An alternative estimate of the lives that could be saved by a side underride guard standard

2nd ACUP meeting

November 15, 2023

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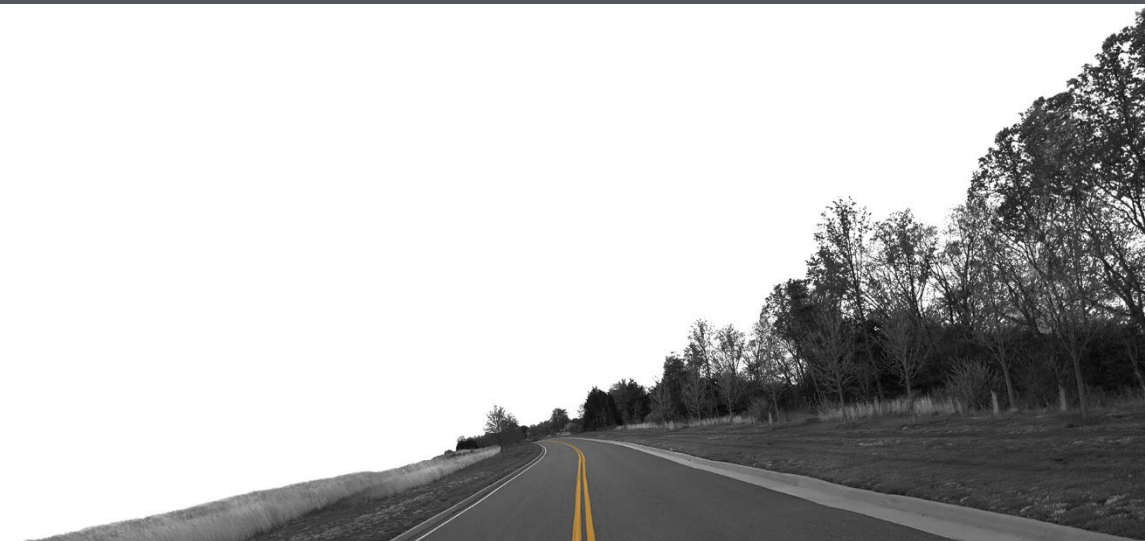
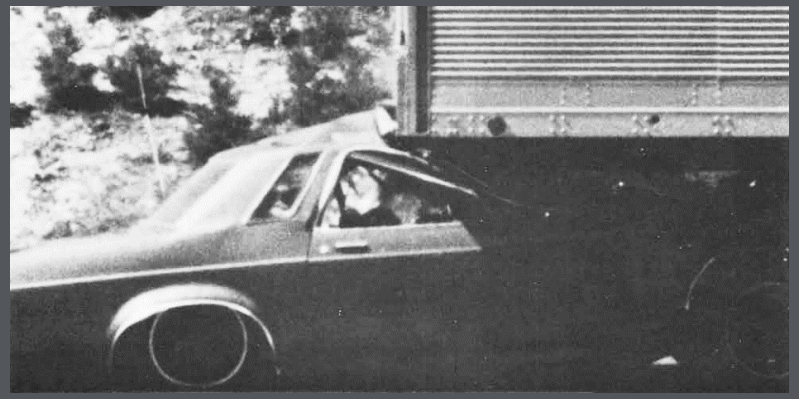
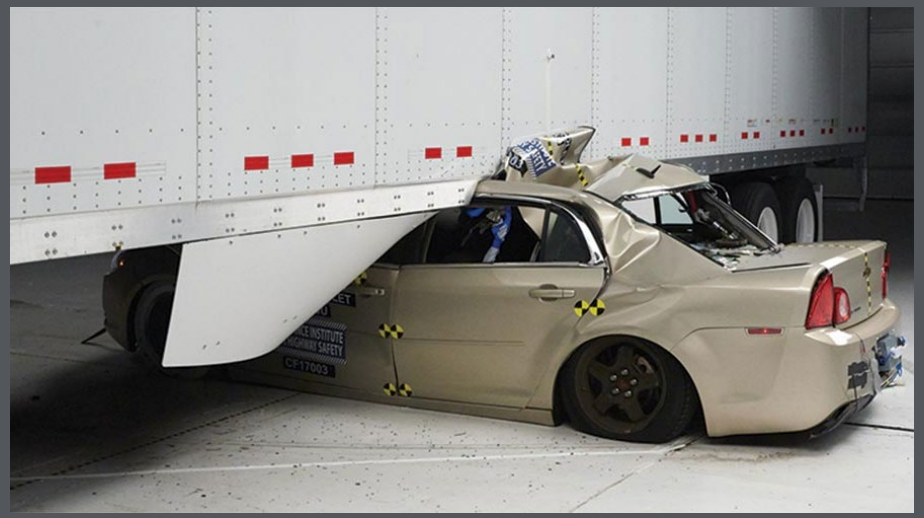
Sr. Research Engineer



