

The vision of the Office of Motor Carriers is to help move people, goods, and commercial motor vehicles on our Nation's highways in the most efficient, economical, and crash-free manner possible. The OMC research and technology program focuses on improving safety in interstate commercial motor vehicle operations and serves a trucking and motor coach industry that carries more than 40 percent of all intercity freight.

Studies are conducted in the following areas: commercial driver human factors, health, and performance needs; new and emerging driver and vehicle technologies; safety-related data collection and analysis needs; and performance-based changes to the Federal Motor Carrier Safety Regulations.

The OMC's human factors research projects aim to promote alert, healthy drivers and seek to improve the uniformity and effectiveness of driver training and licensing.



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Commercial Truck Driver Fatigue, Alertness, and Countermeasures Survey

Introduction

Driver fatigue and loss-of-alertness have long been considered important issues in commercial motor vehicle (CMV) crashes resulting in fatality and injury. The Department of Transportation has devoted considerable resources to addressing the issue of CMV driver fatigue, including sponsorship of major field research studies.

In 1988, the Federal Highway Administration held a Symposium on Truck and Bus Driver Fatigue. The recommendations of the Symposium resulted in the decision to conduct a comprehensive Driver Fatigue and Alertness Study (DFAS). This study included an extensive literature review that highlighted a need for additional data about drivers whose particular job characteristics might lead to irregular schedules, night driving, and daytime sleeping.

A survey was designed and conducted to extend prior work discussed in the DFAS literature review. This tech brief summarizes the methods and results of that survey; the survey final report will be available from the National Technical Information Service.

Purpose

This survey was primarily conducted to extend previous research by collecting additional data about CMV drivers and their job characteristics. It also sought to determine the prevalence of factors that may contribute to fatigue in CMV drivers and to identify and assess the methods used by drivers to alleviate fatigue or its symptoms.

Methodology

Researchers developed a questionnaire to address those factors considered to contribute to fatigue among long-haul tractor-trailer drivers, and the methods those drivers use to counter fatigue. The questionnaire was designed to take no longer than 15 minutes to administer; the final version averaged about 12 minutes to complete.

Interviews were conducted at truck inspection stations in California, Georgia, Missouri, and Virginia. The sites chosen afforded geographic diversity, high density of long-distance CMV traffic, and 24-hour, around-the-clock operation. The California interviews were conducted prior to those at the other sites. Once having established that the procedures and questionnaire operated smoothly, the remaining interviews were conducted concurrently and completed during February and March 1995.

Local interviewers performed the fieldwork at each location. Interviewers were given both written and recorded instructions to minimize the possibility of differences in study administration. Interviews were conducted in parking areas adjacent to the



inspection sites with drivers who were willing and qualified. A qualified driver was one who was driving a loaded tractor-trailer combination, had driven at least 60,000 miles during the last year, and had been on the road at least 24 hours prior to the interview.

Results

Researchers completed a total of 511 interviews.

Table 1 shows the number of participants and refusals at each location. The relatively large number of refusals in Georgia may have been due to the level of inspection performed at that site. At the Georgia inspection site only weight and license checks were conducted, not requiring drivers to stop for an extended amount of time. Hence, many drivers declined to stop for the interview.

Driver and Job Characteristics

Participating drivers were predominantly male (96.5 percent) and ranged in age from 22 to 67 years, but the mean and median ages were virtually the same (42 and 43 years, respectively).

Nearly one-third of the drivers (31.5 percent) were owner-operators. One in twenty (5.3 percent) responded that they were union members. The large

majority of respondents stated that they usually drove irregular routes and had working hours that varied from day to day. Driver and job characteristics for all four interview sites are presented in **table 2**.

Sleeping Habits

Sleep is the most fundamental requirement for driver alertness. For this reason, many of the questionnaire items pertained to the sleep habits of drivers.

To feel totally rested, the large majority of drivers (76.7 percent) reported that they needed between 6 and 8 hours of sleep, with an average of 7 hours.

