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NSTSCE

National Surface Transportation Safety Center for Excellence

Fact Sheets

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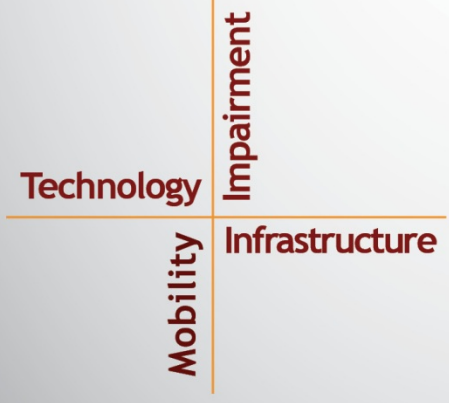

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ACKNOWLEDGMENTS

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The NSTSCE stakeholders have jointly funded this outreach effort for the purpose of disseminating advanced transportation safety techniques and innovations.

ABSTRACT

To extend its public outreach, the National Surface Transportation Safety Center for Excellence has created concise fact sheets describing research findings important to surface transportation safety. To date, fact sheets have been completed for nine projects. They are readily accessible through the NSTSCE page of the Virginia Tech Transportation Institute's website (https://www.vtti.vt.edu/national/nstsce/index.html) and the Commercial Motor Vehicle Driving Safety website (http://cmvdrivingsafety.org).

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LIST OF ABBREVIATIONS AND SYMBOLS

CMV	commercial motor vehicle
NSTSCE	National Surface Transportation Safety Center for Excellence
VTTI	Virginia Tech Transportation Institute

CHAPTER 1. BACKGROUND

A diverse array of research studies and published reports relating to transportation safety have been conducted through the National Surface Transportation Safety Center for Excellence (NSTSCE). While that research is readily known to the transportation industry and government agencies, the general public is often not aware of these studies. In order to expand NSTSCE's reach and, in turn, the benefits to the general motoring public, fact sheets were created for select studies. The NSTSCE stakeholders expressed a desire to have handouts that summarized the pertinent results in a format that the everyday citizen could easily understand. These handouts were also to have an accompanying online version. As an example, Figure 1 shows the top page of the fact sheet for Health & Wellness Programs for Commercial Motor Vehicle Drivers.

Figure 1. Screen capture. Health & Wellness Programs for Commercial Motor Vehicle Drivers.

CHAPTER 2. FACT SHEETS

The NSTSCE fact sheets were designed to be a two-page summary of completed studies. The format accommodates both easy online viewing and printing hard copies.

TEMPLATE

The fact sheet template includes designated spaces for the background of the topic covered, a summary of the study findings, a study-related sidebar, and links to the final report and additional resources where applicable. The template was designed to be easily applied to future studies as they are completed.

The template also includes a "Did You Know?" space for a unique fact related to each study. Figure 2 shows an example of a "Did You Know?" fact for the Health & Wellness Programs for Commercial Motor Vehicle Drivers project.

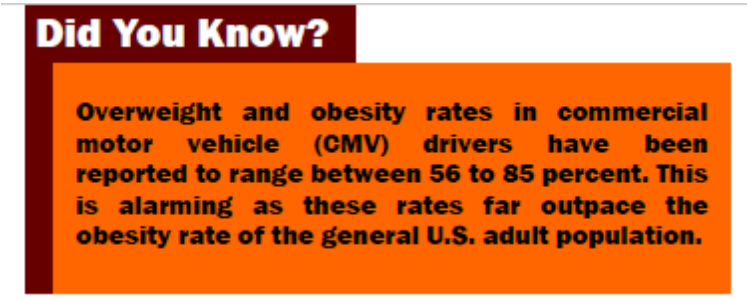

Figure 2. Screen capture. "Did you know?" Fact.

STAKEHOLDER BRANDING

In addition to displaying the NSTSCE brand, the fact sheets include the logos of all the stakeholders and provide links to their websites (Figure 3).

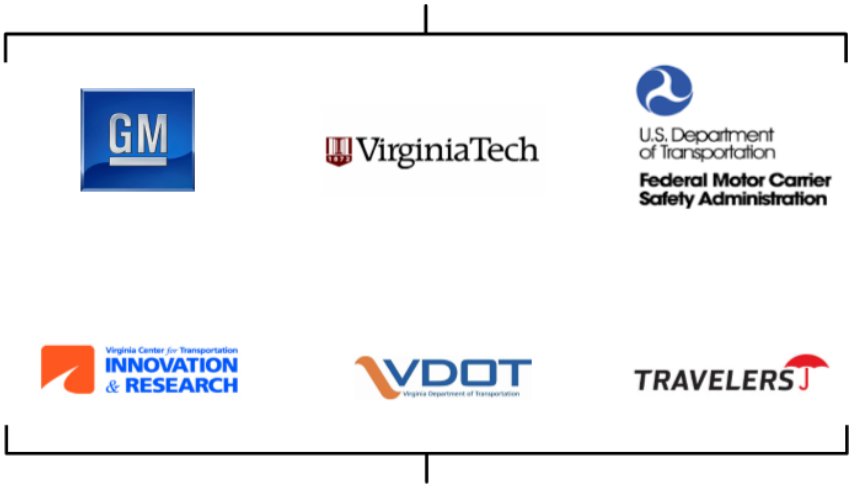

Figure 3. Screen capture. NSTSCE stakeholder logos.