IIHS trailer underride research



- IIHS conducted its first underride crash tests in 1976
- Since 2017 **TOUGH**GUARD award has encouraged trailer manufacturers to voluntarily improve rear underride guards

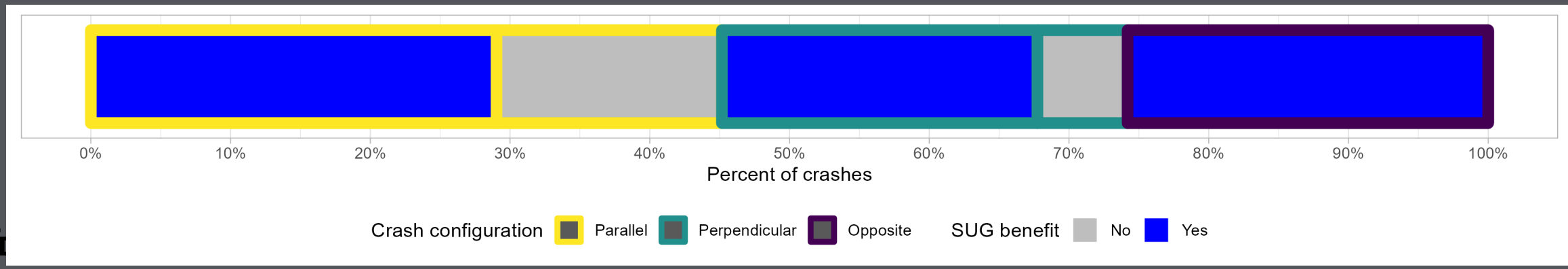


- IIHS has published multiple studies of real-world trailer underride crashes, both rear and side

IIHS HLDI

2012 IIHS side underride study

- Analyzed 206 truck/trailer side impacts in NHTSA's Large Truck Crash Causation Study
- LTCCS contains detailed on-scene photographic documentation and measurements
- In 78% of cases with serious/fatal injury, side underride guards could have reduced injury severity; varying effectiveness by crash configuration



NHTSA's side underride guard cost benefit analysis

- NHTSA estimated 17 lives per year would be saved by SUG standard; costs would be 6-9 times benefits
- IIHS comment on NHTSA's CBA pointed out several limitations:
  - Ignored crashes involving 3+ vehicles
  - Ignored many impact types (e.g. side-to-side)
  - Ignored benefits to other road users (e.g. pedestrians, cyclists, motorcyclists)
  - Assumed trailer crashes had no underride unless police report indicated otherwise (53%)
  - Assumed no benefit of guards at 41+ mph
  - Used posted speed limits to estimate crash severity; ignored crash angles, braking