Of the drivers interviewed, 91 percent responded that while on the road, they usually took their main sleep in the sleeper berth. An additional 6.7 percent reported that they usually slept in motels. Three-quarters of the drivers who used the berth usually took their sleep in one stretch and most of them reported spending 8 to 9 hours in the berth. In contrast, more than two-thirds of those drivers who split their rest periods usually spent 4 to 5 hours in the berth at one time. Further examination of these data revealed that drivers who split their rests tended to sleep fewer hours than those who rested in one stretch. **Table 3** presents the amount of time solo and team drivers typically spend in the sleeper berth.

Table 1.
Distribution of interviews and refusals by location.

	Total	California	Georgia	Missouri	Virginia
Interviews	511	129	124	128	130
Refusals	241	7	146	19	69

Table 2.
Driver and job characteristics.

Characteristic	Total	California	Georgia	Missouri	Virginia
<i>Base for Percent</i>	<i>511</i>	<i>129</i>	<i>124</i>	<i>128</i>	<i>130</i>
Owner-Operator	31.5%	23.3%	23.4%	25.0%	53.8%
Union Member	5.3%	4.7%	4.8%	5.5%	6.2%
Irregular Route	84.1%	74.4%	83.9%	88.3%	89.2%
Variable Hours	84.7%	84.5%	83.1%	82.0%	89.2%
Drive Solo	84.1%	82.9%	86.3%	79.7%	87.7%

Table 3.
Hours typically spend in truck sleeper berth.

Type of Operation	Rest Mode	2–3 Hours	4–5 Hours	6–7 Hours	8–9 Hours	10–12 Hours
Solo	One Stretch	1 (0.3%)	11 (3.6%)	97 (31.7%)	183 (59.8%)	14 (4.6%)
	Split Rest	11 (13.8%)	51 (63.8%)	10 (12.5%)	8 (10.0%)	0
Team	One Stretch	0	4 (11.8%)	7 (20.6%)	18 (52.9%)	5 (14.7%)
	Split Rest	0	29 (78.4%)	5 (13.5%)	2 (5.4%)	1 (2.7%)

* Seven drivers did not respond to the question concerning rest mode. Percentages are based on *n* in each mode.

Overall, three out of five drivers believed that daytime sleeping was not as restful as nighttime sleeping. Appreciably more owner-operators (70 percent) responded that daytime sleeping was not as restful as nighttime sleeping, as compared to 55 percent of the company drivers. Another significant difference was found between team and solo drivers, with the majority of team drivers (55.6 percent) reporting daytime sleep to be just as restful as nighttime sleep, while only a third of solo drivers (37.4 percent) believed that to be true.

The most dangerous consequence of fatigue for drivers is falling asleep at the wheel. Seventy-two percent of drivers reported that they had not dozed or fallen asleep at the wheel within the past month. But of the 28 percent who did, more than half reported that they had done so 1–2 times, and an additional one-third reported they had experienced the problem between 3 and 6 times. Drivers who had irregular schedules reported significantly more incidents of dozing/falling asleep at the wheel than those with regular schedules.

Because the act of falling asleep at the wheel is usually preceded by such symptoms as drowsiness or difficulty in keeping the eyes open, drivers were asked if they had experienced any of these precursors during the past month. Of the 28 percent of drivers who reported having dozed or slept at the wheel, 9.8 percent indicated that they were never aware of the pending problem (i.e., theoretically they could not take any action to circumvent the danger). But 28 percent said they were sometimes aware and 59 percent reported they were always aware of the pending problem. These latter percentages raise concerns about drivers who continue driving while aware of the potential of falling asleep at the wheel.

Work Habits

The needs of shippers and consumers pressure drivers to maintain their delivery schedules. Because driving conditions often interfere with schedules, drivers were asked how frequently they get less sleep to compensate for adverse conditions. While nearly half indicated that they do sometimes, 10.6 percent responded that they always do with less sleep to keep up with schedules. Results also showed that owner-operators are more likely to sacrifice sleep than company drivers, maybe because of their inherently greater monetary investment and concern with maintaining schedules.

