Driver Deaths in Frontal Crashes: Comparison of Older and Newer Airbag Designs

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Did protection afforded to drivers change after the 1997 change in frontal airbag testing rules?

- Model year 1998: Auto makers allowed to choose between 30 mph barrier test or sled test for unbelted dummies
- Objective: reducing airbag-related deaths and injuries

Data sources

- Fatality Analysis Reporting System, 2000-02 (driver deaths)
- R.L. Polk, 2000-02 (U.S. vehicle registrations)
- Vehicle features database maintained by Highway Loss Data Institute (HLDI) (vehicle platforms by make, model, model year)
- HLDI databases of insured drivers by make, model, model year (age and gender distribution of drivers)

Methods: vehicle study population

- Passenger vehicles – cars, minivans, pickups, sport utility vehicles – whose basic vehicle design (platform) remained the same during 1997-99
- All were sled-certified by the beginning of model year 1998
- 171 makes and models studied
- Included 47 percent of all 1997-99 passenger vehicle models registered during 2000-02

Methods: compared model years 1998-99 with model year 1997

- Outcome: Frontal driver deaths (12:00 o'clock impacts) per registered vehicle, 2000-02
- Calculated expected deaths for combined model years 1998-99 specific to each make/model and each calendar year based on model year 1997 deaths per registered vehicle
- Rate Ratio = Observed/expected deaths