Effects of limitations

NHTSA cost benefit analysis

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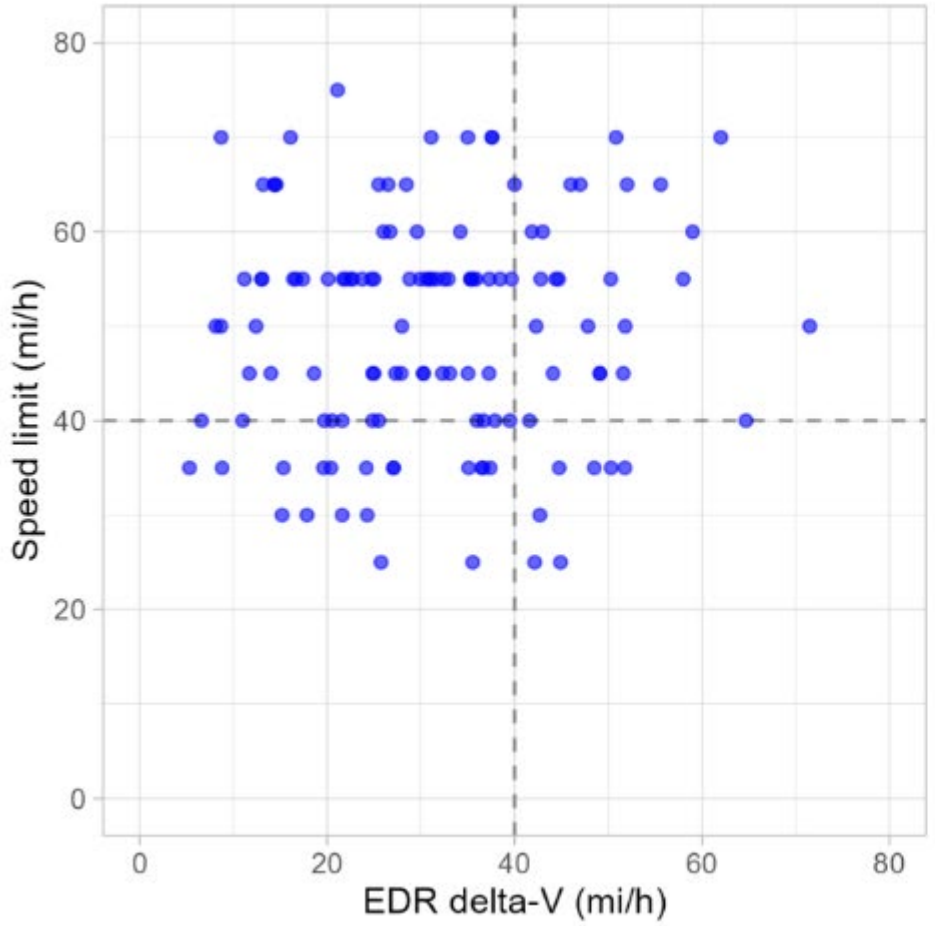
IIHS findings

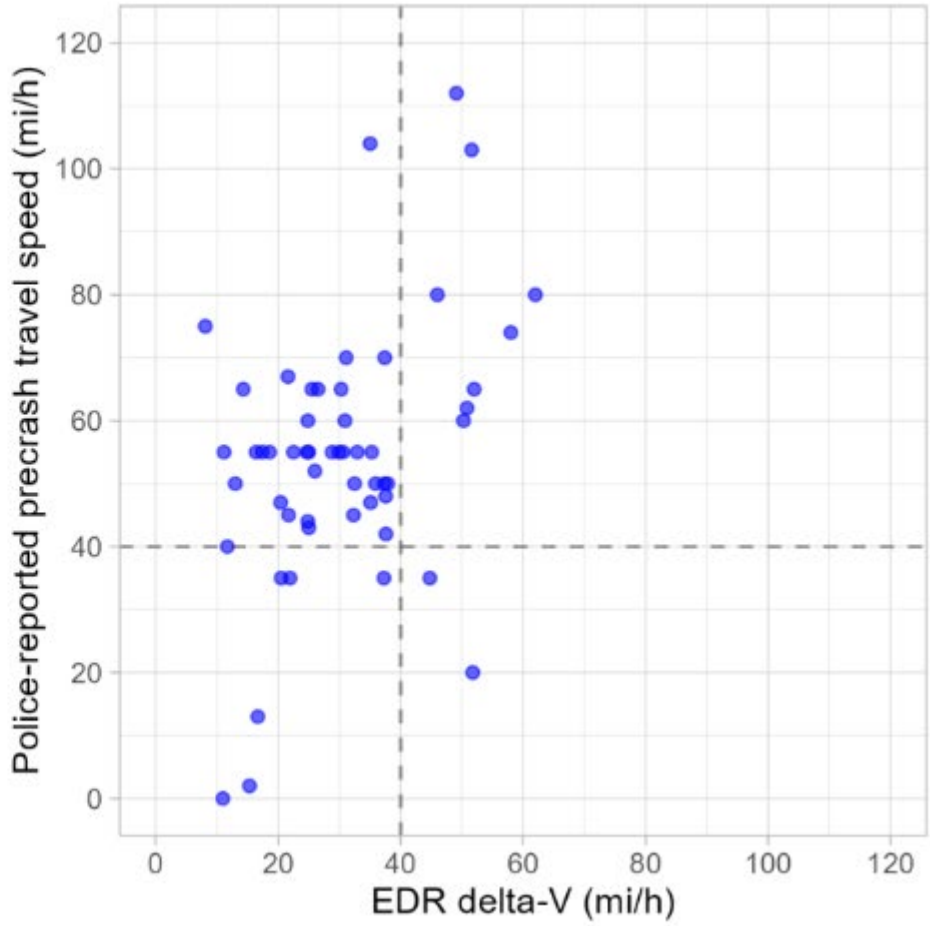
- Excludes two-thirds of relevant fatalities
- 53 pedestrians & bicyclists, 52 motorcyclists killed annually in trailer side crashes
- Photographs show 69-89% underride rate
- NHTSA has not tested any SUG designs to demonstrate a failure speed
- EDR (“black box”) data show 63% of fatal crashes involve forward velocity change <40 mph; unrelated to speed limit

