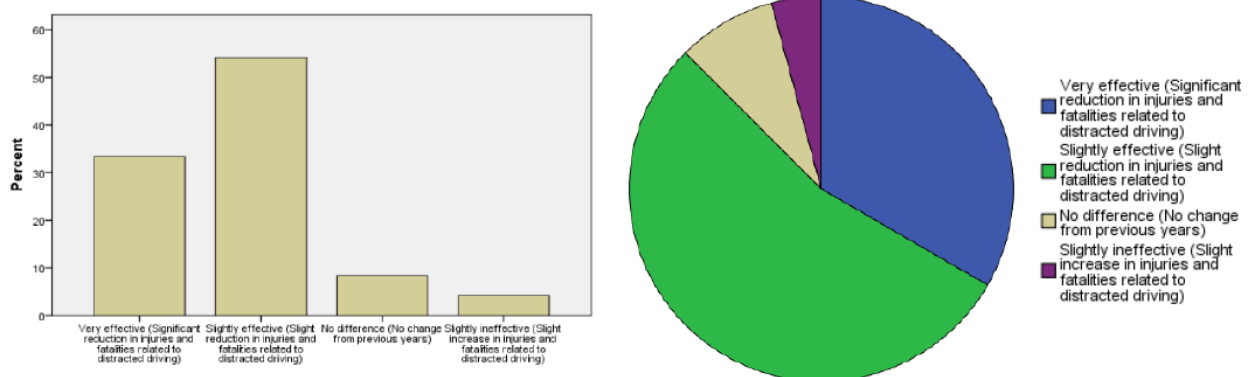
Figure 8. Indication of rating how effective you believe behavioral interventions (e.g., driver training programs) can be in reducing injuries and fatalities related to distracted driving".

17

As indicated in the previous figure, behavioral inventions were generally thought to be very or slightly effective in reducing distracted driving injuries and fatalities (nearly 90%). The state DOTs were asked to "Rate how effective you believe educational campaigns (e.g., websites, school programs) can be in reducing injuries and fatalities related to distracted driving". A summary of their responses is provided in the following figure.
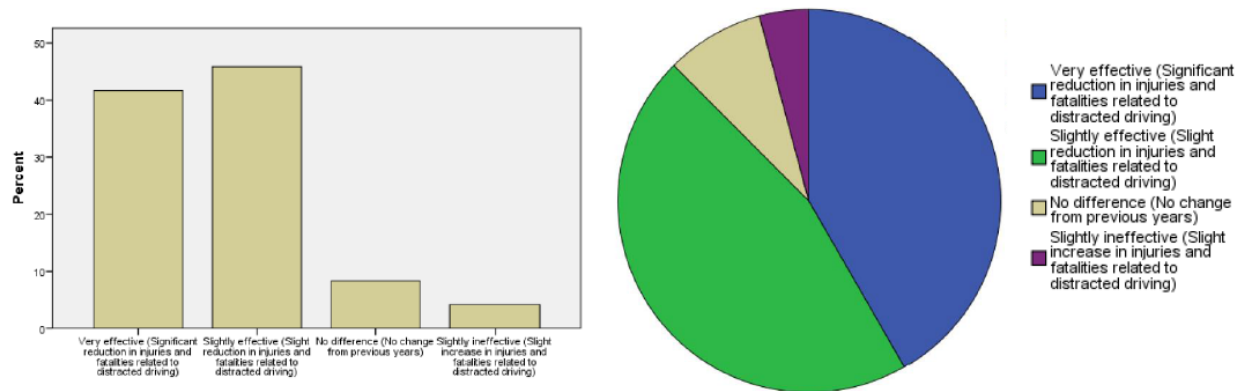
Figure 9. Indication of rating how effective educational campaigns (e.g., websites, school programs) can be in reducing injuries and fatalities related to distracted driving. As indicated in the above figure, educational campaigns were generally thought to be very or slightly effective in reducing distracted driving injuries and fatalities (~85%).

The state DOTs were asked to "Rate how effective you believe policy (e.g., laws against distracted driving) can be in reducing injuries and fatalities related to distracted driving". A summary of their responses is provided in the following figure.
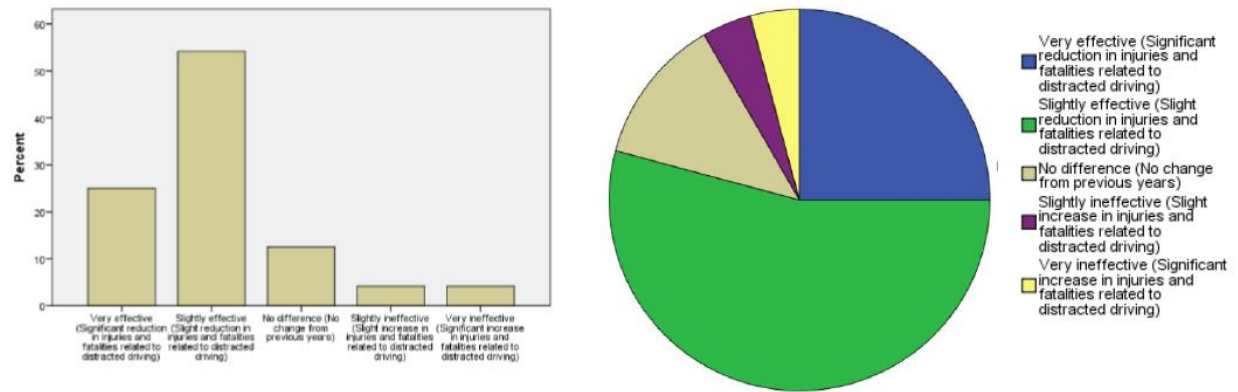
Figure 10. Indication of rating how effective policy (e.g., laws against distracted driving) can be in reducing injuries and fatalities related to distracted driving.

As indicated in the above figure, policy (legislation) was generally thought to be moderately effective in reducing injuries and fatalities related to distracted driving (~80%). The state DOTs were asked to "Rate how effective you believe law enforcement can be in reducing injuries and fatalities related to distracted driving". A summary of their responses is provided in the figure below.
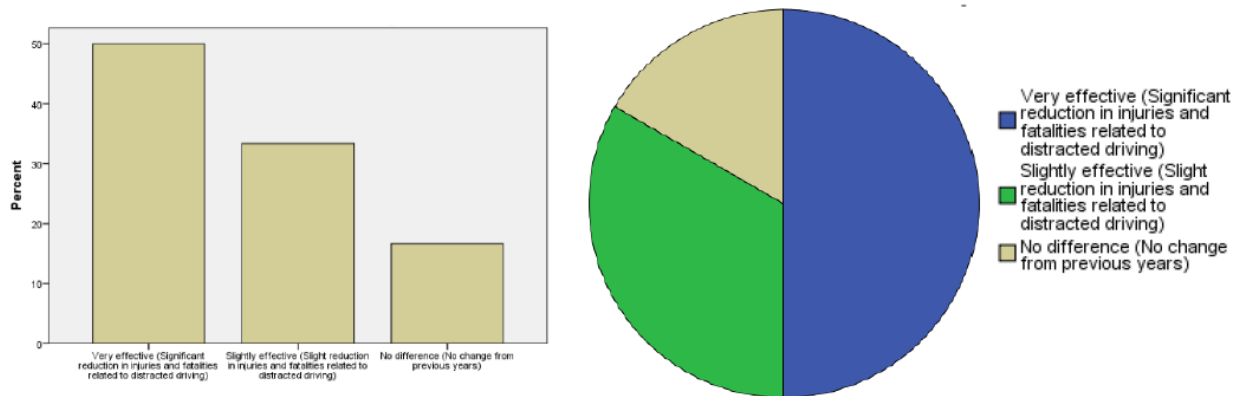
Figure 11. Indication of rating how effective law enforcement can be in reducing injuries and fatalities related to distracted driving.

As shown in the above figure, law enforcement was deemed to be quite effective in reducing injuries and fatalities related to distracted driving (~85% positive response). The state DOTs were asked to "Rate how effective you believe infrastructure solutions (e.g., signs, texting lanes, etc.) can be in reducing injuries and fatalities related to distracted driving". A summary of their responses is provided in the figure below.
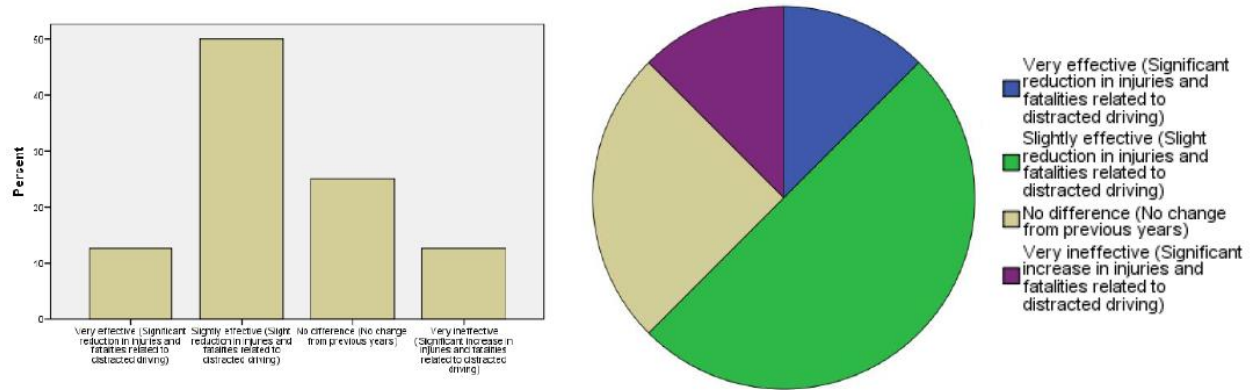
Figure 12. Indication of rating how effective infrastructure solutions (e.g., signs, texting lanes, etc.) can be in reducing injuries and fatalities related to distracted driving.

As shown in the above figure, infrastructure solutions were thought to be slightly effective or offer little difference (~75%), related to reducing injuries and fatalities in conjunction with distracted driving.

In summary, in terms of what was deemed to be the single most effective approach to reduce injuries and fatalities related to distracted driving, law enforcement and behavioral solution were deemed the best approaches. Rumble strips are the most common infrastructure implemented by various state Department of Transportations to minimize distracted driving crashes and fatalities. In terms of what were thought to be the most or slightly effective solutions, law enforcement and behavioral solutions were thought to be the best approaches.

Workshop Participant Survey Results

In this research project, one workshop and two webinars were conducted. The workshop was held on the UAB campus on the afternoon of March 3rd. The first webinar was conducted on April 4th on the UAB campus, for distribution with local participants. The second webinar was conducted in conjunction with STRIDE on June 16th.

Participants in the workshop, held on March 3rd on the UAB campus, were in the following job disciplines:
- Civil engineering professors and graduate students (from Auburn University);
- Environmental engineering professors and graduate students from UAB;
- Psychology professors and graduate students from UAB;
- ALDOT safety engineers;
- Traffic designers;
- Environmental technicians;
- Drivers education instructors;
- Health educators; and
- UAB alumni, faculty, staff, and students; and
- Retired personnel.

The workshop participants were categorized in accordance with their associated job title, as shown in the table below:

Table 1. Participant job titles of people attending the distracted driving workshop.

Job Title	Number Attending	% of Total Attendance
Alumni	1	8.333
Associate Dean	1	8.333
Environmental technician	1	8.333
Faculty	3	25.000
Graduate Student	3	25.000
Health educator	1	8.333
Retired	1	8.333
Traffic designer	1	8.333
Total Respondents	12	

The workshop attendees were categorized by job title in the bar chart below:

Figure 13. Workshop attendance categorized by job title.

The following discussion provides results obtained from the workshop surveys. Responses provided by the workshop participants to the essay-type questions are summarized in Table 2.

21

Table 2. Comments provided on post workshop survey.

Question 1: What is your position title?	
• "UAB alumni" • "Water pollution control technician" • "Traffic designer (civil engineer)" • "Retired" • "Graduate Research Assistant" • "Associate Dean" • "Associate Professor"	• "Researcher" • "Educator" • "Professor and Chair Emeritus of Civil Engineering" • Kohl's Think First Alabama State Chapter Director at Children's Hospital of Alabama"

Question 2: What is the best way to eliminate distracted driving (aside from removing cell phones from vehicles)?

- "Lighted signs, continue to use technology to make vehicles smarter so that they can sense when someone is drifting and give them a warning sign such as having the steering wheel to vibrate, and by continuing to create awareness to the public by offering educational courses about distracted driving prevention";
- "Texting stops";
- "Law enforcement" (2 responses);
- "Develop a system that recognizes when the pupils are not focused on the windshield for three seconds, and an annoying sound is transmitted. After three times, the car shuts down";
- "Warning signs/ traffic control devices";
- "Try in-lane rumble strips too. It will also help wake the drowsy drivers";
- "Infrastructure features like rumble strips and light signage will help to mitigate the results of distracted driving to use in the immediate future - changing the culture - probably stronger fines and points on your license";
- "Signs";
- "Focus and concentrate at the driving task at hand";
- "Education and law enforcement";
- "Automated vehicles".

Question 3: What DOT, law enforcement, high school, university, etc., sponsored distracted driving initiatives are you aware of that are currently implemented in your jurisdiction (other than infrastructure?

- "Unsure";
- "None" (4 responses);
- "Do not text and drive";
- "ALDOT (Alabama Department of Transportation)";
- "Texting and driving outreach";
- "I just learned that we have text bans in AL";
- At Children's we are educating young drivers (age 15–18) about the dangers of distracted driving though events such as Teen Driving Summits, U Drv U txt U Crash at Trussville Playstation, programs at area high schools usually through their driver's education or health classes. Also, we have the Teen Trauma Prevention Program at Children's which is a court ordered program held on Saturdays, where young usually first time offenders are offered an

opportunity to go through a 4 hour program which takes them through the route of an injured person (trauma room, rehab, ICU, and hear from a survivor or survivor's family)";

- "Don't know much about that"; and
- "Jefferson County Sherriff's Office puts on a distracted driving program in the summer".

Question 5: What are the pros of using this approach (infrastructure solutions)?

- "It provides safer alternatives by alerting drivers of the potential dangers they are encountering because of their behavior. It gives drivers a realistic opportunity to choose to make smarter decisions by pulling over in a safer environment and addressing whatever else is competing for their attention";
- "Driver is aware of distraction and focuses on driving";
- "It gives reminders and reinforcement in discouraging these behaviors";
- "It reminds us of our responsibility of driver safety. Some people will develop better habits of following the rules of the road";
- "The most straight forward way to alert drivers on the road";
- "None";
- "It is encouraging people to text while driving?";
- "It can utilize some resources that are already in place - such as abandoned gas stations and rest areas";
- "A safe place to text";
- "No other solution"; and
- "Preventing some roadway departure crashes".

Question 6: What are the cons of using this approach (infrastructure solutions)?

- "Cost maybe an issue";
- "Dependent upon driver they may feel the need to continue texting because they feel it is important and cannot wait";
- "People are going to text and drive as long as they feel comfortable doing it. It doesn't keep people from texting";
- "Not sure";
- "People may just ignore them; more signs may make more distraction activities";
- "People ignore signs – more would not be better";
- "Give drivers the option to have a place stop their cars and text. I think this will also help reduce drowsy driving crashes, since they may take some time drive to the text areas and rest for a while";
- "There is some cost to implement – is there support for the cost of these?";
- "Infrastructure solutions alone are not going to have a significant impact on the young impulsive drivers. Somehow we are going to have to change the culture";
- "people may get used to them and ignore them";
- "Many may not support"; and
- "High cost".

Question 8: What are the pros of using this approach (behavioral interventions)?

- "I believe behavioral interventions will make a substantial difference. The more inform people are the better decisions they will make especially for the well-being for society";
- "Driver is aware of distractions and focus more on driving";

- "Some people would be deterred from these actions after understanding that they really do affect their driving";
- "It makes people aware of the information on accidents. It gives us tools for improved driving";
- "Especially for young drivers, the training program may affect their driving behavior for a long time";
- "Scare people";
- "I think there are no pros here since people know they shouldn't text while driving but they do. Know it and do it are different";
- "Hopefully this approach will provide safe driving mechanics – and practice does usually increase performance";
- "To educate and make the informational available for safe and effective driving";
- "No other solution"; and
- "Reduce unnecessary distracted driving".

Question 9: What are the cons of using this approach (behavioral interventions)?
- "Some people may take time to implement some approaches";
- "N/A (not applicable)";
- "It doesn't force people to stop these actions";
- "Not sure";
- "The effectiveness differs from different drivers";
- "People have short memories";
- "Even though there might not been an effective approach, drivers will still get some horrible numbers during training programs which might provide some alerts";
- "Having drivers education has not proved to be a factor in preventing distracted driving or injuries or fatalities   related to such";
- "You can not make people choose the correct behaviors";
- "Many may not support"; and
- "May not work when people feel that they are in a hurry or emergency situations".

Question 11: What are the pros of using this approach (educational campaigns)?
- "I believe people will gravitate toward something that is safe and beneficial towards society";
- "Constant reminders can sometimes be helpful and drivers are more aware of distractions and results of what could occur";
- "Some people would be deterred from these actions after understanding that they really do affect their driving";
- "Better training";
- "Easy to implement; maybe just put those information as advertisement";
- "Teach young drivers";
- "Not that effective?";
- "Increases awareness";
- "Knowledge";
- "This may be the best"; and
- "Very useful for some young drivers".
- "Too much of the same information may have a diminishing return effect";
- "Some may not take a program"; and

24

- "May not be effective for adult drivers who had already some real life lessons".

Question 12: What are the cons of using this approach (educational campaigns)?

- "Some people may feel that one party is trying to impose a certain type of restriction on them or that it is a political front to alternative agenda";
- "It doesn't force people to stop these actions";
- "N/A";
- "It does not reach a lot of people";
- "The effectiveness varies";
- "Once they have freedom, they will make their own choices";
- "I think this one is better than simply training";
- "Loses effectiveness over a relatively short period of time";
- "Too much of the same information may have a diminishing return effect";
- "Some may not take a program"; and
- "May not be effective for adult drivers who had already some real life lessons."

Question 14: What are the pros of using this approach (policy)?

- "Some people will adhere to the laws";
- "N/A";
- "People can be deterred from these actions they believe there could be added consequences. Some people do want to follow the law";
- "It gives you circumstances when the law is broken":
- "At least we could have a nation-wide uniform standard";
- "Good if enforced";
- "I didn't see any pros";
- "It has been shown that states that have strong laws regarding child passenger safety, seat belt use, drinking under the influence have has a positive impact on the rate of injury and fatality rates in these area";
- "If you are going to follow the law you will";
- "Good if it is enforced"; and
- "Good to have".

Question 15: What are the cons of using this approach (policy)?

- "Possibly being used as a verifiable reason to pull someone over";
- "People have a tendency to ignore laws regardless of implementation";
- "Some people don't care if they break this law, since they don't believe they will be caught";
- "None";
- "Most people care little about policy especially in transportation";
- "People will hide their phones and makes texting harder";
- "People may think about it before texting while driving since this behavior is against law";
- "We have to get legislators engaged – it takes time";
- "If you don't, then you won't be concerned with the law";
- "The cost in doing so"; and
- "Need strict enforcement".