Variables of interest

- Vehicle type
- Car size
- Driver age (cars)
- Driver gender (cars)
- Belt use

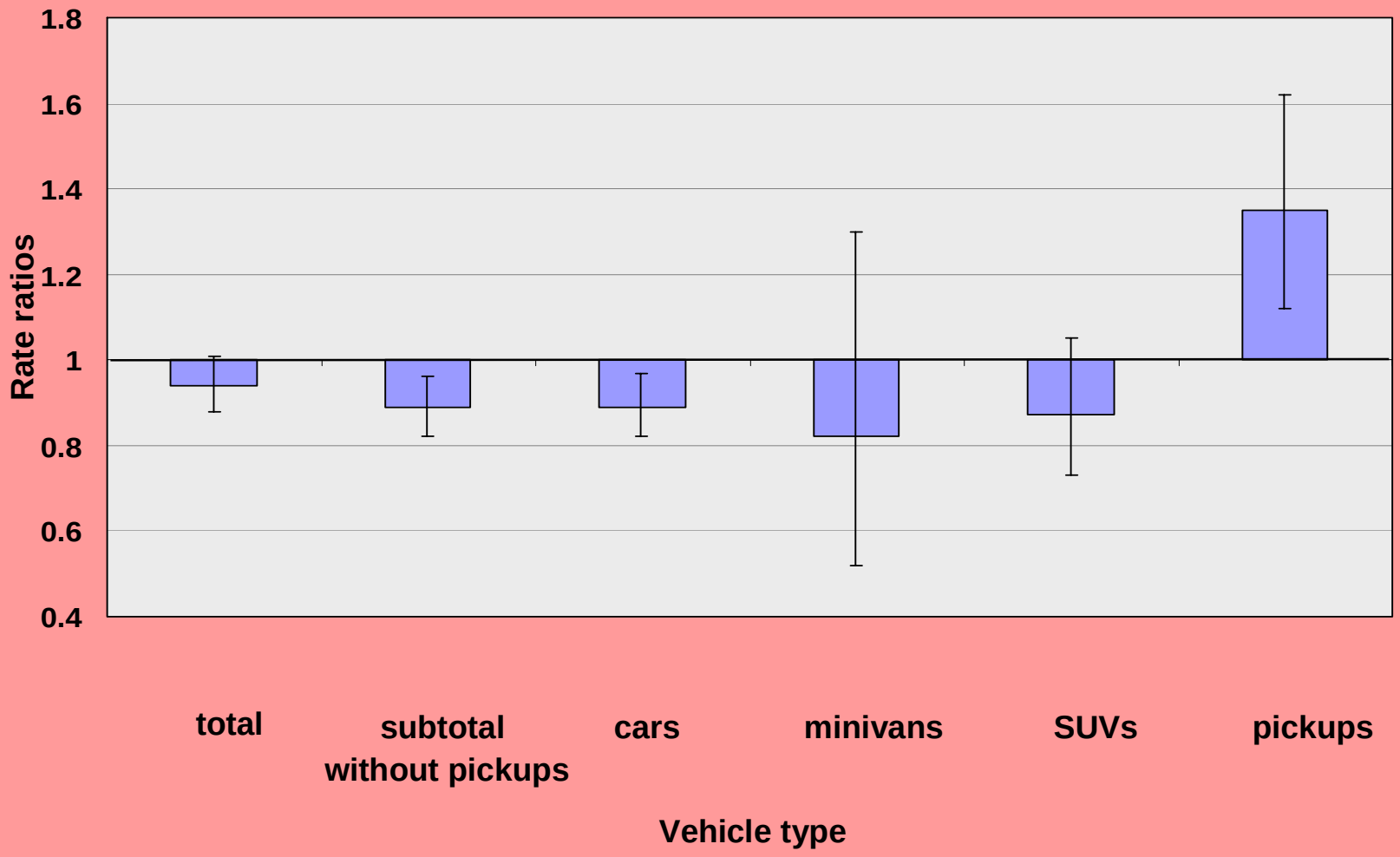
IIHS

Rate ratio (RR)

- No difference between groups: RR close to 1.0
- Findings considered statistically significant if 95% confidence interval excludes 1.0
