

United States House of Representatives
Committee on Energy and Commerce
Subcommittee on Commerce, Trade and Consumer Protection

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**Wednesday, November 4, 2009 at 9:30 a.m.
Room 2123, Rayburn House Office Building
Washington, DC**

Chairman Rush, Ranking Member Radanovich, and members of the Commerce, Trade and Consumer Protection Subcommittee, thank you for the opportunity to testify before you today on a very important topic: “*Driven to Distraction: Technological Devices and Vehicle Safety.*” I am hopeful that my testimony will give you a unique and valuable perspective as you weigh the important policy decisions surrounding this issue.

My name is Thomas A. Dingus. I am director of the Virginia Tech Transportation Institute (VTTI) and I am testifying before you today as a long-time driving safety researcher. I have been involved in the study of transportation safety and human factors research for 25 years, including the issues surrounding driver distraction and inattention. This research has resulted in over 40 book chapters and refereed journal publications, over 150 technical publications, and over 20 major technical reports on this subject. I testified before the U.S. Congressional Subcommittee on Highways and Transit in October 2009 and in May 2001, and I have provided presentations to a Congressional Roundtable, the National Council of State Legislatures, the National Safety Council, and the Virginia Legislature on issues of driver distraction and inattention. I have worked with the Federal Highway Administration, the National Highway Traffic Safety Administration, the Federal Motor Carrier Safety Administration, several major automobile manufacturers, and a number of automotive suppliers in the conduct of development, evaluation, and research activities associated with driver distraction and inattention.

Given recent catastrophic crash events and disturbing trends, there is an alarming amount of misinformation and confusion regarding the distraction associated with using wireless devices such as cell phones and dispatching devices while driving a vehicle. The findings from our research at VTTI can help begin to clear up these misconceptions as these findings are based on real-world driving data.

These real-world data have been gathered using a new method: naturalistic driving studies. VTTI has pioneered this methodology which thus far has led to the conduct of five studies involving both cars and trucks. The method involves the installation of sophisticated instrumentation (including a variety of cameras and other sensors) in

participants' own vehicles. This instrumentation measures driver behavior and performance continuously for between four months and two years.

Naturalistic data collection has provided, and will continue to provide, new insight into the driving distraction problem. Naturalistic data collection is the "gold standard" and is the only way to accurately assess the secondary tasks drivers are engaged in during the seconds just prior to a crash or near-crash. In our research we have found that, very often, when involved in a crash or near-crash, drivers don't remember what they were doing or what happened just prior to the safety-critical event. With the use of sophisticated cameras and instrumentation in participants' personal vehicles, VTTI can provide a clear picture of driver behavior and risk perception under real-world driving conditions. In addition, once the data are collected, they can be re-analyzed and driver behavior can be studied from many different perspectives.

VTTI is currently embarking on the largest naturalistic driving study undertaken to date. Sponsored by the National Academy of Sciences (NAS), we estimate that the Strategic Highway Research Program 2 (SHRP 2) project will ultimately produce over 2.5 million hours of driving data as well as a statistically significant number of crashes (based on the numbers we saw from our "100-Car Study" which was completed several years ago). With a broader base of data from a wider range of the driving population in terms of age, vehicle type, and geographic location, we will be able to explore many heretofore unexamined transportation safety questions. The study will instrument approximately 2,000 cars for a period of two years. This project has great potential to deepen the understanding of driving behaviors so that real advances in highway safety can result. By the end of 2010, we anticipate that data will begin to be available from this project.

Moreover, VTTI recently began a study that will instrument 250 heavy trucks with naturalistic driving instrumentation to record specific data as they make their normal, revenue-producing deliveries on our Nation's roadways. Sponsored by the Federal Motor Carrier Safety Administration, we estimate that these 250 instrumented trucks will drive 40 million miles. VTTI will leverage the data collected in this study to assess a variety of real-world heavy-vehicle safety issues.

Utilizing the naturalistic driving data that we have collected thus far from both cars and trucks, we have made a number of important discoveries that shed light on understanding the risks of distracted driving. **I would like to highlight these discoveries and important points for consideration of the distracted driving problem.**

The distraction issues that we face today are much different than those faced just a few short years ago and, consequently, are resulting in a growing number of crashes.

Many of the electronic devices being used in light and heavy vehicles today require greater visual and cognitive attention from the driver than do conventional tasks. Driving distraction, an old problem, has entered a new dimension. Historically, secondary tasks performed in a moving vehicle were, for the most part, relatively simple. Tuning a radio or eating represented some of these common tasks. While it is true that these tasks take

attention away from the roadway and do cause crashes, they are not the predominant distractions of today's driver. With the explosion of wireless device use, including handheld portable devices that can perform the same functions as your computer, and dispatching devices for commercial drivers to stay in constant contact with their home offices, both the visual and cognitive aspects of distraction are much greater than ever before.

