



Have Second Generation Air Bags Changed Our Rear Seat Recommendations for Children?

May 7, 2007

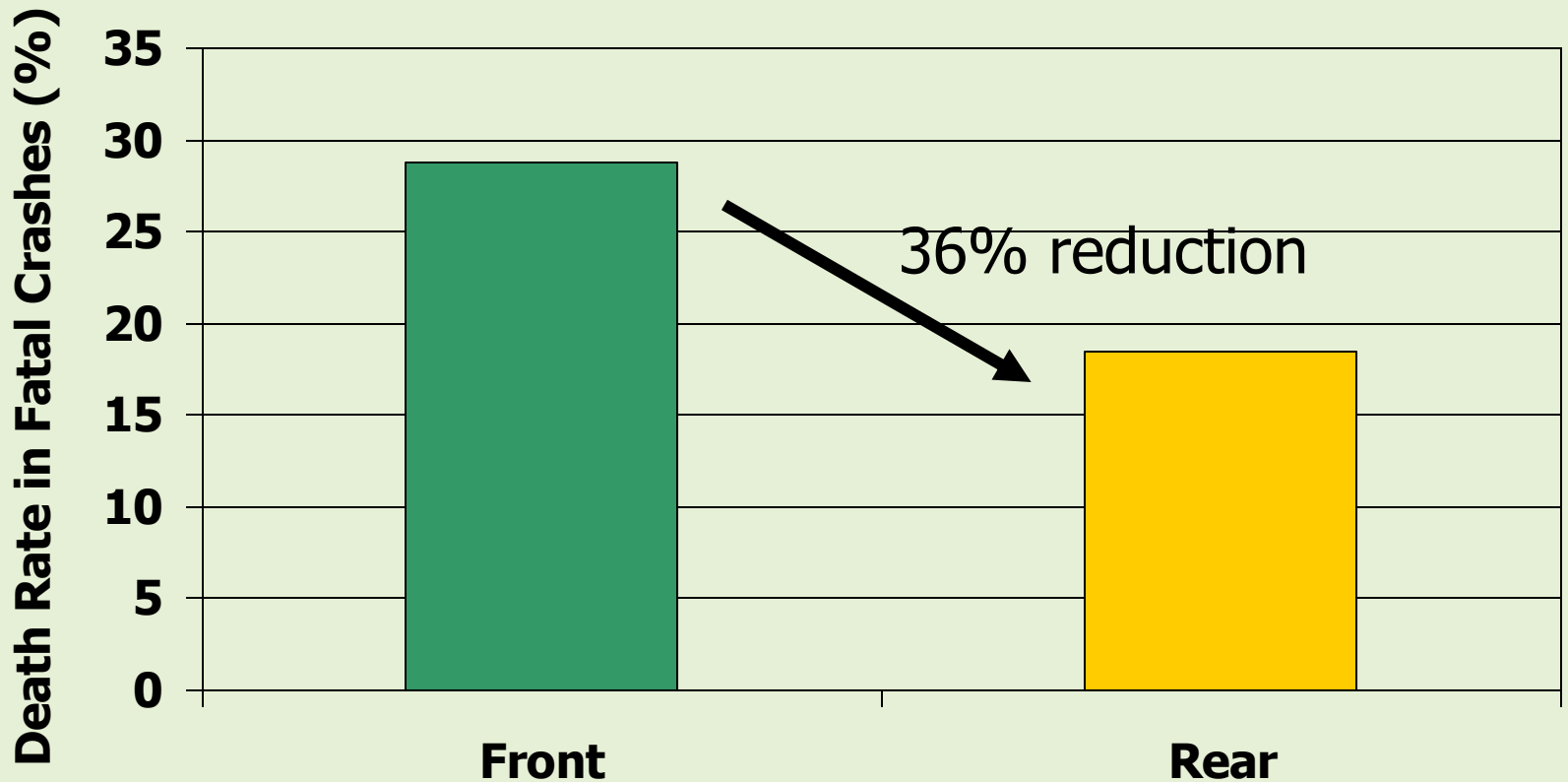
Kristy B. Arbogast, PhD

Research Assistant Professor
Division of Emergency Medicine
Center for Injury Research And Prevention
The Children's Hospital of Philadelphia