- Protective effects: RR below 1.0 and its upper 95% confidence limit is below 1.0
- Increased risk: RR above 1.0 and its lower 95% confidence limit falls above 1.0

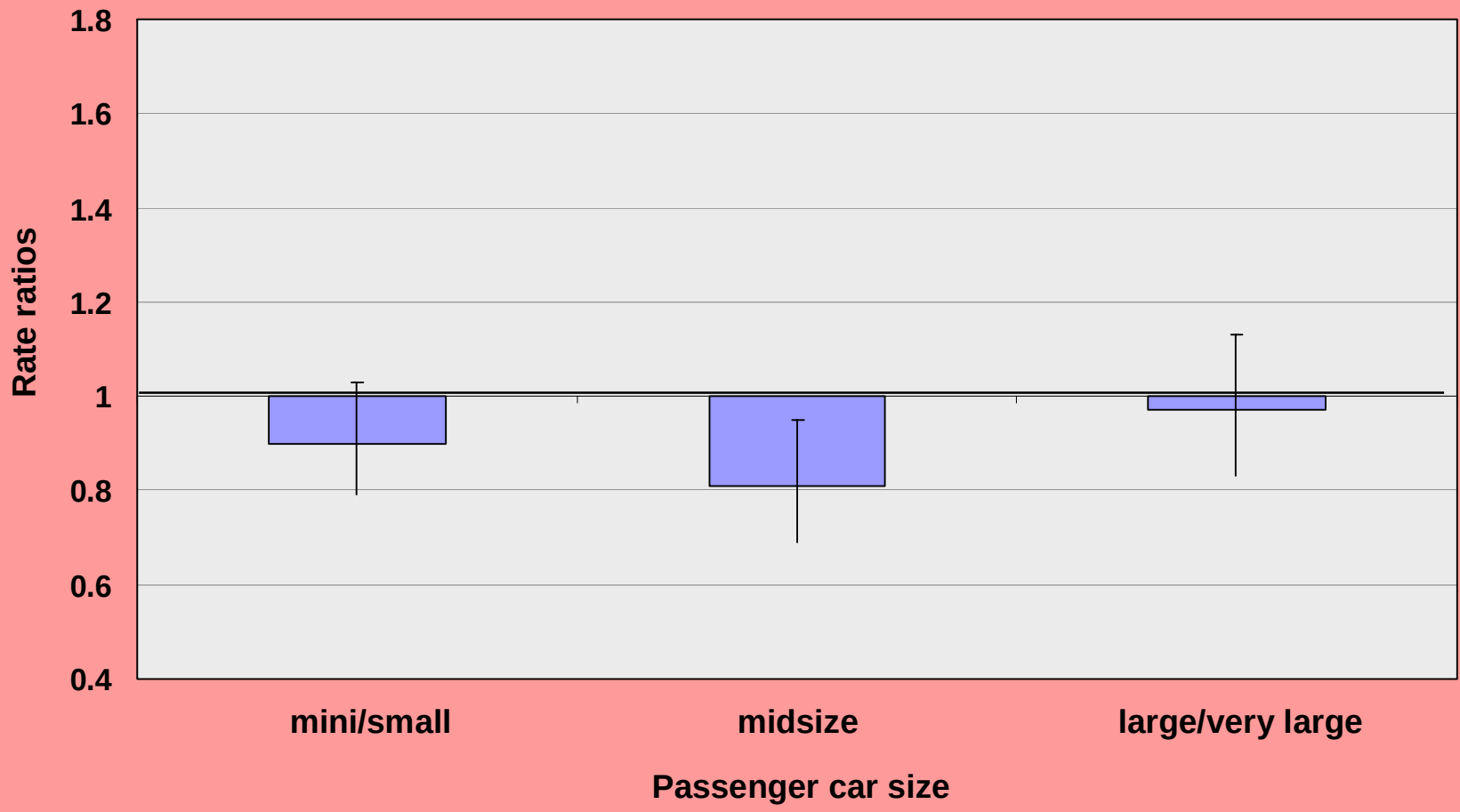
Rate ratios and 95% confidence intervals by vehicle type