Question 17: What are the pros of using this approach (law enforcement)?

- "It will deter many drivers from bad behavior";

- "Increased fines";
- "People can be deterred from these actions they believe there could be added consequences. Some people do want to follow the law";
- "Everyone will know that this law will be enforced";
- "People usually don't want to get tickets or go to attend driving courses with fees";
- "Enforcement modifies behavior";
- "None";
- "It would seem to be highly motivating if the 'cost' is of consequence like points on your license";
- "Law enforcement is a positive method to reduce distracted driving";
- "Good if we can do it"; and
- "Can be very effective if it is enforced".

Question 18: What are the cons of using this approach (law enforcement)?
- "Possibly being used as a verifiable reason to pull someone over";
- "N/A";
- "Some people don't care if they break this law, since they don't believe they will be caught";
- "It will take away time for other law enforcement duties";
- "May bring more complaints from people";
- "They have better things to do";
- "Get a ticket may be the best way. More punishment, less violation";
- "Law enforcement is already overwhelmed and may be unlikely to ticket for a simple texting and driving offense";
- "Law enforcement has too many other areas of concern";
- "Cost"; and
- "Difficult to enforce in the real life".

Question 21: What are the pros of using this approach (Rumble Strips)?
- "Prevent accidents";
- "N/A";
- "They catch drivers' attention and help them regain their focus";
- "It makes us aware when we error and keeps us from running off the road";
- "Good countermeasure of run-off-road crashes or head-on crashes with opposite vehicles";
- "Warning";
- "Deal damage to the road. I wonder if some cars hit the rumbles strips and will lose control, or the driver underestimate the effects of rumble strips to cars, keep little force to the wheel, and the car then lose control. Also, rumble strips produce noises which might be complained by the neighborhood";
- "They get your attention";
- "Alertness";
- "Great"; and
- "Reduce roadway departure crashes".

Question 22: What are the cons of using this approach (Rumble Strips)?
- "None";
- "N/A";
- "Drivers don't like them";

- "Some people may not notice";
- "Difficult to prevent rear-end crash by distracted driving";
- "Bicyclist and noise";
- "Rumble strips have been proved to be effective on preventing other crashes (lane departure crashes, rear end crashes), it this approach can also be used to prevent distract driving crashes, that would be very cool";
- "How expensive are they? are there some areas of the roadway that might be challenging to implement";
- "I can not think of one";
- "Car damage"; and
- "Some drivers may over react".

Question 24: What are the pros of using this approach (Raised Pavement Markers (i.e., reflectors))?
- "It's very helpful";
- "N/A";
- "Similar to rumble strips. Low cost";
- "It makes us aware";
- "Reflector could be effective especially at night time";
- "Warning device";
- "Same as rumble strips";
- "Increased visibility";
- "Lane positioning";
- "Good"; and
- "Increase night time visibility of road edge".

Question 25: What are the cons of using this approach (Raised Pavement Markers (i.e., reflectors))?
- "None" (3 responses);
- "N/A";
- "Not as effective as rumble strips";
- "May bring complaints from drivers";
- "When passing, it's annoying";
- "Let alone the cons of rumble strips, this one also provides visual cue to drivers";
- "Don't know";
- "Cost"; and
- "Winter maintenance".

Question 27: What are the pros of using this approach (LED flashing signs)?
- "It's very helpful";
- "N/A";
- "These signs can serve as a reminder to help reinforce the concept of waiting to text";
- "They are easy to notice";
- "Visually warn potential distracted drivers";
- "None";
- "May cause drivers cannot see well when driving especially in the dark night and cause more crashes";

- "Increased visibility";
- "Better visual";
- "Great"; and
- "Increase visibility and drivers' attention".

Question 28: What are the cons of using this approach (LED flashing signs)?

- "None";
- "N/A";
- "These take drivers' eyes off the road";
- "They are very bright";
- "Could be another reason for distracted driving";
- "People ignore signs";
- "Visual cue to tell drivers something is not going well";
- "Is this something people that might find the increased light distracting?'
- "Seizures";
- "Cost"; and
- "High cost maintenance".

Question 30: What are the pros of using this approach (billboards)?

- "It's very helpful";
- "N/A";
- "These can serve as a reminder to help reinforce the concept of waiting to text";
- "Some people read billboards when able";
- "Cheap";
- "Could put some crash pictures (not too scary) to frighten those drivers";
- "Makes people think for a few seconds";
- "Not effective enough if used alone";
- "Don't know";
- "Reminder of good driving habits";
- "Just another sign"; and
- "Education".

Question 31: What are the cons of using this approach (billboards)?

- "None" (2 responses);
- "N/A";
- "These take drivers' eyes off the road";
- "It distracts some drivers:;
- "Could be another reason for distracted driving";
- "Only lasts a few seconds";
- "May force people to obey the rule?";
- "Old school";
- "Cost"; and
- "Cause additional distraction".

Question 33: What are the pros of using this approach (Text Stops)?

- "It's very helpful";
- "N/A";

- "They give people an alternative to texting and driving";
- "Gives drivers opportunities to stop and text";
- "A safe place to text, call or rest; could be combined with rest areas";
- "None";
- "I wonder if this will increase the text driving";
- "Will appeal to those with good impulse control";
- "Safe texting place";
- "just another sign";
- "Provide drivers' location for sending long text".

Question 34: What are the cons of using this approach (Text Stops)?
- "None" (2 responses);
- "N/A";
- "People will still text and drive if they feel comfortable doing it";
- "Unknown";
- "Make travel time longer";
- "Waste of money";
- "Provide a place for those have to reply on the road";
- "Will probably make no impact on teenagers with low impulse control";
- "Cost"; and
- "May not be used very often if located in an inconvenient locations".

The feedback provided on the post-workshop surveys is addressed as follows.

Question 1 (job position title) has already been addressed (see Table 1 and Figure 13 above).

Question 2: What is the best way to eliminate distracted driving (aside from removing cell phones from vehicles)?
Survey feedback:
- Lighted signs, continue to use technology to make vehicles smarter so that they can sense when someone is drifting and give them a warning sign such as having the steering wheel to vibrate, and by continuing to create awareness to the public by offering educational courses about distracted driving prevention;
- Texting stops;
- Law enforcement;
- Develop a system that recognize when the pupils are not focused on the windshield for three seconds, and an annoying sound is transmitted. After three times the car shuts down;
- Warning signs/traffic control devices;
- Enforcement;
- Try in-lane rumble strips too. It will also help wake the drowsy drivers;
- Infrastructure features like rumble strips and light signage will help to mitigate the results of distracted driving to use in the immediate future – changing the culture – probably stronger fines and points on your license.
- Signs;
- Focus and concentrate at the driving task at hand;

- Education and law enforcement; and
- Automated Vehicles.

Question 3: What Department of Transportation, law enforcement, high school, university, etc. – sponsored distracted driving initiatives are you aware of that are currently implemented in your jurisdiction (other than infrastructure)?
Survey feedback:
- Unsure:
- None (4 responses):
- Do not text and drive;
- ALDOT;
- Texting and driving outreach;
- I just learned that we have text bans in Alabama;
- At Children's we are educating young drivers (age 15-18) about the dangers of distracted driving though events such as Teen Driving Summits, U Drv U txt U Crash at Trussville Playstation, programs at area high schools usually through their drivers education or health classes. Also, we have the Teen Trauma Prevention Program at Children's which is a court ordered program held on Saturdays, where young usually first time offenders are offered an opportunity to go through a 4 hour program which takes them through the route of an injured person (trauma room, rehab, ICU, and hear from a survivor or survivor's family);
- Don't know much about that; and
- Jefferson County Sherriff's Office puts on a distracted driving program in the summer.

The next series of questions addresses workshop perceived pros and cons of using various initiatives.

Question 4: Rate how effective you believe infrastructure solutions (e.g., signs, texting lanes) can be in reducing injuries and fatalities related to distracted driving.
Survey feedback (results shown on next page):

#	Answer	%	Count
1	1-Very effective (Significant reduction in injuries and fatalities related to distracted driving)	41.67%	5
2	2-Slightly effective (Slight reduction in injuries and fatalities related to distracted driving)	50.00%	6
3	3-No difference (No change from previous years)	8.33%	1
4	4-Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving)	0.00%	0
5	5-Very ineffective (Significant increase in injuries and fatalities related to distracted driving)	0.00%	0
	Total	100%	12

Figure 14. How effective you believe infrastructure solutions (e.g., signs, texting lanes) can be in reducing injuries and fatalities related to distracted driving.

Questions 5 and 6: What are the pros and cons of using this approach?
<u>Survey feedback</u>:

Pros:

- "It provides safer alternatives by alerting drivers of the potential dangers they are encountering because of their behavior. It gives drivers a realistic opportunity to choose to make smarter decisions by pulling over in a safer environment and addressing whatever else is competing for their attention";
- "Driver is aware of distraction and focuses on driving";
- "It gives reminders and reinforcement in discouraging these behaviors";
- "The most straight forward way to alert drivers on the road";
- "It can utilize some resources that are already in place - such as abandoned gas stations and rest areas";
- "A safe place to text";
- "No other solution"; and
- "Preventing some roadway departure crashes".

Cons:

- "Cost maybe an issue";
- "People are going to text and drive as long as they feel comfortable doing it. It doesn't keep people from texting";
- "People may just ignore them; more signs may make more distraction activities";
- "People ignore signs – more would not be better";
- It is encouraging people to text while driving?";
- "Give drivers the option to have a place stop their cars and text. I think this will also help reduce drowsy driving crashes, since they may take some time drive to the text areas and rest for a while";
- "Infrastructure solutions alone are not going to have a significant impact on the young impulsive drivers. Somehow we are going to have to change the culture";
- "People may get used to them and ignore them"; and
- "Many may not support".

Question 7: Rate how effective you believe behavioral interventions (e.g., driving training programs) can be is reducing injuries related to distracted driving.
<u>Survey feedback</u> (results shown on next page):

32
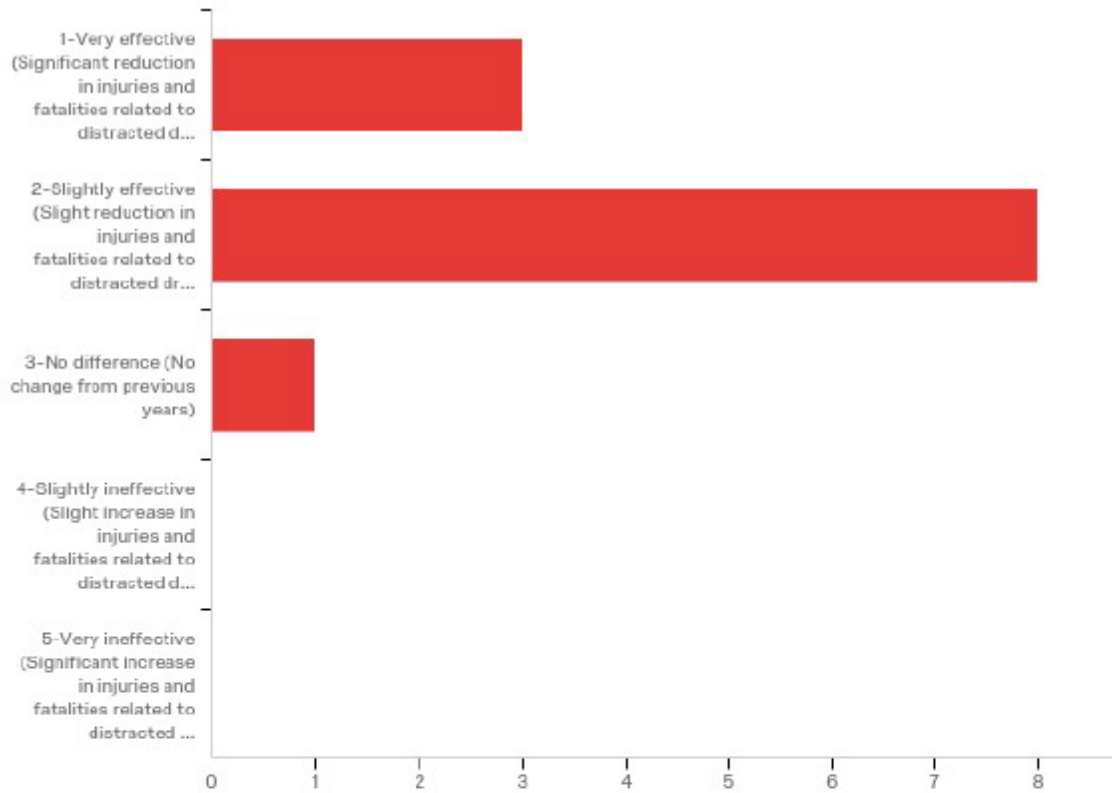
#	Answer	%	Count
1	1-Very effective (Significant reduction in injuries and fatalities related to distracted driving)	25.00%	3
2	2-Slightly effective (Slight reduction in injuries and fatalities related to distracted driving)	66.67%	8
3	3-No difference (No change from previous years)	8.33%	1
4	4-Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving)	0.00%	0
5	5-Very ineffective (Significant increase in injuries and fatalities related to distracted driving)	0.00%	0
	Total	100%	12

Figure 15. How effective you believe behavioral interventions (e.g., driving training programs) can be is reducing injuries related to distracted driving.

Questions 8 and 9: What are the pros and cons of using this approach?
<u>Survey feedback</u>:

Pros:

- "…behavioral interventions will make a substantial difference. The more informed people are, the better decisions they will make…";
- "Driver is aware of distractions and focus more on driving";
- "Some people would be deterred from these actions after understanding that they really do affect their driving";
- "It makes people aware of the information on accidents. It gives us tools for improved driving";
- "Especially for young drivers, the training program may affect their driving behavior for a long time";
- "To educate and make the informational available for safe and effective driving";
- "No other solution"; and
- "Reduce unnecessary distracted driving".

Cons:

- "I think there are no pros here since people know they shouldn't text while driving but they do. Knowing it and doing it are different";
- "It doesn't force people to stop these actions";
- "The effectiveness differs from different drivers";
- "People have short memories";
- "Even though there might not been an effective approach, drivers will still get some horrible numbers during training programs which might provide some alerts";
- "Having drivers education has not proved to be a factor in preventing distracted driving or injuries or fatalities related to such";
- "You can not make people choose the correct behaviors";
- "Many may not support"; and
- "May not work when people feel that they are in a hurry or emergency situations".

Question 10: Rate how effective you believe educational campaigns (e.g. websites, school programs) can be in reducing injuries and fatalities related to distracted driving.
<u>Survey feedback</u> (results shown on next page):

#	Answer	%	Count
1	1-Very effective (Significant reduction in injuries and fatalities related to distracted driving)	41.67%	5
2	2-Slightly effective (Slight reduction in injuries and fatalities related to distracted driving)	50.00%	6
3	3-No difference (No change from previous years)	8.33%	1
4	4-Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving)	0.00%	0
5	5-Very ineffective (Significant increase in injuries and fatalities related to distracted driving)	0.00%	0
	Total	100%	12

Figure 16. How effective you believe educational campaigns (e.g. websites, school programs) can be in reducing injuries and fatalities related to distracted driving.

Questions 11 and 12: What are the pros and cons of using this approach?

<u>Survey feedback</u>:

Pros:

- "…people will gravitate toward something that is safe and beneficial towards society";
- "Constant reminders can sometimes be helpful and drivers are more aware of distractions and results of what could occur";
- "Some people would be deterred from these actions after understanding that they really do affect their driving";
- "Better training";
- "Easy to implement; maybe just put those information as advertisement";
- "Teach young drivers";
- "Increases awareness"; and "Knowledge";
- "This may be the best";
- "Very useful for some young drivers"; and
- "Too much of the same information may have a diminishing return effect".

Cons:

- "Not that effective?";
- "Some may not take a program";
- "Only some people will adhere to the laws";
- "People can only be deterred from these actions if they believe there could be added consequences";
- "It gives you circumstances when the law is broken":
- "At least we could have a nation-wide uniform standard";
- "Good if enforced";
- "If you are going to follow the law you will".

Question 13: Rate how effective you believe policy (e.g., laws against distracted driving) can be in reducing injuries and fatalities related to distracted driving.

<u>Survey feedback</u> (results shown on next page):

#	Answer	%	Count
1	1-Very effective (Significant reduction in injuries and fatalities related to distracted driving)	41.67%	5
2	2-Slightly effective (Slight reduction in injuries and fatalities related to distracted driving)	41.67%	5
3	3-No difference (No change from previous years)	16.67%	2
4	4-Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving)	0.00%	0
5	5-Very ineffective (Significant increase in injuries and fatalities related to distracted driving)	0.00%	0
	Total	100%	12

Figure 17. How effective you believe policy (e.g., laws against distracted driving) can be in reducing injuries and fatalities related to distracted driving.

Questions 14 and 15: What are the pros and cons of using this approach?

Survey feedback:

Pros:

- "Some people will adhere to the laws";
- "People can be deterred from these actions if they believe there could be added consequences. Some people do want to follow the law";
- "It gives you circumstances when the law is broken":
- "At least we could have a nation-wide uniform standard";
- "Good if enforced";
- "It has been shown that states that have strong laws regarding child passenger safety, seat belt use, drinking under the influence have had a positive impact on the rate of injury and fatality rates in these area";
- "If you are going to follow the law you will"; and
- "Good to have".

Cons:

- "Possibly being used as a verifiable reason to pull someone over";
- "People have a tendency to ignore laws regardless of implementation";
- "Some people don't care if they break this law, since they don't believe they will be caught";
- "Most people care little about policy especially in transportation";
- "People may think about it before texting while driving since this behavior is against law";
- "If you don't, then you won't be concerned with the law";
- "The cost in doing so"; and
- "Need strict enforcement".

Question 16: Rate how effective you believe law enforcement can be in reducing injuries and fatalities related to distracted driving.