Rear Seating for Children

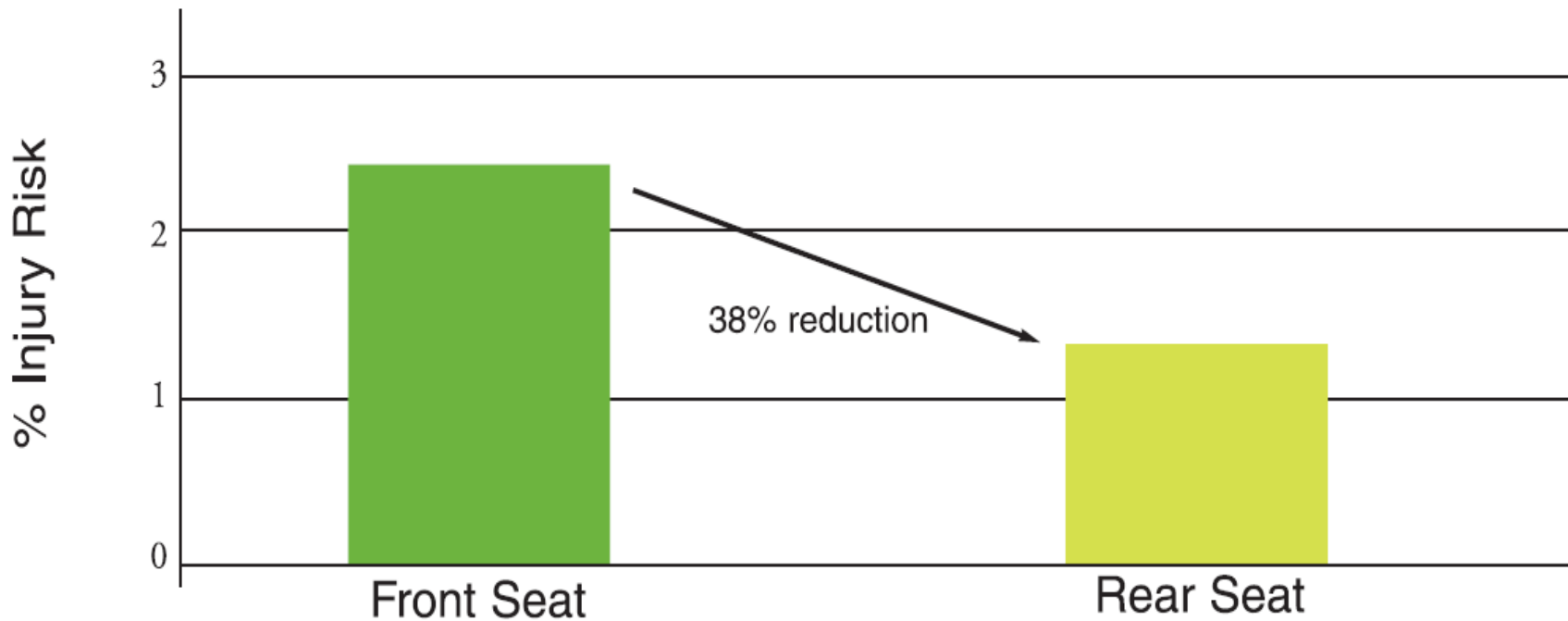
- Bodiwala et al *Lancet*. 1989;1:369–371
- Johnston et al *Pediatrics*. 1994;93:960–965
- Huelke et al. *Accid Anal Prev*. 1995;27:835–838
- Braver et al *Inj Prev*. 1998;4:181–187
- Winston et al *Pediatrics*. 2000;105: 1179–1183
- Berg et al *Pediatrics*. 2000;10:831–835
- Durbin et al AAAM Proceedings, 2001:61–72
- Durbin et al *JAMA*. 2003;289: 2835–2840