Frontal passenger vehicle driver deaths for model years 1998-99 relative to model year 1997 during 2000-02



Rate ratios and 95% confidence intervals by car size

Frontal car driver deaths for model years 1998-99 relative to model year 1997 during 2000-02

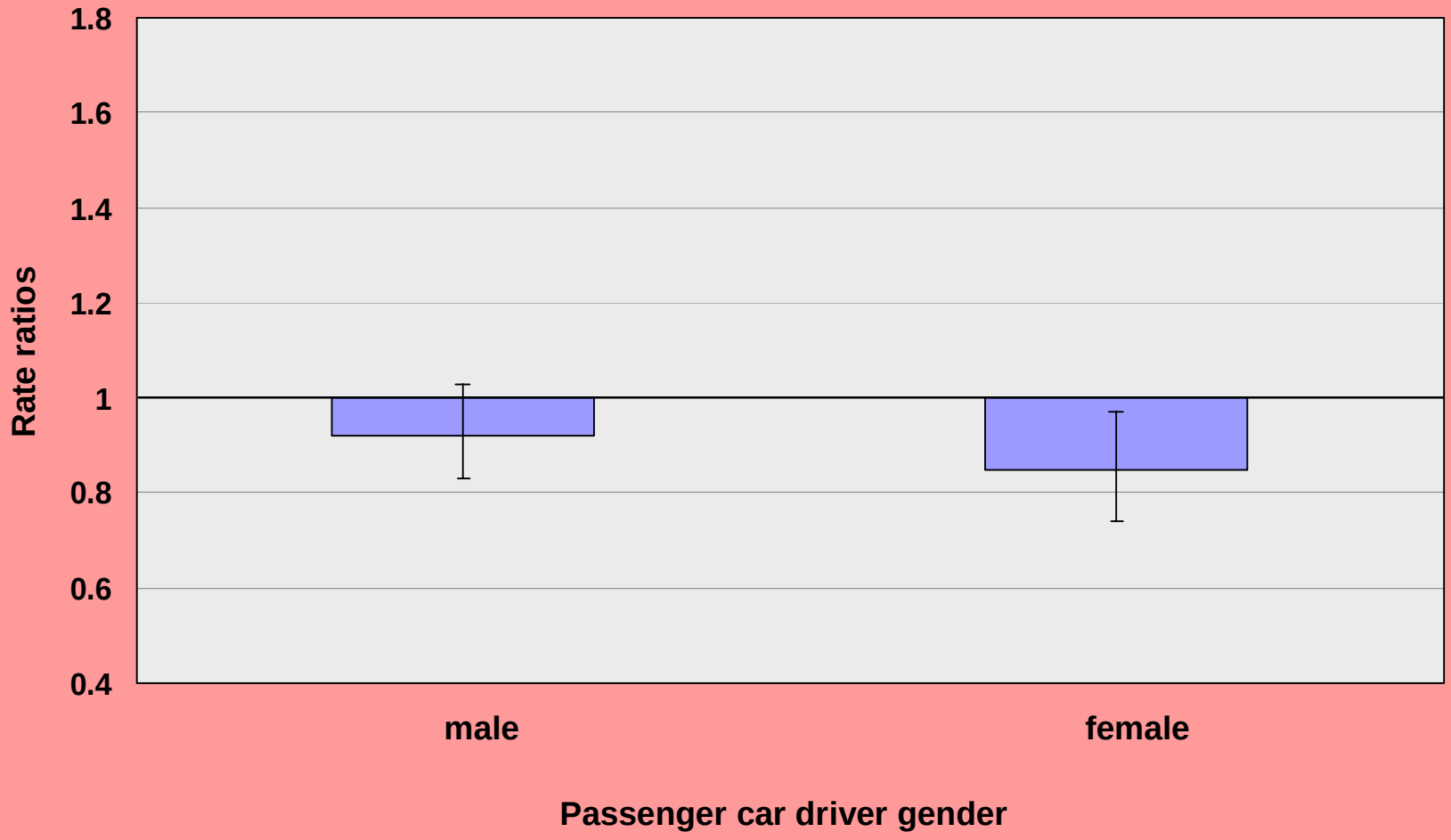


Methods: age and gender

- Examined driver frontal deaths by age and gender among passenger car drivers
- Major insurers reported age and gender distribution of insured drivers by vehicle make, model, and model year for 2000-02
- Multiplied total registrations for each make, model, and model year during 2000-02 by age and gender percentages in insurance databases

Rate ratios and 95% confidence intervals by driver gender

Frontal car driver deaths for model years 1998-99 relative to model year 1997 during 2000-02