CHAPTER 3. SUMMARY

The NSTSCE fact sheets were created to provide a new avenue for disseminating research findings and safety topics to a broad audience, including the general public, advocacy groups (e.g., groups serving senior citizens), driver's education and commercial motor vehicle training institutions, commercial motor vehicle fleets, insurance companies, and other research entities. The fact sheets can be distributed at booths, conferences, open houses, etc., to increase the reach and benefit of these important surface transportation safety findings.

The topics covered by the fact sheets are as follows:

- Quiet Vehicles and Pedestrian and Bicyclist Safety
- Cell Phone Use & Driving
- Commercial Motor Vehicle Driving Safety Website
- Effect of Crashes on Driving Behavior
- Health & Wellness Programs for Commercial Motor Vehicle Drivers
- Older Driver Fitness-to-Drive
- Onboard Safety Monitoring
- Commercial Drivers: Over-the-Counter & Prescription Drugs
- Teen Drivers & Heavy Vehicles: Coexisting Safely

Online versions of the fact sheets can be found on the Virginia Tech Transportation Institute (VTTI) website at http://www.vtti.vt.edu/national/nstsce/index.html under More Information, and on the Commercial Motor Vehicle Driving Safety website at http://cmvdrivingsafety.org. Future fact sheets will utilize the template and be incorporated into the final report development of selected studies by the lead researchers.

APPENDIX A. QUIET VEHICLES AND PEDESTRIANS AND BICYCLIST SAFETY

Virginia Tech Transportation Institute

Quiet Vehicles and Pedestrian and Bicyclist Safety

Background

In 1998, the California Air Resources Board (CARB) mandated requirements for auto manufacturers to produce limited numbers of "zero emission vehicles" (ZEV) for public use. Manufacturers created vehicles to meet those demands with the goal of zero tailpipe emissions. One consequence of adapting this technology is that these vehicles typically operate more quietly than their conventional internal combustion engine (ICE) propelled counterparts. Electrically Propelled Vehicles (EPV) are often referred to as quiet vehicles.

EPVs may have many benefits, including: fuel cost savings, driver performance, and environmental concerns for air quality and energy conservation. However, there is a downside. The low noise operation of these vehicles, at low speeds, has led to safety concerns for those who depend on sound for the detection, identification, and location of moving vehicles. While audible detection of EPVs operating at higher speeds (30 mph and up) is not a problem, advocates of the visually impaired contend that visually impaired pedestrians are at increased risk of conflict with these quiet vehicles during low-speed operation. As a result, they have called for action on the part of automakers and the regulatory community.

Quiet Vehicles

The term "quiet vehicle" can be used to describe any automotive vehicle that can operate at a lower noise level than typically associated with normal internal combustion engine-powered vehicles. Travel modes include EPVs and human-powered vehicles, such as bicycles, scooters, and Segways®.

A Presidential Response

In response to the concerns, President Obama signed the Pedestrian Safety Enhancement Act of 2010 (PSEA) into law on January 4, 2011. This law directed the U.S. Department of Transportation to address the issue of increased risk to pedestrians posed by quiet vehicles through the National Highway Traffic Safety Administration (NHTSA) and the Federal Motor Vehicle Safety Standards by July 4, 2015.

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NSTSCE Study: An Assessment of Quiet Vehicles and Pedestrians and Bicyclist Safety

Did You Know?

The American Council for the Blind and the National Federation of the Blind represent 1.3 million visually impaired people in the United States.

The *Assessment of Quiet Vehicles and Pedestrian and Bicyclist Safety* study focused on providing a comprehensive and concise overview of the apparent safety issues presented to pedestrians and bicyclists by the operation of quiet vehicles on roadways. The project's final report describes implemented and proposed countermeasure methods in addition to opportunities for future potential research to address knowledge gaps and improve overall understanding of the issues.

Although advocates of the visually impaired have adamantly requested that EPVs be equipped with audible alert systems, researchers suggested that pedestrian conflicts with quiet vehicles such as bicycles are common and perhaps an even greater threat than that presented by EPVs. Electric motorcycles, electrically assisted bicycles, and personal mobility devices such as the Segway® run almost silently and at high enough speeds to be a significant threat to unwary pedestrians. Even transit buses, quieter now and equipped with rear-mounted engines and vertical exhaust pipes 40 ft. from the front of the vehicle, present a threat to pedestrians, an issue publicized by the U.S. Federal Transit Administration in recent calls for research. The combination of greater numbers and types of quiet vehicles, along with elevated levels of distraction by both drivers and pedestrians—and increased traffic density and ambient noise levels—will almost certainly lead to more frequent mutual conflicts with associated damages, injuries, and, potentially, fatalities. A better understanding of the overall threat of all types of quiet vehicles to pedestrians and cyclists is needed.