Survey feedback (results shown on next page):

38
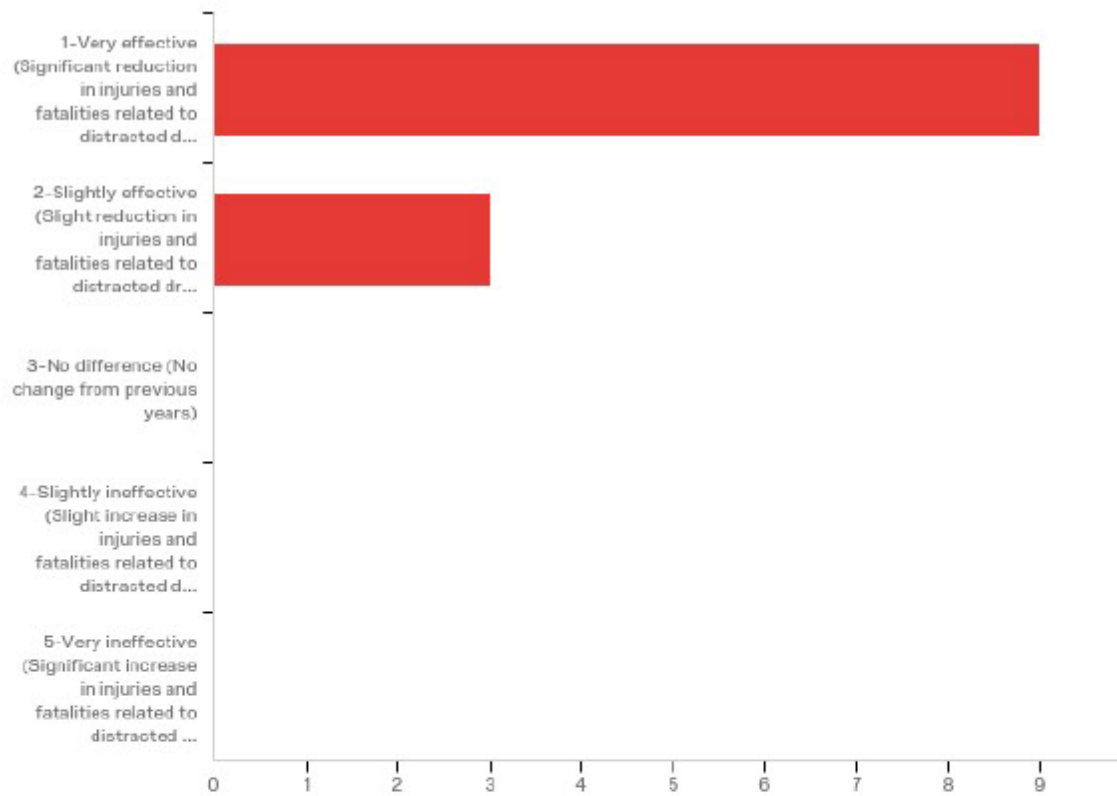
#	Answer	%	Count
1	1-Very effective (Significant reduction in injuries and fatalities related to distracted driving)	75.00%	9
2	2-Slightly effective (Slight reduction in injuries and fatalities related to distracted driving)	25.00%	3
3	3-No difference (No change from previous years)	0.00%	0
4	4-Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving)	0.00%	0
5	5-Very ineffective (Significant increase in injuries and fatalities related to distracted driving)	0.00%	0
	Total	100%	12

Figure 18. How effective you believe law enforcement can be in reducing injuries and fatalities related to distracted driving.

Questions 17 and 18: What are the pros and cons of using this approach?

Survey feedback:

<table>
<tr><td align="center">**Pros:**</td><td align="center">**Cons:**</td></tr>
<tr><td valign="top">

- "It will deter many drivers from bad behavior";
- "Increased fines";
- "People can be deterred from these actions if they believe there could be added consequences. Some people do want to follow the law";
- "Everyone will know that this law will be enforced";
- "People usually don't want to get tickets or go to attend driving courses with fees";
- "Enforcement modifies behavior";
- "It would seem to be highly motivating if the 'cost' is of consequence like points on your license";
- "Good if we can do it"; and
- "Can be very effective if it is enforced".

</td><td valign="top">

- "Possibly being used as a verifiable reason to pull someone over";
- "Some people don't care if they break this law, since they don't believe they will be caught";
- "It will take away time for other law enforcement duties";
- "May bring more complaints from people";
- "They have better things to do";
- "Law enforcement is already overwhelmed and may be unlikely to ticket for a simple texting and driving offense";
- "Law enforcement has too many other areas of concern";
- "Cost"; and "Difficult to enforce in the real life".

</td></tr>
</table>

Question 19: Rank in order how effective you think these approaches are for reducing injuries and fatalities related to distracted driving (1 = most effective, 5 = least effective).

Survey feedback (results shown on next page):

40
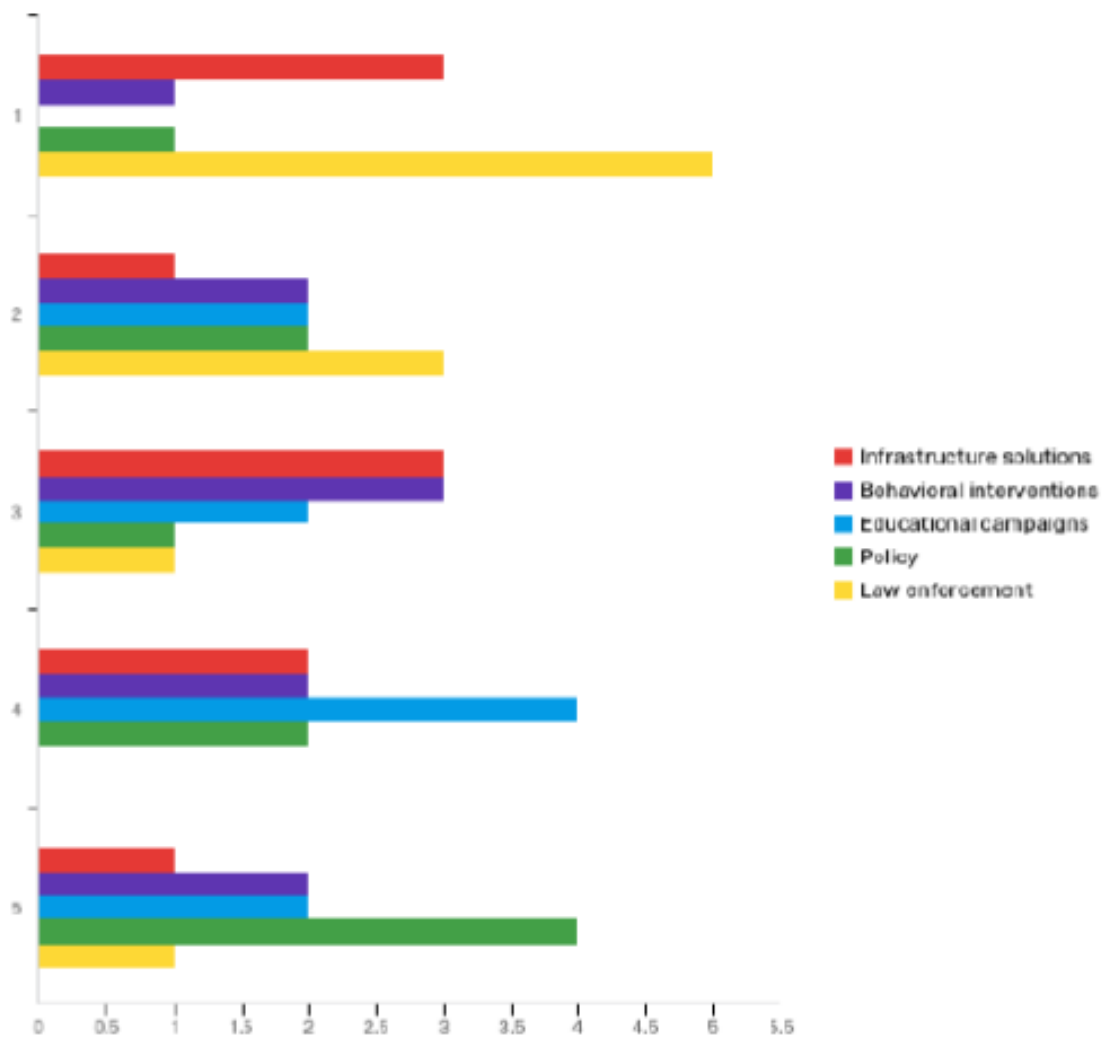
#	Question	1		2		3		4		5		Total
1	Infrastructure solutions	30.00%	3	10.00%	1	30.00%	3	20.00%	2	10.00%	1	10
2	Behavioral interventions	10.00%	1	20.00%	2	30.00%	3	20.00%	2	20.00%	2	10
3	Educational campaigns	0.00%	0	20.00%	2	20.00%	2	40.00%	4	20.00%	2	10
4	Policy	10.00%	1	20.00%	2	10.00%	1	20.00%	2	40.00%	4	10
5	Law enforcement	50.00%	5	30.00%	3	10.00%	1	0.00%	0	10.00%	1	10

Figure 19. How effective you think these approaches are for reducing injuries and fatalities related to distracted driving (1 = most effective, 5 = least effective).

Question 20: Rate how effective your believe **Rumble Strips** can be in reducing injuries and fatalities related to distracted driving.

<u>Survey feedback</u>:
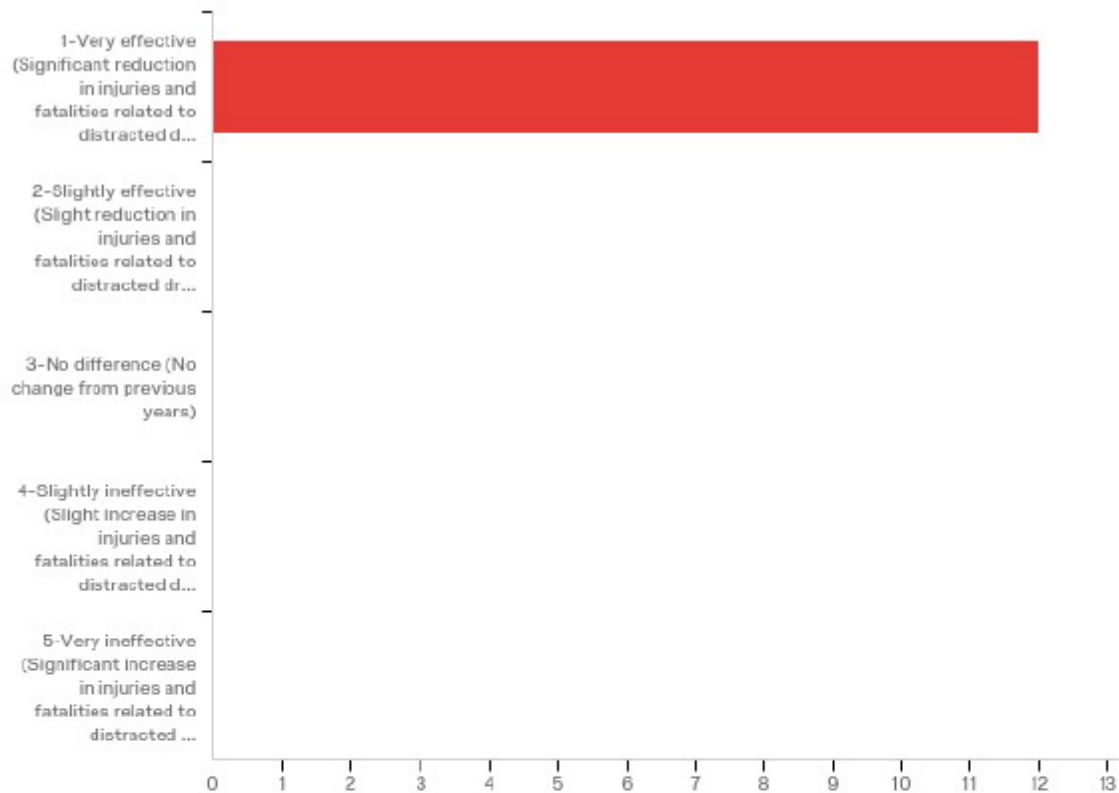
#	Answer	%	Count
1	1-Very effective (Significant reduction in injuries and fatalities related to distracted driving)	100.00%	12
2	2-Slightly effective (Slight reduction in injuries and fatalities related to distracted driving)	0.00%	0
3	3-No difference (No change from previous years)	0.00%	0
4	4-Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving)	0.00%	0
5	5-Very ineffective (Significant increase in injuries and fatalities related to distracted driving)	0.00%	0
	Total	100%	12

Figure 20. How effective your believe Rumble Strips can be in reducing injuries and fatalities related to distracted driving.

Questions 21 and 22: What are the pros and cons of using this approach?

<u>Survey feedback</u>:

Pros:

- •"Prevent accidents";
- •"They catch drivers' attention and help them regain their focus";
- •"It makes us aware when we error and keeps us from running off the road";
- •"Good countermeasure of run-off-road crashes or head-on crashes with opposite vehicles";
- •"Warning";
- •"They get your attention";
- •"Alertness"; and
- •"Reduce roadway departure crashes"

Cons:

- •"Drivers don't like them";
- •"Some people may not notice";
- •"Difficult to prevent rear-end crash by distracted driving";
- •"Bicyclist and noise";
- •"How expensive are they? Are there some areas of the roadway that might be challenging to implement?";
- •"Car damage"; and
- •"Some drivers may over react".

Question 23: Rate how effective you believe **Raised Pavement Markers (i.e., reflectors)** can be in reducing injuries and fatalities related to distracted driving.

<u>Survey feedback</u> (results shown on next page):

#	Answer	%	Count
1	1-Very effective (Significant reduction in injuries and fatalities related to distracted driving)	58.33%	7
2	2-Slightly effective (Slight reduction in injuries and fatalities related to distracted driving)	41.67%	5
3	3-No difference (No change from previous years)	0.00%	0
4	4-Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving)	0.00%	0
5	5-Very ineffective (Significant increase in injuries and fatalities related to distracted driving)	0.00%	0
	Total	100%	12
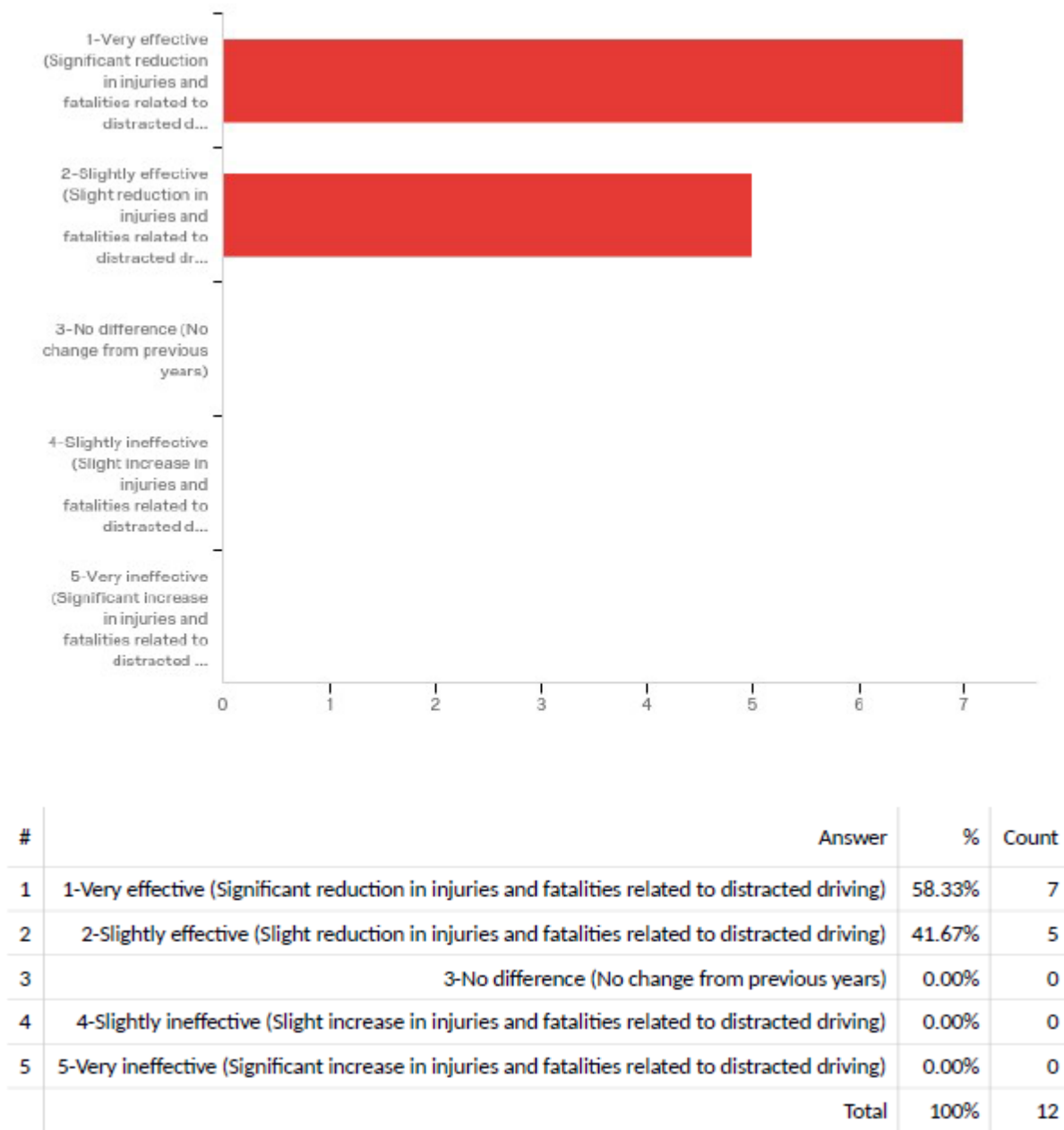
Figure 21. How effective you believe **Raised Pavement Markers (i.e., reflectors)** can be in reducing injuries and fatalities related to distracted driving.

Questions 24 and 25: What are the pros and cons of using this approach?

<u>Survey feedback</u>:

Pros:

- "It's very helpful";
- "Similar to rumble strips. Low cost";
- "It makes us aware";
- "Reflector could be effective especially at night time";
- "Warning device";
- "Increased visibility";
- "Lane positioning";
- "Increase night time visibility of road edge".

Cons:

- "Not as effective as rumble strips";
- "May bring complaints from drivers";
- "When passing, it's annoying";
- "Let alone the cons of rumble strips, this one also provides visual cue to drivers";
- "Don't know";
- "Cost"; and
- "Winter maintenance".

Question 26: Rate how effective you believe **<u>LED flashing signs</u>** can be in reducing injuries and fatalities related to distracted driving.

<u>Survey feedback</u> (results shown on next page):

#	Answer	%	Count
1	1-Very effective (Significant reduction in injuries and fatalities related to distracted driving)	50.00%	6
2	2-Slightly effective (Slight reduction in injuries and fatalities related to distracted driving)	41.67%	5
3	3-No difference (No change from previous years)	8.33%	1
4	4-Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving)	0.00%	0
5	5-Very ineffective (Significant increase in injuries and fatalities related to distracted driving)	0.00%	0
	Total	100%	12

Figure 22. How effective you believe **LED flashing signs** can be in reducing injuries and fatalities related to distracted driving.

Questions 27 and 28: What are the pros and cons of using this approach?

<u>Survey feedback</u>:

<table>
<tr><td align="center">**Pros:**</td><td align="center">**Cons:**</td></tr>
<tr><td valign="top">

•"It's very helpful";
•"These signs can serve as a reminder to help reinforce the concept of waiting to text";
•"They are easy to notice";
•"Visually warn potential distracted drivers";
•"Visual cue to tell drivers something is not going well";
•"Increased visibility";
•"Better visual"; and
•"Increase visibility and drivers' attention".

</td><td valign="top">

•"May cause drivers to not see well when driving especially in the dark night and cause more crashes";
•"These take drivers' eyes off the road";
•"They are very bright";
•"Could be another reason for distracted driving";
•"People ignore signs";
•"Is this something people that might find the increased light distracting?'
•"Seizures";
•"Cost"; and "High cost maintenance".