Fatality Reduction



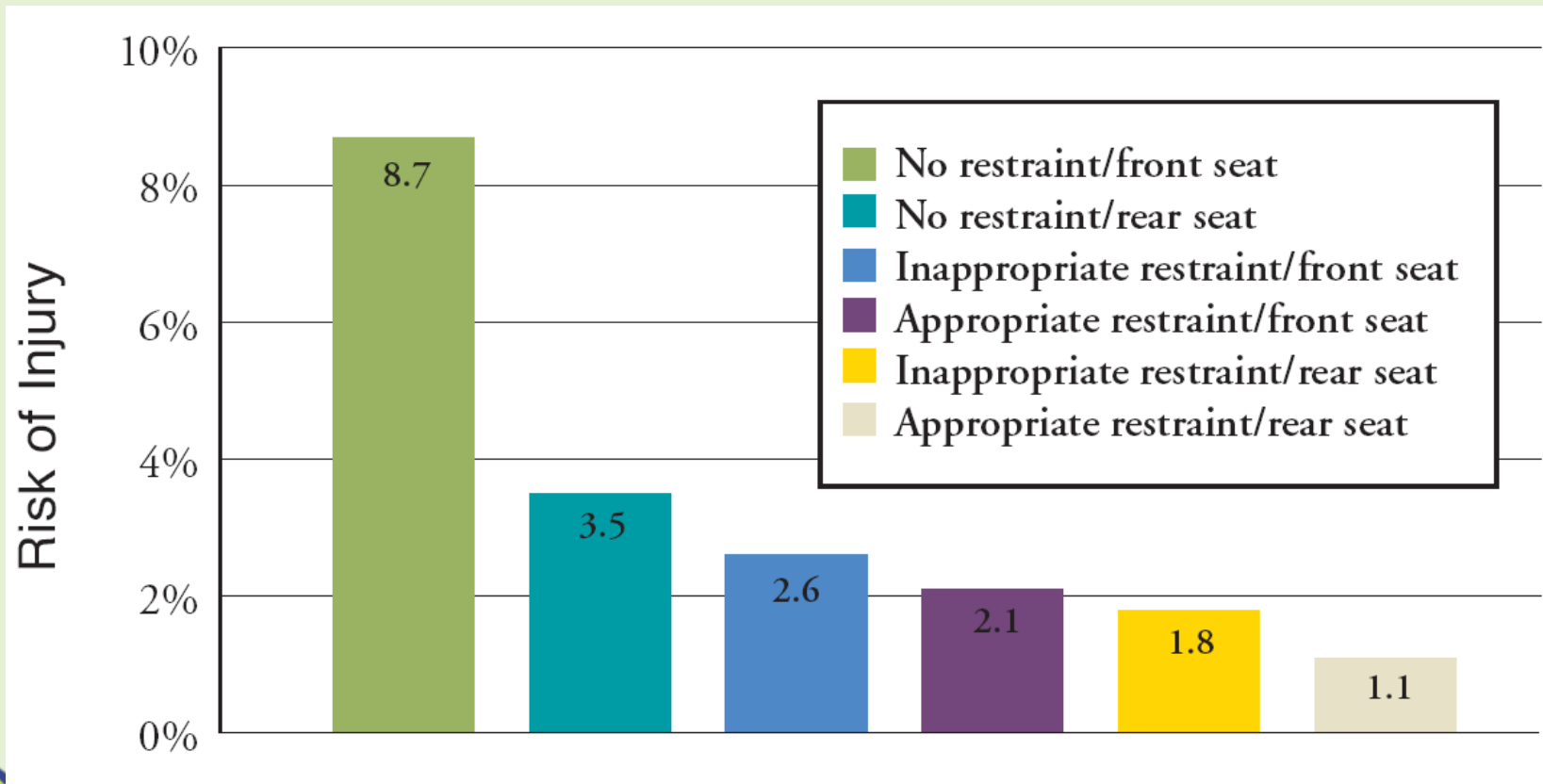
0-12 year olds, adjusted for age, restraint, air bag status, crash direction, vehicle size, and speed limit