In addition to their main task of transporting goods, drivers sometimes load and unload their vehicles.

- 21.1 percent of the drivers reported they usually load or unload their vehicles.
- Owner-operators were more likely to load/unload than company drivers.
- 23.1 percent of the drivers who loaded or unloaded goods reported that the task had a positive effect on their alertness.
- 34.3 percent of drivers who load/unload reported that the task contributed to their fatigue.

As in most occupations, one way of combating fatigue or monotony is to take periodic breaks from work. Approximately half (51.4 percent) of the drivers surveyed prefer to drive four hours or less before stopping for a break. Another 39.6 percent prefer to drive between 5 and 6 hours before stopping. On average, drivers prefer to drive about 4.6 hours before stopping. The length of the rest breaks usually taken by drivers is considerably more variable, ranging from less than 5 minutes to 3 hours or more.

Researcher

This study was performed by Decision Research, Santa Barbara, California; and Essex Corporation, Goleta, California; Contract No. DTFH61-89-C-096.

Distribution

This Tech Brief is being distributed according to a standard distribution. Direct distribution is being made to the Resource Centers and Divisions.

Availability

The study final report will be available from the National Technical Information Service, Telephone: (703) 605-6000.

Key Words

truck driver, fatigue, alertness, commercial motor vehicle drivers, shift workers, driver, countermeasures, work habits, sleep habits, survey.

Notice

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Alertness Maintenance

Drivers employ a variety of methods and activities for maintaining alertness while driving. Some of these include:

- cooling the truck cab
- stretching
- listening to AM/FM radio
- talking on CB
- drinking coffee
- eating
- using tobacco products
- singing

No single activity stands out as being significantly more effective for maintaining alertness than others. However, drivers reported that the most effective group of activities included cooling the air by air conditioning or opening windows, stretching or changing sitting positions, and listening to the radio or tapes.

Other options for maintaining alertness while driving include the use of controlled substances. Interviewers questioned drivers about the use of such substances by other drivers known to the respondent. The large majority of drivers interviewed said that none of the drivers known to them used alertness aids such as speed or cocaine, or relaxants in the form of marijuana or sleeping pills. Seventy percent of the surveyed drivers responded that at least some of the drivers they knew used alcohol to relax, but nearly a third indicated that none of the drivers known to them use alcohol.

Most people having conventional jobs arrive at their places of employment not too long after they awake and begin working in a relatively refreshed state. Because of the nature of their employment, however, truckers are often awake for a longer period of time, and may already be somewhat fatigued before beginning their job. Nearly half (44.6 percent) of the drivers reported that they had been awake for 6 or more hours before beginning their current trip. The elapsed time between waking and beginning to drive was most often due to work-related causes, such as waiting for a dispatcher to call, or loading and unloading a vehicle.

Further Research

These survey results have highlighted the problem of CMV driver fatigue and, in particular, have indicated that driver drowsiness episodes are common in long-haul commercial driving. Since the completion of this study, the FHWA has continued to implement its comprehensive program of research, technology development, rulemaking, education/outreach, and enforcement relating to fatigue and hours of service. Numerous specific questions, issues, and opportunities are being addressed.

In the area of rulemaking, the FHWA is currently in the process of changing the 60-year-old driver hours-of-service rules; one priority in this rulemaking will be to give drivers better opportunities for sufficient daily sleep. In research and technology, the FHWA is performing research on specific operational issues such as sleeper berths, local/short haul driving, and loading/unloading, as well as supporting research to develop technologies that may aid in fatigue management and self management by drivers. One facet of this work involves in-vehicle systems to continuously assess driver alertness based on performance and/or psychophysiological arousal and provide feedback to drivers to encourage sufficient rest and sleep.