</td></tr>
</table>

Question 29: Rate how effective you believe **<u>Billboards</u>** can be in reducing injuries and fatalities related to distracted driving.
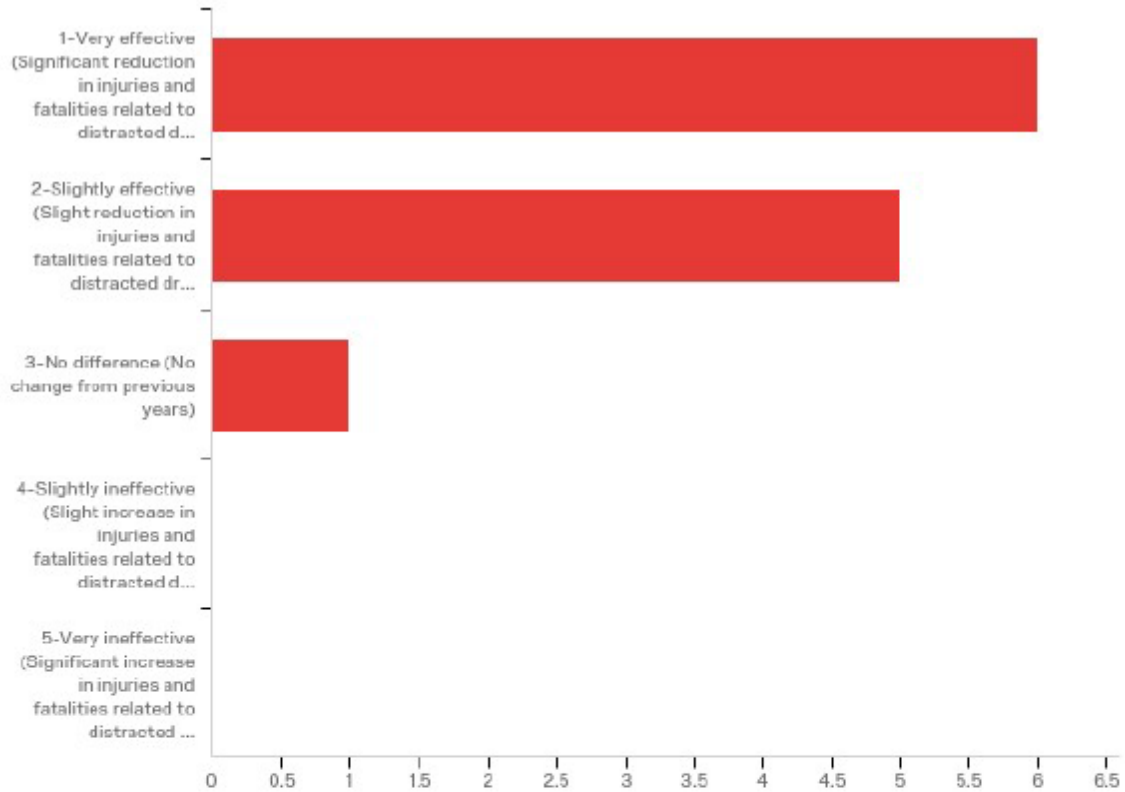
<u>Survey feedback</u> (results shown on next page):

47
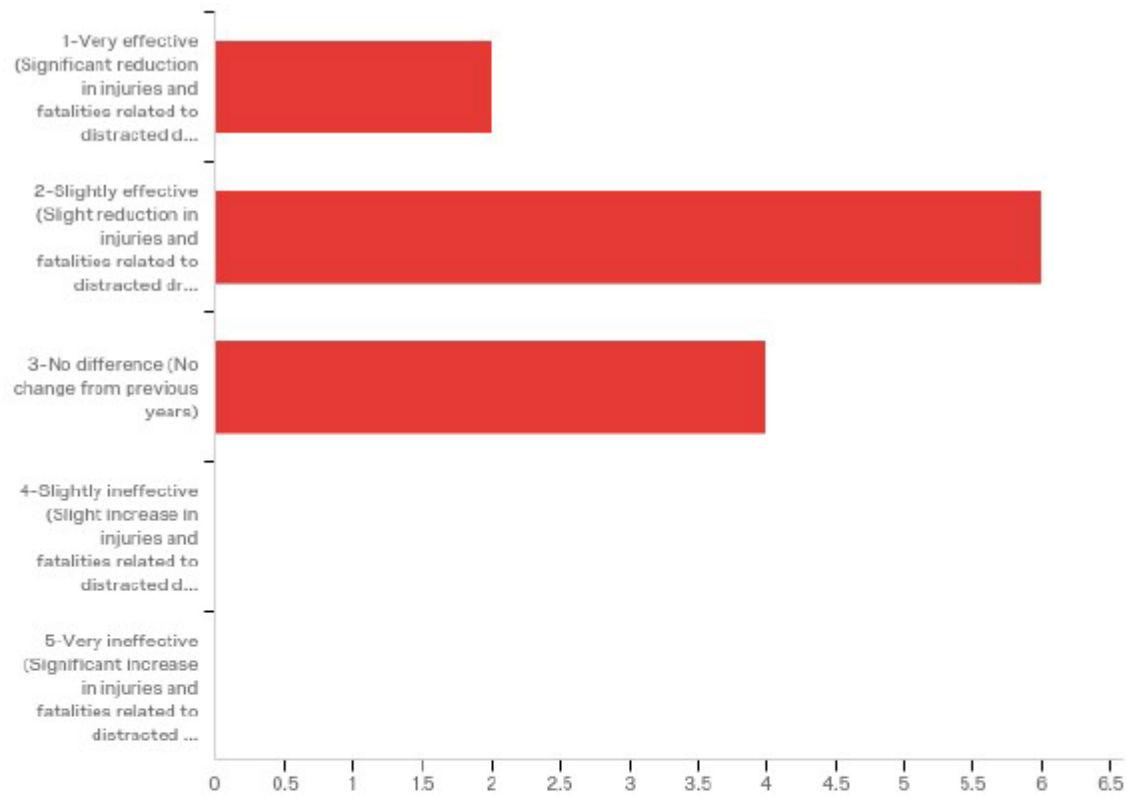
#	Answer	%	Count
1	1-Very effective (Significant reduction in injuries and fatalities related to distracted driving)	16.67%	2
2	2-Slightly effective (Slight reduction in injuries and fatalities related to distracted driving)	50.00%	6
3	3-No difference (No change from previous years)	33.33%	4
4	4-Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving)	0.00%	0
5	5-Very ineffective (Significant increase in injuries and fatalities related to distracted driving)	0.00%	0
	Total	100%	12

Figure 23. How effective you believe **Billboards** can be in reducing injuries and fatalities related to distracted driving.

Questions 30 and 31: What are the pros and cons of using this approach?
<u>Survey feedback</u>:

Pros:

- "It's very helpful";
- "Don't know";
- "N/A";
- "These can serve as a reminder to help reinforce the concept of waiting to text";
- "Some people read billboards when able";
- "Cheap; could put some crash pictures (not too scary) to frighten those drivers";
- "Makes people think for a few seconds";
- "Not effective enough if used alone";
- "Reminder of good driving habits";
- "Just another sign"; and
- "Education".

Cons:

- "These take drivers' eyes off the road";
- "It distracts some drivers";
- "None" (2 responses);
- "N/A";
- "Could be another reason for distracted driving";
- "Only lasts a few seconds";
- "May force people to obey the rule?";
- "Old school";
- "Cost"; and
- "Cause additional distraction".

Question 32: Rate how effective you believe **<u>Text Stops</u>** can be in reducing injuries and fatalities related to distracted driving.
<u>Survey feedback</u> (results shown on next page):
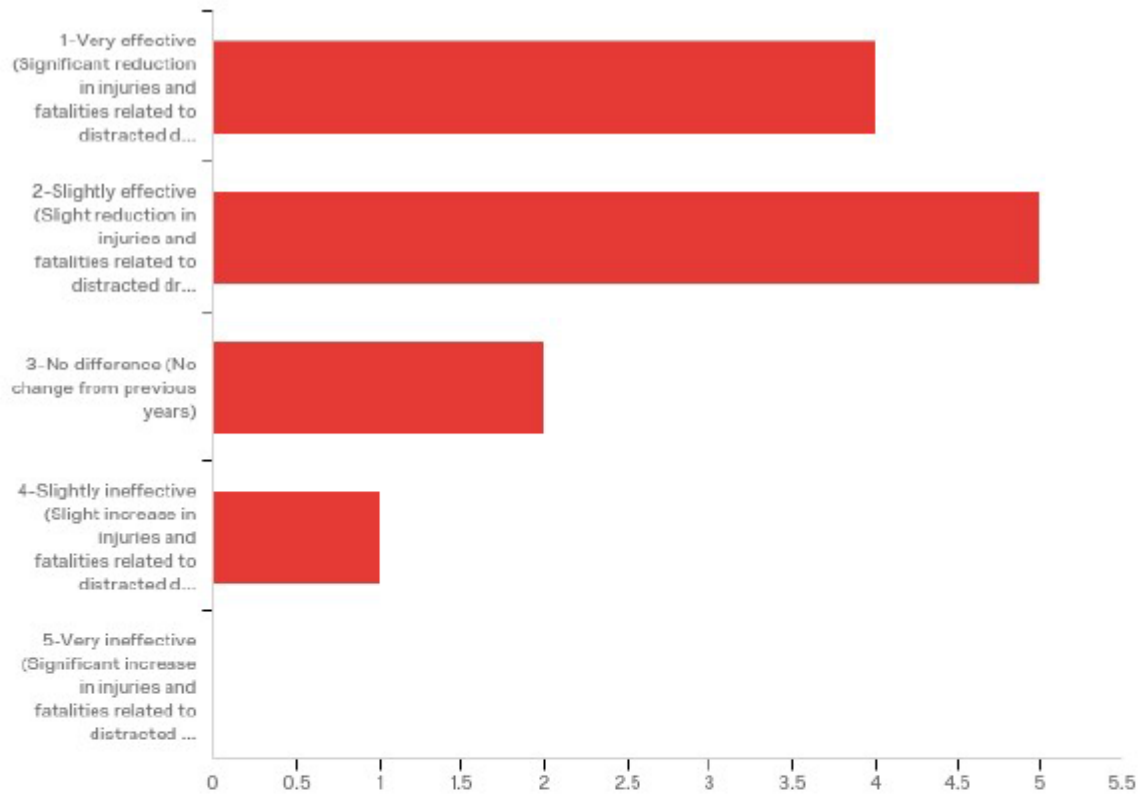
#	Answer	%	Count
1	1-Very effective (Significant reduction in injuries and fatalities related to distracted driving)	33.33%	4
2	2-Slightly effective (Slight reduction in injuries and fatalities related to distracted driving)	41.67%	5
3	3-No difference (No change from previous years)	16.67%	2
4	4-Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving)	8.33%	1
5	5-Very ineffective (Significant increase in injuries and fatalities related to distracted driving)	0.00%	0
	Total	100%	12

Figure 24. How effective you believe **Text Stops** can be in reducing injuries and fatalities related to distracted driving.

Questions 33 and 34: What are the pros and cons of using this approach?

<u>Survey feedback</u>:

Pros:
- "It's very helpful";
- "They give people an alternative to texting and driving";
- "Provides a place for those have to reply on the road";
- "Gives drivers opportunities to stop and text";
- "A safe place to text, call or rest; could be combined with rest areas";
- "I wonder if this will increase the text driving";
- "Will appeal to those with good impulse control";
- "Safe texting place"; and
- "Provide drivers' location for sending long text".

Cons:
- "Just another sign";
- "People will still text and drive if they feel comfortable doing it";
- "Make travel time longer";
- "Waste of money";
- "Will probably make no impact on teenagers with low impulse control";
- "Cost"; and
- "May not be used very often if located in inconvenient locations".

Question 35: Rank in order how effective you think the following infrastructure solutions are for reducing injuries and fatalities related to distracted driving (1 = most effective, 5 = least effective).

<u>Survey feedback</u> (results shown on next page):
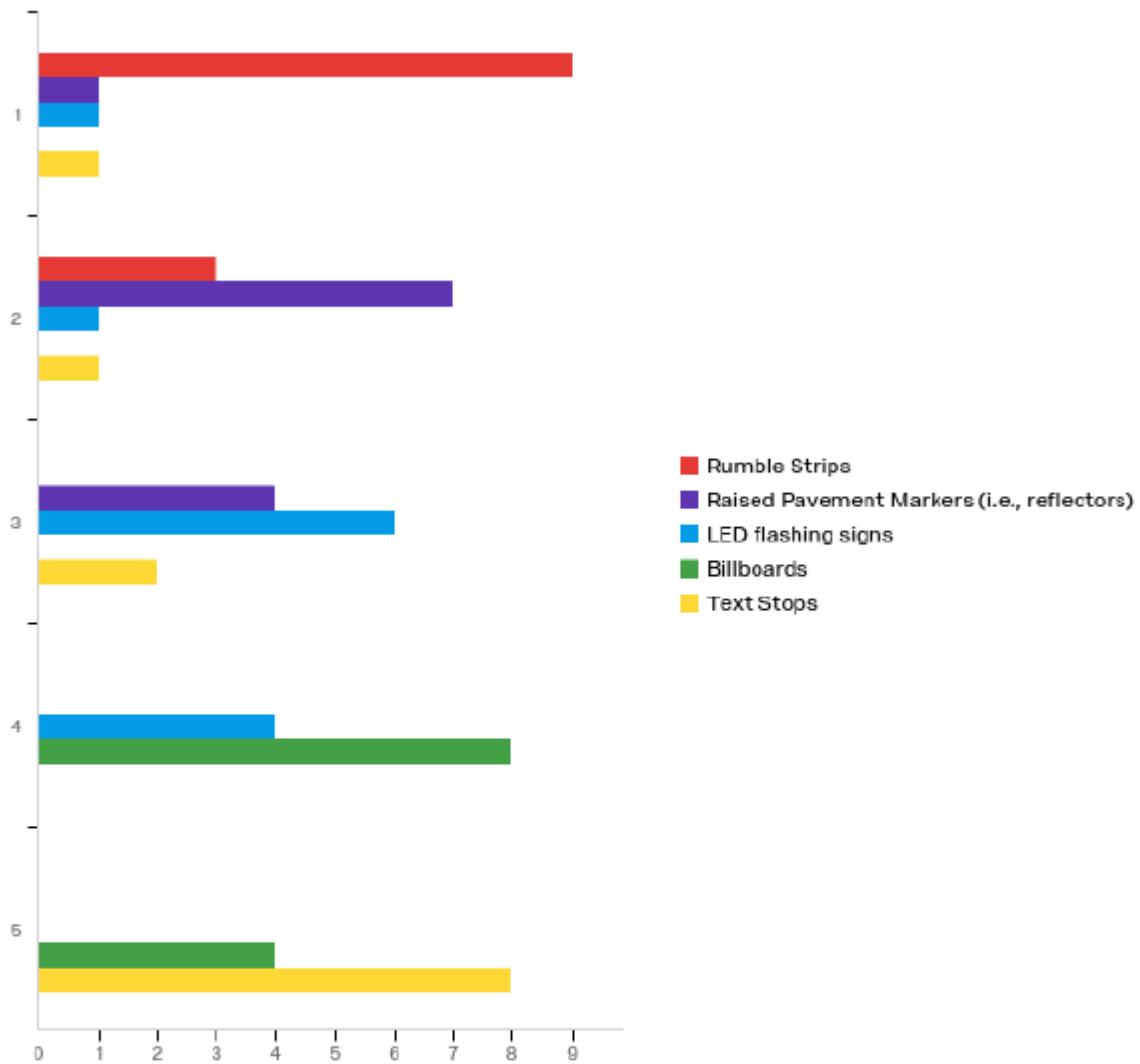
#	Question	1		2		3		4		5	
1	Rumble Strips	75.00%	9	25.00%	3	0.00%	0	0.00%	0	0.00%	0
2	Raised Pavement Markers (i.e., reflectors)	8.33%	1	58.33%	7	33.33%	4	0.00%	0	0.00%	0
3	LED flashing signs	8.33%	1	8.33%	1	50.00%	6	33.33%	4	0.00%	0
4	Billboards	0.00%	0	0.00%	0	0.00%	0	66.67%	8	33.33%	4
5	Text Stops	8.33%	1	8.33%	1	16.67%	2	0.00%	0	66.67%	8
	Total	Total	12	Total	12	Total	12	Total	12	Total	12

Figure 25. How effective you think the following infrastructure solutions are for reducing injuries and fatalities related to distracted driving (1 = most effective, 5 = least effective).

Question 36: Rate how effectively **Rumble Strips** were portrayed in the driving simulator in comparison to the real-world environment.
Survey feedback (results shown below):
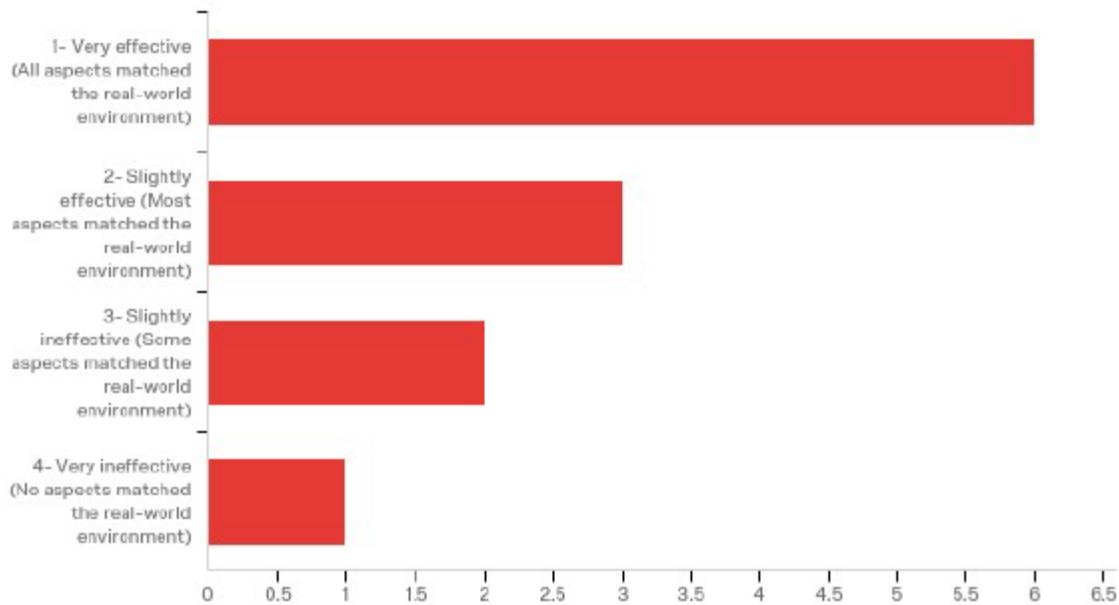
#	Answer	%	Count
1	1- Very effective (All aspects matched the real-world environment)	50.00%	6
2	2- Slightly effective (Most aspects matched the real-world environment)	25.00%	3
3	3- Slightly ineffective (Some aspects matched the real-world environment)	16.67%	2
4	4- Very ineffective (No aspects matched the real-world environment)	8.33%	1
	Total	100%	12

Figure 26. How effectively **Rumble Strips** were portrayed in the driving simulator in comparison to the real-world environment.

Question 37: Rate how effectively **Raised Pavement Markers (i.e., reflectors)** were portrayed in the driving simulator in comparison to the real-world environment.
Survey feedback (results shown on next page):

#	Answer	%	Count
1	1- Very effective (All aspects matched the real-world environment)	33.33%	4
2	2- Slightly effective (Most aspects matched the real-world environment)	33.33%	4
3	3- Slightly ineffective (Some aspects matched the real-world environment)	25.00%	3
4	4- Very ineffective (No aspects matched the real-world environment)	8.33%	1
	Total	100%	12

Figure 27. How effectively **Raised Pavement Markers (i.e., reflectors)** were portrayed in the driving simulator in comparison to the real-world environment.