Injury Reduction



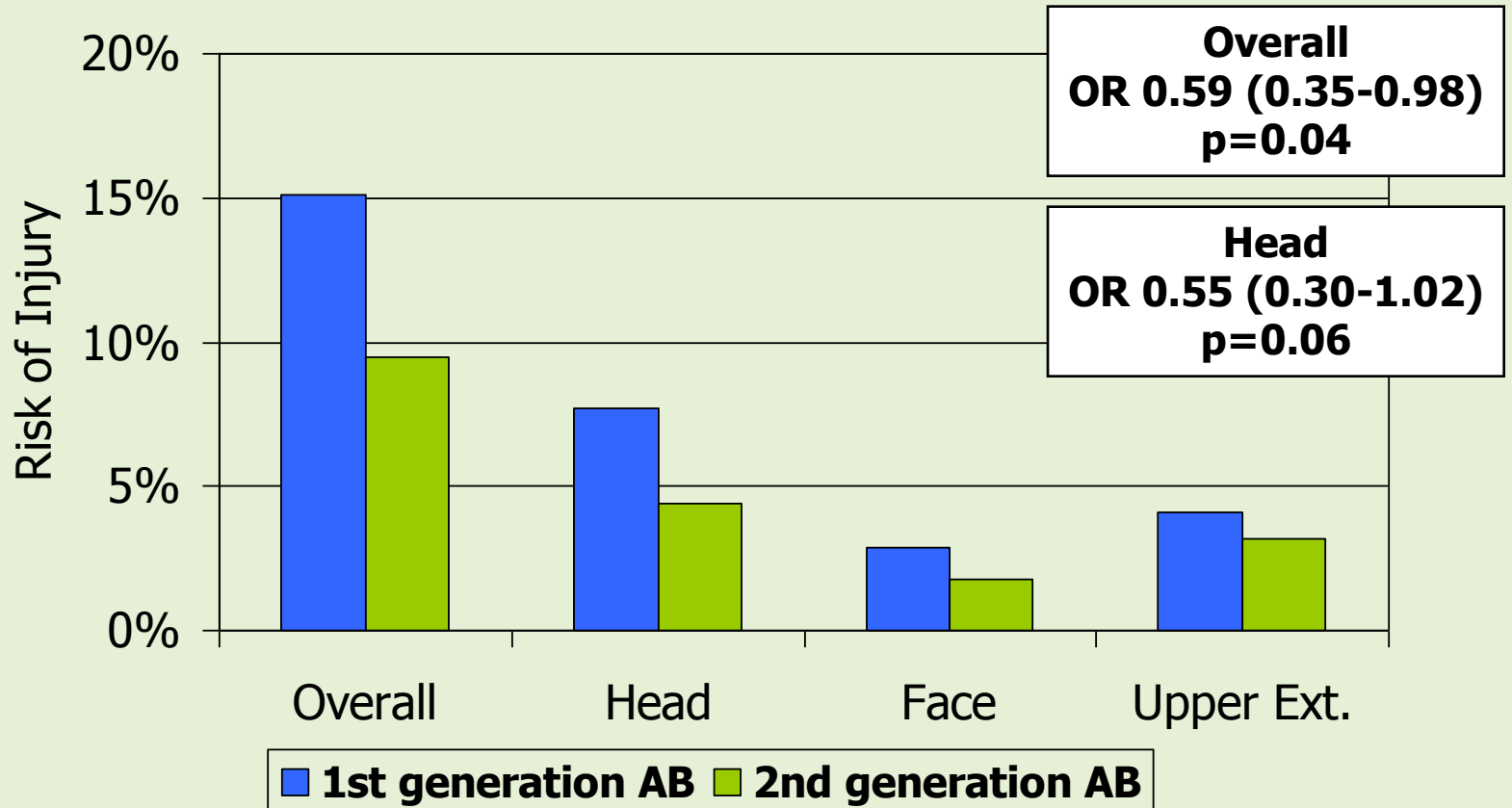
Restrained 0-12 year olds, adjusted for age and restraint type