***Final Report**: Alden, A. S. (2014, June 13). An Assessment of Quiet Vehicles and Pedestrian and Bicyclist Safety. Retrieved from http://vtechworks.lib.vt.edu/handle/10919/49686*

APPENDIX B. CELL PHONE USE & DRIVING

Cell Phone Use & Driving

Virginia Tech Transportation Institute

Background

Researchers working on the study entitled *The Risk of a Safety-critical Event Associated with Mobile Device Subtasks in Specific Driving Contexts* broke down cell phone usage into the actual tasks being performed. The results showed that not all tasks were created equal. Tasks that required visual and manual interaction with the phone (e.g., texting and dialing) were associated with increased risk, while just talking or listening were not. This led to another question about context: If what someone is doing with a phone matters more than previously thought, could *when* and *where* the task is occurring matter just as much?

To find the answer to this question, NSTSCE researchers looked again at the data on cell phone use by both commercial vehicle and light-vehicle drivers, this time to identify the conditions under which people were driving. The researchers began by classifying the data based on the demands that the environment placed on the driver. Depending on the number of lanes, the density of traffic, and the types of maneuvers being performed, each usage of a cell phone was categorized as taking place during a time of Low, Moderate, or High demand. Researchers re-examined the data within these new contexts, and the results were, once again, more complex than originally thought.

Naturalistic Research

One of the lessons learned from naturalistic research is that what appears simple in a lab can be complex in real-world situations. This was the case when researchers decided to dig into the data about cell phone use while driving. What appeared to be a simple story of cell phone use increasing the risk of safety-critical events (SCEs) actually required considering the context in which people used their phones.

Driver's Intuition

Intuition might dictate that cell phone use is more dangerous when the driver is placed under higher demands from driving; for example, under heavy traffic conditions or when navigating intersections. However, the study results indicate that higher driving demands were not associated with increased risk. Under low demands (e.g., light, free-flowing traffic), only dialing was associated with an increased risk of SCEs. Under moderate demands (e.g., heavier but flowing traffic), texting and dialing were associated with increased risk of SCEs, but talking and listening on a cell phone were associated with a decreased risk of SCEs.

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NSTSCE Study: The Risk of a Safety-critical Event Associated with Mobile Device Subtasks in Specific Driving Contexts

Did You Know?

All types of cell phone interaction are not created equal, and the way people use phones in real life may not be a clue to understanding the complexity of cell phone use while driving.

There was little evidence of drivers compensating when they used their cell phones. Commercial vehicle drivers sped up slightly while changing lanes less often, and light-vehicle drivers showed fewer unintentional lane departures. While drivers may have slightly simplified their driving tasks while talking on a cell phone, these behavioral changes were not substantial. This leads to another important question: Could there be something intrinsically beneficial about talking/listening while driving under higher demand conditions?

More research needs to be done to answer this question. Other research has found that drivers tend to look forward more while talking/listening on a cell phone. If drivers are looking forward more, could that be improving their response to what's going on in front of them? Additionally, research has shown that truck drivers tend to use their phones more when they are feeling tired. It could be the case that professionals who drive for a living are instinctively using their phones to help them stave off drowsiness. In this light, this study's results make sense.

Visual/manual tasks, such as texting and dialing, take the driver's eyes off the roadway. However, talking and listening have no visual component. Under conditions of moderate or high demands, there is more information that the driver must process about the forward roadway, and spending more time looking forward could reduce the risk of SCEs. Additional research is needed before cell phone use in vehicles is fully understood, but the answers may not be as simple as previously believed.

Final Report: *Fitch, G., Hanowski, R., & Guo, F. (2014, July 24). The Risk of a Safety-critical Event Associated with Mobile Device Subtasks in Specific Driving Contexts. Retrieved from https://vtechworks.lib.vt.edu/handle/10919/49687*

APPENDIX C. COMMERCIAL MOTOR VEHICLE DRIVING SAFEY WEBSITE

Commercial Motor Vehicle Driving Safety Website

VirginiaTech Transportation Institute

Background

The National Surface Transportation Safety Center for Excellence (NSTSCE) concentrates on practical transportation safety research and, among its priorities, NSTSCE works to conduct outreach efforts that improve the lives of multiple stakeholders and the public. One priority has been commercial motor vehicle (CMV) drivers and improving their safety along with the safety of the general motoring public. Focusing on CMVs has allowed researchers to aid CMV fleets and drivers, CMV training schools, and insurance entities.