Question 38: Rate how effectively **LED flashing signs** were portrayed in the driving simulator in comparison to the real-world environment.

<u>Survey feedback</u> (results shown on next page):

#	Answer	%	Count
1	1- Very effective (All aspects matched the real-world environment)	33.33%	4
2	2- Slightly effective (Most aspects matched the real-world environment)	33.33%	4
3	3- Slightly ineffective (Some aspects matched the real-world environment)	25.00%	3
4	4- Very ineffective (No aspects matched the real-world environment)	8.33%	1
	Total	100%	12

Figure 28. How effectively **LED flashing signs** were portrayed in the driving simulator in comparison to the real-world environment.

Question 39: Rate how effectively **Billboards** were portrayed in the driving simulator in comparison to the real-world environment.
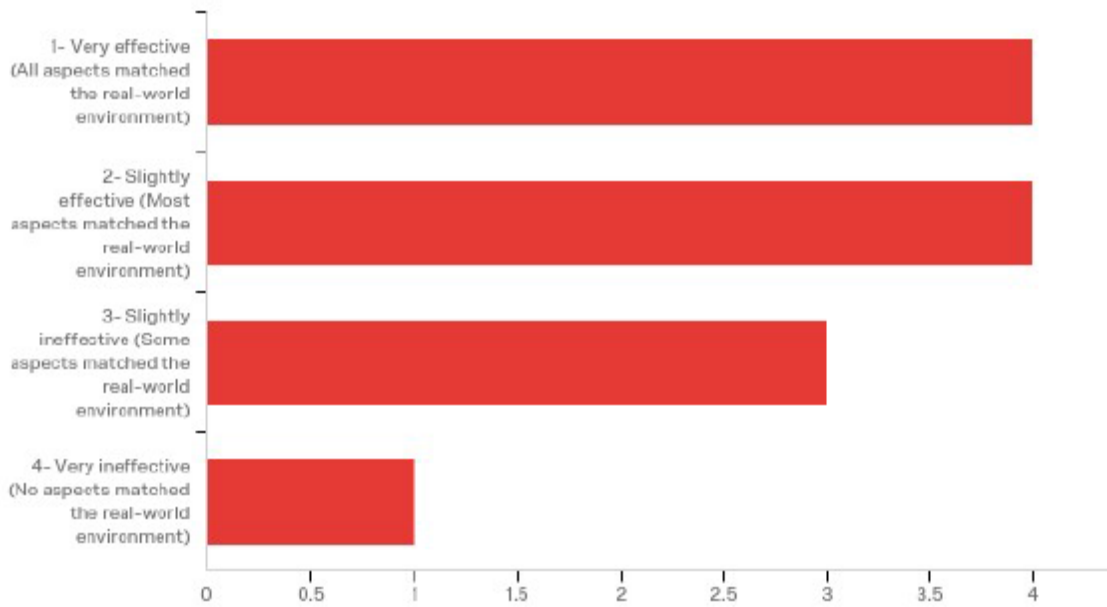
Survey feedback (results shown on next page):

#	Answer	%	Count
1	1- Very effective (All aspects matched the real-world environment)	50.00%	6
2	2- Slightly effective (Most aspects matched the real-world environment)	41.67%	5
3	3- Slightly ineffective (Some aspects matched the real-world environment)	8.33%	1
4	4- Very ineffective (No aspects matched the real-world environment)	0.00%	0
	Total	100%	12

Figure 29. How effectively **Billboards** were portrayed in the driving simulator in comparison to the real-world environment.

Question 40: Rate how effectively **Text Stops** were portrayed in the driving simulator in comparison to the real-world environment.
<u>Survey feedback</u> (results shown on next page):

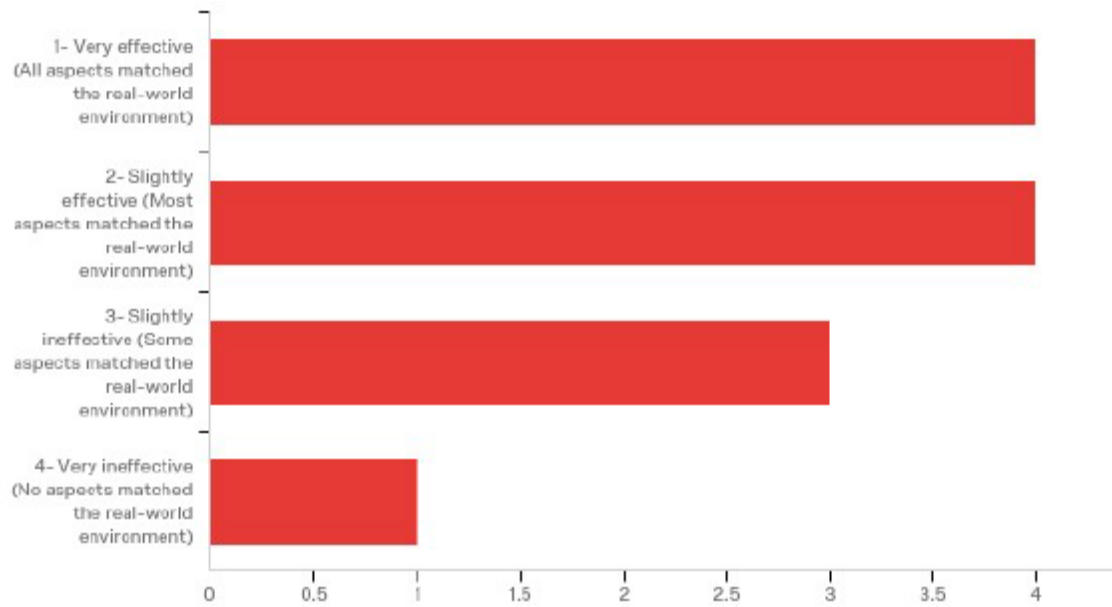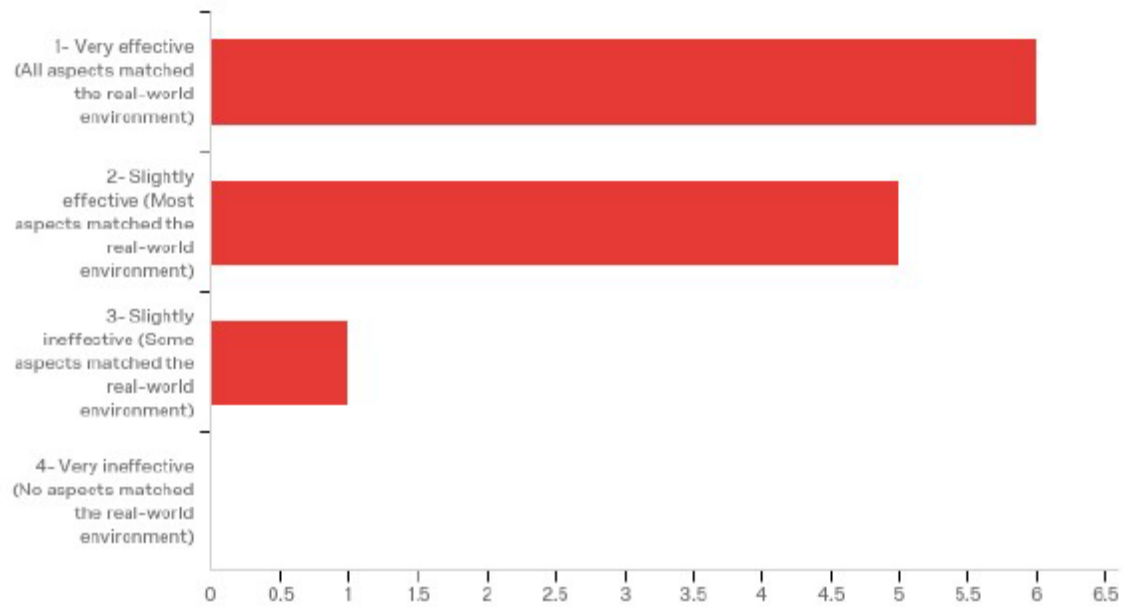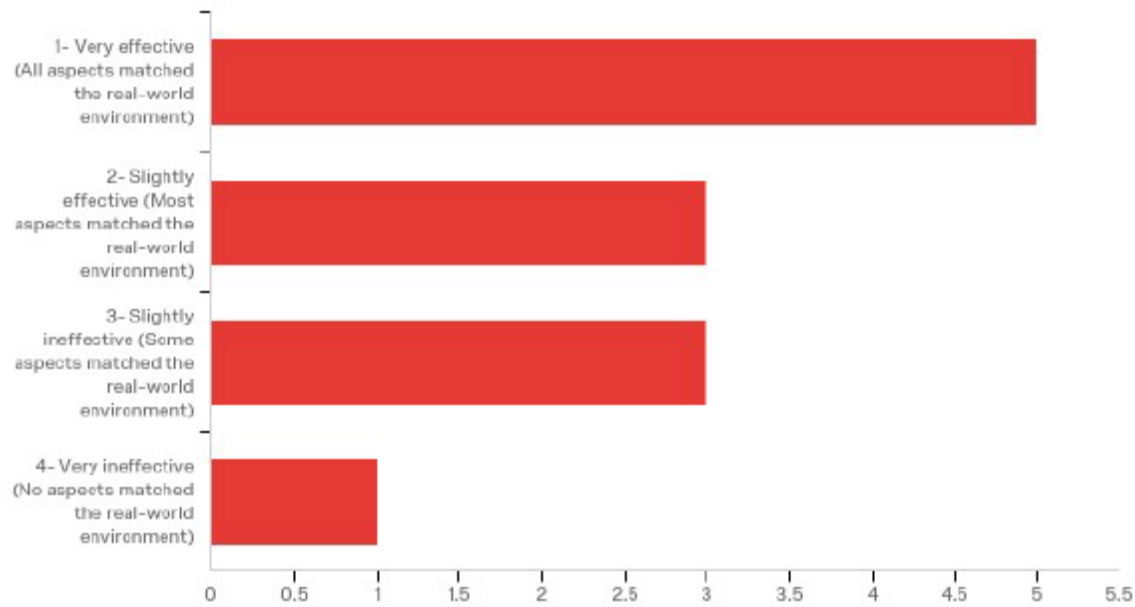| #	Answer	%	Count
1	1- Very effective (All aspects matched the real-world environment)	41.67%	5
2	2- Slightly effective (Most aspects matched the real-world environment)	25.00%	3
3	3- Slightly ineffective (Some aspects matched the real-world environment)	25.00%	3
4	4- Very ineffective (No aspects matched the real-world environment)	8.33%	1
	Total	100%	12

Figure 30. How effectively **Text Stops** were portrayed in the driving simulator in comparison to the real-world environment.

Discussion of Results

Utility of Rumble Strips

Roadway departures account for ~66% of fatalities (in Oregon). Many crashes involve multiple driving violations. Rumble strips create noise and vibration inside the vehicle through interaction with the vehicle tires.

Rumble strips are effective at addressing:

- Speeding;
- Distracted drivers;
- Fatigued or drowsy drivers; and
- Inattentive drivers.

Rumble strips also drain water and provide a reflective back wall that allows the pavement marking to maintain its retroreflectivity at night during rain and post-rain events.

Performance of Rumble Strips to Alleviate Distracted Driving

Road departure crashes account for ~52% of all highway fatalities, according to the Federal Highway Administration (FHWA). FHWA has been promoting rumble strips as a proven safety countermeasure. With implementation of rumble strips, crossover crashes have been reduced 18% to 64% (with most studies showing 40% to 60% reductions). Shoulder rumbles reduced single-vehicle run-off-road freeway crashes by 14% to 80% (with most studies reporting reductions in the range of 30% to 40%).

Effectiveness of Injury Prevention Programs against Distracted Driving

Joseph *et al*. (2016) conducted a study to identify the incidence of distracted driving among health care providers and to create awareness against distracted driving. The study was conducted in four phases: (1) 1-week of preintervention observation; (2) 1-week of intervention; (3) 1-week of postintervention observation, and (4) 1-week of 6 months of postintervention observation. Observations were performed outside the employee parking garage during the following times: 6:30 – 8:30 a.m., 4:40 – 5:30 p.m., and 6:30 – 7:30 p.m.

Intervention included an e-mail survey, pamphlets, and banners in the hospital cafeteria, and a postintervention survey. Hospital employees were identified through badges and scrubs, employees exiting through the employee gate, and parking passes on the cars. Outcome measure was the incidence of distracted driving pre-, post-, and 6 months postintervention.

Incidence of Distracted Driving among Health Care Providers

A total of 15,416 observations (pre: 6,639; post: 4,220; and 6 months post: 4,557) were collected. Incidence of distracted driving was 11.8% among health care providers. There was a significant reduction in distracted driving in each time interval between pre- and postintervention. There was a significant decrease in talking ($p = 0.0001$) and texting ($p = 0.01$) while driving postintervention compared to preintervention. In their study, 35.5% of the respondents admitted to distracted driving, and 4.5% were involved in an accident due to distracted driving. There was a 32% reduction in the incidence of distracted driving postintervention, which remained low even after the 6-month follow-up.

CHAPTER 4 CONCLUSIONS, RECOMMENDATIONS, AND SUGGESTED RESEARCH

Task 5: Conduct a Webinar

On Tuesday, April 4th, 2017, the University of Florida hosted a virtual webinar in which the project goals related to the work titled "Technology Transfer: Distracted Driving – Overview Summary and Assessment of Ways to Alleviate", funded by the STRIDE Center, were discussed. The webinar included a video with presentations from Dr. Robert W. Peters, Dr. Despina Stavrinos, and their graduate students from the previously recorded workshop event. The webinar portrayed the workshop phase of the project in which various members of the community were invited to learn more about the infrastructure solutions being planned to mitigate distracted driving and those currently in place in various states across the U.S. There were 20 participants present for the webinar, including members of Sain and Associates, individuals associated with Orange County traffic, and members of the Florida and Wisconsin Departments of Transportation. The 60-minute webinar culminated in a Q&A session.

On Friday, June 16th, 2017, the University of Florida hosted a second virtual webinar titled, "From Rumble Strips to Text Stops: Infrastructure Solutions to Distracted Driving", in which the project outcomes were discussed by Dr. Robert W. Peters, Dr. Despina Stavrinos, and TRIP Lab Manager, Ms. Mariah Stasiak. The webinar was telecast from the UAB campus and was advertised on the STRIDE website (see Appendix D). This webinar explained the outcomes of the perceived advantages and disadvantages to the suggested distracted driving infrastructure solutions from the workshop participants once they had the opportunity to test their effectiveness in a simulated driving environment. Thirty-three individuals registered for this webinar and nineteen people participated, including representatives from the New Orleans Regional Planning Commission, the Louisiana Center for Transportation Safety and Department of Transportation, as well as Palm Beach County Engineering. The webinar attendees were asked to complete a post-webinar survey (see Appendix D for a copy of the post-webinar survey). Questions asked in this survey are listed below:

- How did you hear about the webinar?
- With 1 being poor and 5 being excellent, please evaluate the quality of the following:
- Did this webinar meet your expectations?
- The least valuable part of the webinar for me was:
- Please let us know if you have suggestions for improvement.

Results provided by the respondents in response to this survey (see Appendix D) are described below.

Question 1: How did you hear about the webinar?

Survey feedback: The survey results are summarized in the table below.

Table 3. How did you hear about the webinar?

How Learned of Webinar	Number of Respondents	% Responses
e-mail message	3	37.5
e-newsletter announcement	1	12.5
STRIDE e-mail notification	1	12.5
Louisiana New Orleans Metro Safety	1	12.5
Friend	1	12.5
Heard from colleague	1	12.5
Total Responses	8	100

The results are presented graphically in the pie-chart below. 62.5% of the webinar respondents learned of the webinar electronically
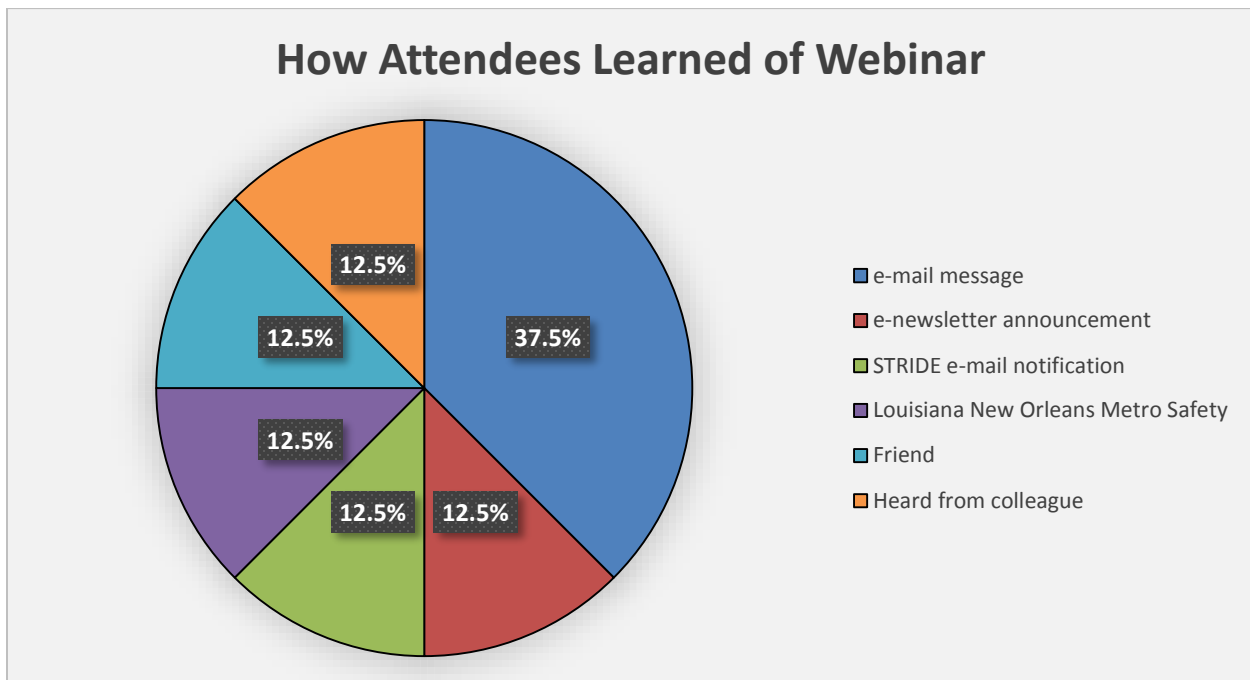
Figure 31. How did you hear about the webinar?

Question 2: With 1 being poor and 5 being excellent, please evaluate the quality of the following: the webinar registration process, information related to the webinar series on the STRIDE website, how well did the presenters know the material, quality of the material presented, and webinar platform used (Adobe Connect).

Survey feedback: Responses related to the webinar registration process, information related to webinar series on the STRIDE website, how well did the presenters know the material, quality of the material presented, and webinar platform used (Adobe Connect). The webinar attendees seemed pleased with the webinar (Figure 32), with responses typically receiving greater than 4 on a 5 point scale.

