

Lessons from the "Large Truck Crash Causation Study"

Mark Davis

In my practice as a lawyer representing people and families who have been injured by careless truck drivers and trucking companies, I am routinely tasked to uncover the *truth* behind the tragic accidents which bring families to my office looking for help. One would think that the cause would be evident from the police report alone, and occasionally that is true. However, more commonly the *full truth* does not become clear until you dig deeper. Until you examine the conduct of the truck driver *and* his/her employer in the days, months and even years leading up to the crash. The unfortunate truth is that trucking companies frequently fail to follow and enforce the rules, regulations and standards which govern their industry -- rules which are designed to preserve the safety of the motoring public.

The results of the Federal Motor Carrier Safety Administration's (FMCSA) "Large Truck Crash Causation Study (LTCCS)" offer evidence of the problem I am speaking about. In this series of blog posts, I will attempt to outline some of the key insights this study offers into the most common causes of serious accidents involving tractor trailers and other "large trucks" (GVW 10,000+).

Part 1 - "Critical Reasons" for Large Truck Crashes

Overview of the Study:

The Federal Motor Carrier Safety Administration (FMCSA) released the results of its "Large Truck Crash Causation Study (LTCCS)" in July, 2007. The study, which was conducted jointly with the National Highway Traffic Safety Administration (NHTSA), employed an exhaustive analysis of 963 of the 120,000 large truck crashes which occurred between April 2001 and December 2003 in order to explore and better identify the factors most strongly associated with serious crashes (those resulting in fatality or injury).

The study utilized detailed data collection methods, including extensive witness interviews, inspection of the trucks, review of drivers' logbooks and other documentation, etc. Examination of each crash involved data collection of as many as 1,000 separate elements, including:

- the condition of the truck driver and the other drivers involved before the crash;
- the drivers' behavior during the crash;
- the condition of the trucks and other vehicles;
- roadway factors; and,
- weather conditions.

The research data was then summarized by coding the variables for crash risk into key areas. In this post, I will address the "Critical Reasons" identified by the study for large truck crashes.

The "Critical Reason" Conclusions:

The study defined a "critical reason" as the failure which produced the critical event (driver error, vehicle failure, etc.), and triggered the path to an unavoidable collision. The study found large trucks to be the "critical reason" for the crash 45-55% of the time.

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As applied to the drivers, the critical reason data were placed into four categories:

1. *Non- Performance*: The driver fell asleep, was disabled by a heart attack or seizure, or was physically impaired for another reason;
2. *Recognition*: The driver was inattentive, distracted, or failed to observe the situation adequately for some other reason;
3. *Decision*: The driver made a poor decision, such as driving too fast for conditions, followed other vehicles too closely, failed to properly judge the speed of other vehicles, etc.;
4. *Performance*: The driver responded to the emergency situation in a poor manner, such as by panicking, overcompensating, exercising "poor directional control, etc.

The following table is taken directly from the study, and extrapolates the data reviewed to "the 141,000 large trucks estimated to have been involved in fatal and injury crashes during the study period. The estimates are based on a probability sample of crashes, and are rounded to the nearest 1,000 large trucks":

Critical reasons - by major category

Estimated Numbers of Trucks in All Crashes, by Critical Reasons

Critical Reasons	Number of Trucks	Percent of Total
Driver	68,000	87%
Non-Performance	9,000	12%
Recognition	22,000	28%
Decision	30,000	38%
Performance	7,000	9%
Vehicle	8,000	10%
Environment	2,000	3%
Total Number of Large Trucks Coded with Critical Reason	78,000	100%
Total Number of Large Trucks Not Coded with Critical Reason	63,000	—
Total Number of Large Trucks Involved in Crashes	141,000	—

The results of this study demonstrate that driver error was responsible for the crash in an overwhelming majority of cases. And, standing alone, this is clearly a significant finding. However, the study's analysis of the "associated factors" data (covered in part 2 of this blog) sheds light into the *real* reasons behind these crashes -- and where efforts need to be concentrated in order to make our roads safer for everyone.

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Part 2 - "Associated Factors" contributing to Large Truck Crashes

The "Associated Factors" Conclusions:

The study defined "associated factors" in very general terms, merely seeking to document what "other factors (persons, vehicles and environmental conditions) existed at the time of the crash". However, when considered in combination with the data identifying the critical factor/reason for the crash (see part 1 of this blog), this aspect of the study is quite compelling when it comes to extrapolating what *needs to be done* to improve safety for the motoring public.

The study reports that literally "[h]undreds of associated factors were collected for each vehicle in each crash". Amongst the most common were:

- Driver Fatigue;
- Driver inattention ("inadequate surveillance");
- Use of Medications (both prescription and over-the-counter);
- Driving too fast for conditions;
- Brake problems; and,
- Lack of familiarity with the area/roadway

The researchers utilized a "relative risk analysis of the data" to sort the factors which were "merely present at the time of the crash" from those which "increase the risk of having a crash." The trucks involved in LTCCS crashes can be divided into two groups: those that were assigned the critical event and critical reason and those that were not. When the presence of associated factors coded to the two groups is compared, the relative risk of each factor can be assessed, as the following examples illustrate:

- If 30 percent of the trucks assigned the critical reason for a crash were coded with the driver associated factor traveling too fast for conditions, while only 5 percent of the trucks that were *not* assigned the critical reason were coded with the same associated factor, it can be concluded that speed is a factor that increases the risk of being involved in a crash.
- If 30 percent of the trucks assigned the critical reason for a crash were coded with the driver associated factor prescription drug use, while 30 percent of the trucks that were *not* assigned the critical reason were also coded with the same associated factor, it can be concluded that prescription drug use is not a factor that increases the risk of being involved in a crash.