In order to maximize the outreach efforts, researchers developed the website, www.CMVDrivingSafety.org, which launched in April 2014. The goal of the CMV Driving Safety website is to help create strategies for a safer, more productive workforce by educating CMV drivers, CMV driver trainers, and fleet managers on key aspects of driving safety, both nationally and internationally.

Commercial Motor Vehicles

CMV refers to self-propelled or towed motor vehicles used on a highway in interstate commerce to transport passengers or property. In order to drive certain CMVs, one must obtain a commercial driver's license (CDL) through a variety of State-administered tests.

FMCSA (1988). "Federal motor carrier safety regulations; General." from https://www.fmcsa.dot.gov/regulations/title49/section/390.5.

Driving Healthy Website

The Driving Healthy website, http://www.drivinghealthy.org/, complements the CMV Driving Safety website. This website aims to provide CMV drivers with information to allow them to live healthier lifestyles while on the road. The Driving Healthy website focuses primarily on eating and wellness living tips. There are also Twitter and Facebook accounts that allow CMV drivers easier access to these healthy living tips.

NSTSCE
National Surface Transportation Safety Center for Excellence

NSTSCE Study: Commercial Motor Vehicle Driving Safety Website Training Modules

Did You Know?

Of the 30,057 fatal crashes that occurred in 2013, 12.7% involved at least one large bus or truck.

(2015). Pocket guide to large truck and bus safety. Federal Motor Carrier Safety Administration. Washington, DC, U.S. Department of Transportation: 23.

CMV Driving Safety was created with six interactive modules. Each module concentrates on a specific learning objective dealing with driving. The modules also present website visitors with the latest science and research behind the learning objective, and include video clips where applicable. At the end of each module, a short quiz is provided to test the retention of knowledge. These modules were created to take a short amount of time (between 15 to 30 minutes) to complete and can either be downloaded via Microsoft PowerPoint or viewed directly on the website. The modules are designed to be used during safety meetings and refresher training by those working in the CMV industry. The six interactive training modules are:

- Driver Distraction
- Driver Health
- Hours-of-Service
- Driver Drowsiness & Fatigue
- Sharing the Road
- Safety Systems

Final Report: Tidwell, S. A., Trimble, T. E., & Blanco, M. (2015). *Commercial motor vehicle driving safety website*. Blacksburg, VA, National Surface Transportation Safety Center for Excellence.

APPENDIX D. EFFECT OF CRASHES ON DRIVING BEHAVIOR

Commercial Motor Vehicle Driving Safety Website

Virginia Tech Transportation Institute

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- Sharing the Road
- Safety Systems

Final Report: Tidwell, S. A., Trimble, T. E., & Blanco, M. (2015). *Commercial motor vehicle driving safety website*. Blacksburg, VA, National Surface Transportation Safety Center for Excellence.

APPENDIX E. HEALTH & WELLNESS PROGRAMS FOR CMV DRIVERS

Health & Wellness (H&W) Programs for CMV Drivers

Virginia Tech Transportation Institute

Background

A study conducted by Wiegand et al. (2009) indicated that obesity in commercial motor vehicle (CMV) drivers was associated with a higher risk of crashes. Truck drivers routinely spend the majority of their day in the truck cab, between driving and sleeping in the sleeper berth. These long hours can reduce a driver's motivation as well as time for exercise.

CMV drivers are also exposed to a number of physical and psychological stresses during the work day. The irregular work/rest schedules and high-mileage driving can take a toll on the drivers' bodies. Extended time away from home along with commonly driving alone can lead to daily frustrations. Research has shown that these factors can compromise the drivers' decision-making processes and roadway safety, as well as their long-term health.

According to a 2012 Bureau of Labor Statistics report, CMV drivers account for 19 percent of all workplace fatalities and consistently rank among the top three occupations for total nonfatal injuries and illnesses.

On the Road Lifestyle

Current Federal regulations allow truck drivers to spend up to 11 hours per day driving and up to 70 hours driving in an 8-day period. These long driving hours coupled with frequently changing schedules—such as late night or early morning shifts—can lead to an unhealthy lifestyle. Limited access to healthy food options, lack of exercise, and irregular sleeping patterns are common among truck drivers.

Health & Wellness (H&W) Program

Due to the elevated prevalence of overweight and obesity in the transportation industry and the risks that accompany obesity, an H&W program at a leading trucking organization was initiated to reduce obesity and the associated risks. In 2008, Schneider National Inc. (SNI), along with Atlas Ergonomics and United Healthcare (UHC), launched a companywide, voluntary H&W Program with their employees.

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NSTSCE Study: Case Study on Worksite Health and Wellness Program for Commercial Motor Vehicle Drivers

Did You Know?

Overweight and obesity rates in commercial motor vehicle (CMV) drivers have been reported to range between 56 to 85 percent. This is alarming as these rates far outpace the obesity rate of the general U.S. adult population.