IIHS HLDI

EDR delta-V for FARS crashes

Speed limit and police-reported precrash speeds are poor indicators of crash severity





IIHS HLDI

IIHS lives saved estimate

- 549 average annual passenger vehicle occupant fatalities in crashes involving side of tractor trailer
- 159-217 of these could be addressed by SUGs, based on LTCCS data
- This is 9-13 times NHTSA's estimate of 17 lives saved per year
- Some crashes may be too severe for SUG effectiveness, but EDR data indicate this would be minority (exact number would depend on SUG requirements in a regulation)
- Still doesn't include 105 annual pedestrian, bicyclist, motorcyclist fatalities
- In total, we estimate a SUG rule would save at least 10 times the lives estimated by NHTSA, making it "cost effective" per DOT's $12.5 million value of a statistical life

The IIHS comment on NHTSA's ANPRM can be found here: https://www.regulations.gov/comment/NHTSA-2023-0012-0092

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May 19, 2023

The Honorable Ann Carlson
Acting Administrator
National Highway Traffic Safety Administration
1200 New Jersey Avenue, S.E.
Washington, D.C. 20590

Side Underride Guards; Advance Notice of Proposed Rulemaking;
Docket No. NHTSA-2023-0012

Dear Acting Administrator Carlson:

The National Highway Traffic Safety Administration (NHTSA) has issued an Advance Notice of Proposed Rulemaking (ANPRM), asking for comments on its report "Side Impact Guards for Combination Truck Trailers: Cost-Benefit Analysis." In this report, NHTSA evaluated the effects of equipping new trailers and semitrailers with side underride guards. The Insurance Institute for Highway Safety (IIHS) believes NHTSA's analysis suffers from several fundamental flaws that reduce its benefit estimates for side underride guards. Specifically, we estimate the number of lives that could be saved by a side underride guard standard is up to ten times the number reported by NHTSA.

Truck underride crashes occur when another vehicle moves under the chassis of a truck or trailer during a crash. The resulting intrusion often bypasses the self-protection countermeasures in the smaller vehicle, increasing the risk of serious injury or fatality. To mitigate the risk of underride in rear-impacts of large trucks, Federal Motor Vehicle Safety Standards (FMVSS) 223 and 224 outline requirements for trailer rear underride guards. There are no existing requirements for side underride guards. NHTSA's report estimates that such a requirement would save 17 lives per year and prevent 69 serious injuries, and would not be cost effective.

Our most serious concerns with NHTSA's report fall into three categories: overly restrictive inclusion criteria used in identifying relevant fatal crashes, problems establishing whether underride occurred in specific crashes, and a misunderstanding of the relationship between crash severity and precrash travel speed. Each of these issues is addressed below, followed by an alternative approach that IIHS believes produces a more realistic estimate for the number of lives that could be saved by side underride guards.

FARS inclusion criteria
NHTSA obtained fatal crash data from the Fatality Analysis Reporting System (FARS) to use in its lives-saved estimates. NHTSA included two-vehicle crashes involving one passenger vehicle and one tractor-trailer in which the passenger vehicle's initial impact location was coded as front or roof, and the truck's initial impact location was coded as side or undercarriage. As described below, each of these criteria is overly restrictive and results in a target population of fatal crashes that is unrealistically low.