Rate ratios and 95% confidence intervals by driver age

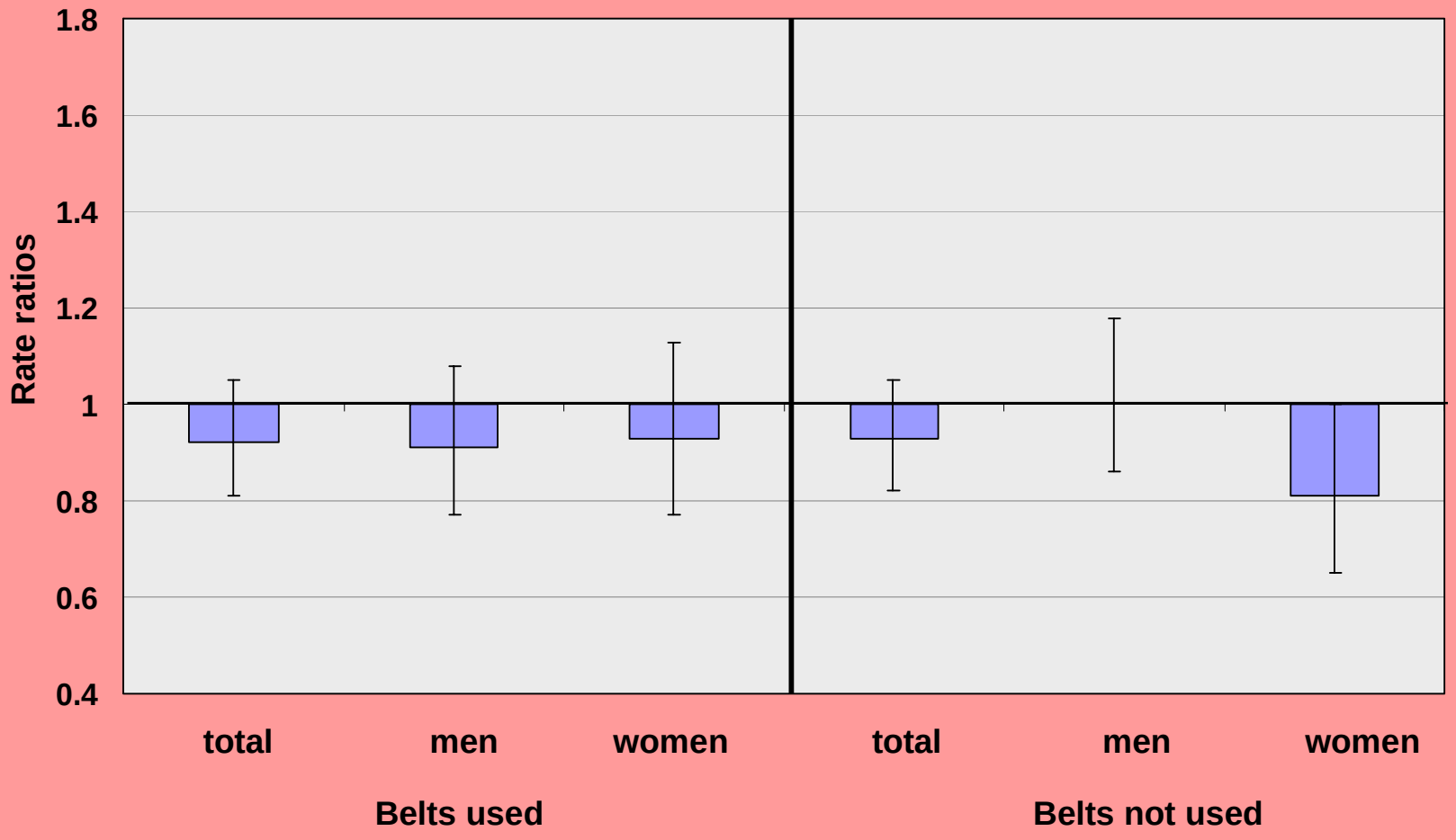
Frontal car driver deaths for model years 1998-99 relative to model year 1997 during 2000-02

Methods: belt use status

- Examined driver frontal deaths by belt use status among passenger car drivers
- Data unavailable on belt use in registered vehicles (make, model, model year), but had belt use data for fatally injured drivers
- Used total registrations for each make, model, and model year during 2000-02 for analyses of belt use
- Method reasonable, assuming that model years 1998-99 had belt use similar to model year 1997 during 2000-02 for same makes and models