With 1 being poor and 5 being excellent, please evaluate the quality of the following:

Answered: 8   Skipped: 0
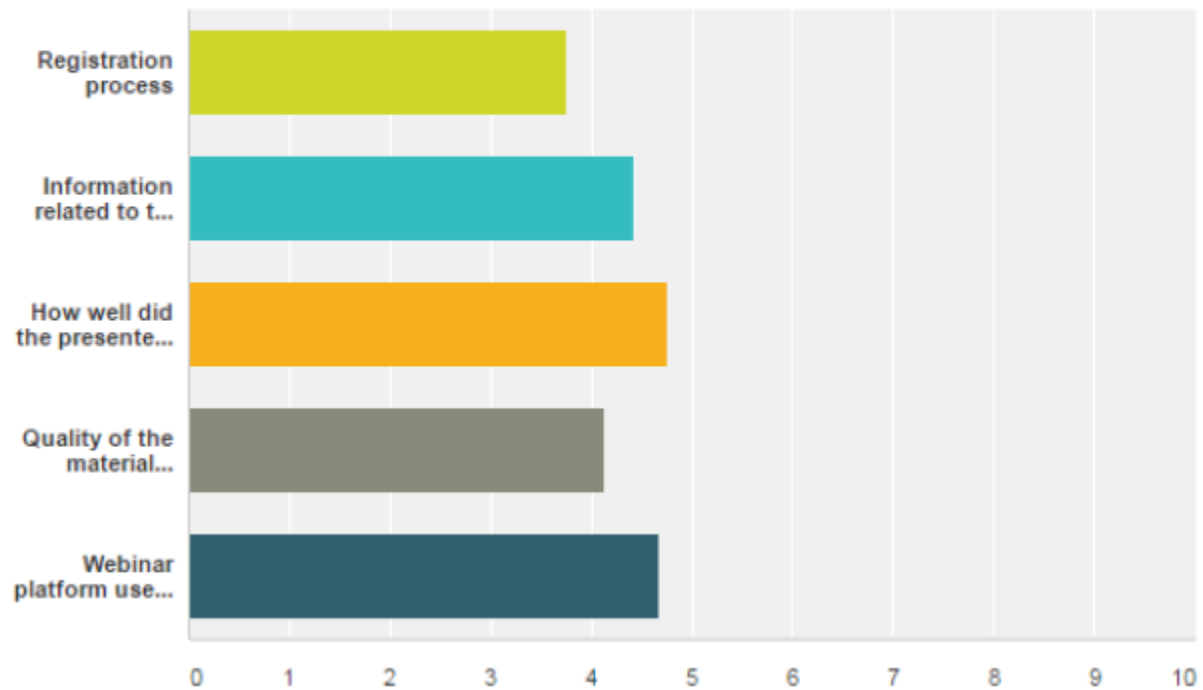
Figure 32. Evaluate the quality of the webinar

Question 3:   Did this webinar meet your expectations?

Survey feedback: As shown in the pie-chart below, the webinar respondents felt the webinar met their expectations.

Did Webinar Meet Your Expectations?

100%

☐ Yes ☐ No
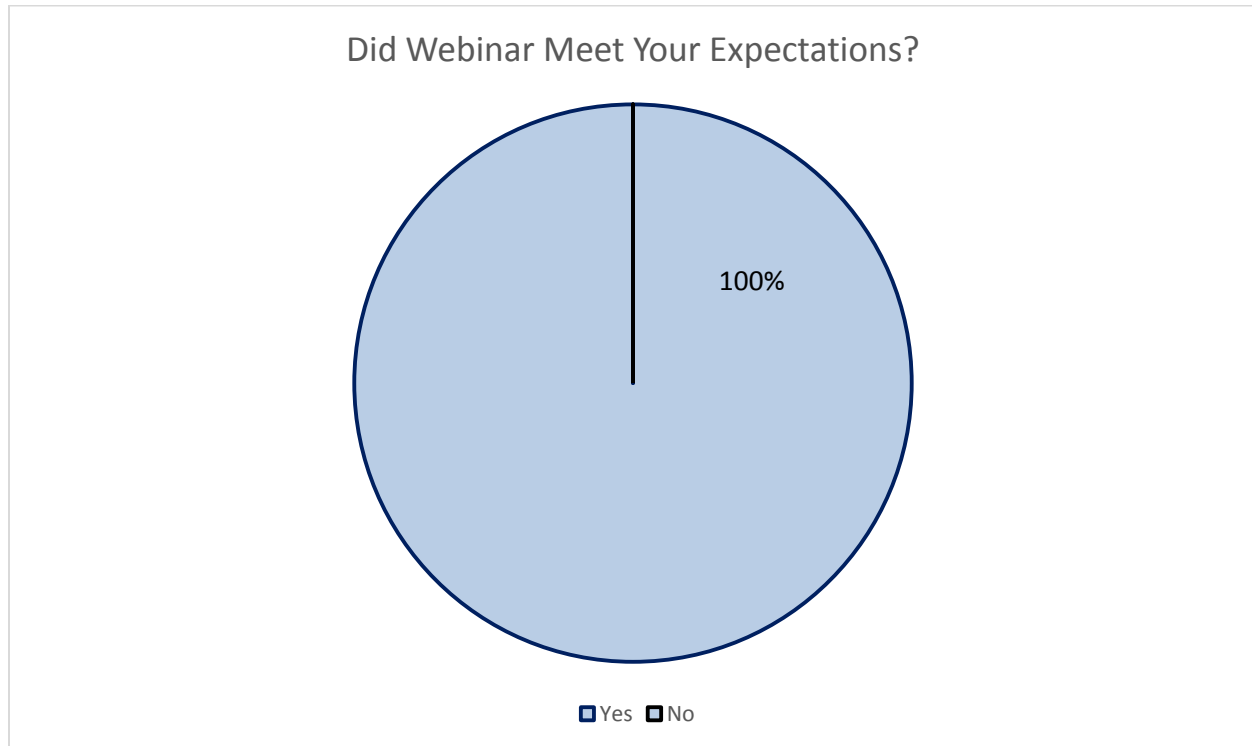
Figure 33. Did the webinar meet your expectations?

Table 4. Post-webinar survey questions 4 & 5

Question 4: The least valuable part of the webinar was:
• Not applicable (3 responses);
• Registration;
• Introduction to the concept;
• It was useful;
• Statistics were presented too fast and slide was not good (very small); and
• The video included was glitching.
Question 5: Any suggestions for improvement?
• The webinar link was published so late (20–30 mins before it started) and I was looking for the information on your website with nothing. Every clickable link took me back to the registration. This could be the reason why only 18 people attended;
• First time thought it went well; however would liked to have seen some of the results for those distracted drivers at grade crossing;
• It was frustrating, however, to introduce an innovative concept, but not have significant new info about it. Adding a presenter from NY State would have been more beneficial. Also, there are challenges with using rumble strips on non-asphalt roads which would have been helpful to address;
• Interesting to know about behavior strategies more;
• N/A (3 responses); and
• The PowerPoint could have been created a little better

In summary, the webinar attendees generally felt satisfied with the webinar and its contents.

Conclusions

Conclusions from this technology transfer project are summarized below:

1. Distracted driving is a serious concern when traveling; examples of distracted driving include: using a cell phone, texting, eating, drinking, smoking, grooming, navigation system use, adjusting a radio/CD player/MP3 player, temperature control adjustment, disciplining/ attending to other passengers in a car, adjusting rear or side view mirrors, etc.

2. Various approaches can be used to help prevent distracted driving crashes and fatalities, including use of the following:

   • Rumble strips/rumble stripes
   • Signage
   • Text stops
   • Driver training programs
   • Educational campaigns (e.g., websites, school programs, etc.)
   • Legislation/law enforcement
   • Other

3. Rumble strips are most common infrastructure implemented by various state Department of Transportations to minimize distracted driving crashes and fatalities.

4. The ultimate goal is to safeguard travelers; remember its only takes a split second of distracted driving that can cause motor vehicle crashes and fatalities.

Recommendations

Potential benefits associated with this technology transfer project is to make both state Department of Transportations and the general public more knowledgeable about various approaches that can be used to mitigate distracted driving. Various approaches can be used to help prevent distracted driving crashes and fatalities, including use of the following: rumble strips/rumble stripes, signage, text stops, driver training programs, educational campaigns, and legislation/law enforcement. Rumble strips are most common infrastructure implemented by various state Department of Transportations to minimize distracted driving crashes and fatalities. Such distracted driving mitigation approaches can be provided as training materials for state Department of Transportations, secondary school systems, community outreach programs, etc. Such outreach efforts may have a profound effect to mitigate distracted driving behavior.

Another aspect that we might want to suggest for future research activity is to visit/interview/meet with various state Department of Transportations to determine the effectiveness of various distracted driving mitigation approaches in their states.

Suggested Research

Several recommendations are put forth to further develop infrastructure technologies aimed at reducing accidents and fatalities cause by distracted driving. These recommendations are briefly addressed below:

1. The performance of the various infrastructure technologies needs to be better ascertained and quantified, through further interactions with state Department of Transportations (DOTs);
2. If possible, pilot demonstrations should be conducted on the various infrastructure techniques;
3. The performance of these infrastructure techniques should be ascertained in both rural and urban environments (and their performance should be compared and contrasted); and
4. The interactions of distracted driving and distracted pedestrians needs to be investigated.

References Cited

Angell, L., 2014. "An Opportunity for Convergence? Understanding the Prevalence and Risk of Distracted Driving through the Use of Crash Databases, Crash Investigations, and Other Approaches", *Annals of Advances in Automotive Medicine*, *58*: 40–59.

Atchley, P., C. Hadlock, and S. Lane, 2012. "Stuck in the 70s: The Role of Social Norms in Distracted Driving", *Accident Analysis and Prevention*, *48*: 279–284.

Auto Safety, 2013. "Texting While Driving Now Leading Cause of US Teen Deaths. Fact Sheet", retrieved from: http://safety.trw.com/texting-while-driving-now-leading-cause-of-us-teen-deaths/0710/[11/03/2016]. Accessed: November, 2016.

Butler, Karen (2010). "Rumble Strips Keeps Drivers on the Road." Retrieved from: http://asphaltmagazine.com/rumble-strips-keep-drivers-on-the-road/ Accessed: 02/02/2017.

Center for Disease Control and Prevention (CDC), 2017. "Pedestrian Safety", retrieved from: https://www.cdc.gov/motorvehiclesafety/pedestrian_safety/[2/18/2017]. Accessed: February 18, 2017.

Center for Disease Control and Prevention (CDC), 2014. "Distracted Driving in the United States and Europe", Retrieved: https://www.cdc.gov/features/dsdistracteddriving/. Accessed: February 18, 2017.

Cornell Local Roads Program (CLRP), 2016. "Center Rumble Strips Reduce Crashes", Retrieved from: https://cornell.app.box.com/v/clrp-tt-dyk-centerline. Accessed: February 18, 2017.

Cruz, G., and K. Oloffson, 2009. "Distracted Driving: Should Talking, Texting Be Banned?", retrieved from: http://www.time.com/rimw/peinrour/0,8816, 1916291,OO.html. Accessed: November 3, 2016.

Edger Snyder and Associates, 2013. "Cell Phone Use While Driving Statistics. Fact Sheet", Retrieved from: https://www.edgarsnyder.com/car-accident/cause-of-accident/cell-phone/cell-phone-statistics.htm. Accessed: November 3, 2016.

U.S. Department of Transportation (US DOT), and Federal Highway Administration (FHWA), 2015. "Rumble Strips & Rumble Stripes", Retrieved from: http://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/cmrumblestrips/.   Accessed: November 3, 2016.

Ferguson, S.A., 2014. "Distracted Driving: What is the State of the Science, and What are our Knowledge Gaps?", *Annals of Advances in Automotive Medicine*, 58: 1–4.

Garner, A.A, P.R. Fine, and C.A Franklin, 2011. "Distracted Driving Among Adolescents: Challenges and Opportunities", *Injury Prevention*, *17*(4): 285; Retrieved: doi: 10.1136/injuryprev-2011-040096. Accessed: February 13, 2017.

Harvard Medical Men's Watch, 2012. "Distracted Driving: Fast Lane to Disaster", *Harvard Mens Health Watch*, *16* (10): 6 – 7; Retrieved from: www.health.edu. Accessed: November 1, 2016.

Joseph, B., B. Zangbar, S. Bains, N. Kulvatunyou, M. Khalil, R.S. Friese, T. O'Keeffe, V. Pandit, and P. Rhee, 2016. "Injury Prevention Programs against Distracted Driving: Are They Effective", *Traffic Injury Prevention*, *17* (5): 460–464; Retrieved from: http://dx.doi.org/10.1080/15389588.2015.1116042.

Leone, K., 2010. "Taking on Distracted Driving", *Federal Highway Administration Research and Technology*, Publication No. FHWA-HRT-10-006, Issue No. *74* (2); Retrieved from: https://www.fhwa.dot.gov/publications/publicroads/10septoct/01.cfm. Accessed: February, 2017.

Lerner, B.H., 2011. "Drunk Driving, Distracted Driving, Moralism, and Public Health", *The New England Journal of Medicine*, *365* (10): 879–881.

Madden, M., and A. Lenhart, 2009. "Teens and Distracted Driving: Texting, Talking and Other Uses of the Cell Phone Behind the Wheel", *Pew Internet & American Life Project*, retrieved from: http://pewinternet.org/Reports/2009/Teens-and-Distracted-Driving.aspx. Accessed: December 1, 2016.

Mlot, Stephanie (September 23, 2013). NY Installs 'Text Stops' Along State Highways. News & Opinion, PCMag.com http://www.pcmag.com/article2/0,2817,2424762,00.asp Accessed: 8/1/2016.

National Highway Traffic Safety Administration (NHTSA), 2014. National Highway Traffic Safety Administration (2014). Policy Statement and Compiled FAQs on Distracted Driving. Policy Statement", Additional information can be found at: https://www.nhtsa.gov/risky-driving/distracted-driving, Accessed: November 1, 2016.

National Highway Traffic Safety Administration (NHTSA), 2012. "National Survey on Distracted Driving Attitudes and Behaviors – 2012", U.S. Department of Transportation, National Highway Traffic Safety Administration. Washington, D.C.

National Safety Council (NSC), 2010. "Understanding the Distracted Brain – Why Driving While Using Hand-Free Cell Phones is Risky Behavior", (White Paper), National Safety Council. Retrieved from: http://www.nsc.org/DistractedDrivingDocuments/Cognitive-Distraction-White-Paper.pdf, Accessed: February 11, 2017.

Parr, M.N., L.A. Ross, B. McManus, H.J. Bishop, S.M.O. Wittig, and D. Stavrinos, 2016. "Differential Impact of Personality Traits on Distracted Driving Behaviors in Teens and Older Adults", *Accident Analysis and Prevention*, *92*: 107–112.

Smith, M.L., M. Benden, and C. Lee, 2011. "Promoting Active Communities in a Culture of Distracted Driving", *Preventing Chronic Disease*, *9*, E31. Retrieved from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3277390/ [02/16/2017], Accessed: November 1, 2016.

State Farm, August 2015. "Teens and Distracted Driving", State Farm Automobile Insurance Study, Retrieved from: http://www.multivu.com/players/English/7292859-state-farm-distracted-driving-teens/document/31a5c90b-ed2e-4bd8-af6a-11ae4d1ddbbf.pdf, Accessed: November 2016.

Stavrinos, Despina, Jennifer L. Jones, Annie A. Garner, Russell Griffin, Crystal A. Franklin, David Ball, Sharon C. Welburn, Karlene K. Ball, Virginia P. Sisiopiku and Philip R. Fine (February 2013). Impact of Distracted Driving on Safety and Traffic Flow. *Accident Analysis and Prevention*, Vol. 61, pp. 63-70.

Stewart, T.C., J. Harrington, B. Bately, N.H. Merritt, and N.G. Parry, 2015. "From Focus Groups to Production of a Distracted Driving Video: Using Teen Input to Drive Injury Prevention Programming", *J. Trauma Acute Care Surg.*, *79* (3), Supplement 1.

Virginia Tech Transportation Institute, 2013. "New VTTI Study Results Continue to Highlight the Danger of Distracted Driving", Retrieved from: http://www.vtti.vt.edu/featured/?p=193, Accessed: August 1, 2016.

Fitch. G.A., J.A. Joccolich, F. Guo, J. McClafferty, Y. Fangh, R.L. Olson, M.A. Perez, R.J. Hanowski, J.M. Hankey, and T.A. Dingus, 2013. *The Impact of Hand-held and Hands-free Cell Phone Use on Driving Performance and Safety-Critical Event Risk*, Report No. DOT HS 811 757, National Highway Traffic safety Administration, Washington, D.C.

Winston, F.K., C.C. McDonald, and D.V. McGehee, 2013. "Are We Doing Enough to Prevent the Perfect Storm? Novice Drivers, ADHD, and Distracted Driving", *J. American Medical Association Pediatrics*, *167* (10): 892–894.

Zhang, Y., and B.H. Williams, 2015. "Distracted Driving is Driving Without Full Attention to Road Conditions", *Journal of American Medical Association*, *314* (16): 1768.

APPENDIX A   RECRUITMENT MATERIAL

UAB

We are contacting stakeholders to complete a *brief* survey examining infrastructure aimed at addressing distracted driving. This survey will help us determine what is currently being done in your jurisdiction regarding ways to curb distracted driving. For example, we recently learned about "texting zones" in New York, which encourage drivers to wait until they can safely pull of the road to respond to a text message.

We would like to ask for your help by completing a *quick* 5-10 minute internet survey.

If you are interested in participating, please follow the survey link below. When you open the link, you will be given additional information about completing the survey. Once you have read about our survey, you will be asked if you would like to participate.

If you have any questions about the study, please call us at 205-975-9440. A research assistant will be able to answer any questions or concerns.

We would like to thank you in advance for your time, consideration, and assistance with this important research study. Below is the survey link:

https://uab.co1.qualtrics.com/SE/?SID=SV_7PXOb4o58IUEIU5

Please complete the survey no later than January 31, 2017.

Thank you.

Mariah Stasiak | TRIP Lab Manager (Researcher II)
Department of Psychology
UAB | University of Alabama at Birmingham
P: 205.975.9440 | F: 205.934.2295 | mariahes@uab.edu
Lab website: www.triplaboratory.com

Distracted Driving Infrastructure Workshop

FUNDED BY:

STRIDE — Southeastern Transportation Research, Innovation, Development and Education Center

FREE WORKSHOP

March 3rd 1-4:30PM
Community Health Services Building
Room 207
933 South 19th Street
Refreshments will be served

Workshop Presenters:

Dr. Despina Stavrinos

Dr. Robert Peters

**RSVP for this event to mariahes@uab.edu
Mariah Stasiak, TRIP Lab Manager**

Workshop attendees will have the opportunity to drive in UAB's new state-of-the-art high fidelity driving simulator which was recently developed in the UAB TRIP Lab with funds from ALDOT and Honda Manufacturing of Alabama. The simulator scenario has been programmed to include various existing and suggested infrastructure solutions to mitigate distracted driving, offering an opportunity for users to see how they work.