Since the H&W Program launched in 2008, Atlas and UHC have worked with SNI to offer health and wellness programs, ergonomic and injury prevention services, on-site physical therapy and health screenings, and overall wellness coaching to approximately 17,000 company-insured employees, including commercial drivers, at 15 SNI operating centers across the U.S. and Canada. Employees' spouses are also eligible to enroll in the H&W Program. The purpose of this Case Study was to detail SNI's H&W Program with Atlas Ergonomics and UHC and to evaluate the opinions, perceptions, and program satisfaction of participating drivers and program staff. The findings from this Case Study will aid in the development of recommendations for a carrier-implemented H&W program.

The study concluded that CMV drivers face many barriers and challenges in attaining a healthy lifestyle. Even small, positive health changes, such as limiting soda consumption or incorporating 15 minutes of daily physical activity, can significantly impact health status. Often, small changes snowball into larger changes, which results in goal attainment. Identifying sources of motivation and supporting individualized and manageable goals were identified as predictors of success. A corporate H&W program is only one piece in the larger promotion of healthy living on the road for CMV drivers; however, educating drivers on health and wellness and empowering them to take positive steps toward healthy living using the knowledge and tools they acquire in the H&W Program is a significant move in the right direction.

VTTI, along with participating sponsors Travelers Insurance and Northland Insurance, have created a helpful web-based resource with health tips for CMV drivers. This resource can be found at www.drivinghealthy.org.

Final report:

Mabry, J. E., Hickman, J., & Hanowski, R. (2013,). Case Study on Worksite Health and Wellness Program for Commercial Motor Vehicle Drivers. Retrieved from http://vtechworks.lib.vt.edu/handle/10919/24207

Resources:

Bureau of Labor Statistics. (2012). Fatal Occupational Injuries by Occupation and Event or Exposure. Retrieved from http://www.bls.gov/news.release/cfoi.t03.htm

Wiegand, D.M., Hanowski, R.J., & McDonald,, S.E. (2009). Commercial Motor Vehicle Health and Fatigue Study. Retrieved from http://scholar.lib.vt.edu/VTTI/reports/Health_and_Fatigue_021109.pdf

APPENDIX F. OLDER DRIVER FITNESS-TO-DRIVE

Older Driver Fitness-to-Drive

Virginia Tech Transportation Institute

Background

They are the most experienced drivers on the road, but according to the Centers for Disease Control and Prevention (CDC) seniors are among the highest risk for crashes on roadways. Studies have shown that as we age we are at a higher risk of being in a crash and are more susceptible to injuries, which are often fatal (CDC, 2013). According to the Federal Highway Administration (FHWA, 2014), adults 65 and older accounted for 33 million licensed drivers in 2009. In fact, over the past decade more than 20 percent of Americans in that age group have been licensed drivers. It is clear that a large majority of the population of older drivers are still driving.

Given this substantial number of older drivers on the road, it is becoming more important to develop standards for evaluating and measuring fitness-to-drive for those responsible for making these determinations. This includes state driver's licensing authorities, physicians, occupational therapists, and certified rehabilitation specialists. A recent study, *Older Driver Fitness-to-Drive Evaluation Using Naturalistic Data*, was conducted by NSTSCE researchers with the goal of doing just that.

Who Makes the Decision?

The evaluation of fitness to drive has been a hot topic for the past 50 years. This decision is most often determined by the family physician. Despite how that final decision may impact others on roadways, medical professionals have often been hesitant to make the call due to the impact on existing physician-patient relationships. While tools have been developed through the years to assist in evaluation, there has been no valid test for identifying specific medical conditions and how these conditions may relate to driving risk and behavior.

Measuring Fitness-to-Drive

This NSTSCE project set out to predict safety-related driving outcomes in a naturalistic setting associated with functional assessments. In naturalistic driving studies, cameras, data recorders, and other instrumentation are installed unobtrusively in vehicles in order to observe driving behaviors and events in their most natural state. This groundbreaking study was the first of its kind to use naturalistic driving as a tool to evaluate fitness-to-drive for older drivers.

During the testing phases, more than 4,000 driving hours were logged by 20 participants. The study focused on several components, including the incidence rate of crashes and near-crashes. A crash is defined as a vehicle making contact with another vehicle(s) and/or objects(s) on or off the road. (This includes roadside barriers [guardrails], pedestrians, cyclists, and animals.) A near-crash is a "rapid, evasive maneuver by a participant or any other vehicle" to avoid the previously mentioned objects (Guo, Fang, & Antin, 2014). While crashes are rare, near-crashes, on average, occur 10 times more frequently than crashes.

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NSTSCE Study: Older Driver Fitness-to-Drive Evaluation Using Naturalistic Data

Did You Know?