Table 2 shows the 19 associated factors that were coded most frequently for large trucks in the LTCCS, *where there was a statistically significant association between the factor and the assignment of the critical reason*. The order of the factors in the table is based on the number and percentage of trucks assessed with each factor. The relative risk number is a ratio of the critical reason coding for trucks coded with the factor, compared with trucks not coded with the factor. Thus, Table 2 shows that a truck with brake problems was 170 percent more likely to be coded

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with the critical reason for a crash than a truck that was not coded with the brake problems associated factor.

Table 2
Associated Factors Assigned in Large Truck Crashes and Their Relative Risk Importance

Factors	Number Trucks	of Total	Percent	of Relative Risk
Vehicle: Brake problems	41,000		29%	2.7
Driver: Traveling too fast for conditions	32,000		23%	7.7
Driver: Unfamiliar with roadway	31,000		22%	2.0
Environment: Roadway problems	29,000		20%	1.5
Driver: Over-the-counter drug use	25,000		17%	1.3
Driver: Inadequate surveillance	20,000		14%	9.3
Driver: Fatigue	18,000		13%	8.0
Driver: Felt under work pressure from carrier	16,000		10%	4.7
Driver: Made illegal maneuver	13,000		9%	26.4
Driver: Inattention	12,000		9%	17.1
Driver: External distraction	11,000		8%	5.1
Vehicle: Tire problems	8,000		6%	2.5
Driver: Following too close	7,000		5%	22.6
Driver: Jackknife	7,000		5%	4.7
Vehicle: Cargo shift	6,000		4%	56.3
Driver: Illness	4,000		3%	34.0
Driver: Internal distraction	3,000		2%	5.8
Driver: Illegal drugs	3,000		2%	1.8
Driver: Alcohol	1,000		1%	5.3

Notes: Results shown are national estimates for the 141,000 large trucks estimated to have been involved in fatal and injury crashes during the study period. The estimates may differ from true values, because they are based on a probability sample of crashes and not a census of all crashes. Estimates are rounded to the nearest 1,000 large trucks.

Of the top 10 associated factors coded for large trucks, 3 do not appear in Table 2. For those three associated factors—traffic flow interruption, prescription drug use, and required to stop before crash—there was no significant difference in the frequency at which trucks with and without the factors were coded with the critical reason for a crash.

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It is important to note both the number of times an associated factor is coded and its relative risk ratio. For example, the brake problems associated factor is the most frequently coded (29 percent), but it has a lower relative risk ratio than those for 13 other factors. Pre-crash cargo shift, with the highest relative risk ratio (56.3), was reported for only 4 percent of the large trucks involved in LTCCS crashes.

Of the 19 factors listed in Table 2, 15 are driver factors. Those 15 driver factors can be divided into two major groups. One group—fatigue, illness, and drug use (both legal and illegal)—reflects the condition of the driver before the crash. The other group—excessive speed, inadequate surveillance, illegal maneuver, inattention, distraction (outside the truck and inside the truck), and following too close—reflects driving mistakes.

As applied to the drivers, the critical reason data were placed into four categories:

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Part 3 - "Difference" data between Large Trucks & Passenger Vehicles

Data Review - Large Truck vs. Passenger Vehicle

Evaluation of collisions between large trucks and passenger vehicles demonstrated that there was no statistically significant variance between the "associated factors" for the trucks vs. the passenger vehicles identified to be responsible for the accidents examined. And, for both, a statistically significant link was found to exist between the following factors and the critical reason for the crash:

- Lack of familiarity with roadway;
- Driver inattention ("Inadequate surveillance");
- Driving too fast for conditions;
- Illegal maneuver;
- Driver Inattention or distraction;
- Driver Fatigue; and,
- Misidentification of other driver's actions;

However, the study did identify some "important differences . . . between the two vehicle types", including:

1. Following too closely and driver distraction were closely linked to accident causation for operators of large trucks, but not passenger vehicles;
2. Use of alcohol and drugs were found to have a much higher and "statistically significant association" with responsibility for the accident in drivers of passenger vehicles;
3. Driver fatigue was found to be causative of the accident twice as frequently in passenger vehicles than in large trucks; and,
4. Illness was found to be a contributing factor to causing the accident five times more often in drivers of passenger vehicles than in large trucks

Given these data, the researchers concluded "adverse physical conditions" were more strongly linked to the cause of the crash with passenger drivers than with truck drivers.

For more information on the FMCA's "large truck crash causation study", visit the agency's website at www.fmcsa.dot.gov/about/news/news-releases/2006/lccs-digest.htm.