

Programs of the Federal Motor Carrier Safety Administration (FMCSA) encompass a range of issues and disciplines, all related to motor carrier and bus safety and security. FMCSA's Office of Research and Analysis, which includes the Research, Technology, and Analysis Divisions, defines a "research program" as any systematic study directed toward fuller scientific discovery, knowledge, or understanding that will improve safety, and reduce the number and severity of commercial motor vehicle crashes. Similarly, a "technology program" is a program that adopts, develops, tests, and/or deploys innovative driver and/or vehicle best safety practices and technologies that will improve safety and reduce the number and severity of commercial motor vehicle crashes. An "analysis program" is defined as economic and environmental analyses done for the agency's rulemakings, as well as program effectiveness studies, state-reported data quality initiatives, and special crash and other motor carrier safety performance-related analyses. A "large truck" is any truck with a Gross Vehicle Weight rating or Gross Combination Weight rating of 10,001 pounds or greater.

Currently, FMCSA's Analysis, Research and Technology Divisions are conducting programs in order to produce safer drivers, improve safety of commercial motor vehicles, produce safer carriers, advance safety through information-based initiatives, and improve security through safety initiatives. The study described in this Tech Brief was designed and developed to support the Research and Technology Divisions' strategic objective to produce safer drivers. The primary goals of this initiative are to ensure that commercial drivers are physically qualified, trained to perform safely, and mentally alert.



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Commercial Motor Vehicle Driver Safety Belt Usage

Background

Although FMCSA requires the use of safety belts by commercial motor vehicle (CMV) drivers, research cited by FMCSA showed that less than half of CMV drivers actually used safety belts. In 2003 FMCSA completed a study of CMV safety belt usage, conducted by the Center for Applied Research, Inc. (CFAR). The study estimated an overall safety belt usage rate of 48%. (Large national fleets averaged a usage rate of 54% and the independent and local fleets usage rate was estimated to be 44%.) This usage rate compared with a national safety belt usage rate of 79% for passenger car drivers.

FMCSA also reported that in 2002, of the 588 CMV drivers killed in crashes, more than half were not wearing safety belts. Of those drivers ejected from their trucks, 80% were not wearing safety belts. Other countries such as Australia and the United Kingdom have experienced similar results and have undertaken programs to encourage CMV drivers to wear safety belts as a part of their daily operating practices.

As a part of its goal to reduce fatal truck-involved crashes to 1.65 fatalities per 100 million truck vehicle miles traveled by 2008, FMCSA is seeking to increase safety belt use among CMV drivers. To this end, in December 2003, the U.S. Department of Transportation (USDOT) announced that it had established the Commercial Motor Vehicle Safety Belt Partnership (Partnership). The Partnership conducted outreach activities promoting safety belt use and implemented safety belt-related research. FMCSA initiated this research project so that it could learn about motivating factors that influence CMV drivers in deciding whether to wear safety belts and about any research and best practices that address the use of safety belts.

Scope

First, the CFAR research team summarized available information in the safety literature and other sources on the factors that influenced CMV drivers to use or not to use safety belts in their daily operations. This information included a special focus on driver motivational factors. The literature review identified and annotated past and current ongoing research on safety belt usage by CMV drivers, not only in the United States, but in other countries as well (Australia and the United Kingdom were key examples). Second, the research team identified motivational factors affecting safety belt usage through surveys of fleet managers and drivers and structured interviews conducted through cooperating associations. Third, the research team explored documented accounts and other research to examine problems and factors that have limited the use of CMV safety belts. This

exploration included a review of ergonomic and human engineering factors in design and use or non-use of safety belts in commercial trucks, as well as approaches to facilitating safety belt use by truck manufacturers. The fourth component of the research project was a discussion of techniques used by transportation managers, especially fleet managers, to encourage and potentially enforce safety belt use as a part of fleet management safety operations. These practices were gathered from the literature review and responses to the fleet manager and driver surveys. This component also included a description of the regulatory framework that has influenced the use of safety belts. Finally, the research team developed recommendations for additional research to improve knowledge on motivational factors affecting the use of safety belts by commercial motor vehicle drivers.

Throughout this study, the CFAR research team coordinated its efforts with the Partnership to ensure that surveys and activities were consistent with the work of the Partnership, especially in the area of surveys and research activities.

Commercial Vehicle Safety Belt Partnership

American Association of Motor Vehicle Administrators	National Highway Traffic Safety Administration
American Society of Safety Engineers	National Private Truck Council
American Trucking Associations	National Safety Council
Commercial Vehicle Safety Alliance	National Tank Truck Carriers
Federal Motor Carrier Safety Administration	Network of Employers for Traffic Safety
Great West Casualty Company	Owner Operator Independent Drivers Association
International Association of Chiefs of Police	Professional Truck Driver Institute
Motor Freight Carriers Association	Property Casualty Insurers Association of America
National Association of Publicly Funded Truck Driving Schools	Truckload Carriers Association
National Association of Truckstop Operators	Truck Manufacturers Association

Approach

Information on factors affecting CMV driver safety belt use was obtained through several approaches. The initial effort was a review of the literature that encompassed the following:

- CMV safety research, both in the United States and in other countries
- Motivational research in related fields
- Company practices and approaches to documenting and encouraging safety belt usage
- Industrial and transportation safety management in modes other than CMV transport, including commercial and public bus and transit modes

The literature review also included a review of the National Highway Traffic Safety Administration's (NHTSA) earlier initiative to increase safety belt use by passenger car drivers. Although factors relating to safety belt use by CMV drivers and passenger car drivers could be different in some respects, the information in the NHTSA report provided a baseline and starting point for this research project.