According to the National Highway Traffic Safety Administration (NHTSA), there were 36.8 million licensed drivers in the U.S. over the age of 65 in 2013 and the U.S. Census Bureau predicts that will jump to over 60 million by 2030.

The main goal of this study was to evaluate the relationship between older drivers' fitness profiles and driving risk with the primary component being crash/near-crash events. There were three functional dimensions in the fitness model applied in this study: perceptual (vision), physical (strength), and visual-cognitive. During the naturalistic driving hours documented, 80 crash/near-crash events were documented and more than 1,000 risky behaviors were observed. The study found that crash/near-crash events are associated with the physical and mental capabilities of the driver. Primarily, it was found that a driver's visual contrast sensitivity has a significant impact on crash risk.

Additionally, the drivers were asked to perform a self-assessment of their driving performance. Older drivers who remained objective and provided a more realistic evaluation of their own driving performance tended to be more aware of their cognitive abilities; thus, they were aware of their limitations and adjusted their driving performance accordingly.

Future work with larger naturalistic driving populations will further refine and validate these findings, which can then be applied wherever older driver fitness-to-drive screenings are administered.

Final Report: Guo, F., Fang, Y., & Antin, J. (2014). Older Driver Fitness-to-Drive Evaluation Using Naturalistic Data. http://vtechworks.lib.vt.edu/handle/10919/54824

Resources:

Centers for Disease Control and Prevention (CDC). Older Adult Drivers: Get the Facts. (2013, January 31). Retrieved from: http://www.cdc.gov/motorvehiclesafety/older_adult_drivers/adult-drivers_factsheet.html

Federal Highway Administration, Department of Transportation (US). Highway Statistics 2012. Washington (DC): FHWA. [cited 2015 Mar 25]. Available from URL: https://www.fhwa.dot.gov/policyinformation/statistics/2012/

National Highway Traffic Safety Administration, Department of Transportation (US). Older Driver Program Five-Year Strategic Plan 2012-2017. Washington, DC: NHTSA; December 2010. Retrieved from: www.nhtsa.gov/staticfiles/nti/pdf/811432.pdf

APPENDIX G. ONBOARD SAFETY MONITORING

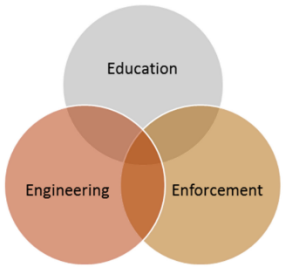
Onboard Safety Monitoring

Virginia Tech Transportation Institute

Background

In 2012, commercial motor vehicles (CMVs) were involved in 12%, or 3,702, of all fatal crashes. An additional 367,000 were involved in nonfatal crashes (or 6.6% of all nonfatal crashes). A study by Marburg, Hickman, and Hanowski (2015) found that approximately 87% of all CMV crashes were the result of risky driving behaviors or driver error. Similarly, human factors (i.e., recognition errors, decision errors, performance errors, and critical non-performances) were assigned as the probable cause in 92.6% of all crashes. Driver behavioral errors contributed to or caused 717 out of 723 crashes. These studies show that most of the CMV crashes involved risky driving behaviors or errors on the part of the driver and, thus, were preventable. Yet, many drivers continue to behave in ways that put themselves and others at risk for a vehicle crash and/or serious injury.

NSTSCE researchers wanted to know if onboard safety monitoring devices play a positive role in getting drivers to understand and improve their risky driving behaviors. These risky driving behaviors include: violating speed limits, excessive speed and lateral acceleration on curves, unplanned lane departures, frequent hard braking, close following distances, lateral encroachment (e.g., during attempted lane changes—perhaps due to improper mirror use), failure to yield at intersections, and general disobedience of the rules of the road, among others. Considering these research results, the reduction in risky driving behaviors should lead to a reduction in crashes and their associated fatalities and injuries.



What is OSM?

OSM devices incorporate in-vehicle recording technology that can continuously measure and record the driver's performance. There are two types of OSMs. The first type only records driver performance with vehicle telematics. These devices can be inconspicuously installed in the engine and connected to the vehicle's network, or they can be simple "plug and play" devices easily inserted into the vehicle's onboard diagnostics connection. These types of OSM devices are designed to record all driving data from the vehicle's sensors and typically include an accelerometer. The second type of system incorporates in-vehicle video technology that can record the environment surrounding the vehicle, as well as the driver's behavior and performance. Camera feeds provided by these systems may include the forward roadway, the driver and inside the cab, the roadway behind the vehicle, and views of the lanes directly beside the vehicle.

NSTSCE
National Surface Transportation Safety Center for Excellence

NSTSCE Study: Effective Use of Commercially Available Onboard Safety Monitoring Technologies

Did You Know?

One method to reduce risky driving behaviors is through the use of OSM technologies. These in-vehicle technologies are able to provide continuous or event-based measures on a wide variety of driving behaviors previously unavailable to fleet safety managers.

