Data sources to study CMV driver fatigue in safety & health

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Data needs

- **Outcomes**:
  - Safety: Crashes
  - Driver health & wellbeing

- **Predictors**:
  - Drivers (condition, hours driving, sleep schedule, behavior, demographics, compensation, etc.)
  - Vehicles (configuration, loading, mechanical condition, etc.)
  - Carriers (type of operations)
  - Environment (weather, road type, traffic, other vehicles, etc.)

Crash & Exposure Data

- Mosaic of public crash databases:
  - FARS: Census of fatal crashes
  - GES: Sample of all crash severities
  - MCMIS crash: Census reported by states, meeting severity threshold
  - LTCCS: In-depth, 963 serious-injury crashes
  - State crash files: Census of all crash

- Exposure data
  - FHWA vehicle-miles-traveled (VMT) estimates
  - MCMIS carrier file: Census of interstate & intrastate hazmat carriers.
  - Drivers: No database of drivers, no feasible sampling frame.

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Limitations

- Crash databases:
  - Driver data typically confined to demographic (age, sex)
  - **Driver fatigue not well-identified; based on police investigator judgment.**
  - Driver sleep schedule, HOS, loading/unloading, etc. <u>not</u> available.
  - Linkage to other files (like MCMIS carrier file) not supported.
  - Vehicle & environment data, but relatively high-level.
- Exposure data aggregate, high-level.
  - Aggregate by simple vehicle configuration.
  - No exposure by carrier operation type in <u>very diverse</u> population of CMV operators.

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Naturalistic driving data

- Instrumented vehicles in actual operation.

- Information on vehicle & driver behavior, some information on surrounding environment.

- Advantages: Ecological validity is high; massive amounts of data; contains its own exposure data.

- Increasingly cheap to instrument; advances in automatic image processing for feature extraction.

- Limitations: Crashes are rare; issues related to crash surrogates; generalizability of findings to very diverse population.

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Other sources, new sources

- Driving simulators: experimental control, repeatability; sample size, generalizability to population are issues.
- Carrier crash data: Proprietary, raises issues of privacy, availability.
- Surveys of driver health & wellness: Long-haul truckers (NIOSH 2013); Motorcoach bus driver fatigue (2011)
- New sources:
  - Telematics of vehicle operation; driver video; electronic on-board recorders; electronic logging devices.
  - ATRI GPS exposure data; proprietary and protected.
  - Issues: Driver privacy protection; proprietary formats; data linkage.

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Data Recommendations (1)

1. "The National Institute for Occupational Safety and Health should be enlisted to design and conduct a regularly scheduled survey every 5 to 10 years to gather information needed to better understand the demographics and employment circumstances of all commercial motor vehicle drivers in various industry segments."

2. "The Federal Motor Carrier Safety Administration should conduct an evaluation to determine whether commercial motor vehicle drivers' use of electronic on-board recorders correlates with reduced frequency of hours-of-service violations and reduced frequency of crashes compared with those drivers who do not use such instruments."

Data Recommendations (2)

3. "Given the potential research benefits of the use of data from electronic logging devices, Congress should consider modifying Title 47 of the U.S. Code to permit the use of such data for research purposes in a manner that protects individualized confidential data from disclosure, and if such a change is made, the Federal Motor Carrier Safety Administration should make parallel provisions in its regulations."

4. "When commercial trucks and buses containing electronic data recorders that record data on the functioning of the driver and the truck or bus are involved in serious crashes, the relevant data should be made available to investigators and to safety researchers."

Data recommendations (3)

5. "The Federal Motor Carrier safety Administration should incentivize those that capture driver performance data (e.g., large fleets, independent trucking associations, companies that collect telematics data, insurance companies, researchers) to increase the availability of those data relevant to research issues of operator fatigue, hours of service, and highway safety. Any such efforts should ensure that data confidentiality is maintained, perhaps through restricted access arrangements or use of statistical techniques for disclosure protection."

Data recommendations (4)

6. "The Federal Motor Carrier Safety Administration should work to improve the collection of and/or access to baseline data on driving exposure by including in its data collection efforts greater detail on the driving environment and by providing these data at low levels of geographic aggregation—even for individual highway segments. Comparisons enabled by the availability of these baseline data would benefit several proposed lines of new research."