The driving distraction problem is now particularly time-critical because the number of crashes involving complex tasks such as texting, typing, reading, and dialing has the potential to grow exponentially.

Texting while driving has the potential to create a true crash epidemic if texting-type tasks continue to grow in popularity and the generation of frequent text-message senders reaches driving age in large numbers. In addition, several recent high-visibility trucking and transit crashes have been directly linked to texting from a cell phone. We can all agree that strong action must be taken to combat this growing problem; however, how to legislate that strong action presents some challenges.

Naturalistic driving studies conducted at VTTI have shown that text messaging using a cell phone is associated with the highest risk of all sources of distraction. Text messaging, which is approximately 20 times riskier than driving while not using a phone, also had the longest duration of eyes-off-road time (an average of 4.6 seconds). This equates to a driver traveling the length of a football field at 55 mph without looking at the roadway. In contrast, talking/listening to a cell phone allowed drivers to maintain eyes on the road and was not associated with an increased safety risk to nearly the same degree.

The heavy-vehicle naturalistic driving studies conducted at VTTI have shown that work-related non-driving tasks, such as using a dispatching device, writing, and using a calculator, were over seven times riskier than driving while not engaging in these tasks. These high-risk tasks also had the longest durations of eyes-off-road time; highlighting that driving is primarily a visual task and maintaining eyes forward is critical to avoiding risk. While these tasks were frequently performed by heavy-vehicle drivers, they were not commonly performed by light-vehicle drivers, which underlines the need for naturalistic research in other transportation modalities, such as motorcoaches, buses, trolleys, trains, airplanes, etc.

While there are safety benefits that will be realized with the continued deployment of electronic devices, these benefits can be attained only in vehicles engineered to minimize driver distraction.

Driving is a visual task and non-driving activities that draw the driver's eyes away from the roadway (such as texting, dialing, and use of a laptop or dispatching device to perform complex tasks) should always be avoided.

Many in-vehicle technologies promise to make driving safer. These technologies include collision-warning systems, night-vision systems, and "Mayday" alert systems. In

addition, studies have shown that cell phones do in fact have significant safety benefits (such as reducing the response time of emergency personnel in the case of a crash).

However, while some electronic devices have shown safety benefits, these benefits can be fully realized only when they are incorporated in systems designed to minimize distraction in a moving vehicle. That is, with prudent design and selective restrictions, it may be possible to enhance safety as part of the electronic revolution in the automobile and truck instead of increasing crashes and fatalities. For example, a voice-activated cell phone using a simple interface that can be used to contact emergency or law enforcement personnel would allow an obvious safety benefit to be realized while minimizing the associated safety decrement.

In contrast, handheld, portable devices brought into, but not intergrated with, the vehicle, constitute the majority of the driving distraction problem. “True hands-free” device use, such as voice-activated systems, are less risky than handheld devices if they are designed well enough so the driver does not have to take his or her eyes off the road often or for long periods. However, “headset” use with a manual cell phone is not substantially safer than “handheld” use because the primary risk associated with both tasks is answering, dialing, and other tasks that require the driver’s eyes to be off the road.

Teen drivers, by far, represent the largest population of those who engage in complex tasks while they drive.

Teens believe they can multi-task much better than older adults who have been driving a significantly longer period of time. For example, they mistakenly believe they can text and not take their eyes off the forward roadway at all. They do not have the maturity or the experience to adequately assess their risk while driving, in general, much less their risk while using a cell phone while driving. Our research has shown that teens tend to engage in cell phone tasks much more frequently, and in much riskier situations, than adults. Thus, our naturalistic driving data indicate that teens are four times more likely to be involved in a related crash or near-crash event than their adult counterparts.

The problem of driver distraction associated with electronic devices is multi-dimensional, requiring multiple solutions.

There are important differences in the deployment of electronic technology in the automobile. Specifically, the major differences exist between devices that are designed to be used in-vehicle and portable devices that are carried by consumers into vehicles.