Several studies have found OSM devices to be highly effective in increasing the safety of drivers. A combination of an OSM device with driver feedback and coaching resulted in a 52.2% reduction in safety-related events, and a 59.1% reduction in the most severe safety-related events. In order to achieve a positive outcome using an OSM device, careful consideration is required when developing, implementing, and evaluating the OSM program. An 11-step procedure is recommended to achieve successful implementation. The implementation procedure entails: Developing a positive safety culture, assembling a steering committee, defining roles and responsibilities for developing an OSM policy, conducting benchmarking, evaluating and selecting an OSM system, developing performance measures, constructing a timeline for implementation, developing accountability, increasing awareness, providing communication, and evaluating and monitoring the OSM program. Each step is a critical aspect to obtain the full benefit of OSMs and driver acceptance.

Final Report:

Camden, M., Jeffrey S., H., & Hanowski, R. (2015). Effective Use of Commercially Available Onboard Safety Monitoring Technologies: Guidance for Commercial Motor Vehicle Carriers. Retrieved from https://vtechworks.lib.vt.edu/handle/10919/51586

Resources:

Marburg, T., Hickman, J., & Hanowski, R. (2015). Common Data Elements between the Large Truck Crash Causation Study Investigations and Commercially Available Onboard Monitoring Systems. Retrieved from https://vtechworks.lib.vt.edu/handle/10919/51270

APPENDIX H. COMMERCIAL DRIVERS: OVER-THE-COUNTER & PRESCRIPTION DRUGS

Commercial Drivers: Over-the-Counter (OTC) & Prescription (Rx) Drugs

Virginia Tech Transportation Institute

Background

In previous work conducted by the Federal Motor Carrier Safety Administration (FMCSA, 2006), it was found that 30 percent of commercial motor vehicle (CMV) drivers involved in one truck/one passenger-vehicle crashes had a related crash factor of prescription (Rx) drug use and 19 percent had a related crash factor of over-the-counter (OTC) drug use. However, this FMCSA study did not delve deeper into the relationship between crash involvement and the Rx and OTC drug use while driving. In this current study conducted by the National Surface Transportation Safety Center for Excellence (NSTSCE) titled *Prescription and Over-the-Counter Drug Use and its Relationship to Involvement in Safety-critical Events (SCEs)*, researchers used data from a naturalistic truck driving study (Blanco et al., in press) to conduct an analysis of the impact of truck driver Rx and OTC drug use on safety-critical events (SCE). The goal of this study was to address two main questions:

- What was the prevalence of Rx and OTC drug use among truck drivers?

and

- Was there an association between Rx and OTC drug use?

Frequently Used OTC & Rx Drugs

The most frequently reported Rx drug classification, as reported by 45 percent of the drivers, was cardiac medication, while the most frequently reported OTC drug was caffeine (a stimulant). Of all of the drugs taken by drivers, 61 percent of the Rx drugs had potential performance-degrading qualities, while only 1 percent of the OTC drugs had potential performance-degrading qualities. A total of 10 different classifications of drugs were taken by the CMV drivers who participated in this study. Caffeine was the drug reported with the highest rate of consumption.

The Drivers

A total of 100 CMV drivers participated in this study, with each driver participating for four weeks.

In addition to the driving data, each driver filled out a daily log book; 97 drivers completed the log books. Each day in the log book corresponded to a 24-hour time period, from midnight to midnight. Drivers self-reported each activity performed (e.g., on-duty driving) along with any medication taken, the amount taken, and the time of use. It is important to understand that caffeine is considered a stimulant and, therefore, was classified as an OTC drug.

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NSTSCE Study: Prescription and Over-the-Counter Drug Use and its Relationship to Involvement in Safety-Critical Events

Did You Know?

According to the study, CMV drivers that used caffeine were found to be half as likely to be involved in an SCE compared to CMV drivers that did not use caffeine.

In general, the results of this study indicate that Rx and OTC drug use by CMV drivers was not associated with an increased risk of being involved in an SCE. However, the researchers point out that these results should not be considered all-inclusive for all drugs, given the sample size of drivers using certain drug classifications. In some instances, certain drug classifications were only represented by a few drivers (e.g., one drug classification was only used by two drivers in this study). One drug classification that stood out in these results was the stimulant classification (due to the large number of drivers using caffeine). This is important to note, as CMV drivers typically work long, irregular hours and quite often drive at night. This is also consistent with previous studies that have found caffeine to be effective against driver fatigue, at least in the short term.