Dr. Robert Peters, from the UAB Department of Civil, Construction, and Environmental Engineering, and Dr. Despina Stavrinos, from the UAB Department of Psychology, will present at the workshop. After presentations, workshop attendees may visit the TRIP Lab for an optional simulator tour.

Those who participate in the simulator tour will be asked to fill out a brief, voluntary survey and light refreshments will be served. Come join us for an exciting workshop and learn more about how distracted driving is being mitigated in your area!

UAB SCHOOL OF ENGINEERING

TRIP — Translational Research for Injury Prevention LABORATORY

UAB SUSTAINABLE SMART CITIES RESEARCH CENTER
Knowledge that will change your world

UAB DEPARTMENT OF PSYCHOLOGY

Dr. Peters,

The **"Distracted Driving Infrastructure Workshop"** has been publicized as follows, hope this campaign generated reservations, please let me know.

1. UAB SSCRC Facebook page posts:

- On 2/16 - generated **73** views
- On 2/23 -generated **737** views
- Both posts have direct feed to the Home page of the UAB SSCRC website www.uab.edu/smartcities

2. UAB SSCRC Website - Events Page http://www.uab.edu/smartcities/events

- Posted 2/27

3. eNews (direct email campaign requesting RSVP to mariahes@uab.edu - see attached and below)

- On 2/27 sent to: **2,820** contacts mainly in Birmingham and AL.
- On 3/1 total message opens: **610**

UAB Distracted Driving Infrastructure Workshop 🔗

SENT **Newsletter Email,** Sent Feb 27, 2017

Actions ▾

YOUR OPEN RATE

610 27% 18%

OPENS AVERAGE USER

How can I improve my open rate?

YOUR CLICK RATE

4 1% 12%

CLICKS AVERAGE USER

How do I get more clicks?

2820

SENDS
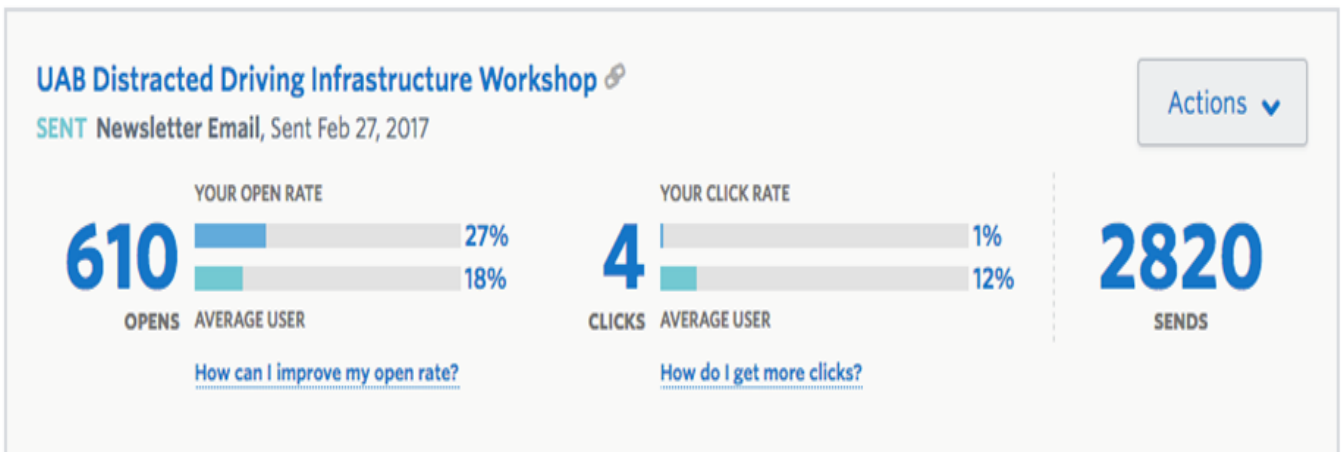
Maria

Maria Claudia Norena | Associate Center Director, Strategy & Innovation

Minority Health & Health Disparities Research Center
School of Medicine
www.uab.edu/MHRC

Sustainable Smart Cities Research Center

A-3

APPENDIX B   SURVEY FORMS

DOT_State_Safety_Operations_Personnel_Survey_V1

What Department of Transportation do you represent?

What is your position title?

What is the single most productive infrastructure improvement (buildings, roads, modifications to the built roadway environment) your agency has implemented to mitigate distracted driving? Provide a brief description of what it looks like or how it works. If none, please select "none" below.

Please select "none" if answer above is left blank.
○ None (1)

If available, please upload a picture, schematic, etc. of the implementation

If you have additional pictures, schematics, etc. of the implementation to add, please upload them

If you have additional pictures, schematics, etc. of the implementation to add, please upload them

Answer If Please select "none" if answer above is left blank. None Is Not Selected
How have you advertised this improvement?
❑ Website (1)
❑ Radio/PSA (2)
❑ TV Commercials (3)
❑ Billboards (4)
❑ Printed media (5)
❑ Other (6)
❑ Not advertised (7)

Answer If How you advertised this improvement? Other Is Selected
Please explain your "other" advertisement:

Answer If Please select "none" if answer above is left blank. None Is Not Selected
Are any data on this infrastructure implementation collected?
○ Yes (1)
○ No (2)
○ No, but data collection is in progress (3)
○ No, but data collection will occur in the future (4)

Answer If Are any data on this infrastructure implementation collected? Yes Is Selected
If "Yes," has this infrastructure implementation been effective in reducing distracted driving related crashes?

Please describe another infrastructure improvement your agency has implemented to mitigate distracted driving? Provide a brief description of what it looks like and how it works. If none, please select "none" below.

Please select "none" if answer above is left blank.
○ None (1)

If you have any pictures, schematics, etc. of this additional implementation, please upload them

Answer If Please select "none" if answer above is left blank. None Is Not Selected
How have you advertised this improvement?
❏ Website (1)
❏ Radio/PSA (2)
❏ TV Commercial (3)
❏ Billboard (4)
❏ Printed media (5)
❏ Other (6)
❏ Not advertised (7)

Answer If How have you advertised this improvement? Other Is Selected
Please explain your "other" advertisement:

Answer If Please select "none" if answer above is left blank. None Is Not Selected
Are any data on this infrastructure implementation collected?
○ Yes (1)
○ No (2)
○ No, but data collection is in progress (3)
○ No, but data collection will occur in the future (4)

Answer If Are any data on this infrastructure implementation collected? Yes Is Selected
If "Yes," has this infrastructure implementation been effective in reducing distracted driving related crashes?

What infrastructure improvements does your agency have planned to mitigate distracted driving? If none, please write "none".

Please upload any pictures, schematics, etc. of these planned implementations

What is the best way to eliminate distracted driving (aside from removing cell phones from vehicles)?

What challenges or barriers are there to implementing infrastructure solutions aimed at reducing distracted driving in your jurisdiction?

What other DOT, law enforcement, high school, university, etc., -sponsored distracted driving initiatives are you aware of that are currently implemented in your jurisdiction (other than infrastructure)?

Rate how effective you believe infrastructure solutions (e.g. signs, texting lanes) can be in reducing injuries and fatalities related to distracted driving.
○ Very effective (Significant reduction in injuries and fatalities related to distracted driving) (1)
○ Slightly effective (Slight reduction in injuries and fatalities related to distracted driving) (2)
○ No difference (No change from previous years) (3)
○ Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving) (4)
○ Very ineffective (Significant increase in injuries and fatalities related to distracted driving) (5)

Rate how effective you believe behavioral interventions (e.g. driver training programs) can be in reducing injuries and fatalities related to distracted driving.
○ Very effective (Significant reduction in injuries and fatalities related to distracted driving) (1)
○ Slightly effective (Slight reduction in injuries and fatalities related to distracted driving) (2)
○ No difference (No change from previous years) (3)
○ Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving) (4)
○ Very ineffective (Significant increase in injuries and fatalities related to distracted driving) (5)

Rate how effective you believe educational campaigns (e.g. websites, school programs) can be in reducing injuries and fatalities related to distracted driving.
○ Very effective (Significant reduction in injuries and fatalities related to distracted driving) (1)
○ Slightly effective (Slight reduction in injuries and fatalities related to distracted driving) (2)
○ No difference (No change from previous years) (3)
○ Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving) (4)
○ Very ineffective (Significant increase in injuries and fatalities related to distracted driving) (5)

Rate how effective you believe policy (e.g. laws against distracted driving) can be in reducing injuries and fatalities related to distracted driving.
○ Very effective (Significant reduction in injuries and fatalities related to distracted driving) (1)
○ Slightly effective (Slight reduction in injuries and fatalities related to distracted driving) (2)
○ No difference (No change from previous years) (3)
○ Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving) (4)
○ Very ineffective (Significant increase in injuries and fatalities related to distracted driving) (5)

Rate how effective you believe law enforcement can be in reducing injuries and fatalities related to distracted driving.

○ Very effective (Significant reduction in injuries and fatalities related to distracted driving) (1)
○ Slightly effective (Slight reduction in injuries and fatalities related to distracted driving) (2)
○ No difference (No change from previous years) (3)
○ Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving) (4)
○ Very ineffective (Significant increase in injuries and fatalities related to distracted driving) (5)

Rank in order how effective you think these approaches are for reducing injuries and fatalities related to distracted driving. (1 = most effective, 5 = least effective)

_____ Infrastructure solutions (1)
_____ Behavioral interventions (2)
_____ Educational campaigns (3)
_____ Policy (4)
_____ Law enforcement (5)

WORKSHOP SURVEY

What is your position title?

What is the best way to eliminate distracted driving (aside from removing cell phones from vehicles)?

What DOT, law enforcement, high school, university, etc., -sponsored distracted driving initiatives are you aware of that are currently implemented in your jurisdiction (other than infrastructure)?

Rate how effective you believe infrastructure solutions (e.g. signs, texting lanes) can be in reducing injuries and fatalities related to distracted driving.
- ⭘ Very effective (Significant reduction in injuries and fatalities related to distracted driving) (1)
- ⭘ Slightly effective (Slight reduction in injuries and fatalities related to distracted driving) (2)
- ⭘ No difference (No change from previous years) (3)
- ⭘ Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving) (4)
- ⭘ Very ineffective (Significant increase in injuries and fatalities related to distracted driving) (5)

What are the pros of using this approach?

What are the cons of using this approach?

Rate how effective you believe behavioral interventions (e.g. driver training programs) can be in reducing injuries and fatalities related to distracted driving.
- ⭘ Very effective (Significant reduction in injuries and fatalities related to distracted driving) (1)
- ⭘ Slightly effective (Slight reduction in injuries and fatalities related to distracted driving) (2)
- ⭘ No difference (No change from previous years) (3)
- ⭘ Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving) (4)
- ⭘ Very ineffective (Significant increase in injuries and fatalities related to distracted driving) (5)

What are the pros of using this approach?

What are the cons of using this approach?

Rate how effective you believe educational campaigns (e.g. websites, school programs) can be in reducing injuries and fatalities related to distracted driving.

- ⃝ Very effective (Significant reduction in injuries and fatalities related to distracted driving) (1)
- ⃝ Slightly effective (Slight reduction in injuries and fatalities related to distracted driving) (2)
- ⃝ No difference (No change from previous years) (3)
- ⃝ Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving) (4)
- ⃝ Very ineffective (Significant increase in injuries and fatalities related to distracted driving) (5)

What are the pros of using this approach?

What are the cons of using this approach?

Rate how effective you believe policy (e.g. laws against distracted driving) can be in reducing injuries and fatalities related to distracted driving.

- ⃝ Very effective (Significant reduction in injuries and fatalities related to distracted driving) (1)
- ⃝ Slightly effective (Slight reduction in injuries and fatalities related to distracted driving) (2)
- ⃝ No difference (No change from previous years) (3)
- ⃝ Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving) (4)
- ⃝ Very ineffective (Significant increase in injuries and fatalities related to distracted driving) (5)

What are the pros of using this approach?

What are the cons of using this approach?

Rate how effective you believe law enforcement can be in reducing injuries and fatalities related to distracted driving.

- ⃝ Very effective (Significant reduction in injuries and fatalities related to distracted driving) (1)
- ⃝ Slightly effective (Slight reduction in injuries and fatalities related to distracted driving) (2)
- ⃝ No difference (No change from previous years) (3)
- ⃝ Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving) (4)
- ⃝ Very ineffective (Significant increase in injuries and fatalities related to distracted driving) (5)

What are the pros of using this approach?

What are the cons of using this approach?

Rank in order how effective you think these approaches are for reducing injuries and fatalities related to distracted driving. (1 = most effective, 5 = least effective)

_____ Infrastructure solutions (1)
_____ Behavioral interventions (2)
_____ Educational campaigns (3)
_____ Policy (4)
_____ Law enforcement (5)

Rate how effective you believe **Rumble Strips** can be in reducing injuries and fatalities related to distracted driving.

○ Very effective (Significant reduction in injuries and fatalities related to distracted driving) (1)
○ Slightly effective (Slight reduction in injuries and fatalities related to distracted driving) (2)
○ No difference (No change from previous years) (3)
○ Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving) (4)
○ Very ineffective (Significant increase in injuries and fatalities related to distracted driving) (5)

What are the pros of using this approach?

What are the cons of using this approach?

Rate how effective you believe **Raised Pavement Markers (i.e., reflectors)** can be in reducing injuries and fatalities related to distracted driving.

○ Very effective (Significant reduction in injuries and fatalities related to distracted driving) (1)
○ Slightly effective (Slight reduction in injuries and fatalities related to distracted driving) (2)
○ No difference (No change from previous years) (3)
○ Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving) (4)
○ Very ineffective (Significant increase in injuries and fatalities related to distracted driving) (5)

What are the pros of using this approach?

What are the cons of using this approach?

Rate how effective you believe **LED flashing signs** can be in reducing injuries and fatalities related to distracted driving.

○ Very effective (Significant reduction in injuries and fatalities related to distracted driving) (1)
○ Slightly effective (Slight reduction in injuries and fatalities related to distracted driving) (2)
○ No difference (No change from previous years) (3)
○ Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving) (4)

○ Very ineffective (Significant increase in injuries and fatalities related to distracted driving) (5)

What are the pros of using this approach?

What are the cons of using this approach?

Rate how effective you believe **Billboards** can be in reducing injuries and fatalities related to distracted driving.
○ Very effective (Significant reduction in injuries and fatalities related to distracted driving) (1)
○ Slightly effective (Slight reduction in injuries and fatalities related to distracted driving) (2)
○ No difference (No change from previous years) (3)
○ Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving) (4)
○ Very ineffective (Significant increase in injuries and fatalities related to distracted driving) (5)

What are the pros of using this approach?

What are the cons of using this approach?

Rate how effective you believe **Text Stops** can be in reducing injuries and fatalities related to distracted driving.
○ Very effective (Significant reduction in injuries and fatalities related to distracted driving) (1)
○ Slightly effective (Slight reduction in injuries and fatalities related to distracted driving) (2)
○ No difference (No change from previous years) (3)
○ Slightly ineffective (Slight increase in injuries and fatalities related to distracted driving) (4)
○ Very ineffective (Significant increase in injuries and fatalities related to distracted driving) (5)

What are the pros of using this approach?

What are the cons of using this approach?

Rank in order how effective you think the following infrastructure solutions are for reducing injuries and fatalities related to distracted driving. (1 = most effective, 5 = least effective)
_____ Rumble Strips (1)
_____ Raised Pavement Markers (i.e., reflectors) (2)
_____ LED flashing signs (3)
_____ Billboards (4)

_____ Text Stops (5)

Rate how effectively **Rumble Strips** were portrayed in the driving simulator in comparison to the real-world environment.
- ◯ Very effective (All aspects matched the real-world environment) (1)
- ◯ Slightly effective (Most aspects matched the real-world environment) (2)
- ◯ Slightly ineffective (Some aspects matched the real-world environment) (3)
- ◯ Very ineffective (No aspects matched the real-world environment) (4)

Rate how effectively **Raised Pavement Markers (i.e., reflectors)** were portrayed in the driving simulator in comparison to the real-world environment.
- ◯ Very effective (All aspects matched the real-world environment) (1)
- ◯ Slightly effective (Most aspects matched the real-world environment) (2)
- ◯ Slightly ineffective (Some aspects matched the real-world environment) (3)
- ◯ Very ineffective (No aspects matched the real-world environment) (4)

Rate how effectively **LED flashing signs** were portrayed in the driving simulator in comparison to the real-world environment.
- ◯ Very effective (All aspects matched the real-world environment) (1)
- ◯ Slightly effective (Most aspects matched the real-world environment) (2)
- ◯ Slightly ineffective (Some aspects matched the real-world environment) (3)
- ◯ Very ineffective (No aspects matched the real-world environment) (4)

Rate how effectively **Billboards** were portrayed in the driving simulator in comparison to the real-world environment.
- ◯ Very effective (All aspects matched the real-world environment) (1)
- ◯ Slightly effective (Most aspects matched the real-world environment) (2)
- ◯ Slightly ineffective (Some aspects matched the real-world environment) (3)
- ◯ Very ineffective (No aspects matched the real-world environment) (4)

Rate how effectively **Text Stops** were portrayed in the driving simulator in comparison to the real-world environment.
- ◯ Very effective (All aspects matched the real-world environment) (1)
- ◯ Slightly effective (Most aspects matched the real-world environment) (2)
- ◯ Slightly ineffective (Some aspects matched the real-world environment) (3)
- ◯ Very ineffective (No aspects matched the real-world environment) (4)

APPENDIX C   WORKSHOP DETAILS

STRIDE | Southeastern Transportation Research, Innovation, Development and Education Center

Distracted Driving Infrastructure Workshop

March 3, 2017

1:00pm	Check-in/Registration
1:10pm	Project goals, objectives, and tasks: • Dr. Robert Peters, PhD; Professor, *UAB Department of Civil, Construction, & Environmental Engineering*
1:20pm	Opening remarks from invited guests: • Dean Iwan Alexander, PhD; Dean, *UAB School of Engineering* • Dr. Fouad Fouad, PhD; Professor and Chairman, *UAB Department of Civil, Construction, & Environmental Engineering* • Mr. Tim Barnett; State Safety Operations Engineer, *Alabama Department of Transportation*
1:30pm	Overview of distracted driving: • Dr. Despina Stavrinos, PhD; Assistant Professor and TRIP Lab Director, *UAB Department of Psychology*
1:40pm	Literature Review: • Sandra Cutts, MS; Graduate Research Assistant, *UAB Department of Civil, Construction, & Environmental Engineering*
1:50pm	Survey Results: • Dr. Robert Peters, PhD
2:00pm	TRIP Lab simulator overview: • Ben McManus, MA; Graduate Research Assistant, *UAB Department of Psychology, Lifespan Developmental Psychology Program*
2:10pm	Q&A
2:20pm	Group Formation: Mariah Stasiak; TRIP Lab Manager
2:30pm	Break/Refreshments
2:45pm to 3:45pm	Simulator experience @ TRIP Lab (916 Building, across the street)
3:45pm	Activity (Community Health Services Building, CH-19 207) • Dr. Despina Stavrinos, PhD
4:00pm	Results, Conclusions, & Acknowledgements: • Dr. Robert Peters, PhD
4:15pm	Q&A
4:30pm	Adjournment