In-vehicle devices. Many vehicle manufacturers and suppliers in this mobile information revolution have recognized the potential risk to the public. Many have already taken measures to improve design and provide the appropriate functionality of *in-vehicle* systems. It is important for the government to continue to support the continuing efforts of these stakeholders to address the distraction issue through design and implementation of safer devices. Specifically, the following considerations are important for in-vehicle devices:

- Follow human factors design principles such as limiting visual information complexity and maximizing display legibility and speech intelligibility.
- Provide appropriate functionality of devices (including limiting functionality, in some cases) in a moving vehicle. This will be necessary as more electronic convenience features become commonplace.
- Develop a consistent driver interface for selected driver interface functions. This can significantly reduce the task load required and therefore can reduce distraction.
- Use properly designed, true “hands-free” voice input/output devices when effective. Hands-free operation can reduce visual distraction relative to manual-control/visual display devices. However, voice systems, as with any other interface, require careful design and development. When properly implemented, true hands-free systems can provide an appropriate alternative method of input and information retrieval.
- Hands-free devices, although advantageous in many instances, may also pose risks. Care should be taken to limit “cognitive distraction” through simplification of design and messaging.

I believe that, in general, most vehicle manufacturers and suppliers are currently taking appropriate action to protect public safety. For example, most automobile manufacturers and some major suppliers are actively engaged in research, product evaluation, and standards development activities aimed at safely deploying electronic devices. However, it is important that all designers create devices that limit functionality and minimize driver distraction. I also believe that efforts to implement standards that require testing of potentially distracting automotive technologies need to be more broadly applied.

Portable devices. Of greater concern than the design of in-vehicle devices has been the introduction of portable electronic devices into cars and trucks. These devices include standard cell phones as well as cell phones that have additional wireless features such as Internet access, personal digital assistants, and portable computers.

In general, portable devices are not designed to be safely used by the driver in a moving vehicle. In addition, unlike in-vehicle devices, vehicle manufacturers and suppliers do not have any control over their functionality or design.

Public awareness and education programs are an important part of the solution to the driver distraction problem, but they will be insufficient in and of themselves.

Many organizations, including the wireless communications industry, have recognized the hazards associated with these devices. Several have implemented public awareness programs aimed at reducing distraction-induced crashes by educating drivers about the consequences of distraction and persuading them to limit associated activities. There are many historical examples of the effectiveness of such public awareness campaigns. Examples include seat belts, drinking and driving, motorcycle helmets, and many non-driving-related public health initiatives. This historical perspective tells us that such a

campaign will help reduce unsafe behavior associated with electronic devices. However, the effectiveness, in terms of people influenced to behave safely, for even a successful public persuasion program, will be in the range of 15-20%. Therefore, while such endeavors are important and should be supported, they will not be sufficient in and of themselves.

From this perspective, I believe that laws and enforcement methods aimed at limiting the use of handheld portable electronic devices in moving vehicles are necessary in order to provide an effective set of countermeasures to the distraction problem and protect public safety.

Conclusion

Driving distraction associated with electronic devices has the potential to pose a serious public health risk. Due to this risk and the rapid rate of deployment of these technologies, quick and decisive action is needed. However, in-vehicle devices have also been shown to actually enhance safety in some cases. Therefore, measured action is also warranted so that solutions enacted with good intent do not stifle the improvements in driving safety.

In 2001, at the Subcommittee on Highways and Transit hearing on “Driver Distraction: Electronic Devices in the Automobile,” I indicated that “if we wait until we have very accurate data to act, the data will likely tell us that hundreds of thousands of crashes and thousands of fatalities will have resulted from delayed action.”

We can now provide that accurate, real-world data to show that the odds of being involved in a crash or near-crash increase as much as 20 times for drivers who are dialing, texting, typing or reading compared to those drivers who are not distracted while driving. Distractions from using electronic devices while driving, and specifically texting while driving, could quickly create an injury epidemic if popularity continues to grow exponentially. The time to take action is now.

Therefore, I recommend the following:

- **A primary law banning the use of handheld, wireless devices in a moving vehicle. The law should:**
 - Preclude use of: cell phones, MP3 players, BlackBerrys, iPhones, etc., as well as headset use with conventional cell phones
 - Exclude “true-hands-free” and in-vehicle devices that are simple to operate and do not require substantial “eyes-off-road time”
 - Carry a significant monetary fine and “points”
 - Include a total cell phone ban for newly-licensed teens and for special cases such as school buses
 - Exclude emergency communications for all users
- **A regulation limiting functionality of visually demanding, in-vehicle devices in a moving vehicle is necessary and should:**

- Include manual navigation destination entry and all “keyboard” tasks
- Include all complex reading tasks
- **Standards for testing of potentially distracting devices prior to market introduction need to be broadly applied.**

Again, thank you very much for giving me the opportunity to testify before you on this important issue. I will be happy to answer any questions you have regarding my recommendations. Feel free to contact me at the address on the cover page of my written testimony, (540) 231-1501, or tdingus@vti.vt.edu.