While this study was small-scale in nature (97 drivers), it did show the feasibility of using naturalistic data to assess the risk associated with Rx and OTC drug use while driving a CMV. Larger sample sizes of drivers could potentially yield more beneficial data regarding specific drug classifications and their relationship to SCEs. Another valuable insight gained from this study was the high percentage of CMV drivers that take some form of OTC and/or Rx drug. Nearly all (97 percent) of the CMV drivers reported taking an OTC drug during their driving shifts while 25 percent reported taking Rx drugs. From a safety and regulatory perspective, being able to fully understand the cause-and-effect relationships between different OTC and Rx drugs and how they affect CMV driving performance is a crucial piece of the puzzle to help further reduce the number of crashes involving heavy vehicles and, thus, save lives.

Final Report: Camden, M., Hickman, J., Soccolich, S., & Hanowski, R. (2014). Prescription and Over-the-Counter Drug Use and its Relationship to Involvement in Safety-Critical Events. Retrieved from: http://vtechworks.lib.vt.edu/handle/10919/50549

Resources:

Blanco, M., Hickman, J. S., Olson, R. L., Bocanegra, J. L., Hanowski, R. J., Nakata, A., . . . Bowman, D. (in press). Investigating Critical Incidents, Driver Restart Period, Sleep Quantity, and Crash Countermeasures in Commercial Operations Using Naturalistic Data Collection. Washington, D.C.: Federal Motor Carrier Safety Administration

APPENDIX I. TEEN DRIVERS & HEAVY VEHICLES: COEXISTING SAFELY

Teen Drivers & Heavy Vehicles: Coexisting Safely

Virginia Tech Transportation Institute

Background

One goal of the National Surface Transportation Safety Center for Excellence (NSTSCE) is to develop a greater understanding of driver decision-making and performance. In response to consistent research literature showing that a larger proportion of light-vehicle drivers are at-fault in incidents involving light-vehicle/heavy-vehicle interactions, NSTSCE researchers conducted the *Survey of Light-Vehicle Driver Education Programs to Determine the Prevalence of Curriculum on Sharing the Road with Heavy Trucks*. Both administrators and teachers in each state in the United States were surveyed to assess the presence of curricula relevant to heavy-vehicle characteristics and procedures for sharing the road.

Although preliminary results indicated that a large proportion of light-vehicle driver education programs include a component on how to safely share the road with heavy vehicles, there may be room for improvement with regard to the content of these programs. It may be beneficial for states that currently do not require their curriculum and/or driver education manual to include a related component to have a supplemental practice document available that details the key safety topics that should be covered when teaching students how to share the road with heavy trucks.

Determining Who is at Fault

Researchers at VTTI investigated light-vehicle/heavy-vehicle near-crashes and crashes (critical incidents) and found that 78% were initiated by the light-vehicle driver. This larger proportion of light vehicle, at-fault incidents may result from inadequate training in driver education programs about how to safely share the road with heavy vehicles.

Open-ended survey responses from driver education instructors and administrators indicated that students may benefit from supplemental materials such as hands-on experience with a heavy vehicle as part of their driver education coursework. Instructors also need up-to-date materials that they can use while teaching students how to share the road with heavy vehicles.

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NSTSCE Study: Evaluation of Light-Vehicle Driver Education Programs Targeting Sharing the Road with Heavy Vehicles: A Case Study Analysis.

Did You Know?

You can decrease your likelihood of a collision with a heavy vehicle by increasing your following distance to more than four seconds and staying well out of the rear "no zone."

The purpose of this project was twofold. First, researchers wanted to investigate current light-vehicle driver education programs that contain components on sharing the road with heavy vehicles and develop a supplemental practices document on key sharing-the-road information that teachers could cover with students. A public program (e.g., high school driver education program) and private programs (e.g., Commercial Vehicle Safety Alliance [CVSA] Teens & Trucks, Walmart Truck Team, etc.) that teach key sharing-the-road information were identified. These resources were used to develop a supplemental practices document on key sharing-the-road information and how the information may be taught. Second, a case study was performed with a light-vehicle driver education program in a single state that only included a basic textbook-based component on sharing the road with heavy vehicles. Based on the survey results mentioned earlier, two components were introduced into different driver education classrooms and evaluated in comparison with the basic textbook-based component. The first component introduced was updated material (i.e., a DVD developed by the CVSA titled Teens and Trucks). The second component introduced was a hands-on truck experience program developed by NSTSCE researchers based on an investigation of how other organizations conduct hands-on truck demonstrations at high schools.

The results of the study found that, if a truck and driver are available, teachers should try to include a hands-on experience when teaching sharing the road with trucks. Students are likely to find real-world demonstrations helpful and preferable to simply reading about sharing the road in their textbook. Another great resource to assist with teaching how to share the road with heavy vehicle is CMV road sharing website created by NSTSCE researchers:

http://www.cmvroadsharing.org/

Final Report: Baker, S., Schaudt, W., Joslin, S., Tidwell, S., & Bowman, D. (2014, October 16). Evaluation of Light-Vehicle Driver Education Programs Targeting Sharing the Road with Heavy Vehicles: A Case Study Analysis. Retrieved from http://vtechworks.lib.vt.edu/handle/10919/51199