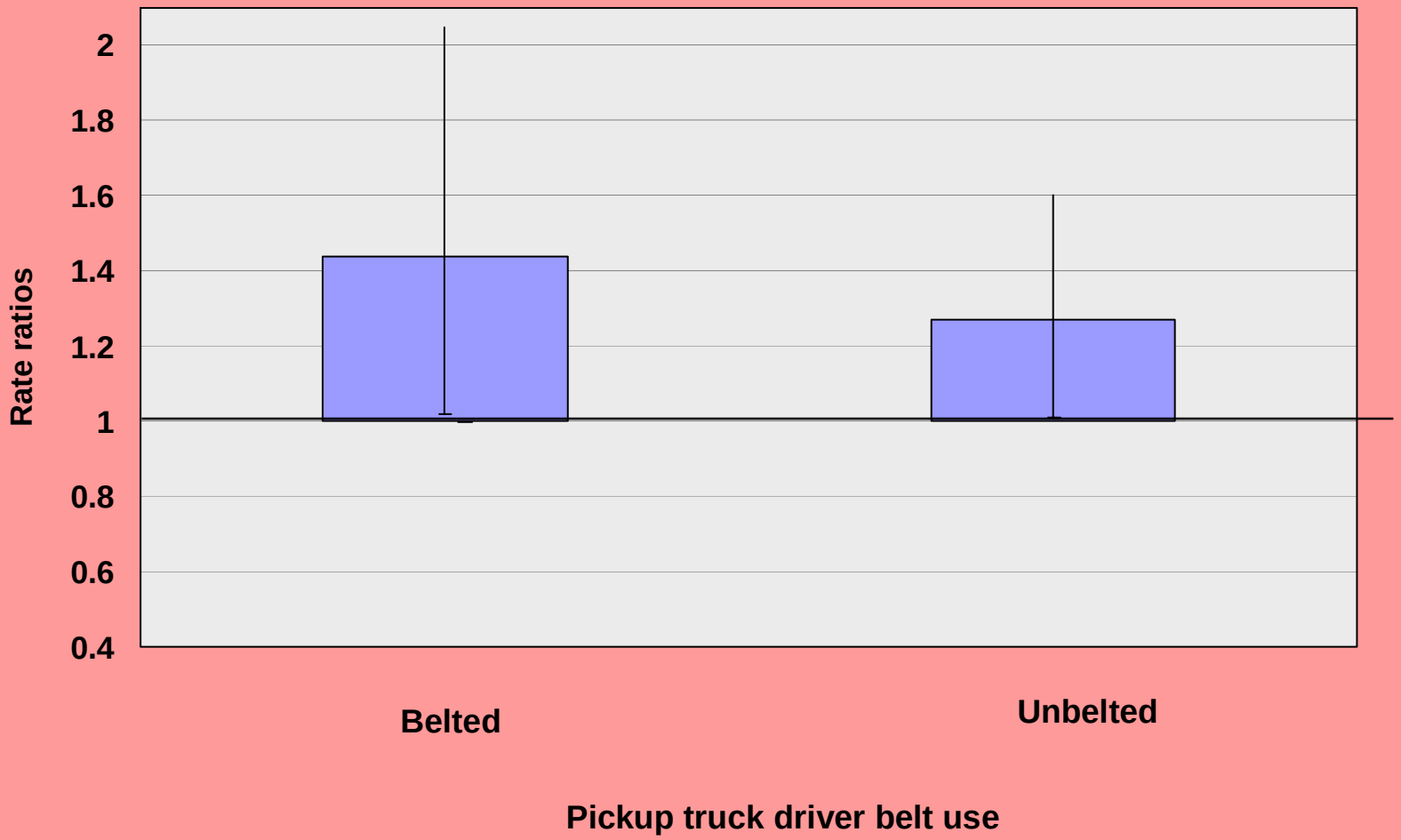
Rate ratios and 95% confidence intervals by belt use

Frontal car driver deaths for model years 1998-99 relative to model year 1997 during 2000-02



Pickup trucks: rate ratios and 95% confidence intervals by driver belt use

Frontal pickup truck driver deaths for model years 1998-99 relative to model year 1997 during 2000-02



Summary

- Based on driver deaths, no overall decrease in frontal protection among passenger vehicles manufactured after 30 mph sled tests were permitted (model years 1998-1999)
- Observed increased risk among drivers of pickup trucks
- Findings suggest improved protection among drivers of other types of passenger vehicles (cars, minivans, SUVs combined)
- Nearly identical findings when principal impact points were 11, 12, and 1 o'clock combined as when 12 o'clock only

Conclusions

- Overall findings encouraging: equivalent or improved protection in frontal crashes among drivers
- Need to explore crash experience among drivers of pickups to determine if increased risk continues and understand risks experienced by drivers of these vehicles