The primary means for obtaining information for this research project were surveys. Parallel survey forms were employed for CMV fleet managers and drivers. The surveys included both objective and subjective questions. For example, there were objective questions asking fleet managers about their particular safety management practices relating

to safety belts. Subjective questions addressed the reasons some drivers did not wear safety belts and the relationship between non-safety belt usage and other risky behaviors. Both objective and subjective questions have value, but the distinction between them should be kept in mind.

The surveys included yes-no, multiple choice, and 5-point scale items. The survey forms also included basic information on respondents and their carriers. The fleet manager survey was distributed primarily by U.S. Mail using a Virginia Tech Transportation Institute mailing list of fleet managers who had responded to previous surveys. Other fleet manager respondents were identified in conjunction with the American Transportation Research Institute (ATRI). Survey forms were also distributed with the assistance of industry trade associations.

Surveys of CMV drivers were also conducted. The format and many questions of the survey questionnaire were similar to that of the fleet manager form. However, these questions focused on the individual driver's own attitudes and behavior. The distribution of these questionnaires to drivers was primarily through the efforts of ATRI, which conducted surveys at truck stops. Additionally, the CFAR research team conducted several interviews at an industry event and at a fleet location. To focus on ergonomic and physical issues relating to safety belt use, the research team canvassed truck manufacturers to identify and summarize technological approaches to dealing with barriers to safety belt usage. The staff of the Truck Manufacturers Association was especially helpful in this effort.

Drawing from the literature review, surveys, and analysis of ergonomic factors, the CFAR research team summarized the principal factors and presented these to help guide the Partnership in planning and implementing outreach efforts to encourage increased safety belt use by CMV drivers.

Survey Results

Much of the additional information on CMV driver motivations relating to the use of safety belts was collected through two surveys. The first focused on fleet managers, gauging their approaches and policies relating to safety belt use. The second effort focused on the drivers, and information was gathered through interviews at truck stops and structured group interviews.

The fleet manager survey included 120 respondents, based both on mail distribution and collection at meetings of trucking industry associations. This survey consisted of 36 questions, including general questions and those related to fleet methods to promote safety belt use, government/industry programs to promote use, general comments, and demographic questions. The managers listed the following major reasons that their drivers might not use safety belts:

- Too much trouble and effort
- Just forget to use them
- Habit
- Belt does not fit well
- Uncomfortable for other reasons
- Restricts movement in vehicle
- Infringes on personal freedom
- Worried about being trapped in vehicle
- Don't believe belts increase safety
- Just don't like them
- Part-time users (i.e., only in bad weather)

With respect to methods that fleet managers used to promote use, the three top-rated methods were rewards/recognition for observed use, observing driver belt use in vehicles, and punishments/reprimands for non-use. Other methods were also identified, and there were indications that fleet managers used multiple approaches to encourage drivers to use safety belts. The highest rated method involved industry and government programs showing crash testing with test dummies with and without safety belts.

Availability: The synthesis report "Commercial Motor Vehicle Driver Safety Belt Usage" is available at the Transportation Research Board and can be found at www.trb.org.

Key Words: CMV, Carrier Safety, Commercial Motor Vehicle, Safety Belt, Seat Belt, Truck

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The principal driver survey, involving 238 respondents, was a structured interview conducted at two truck stop locations in Georgia and Wisconsin. The on-site random interviews were based on an interview guide that contained 18 questions about various topics, including safety belt functionality, carrier/driver interactions, trucking and driver demographics, and general information. The interview population indicated that they chose to wear a belt for safety reasons, the law, a habit, or because they had seen or been in a crash. For those who did not choose to wear a safety belt, the primary reason related to comfort, personal choice, or dislike. For those drivers who felt that truck safety belts should be more functional, they listed the following issues:

- Limited range of arm and shoulder motion
- Lap belt or shoulder harness is not long enough/too tight
- Shoulder harness position is awkward
- Belts ride too high or too low

Some 62% of drivers had complaints about safety belts. The major complaints were that the safety belt:

- Rubs or vibrates against neck/shoulder
- Locks
- Is uncomfortable
- Is too tight
- Has limited range of motion

The major recommendations drivers gave that would make a safety belt easier to use were that it should not be too tight, not interfere with driving, be simple to put on and take off, and be easy to position. With respect to carrier and fleet interactions, most drivers who responded to these questions indicated that there is no penalty for non-use, and there are no special incentives that would encourage them to use safety belts.

A review was conducted of ergonomic and human engineering factors in design and use or non-use of safety belts in commercial trucks as well as approaches to facilitating safety belt use by truck manufacturers. The CFAR research team ergonomist examined the interactions of generally used 3-point safety belts with a range of drivers and in different types of truck cabs. The research team also visited original equipment manufacturers (OEMs) to examine installation of current seat and safety belt designs and to study differing approaches used in new large trucks. In general, the assessment was that the majority of safety belts were practical and functional and that newer belts had features that made them even more user-friendly. However, current belts were not as comfortable or effective with large- or small-statured individuals. Also the assessment found that many drivers observed were not fully aware of the features that made safety belts both comfortable and easy to use. The assessment also included additional ergonomics and human factors considerations such as ride quality, comfort, and the interaction of air-ride seats with safety belts. New technologies for safety belt comfort and user-friendly design were also discussed.