The Relative Safety of Large and Small Passenger Vehicles

NHTSA Mass-Size Safety Symposium
Washington, DC • May 14, 2013

Joe Nolan
Historical trends
Motor vehicle crash deaths per billion miles traveled
1950-2011

11.0 per billion
Historical changes in vehicle mass
Cumulative percent of passenger vehicles by weight (lbs.)
Historical changes in vehicle size

Cumulative percent of passenger vehicles by shadow (sq ft)

- 1983
- 1988
- 1998
- 2008
- 2012
Driver fatality risk by vehicle weight 20 years ago

Deaths per million registration years, 1987-90 passenger vehicles during 1988-91

![Graph showing driver fatality risk by vehicle weight](image-url)
Driver fatality risk by vehicle weight 10 years ago

Deaths per million registration years, 1997-00 passenger vehicles during 1998-01
Driver fatality risk by vehicle weight today

Deaths per million registration years, 2007-10 passenger vehicles during 2008-11
Driver fatality risk by vehicle size today

Deaths per million registration years, 2007-10 passenger vehicles during 2008-11
Changes in driver fatality risk of cars by weight

Deaths per million registration years

Small cars now as safe as big cars 20 years ago
Changes in driver fatality risk of cars by size

Deaths per million registration years

Small cars now as safe as large cars 20 years ago

- 1987-90 model cars during 1988-91
- 1997-00 model cars during 1998-01
- 2007-10 model cars during 2008-11

vehicle shadow (sq ft)
Historical conclusions

- Passenger vehicles of all types and sizes provide their occupants with greater protection today than just a decade ago and much greater protection than two decades ago.

- Occupants of the smallest and/or lightest vehicles still have higher death rates as occupants of the largest and/or heaviest vehicles.
  - Some evidence the gap in death rates is narrowing.
Countermeasures for improved occupant protection in a mixed-size fleet
Improved crashworthiness
Ratings in IIHS moderate overlap crash test
By size, 2003 vs. 2013
Ratings in IIHS side impact
By size, 2005 vs. 2013
Improved compatibility
Enhancing vehicle compatibility (EVC) WG
Voluntary design guides to improve light truck compatibility

• Goal to improve car occupant safety in crashes with a light truck (SUV and pickups)

Agreement established:
• Height-matching of light truck structure with car front structure
• Expedited fitment of side airbags with head protection in cars
• Fully adopted by MY 2010 vehicles
Partner protection

Car crash partner deaths per million registrations
1-4 year-old vehicles, 2000-01

- Car
- SUV
- Pickup
Partner protection

Car crash partner deaths per million registrations
1-4 year-old vehicles, 2008-09

![Graph showing car, SUV, and pickup crash partner deaths per million registrations.](www.iihs.org)
Partner protection in front-to-front crashes

Car crash partner deaths per million registrations
1-4 year-old vehicles, 2000-01

[Graph showing car, SUV, and pickup crash partner deaths per million registrations from <2,500 to 5,000+ registrations.]
Partner protection in front-to-front crashes

Car crash partner deaths per million registrations
1-4 year-old vehicles, 2008-09
Partner protection in front-to-side crashes

Car crash partner deaths per million registrations
1-4 year-old vehicles, 2000-01
Partner protection in front-to-side crashes

Car crash partner deaths per million registrations

1-4 year-old vehicles, 2008-09
Partner protection in front-to-front crashes

Car crash partner deaths per million registrations
1-4 year-old SUVs and pickups
Partner protection in front-to-side crashes

Car crash partner deaths per million registrations
1-4 year-old SUVs and pickups

- SUVs in 1990-91
- SUVs in 2000-01
- SUVs in 2008-09
- pickups in 1990-91
- pickups in 2000-01
- pickups in 2008-09

Legend:
- SUVs in 1990-91
- SUVs in 2000-01
- SUVs in 2008-09
- pickups in 1990-91
- pickups in 2000-01
- pickups in 2008-09

Data categories:
- <2,500
- 2,500-3,000
- 3,000-3,500
- 3,500-4,000
- 4,000-4,500
- 4,500-5,000
- 5,000+
Insurance claims by size
Relative collision claim frequencies
By body style and size class, 2000-02 models

100 = all-passenger-vehicle result of 8.7
Relative collision claim frequencies
By class and size, 2010-12 models

100 = all-passenger-vehicle result of 6.9
Why the change in collision trends by size?

• ESC
  – Is it possible that smaller wheelbase vehicles experience more benefit?
• Improvements in small vehicle handling?
• Changing demographics
  – Commuters downsizing vehicles?
• Economic factors
  – Less discretionary travel?
  – Censoring claims to avoid insurance penalty?
Summary of countermeasures that help equalize occupant safety in a mixed-size fleet

- Crashworthiness improvements, especially for smallest vehicles
  - Strong front, side, roof structures
  - Head-protecting side airbags with rollover deployment

- Better light truck compatibility with cars
  - Lowering light truck structure to car levels

- Electronic stability control

- Continued improvement in belt use rates
Thoughts for the future

- Disparate size & weight vehicles will always exist in the fleet
- Smaller and lighter vehicles will always have some disadvantage

BUT,

- Advanced structural engineering and technology innovations have improved the fleet compatibility and occupant protection across all vehicle sizes

- Advanced crash avoidance and mitigation will help, especially if fitted to the most vulnerable vehicles
  - Counter to industry trend of fitting expensive technologies to larger (and more expensive) vehicles first
Dedicated to reducing deaths, injuries, and property damage on the highway