Workshop Speakers

- Dr. Robert Peters, PhD
  - *Dr. Robert W. Peters is a Professor of Environmental Engineering in the Department of Civil, Construction, and Environmental Engineering at the University of Alabama at Birmingham (UAB). Prior to his faculty appointment at UAB, he served as Research Area Leader in the Energy Systems Division at Argonne National Laboratory, where he directed a laboratory addressing treatment of contaminated soils and groundwaters. At UAB, he recently completed a STRIDE project addressing "Development of Educational and Professional Training Modules on Green/ Sustainability Design and Rating Systems for Neighborhood Development and Transportation", Project: 2012-051S. He currently has an NSF project addressing characterization and assessment of industrial wastewaters in Egypt. As a part of that project, he has led two sets of workshops in Egypt (at the Housing Building Research Center in Cairo, and in Alexandria) describing the results of the study, and obtaining input from our Egyptian colleagues on the research needs. Since joining UAB, he has also worked on collaborative research projects with the transportation center at Argonne National Laboratory. Since joining the faculty at UAB, he has secured funding of more than $3,000,000. During his career, he has in excess of 90 peer-reviewed journal articles. He is a registered professional engineer. At UAB, he serves as the departmental Graduate Program Director and chairs the School of Engineering Graduate Programs Committee He serves as Secretary of the Environmental Division of the American Institute of Chemical Engineers (AIChE). He was the recipient of the AIChE Environmental Division Service Award in 2014.*

- Dr. Despina Stavrinos, PhD
  - *Dr. Despina Stavrinos is an Assistant Professor of Psychology at UAB and Director of the Translational Research for Injury Prevention (TRIP) laboratory. The TRIP lab houses a fully immersive, state-of-the-art driving simulator designed by Realtime Technologies, Inc., that is customizable to various types of research. Dr. Stavrinos focuses on the cognitive aspects of pediatric unintentional injury – particularly injuries resulting from motor vehicle collisions related to distracted driving. Her research addresses applied injury prevention issues from a behavioral science perspective, and advances our understanding of development's influences on the basic psychological processes of attention, executive function, and cognition, as well as how these factors impact real-world problems. Dr. Stavrinos' work with driving simulation led to a better understanding of the underlying cognitive processes of distracted driving, and to translational efforts to reduce this dangerous behavior. Dr. Stavrinos has received over 1 million dollars in grant funding, mentored nearly 100 students from various disciplines, and actively involves women and minorities in her research to increase the diversity of our nation's workforce. Her partnerships and research collaborations span both the public and private sector, as well as numerous academic disciplines. These connections help build capacity, leverage resources, and increase the speed of translation from discovery to innovation. Dr. Stavrinos serves the scientific community through reviewing for journals, grants, and scientific conferences, through professional memberships (APS, TRB Committee on Operator Education and Regulation), and by serving as Moderator for a Whitehouse Roundtable Discussion with FMSCA and the Alabama Distracted Driving Summit.*

- Dean Iwan Alexander, PhD
  - *Dr. Alexander has been Dean of the School of Engineering at the University of Alabama at Birmingham (UAB) since August 2013. Dr. Alexander's research interests now cover a number of topics ranging from the physics and mechanics of fluid interfaces, computational fluid mechanics and energy transport to crystal growth and solidification. This work has produced over a 120 refereed journal papers and book chapters. For the last thirty years his research has included theoretical studies, computational simulations and experiments, particularly those processes associated with materials preparation and also with fluid surface dynamics. Dr. Alexander was also involved with five space experiments, three involving semiconductor crystal growth, one liquid diffusion experiment and an acceleration measurement experiment. Dr. Alexander has serves on a number of national committees, is an AIAA associate fellow and has chaired two Gordon Research Conferences (Gravitational Effects in Physical-Chemical Systems and Thin Film and Crystal Growth Mechanisms). He is internationally recognized for his work on microgravity fluid processes. He has over 20 years of experience in the management and coordination of multi-million dollar research projects. Before coming to UAB he was chair of the Department of Mechanical and Aerospace Engineering at Case Western Reserve University. In 2007 he started and became faculty director of CWRU's Great Lakes Energy Institute. During the period 2005-2010 he was directed the National Center for Space Exploration Research (NCSER), co-located at NASA's Glenn Research Center. Dr. Alexander was awarded NASA's Exceptional Service Medal in August 2008.*

- Dr. Fouad Fouad, PhD
  - *Dr. Fouad is Professor and Chairman of the Civil Engineering Department at the University of Alabama at Birmingham, USA. He teaches and conducts research in the area of reinforced concrete structures and concrete materials, and has published numerous technical papers in the field. His research efforts have led to the development of national standards and specifications for a number of sustainable green concrete products and building systems. Dr. Fouad currently chairs the PCI committee on Prestressed Concrete Poles and the ASTM committee on Autoclaved Aerated Concrete. He is the past chair of ACI committee on Cellular Concrete and the founding chair of its subcommittee on AAC. . Dr. Fouad is a fellow of ACI and ASCE and has received a number of prestigious awards due to his professional services in the civil engineering field. Dr. Fouad's research expertise in green materials and construction methods has a global perspective. He recently held three National Science Foundation (NSF) workshops in Cairo, Egypt (December 2007, March 2009, and June 2012) on Sustainable Green Building design and Construction. Dr. Fouad has been working in the area of highway sign and traffic signal supports since for the past 20 years. As principal investigator on several NCHRP and DOT projects, he led a team of experts from U.S. universities whose efforts culminated in the development of the current, newly and totally revised, AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals. Continued research efforts in this area resulted in revising the AASHTO Standard Specifications a number of times, and the recent inclusion of fatigue provisions for the design of highway signs and traffic signal support structures. He also serves as the Director of UAB's Sustainable Smart Cities Research Center (SSCRC).*

- Mr. Timothy Barnett
  - *Tim Barnett's active career has revolved around traffic operations and traffic safety at the state and local levels. He currently serves as State Safety Operations Engineer for the Alabama Department of Transportation, where he has been employed in various positions since 2004; including time as a Division Right-of-Way Engineer and as a Division Design Engineer. He holds a B.S. and M.S. in Civil Engineering from the University of Alabama in Huntsville. Tim maintains a professional engineer's license in Alabama, Florida, Georgia, Louisiana and Mississippi, and is a certified Professional Traffic Operations Engineer. Prior to his career with ALDOT, he served twenty years with the City of Huntsville, Alabama in various engineering positions, and held the position of City Traffic Engineer prior to accepting a position with the State of Alabama. In addition to his duties for the rapid response and resolution of pressing highway safety concerns on the public roadway system, he is responsible for managing the implementation of the Highway Safety Manual, Highway Safety Improvement Program, and other critical safety activities for ALDOT. Tim is a Fellow of ITE, and a member of ASCE, ASEM, and IMSA. He also serves on several AASHTO and TRB Committees, Panels, and Working Groups.*

- Sandra Cutts
  - *Sandra Cutts is a graduate research assistant under the mentorship of Dr. Robert Peters, in the Civil, Construction and Environmental Engineering doctoral program. In her role as a graduate researcher, she has performed activities in support of the missions of the Department of Civil, Construction, and Environmental Engineering. Ms. Cutts has always been concerned with the environment and her current research efforts are on evaluating enhancement processes to remove tritium from groundwater, a by-product of nuclear reactors, using phytoremediation. As a result of her research interests, Ms. Cutts has secured a one-year research internship with Savannah River National Laboratory to continue her work. Ms. Cutts has a Master's degree in Environmental Planning, from the Urban and Regional Studies program at Alabama A&M University (AAMU) and was also part of Oak Ridge's Institute for Science and Education (ORISE) program. Her research work included: nuclear energy, sustainable development, citizens' participation, hazardous waste, nuclear power plants and policy effectiveness. Her research contributed to the growing need to investigate and justify emerging technologies and alternative, clean, and efficient energy sources. In 2014, Ms. Cutts presented her research at the Emerging Researcher National (ERN) Conference in Washington, DC and in 2011, her research on community perceptions was awarded second place during a STEM contest held at Alabama A&M University which resulted in her being the first STEM award recipient for the Department of Community and Regional Planning. As a researcher and intern, she has had the opportunity to review, research, and assist with land use, environmental policies and emerging technologies that supported the process of efficient urban development. Ms. Cutts has always been interested in man's footprint on earth and was a former intern with the Environmental Protection Agency where she was part of a team that investigated integrative approaches to sustainability, i.e., development of a conceptual model for optimal implementation of a light rail system which was in support of the Sustainable Healthy Communities (SHC) program. Ms. Cutts has a MBA from the University of Chicago and a B.S. in Mathematics from AAMU.*

- Benjamin McManus
  - *Benjamin McManus is a graduate research assistant with the Translational Research for Injury Prevent (TRIP) laboratory. His primary research interests are human factors and cognitive performance in transportation with a focus on occupational populations with unique transportation safety considerations. Ben's master's thesis work investigated sustained attentional control in long haul commercial truck drivers. He has received funding from the NIOSH Deep South Center for Occupation Health and Safety to investigate the impact of sleep, fatigue, and stress on driving safety in surgical residents, a population at-risk for drowsy driving. In addition to obtaining his Master's degree at UAB, Ben also completed his undergraduate work here, earning his B.S. in Psychology and B.S. in Biology in 2011 and has worked under the mentorship of Dr. Stavrinos at the TRIP Lab since 2010.*

Dean Iwan Alexander providing opening remarks.

Dr. Fouad Fouad providing opening remarks.

Mr. Tim Barnett providing opening remarks.

Dr. Robert W. Peters workshop presentation.

Dr. Despina Stavrinos workshop presentation.

Graduate student, Sandra Cutts workshop presentation.

Graduate student, Benjamin McManus workshop presentation.

Graduate student, Benjamin McManus providing driving simulator tours.

Mr. Tim Barnett driving in 2016 Honda Pilot simulator

APPENDIX D   WEBINAR DETAILS

STRIDE webinar website: https://stride.ce.ufl.edu/2017/04/stride-research-webinars-2017/

Post-webinar survey:

* 1. How did you hear about the webinar?

2. With 1 being poor and 5 being excellent, please evaluate the quality of the following:

	1	2	3	4	5
Registration process	○	○	○	○	○
Information related to the webinar series on the STRIDE website	○	○	○	○	○
How well did the presenters know the material	○	○	○	○	○
Quality of the material presented	○	○	○	○	○
Webinar platform used: Adobe Connect	○	○	○	○	○

3. Did this webinar meet your expectations?

○ Yes

○ No

* 4. The least valuable part of the webinar for me was:

* 5. Please let us know if you have suggestions for improvement.
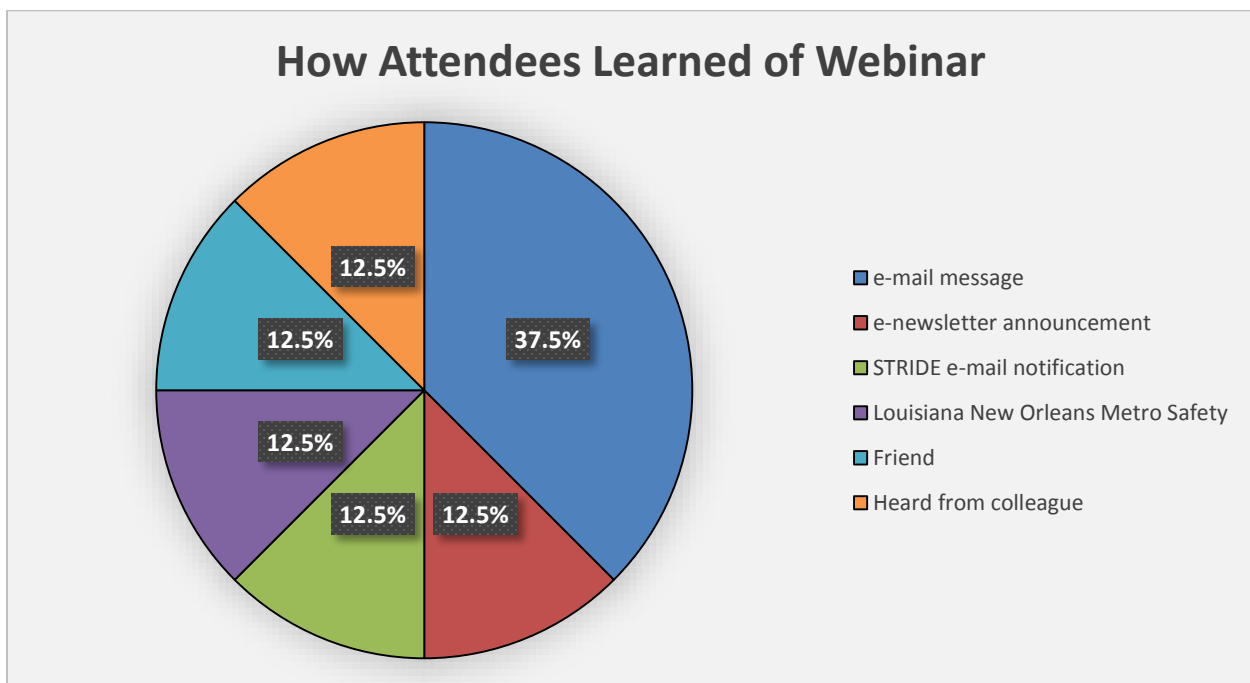

Results provided by the respondents:

Question 1: How did you hear about the webinar?

Survey feedback: The survey results are summarized in the table below.

How Learned of Webinar	Number of Respondents	% Responses
e-mail message	3	37.5
e-newsletter announcement	1	12.5
STRIDE e-mail notification	1	12.5
Louisiana New Orleans Metro Safety	1	12.5
Friend	1	12.5
Heard from colleague	1	12.5
Total Responses	8	100

The results are presented graphically in the pie-chart below. 62.5% of the webinar respondents learned of the webinar electroncially

How Attendees Learned of Webinar

Legend:
- e-mail message
- e-newsletter announcement
- STRIDE e-mail notification
- Louisiana New Orleans Metro Safety
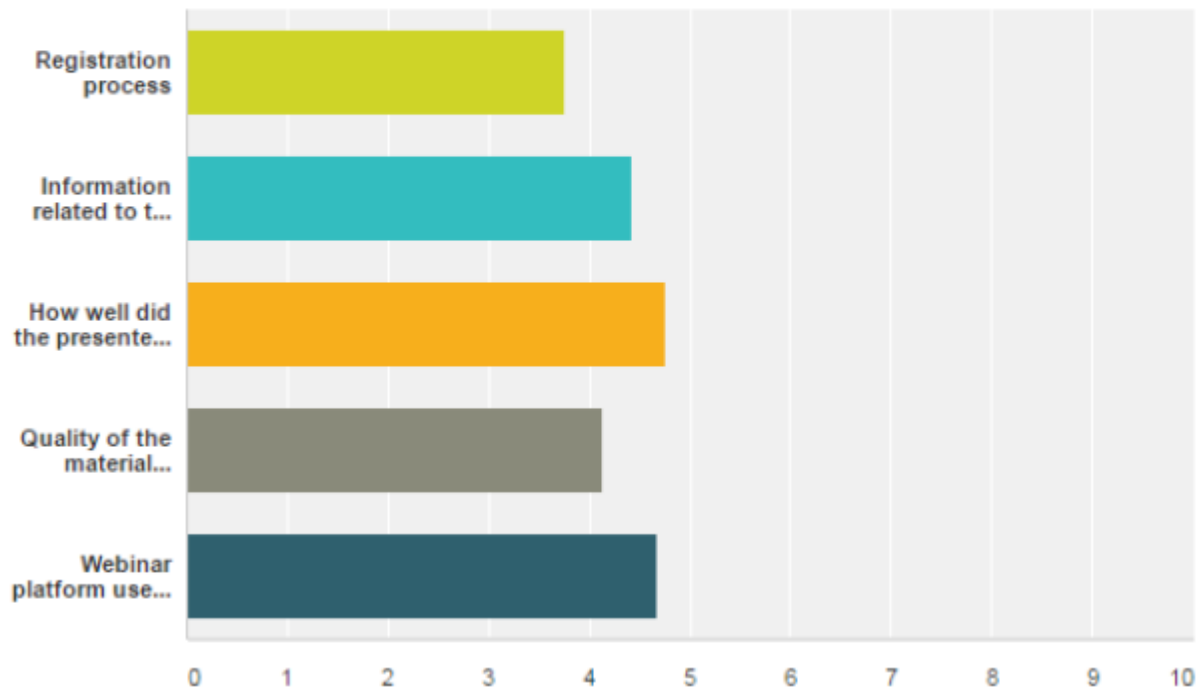- Friend
- Heard from colleague

Question 2: With 1 being poor and 5 being excellent, please evaluate the quality of the following: the webinar registration process, information related to the webinar series on the STRIDE website, how well did the presenters know the material, quality of the material presented, and webinar platform used (Adobe Connect).

Survey feedback: Responses related to the webinar registration process, information related to webinar series on the STRIDE website, how well did the presenters know the material, quality of

the material presented, and webinar platform used (Adobe Connect). The webinar attendees seemed pleased with the webinar, with responses typically receiving greater than 4 on a 5 point scale.

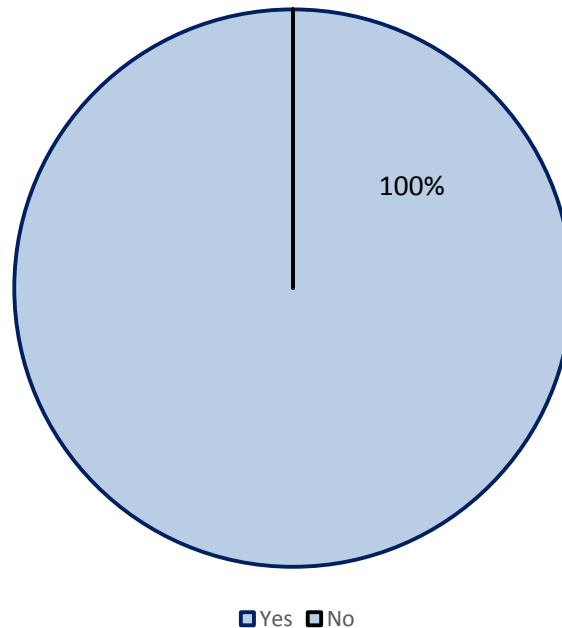## With 1 being poor and 5 being excellent, please evaluate the quality of the following:

Answered: 8   Skipped: 0

Question 3:   Did this webinar meet your expectations?

Survey feedback: As shown in the pie-chart below, the webinar respondents felt the webinar met their expectations.

Did Webinar Meet Your Expectations?

100%

□ Yes □ No

Question 4: The least valuable part of the webinar was:
• Not applicable (3 responses);
• Registration;
• Introduction to the concept;
• It was useful;
• Statistics were presented too fast and slide was not good (very small); and
• The video included was glitching.

Question 5: Any suggestions for improvement?
• The webinar link was published so late (20–30 mins before it started) and I was looking for the information on your website with nothing. Every clickable link took me back to the registration. This could be the reason why only 18 people attended;
• First time thought it went well; however would liked to have seen some of the results for those distracted drivers at grade crossing;
• It was frustrating, however, to introduce an innovative concept, but not have significant new info about it. Adding a presenter from NY State would have been more beneficial. Also, there are challenges with using rumble strips on non-asphalt roads which would have been helpful to address;
• Interesting to know about behavior strategies more;
• N/A (3 responses); and
• The PowerPoint could have been created a little better