

Highway safety: National Academies committee recommends implementation improvements

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Credit: Carnegie Mellon University

An estimated 550,000 commercial motor carriers —trucks and buses, employing over 4 million drivers—move freight and passengers across U.S. highways each year, resulting in about 100,000 fatality- or injury-causing crashes.

Congress asked the National Academies of Sciences, Engineering and Medicine to investigate whether the methods used to evaluate the [safety](#) of long-distance trucks and buses were adequate. A committee, co-chaired by Carnegie Mellon University's Joel Greenhouse, found that while the Federal Motor Carrier Safety Administration's (FMCSA) Safety Measurement System (SMS) used to identify vehicles at high risk for future crashes is conceptually sound, several features involving its implementation need to be improved.

Specifically, the committee proposed that FMCSA develop a more statistically principled approach based on item response theory (IRT) to measure the "safety fitness" of each carrier. IRT models have been applied successfully in informing policy decisions in other areas such as hospital rankings. If the new model is then demonstrated to perform well in identifying motor carriers that need interventions, FMCSA should use it to replace SMS.

"Using the IRT approach, the evaluations made by the FMCSA will be transparent and reproducible," said Greenhouse, professor of statistics in the Dietrich College of Humanities and Social Sciences. "Formalizing the approach using IRT models will address many of the criticisms of the current SMS, such as, 'How can a safety violation, e.g., a broken tail light, be related to crashes?' or 'Why can a carrier's relative safety ranking change significantly from year to year?' As the long distance carriers have more faith in how they are being evaluated for safety, they will invest more effort in improving the safety of their fleets, which will help them attract more business."

Approximately 3.5 million commercial motor vehicle (CMV) roadside inspections are conducted yearly by specially trained inspectors on approximately 900 potential violations of safety regulations that fall under six categories: unsafe driving, hours of service compliance, vehicle maintenance, controlled substances/alcohol use, hazardous

materials compliance and driver fitness.

FMCSA uses information that is collected mainly during these inspections to identify motor carriers that are operating unsafely and therefore are likely to be at higher risk for future crashes. Carriers found to have frequent violations are subject to interventions from FMCSA, which can include warning letters and investigations.

The report identified a number of data quality issues and recommended that FMCSA should continue to collaborate with states and other agencies to improve the collection of data on vehicle miles traveled and on crashes, data which are often missing and of unsatisfactory quality. Including vehicle miles traveled data by state and month will enable SMS to account for varied environments where carriers travel—for example, in icy winter weather in the North. In addition, there is information available in police narratives not represented in the data used that could be helpful in understanding the contributing factors in a [crash](#).

The committee also believes the FMCSA should research ways of collecting data on carrier characteristics—including driver turnover rates, type of cargo, and method and level of compensation. For example, compensation levels are relevant because it is known that drivers who are better-compensated, and those not compensated based on miles traveled, have fewer crashes. This additional data collection would require greater collaboration between FMCSA and the states to standardize the effort and to protect carrier-specific information.

In addition to Greenhouse, Harvard Medical School's Sharon-Lise T. Normand co-chaired the committee. The committee operated under the National Academies' Division of Behavioral and Social Sciences and Education's Committee on National Statistics.

More information: [www8.nationalacademies.org/onp ...](http://www8.nationalacademies.org/onp...)

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Provided by Carnegie Mellon University

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