Rear Seat is Better Regardless of Restraint



Comparison of airbag designs

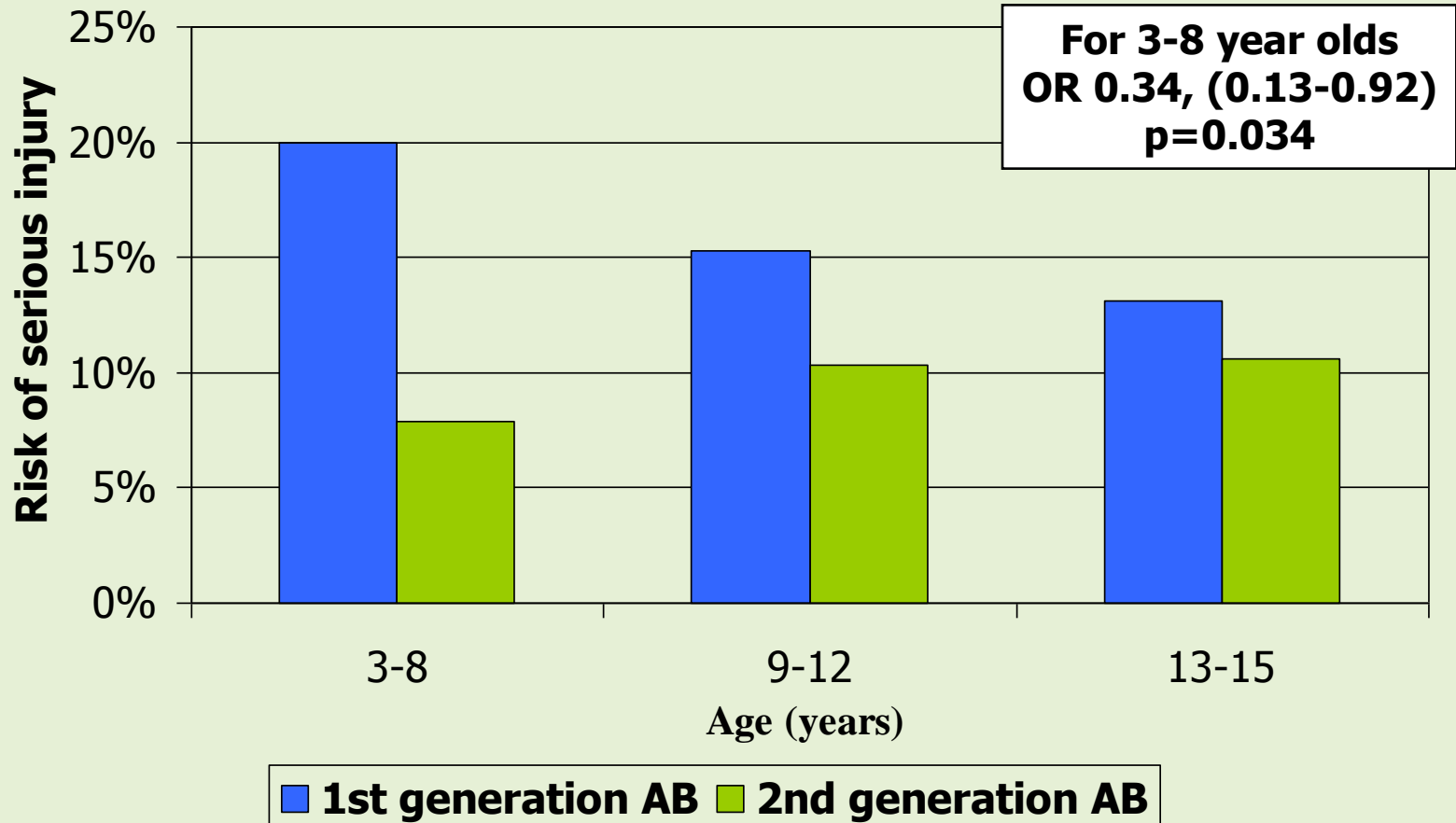
Injury Risk



Frontal crashes, restrained 3-15, All vehicle types, 12/1/98-11/30/02

Second Generation Airbags

Effect of age group

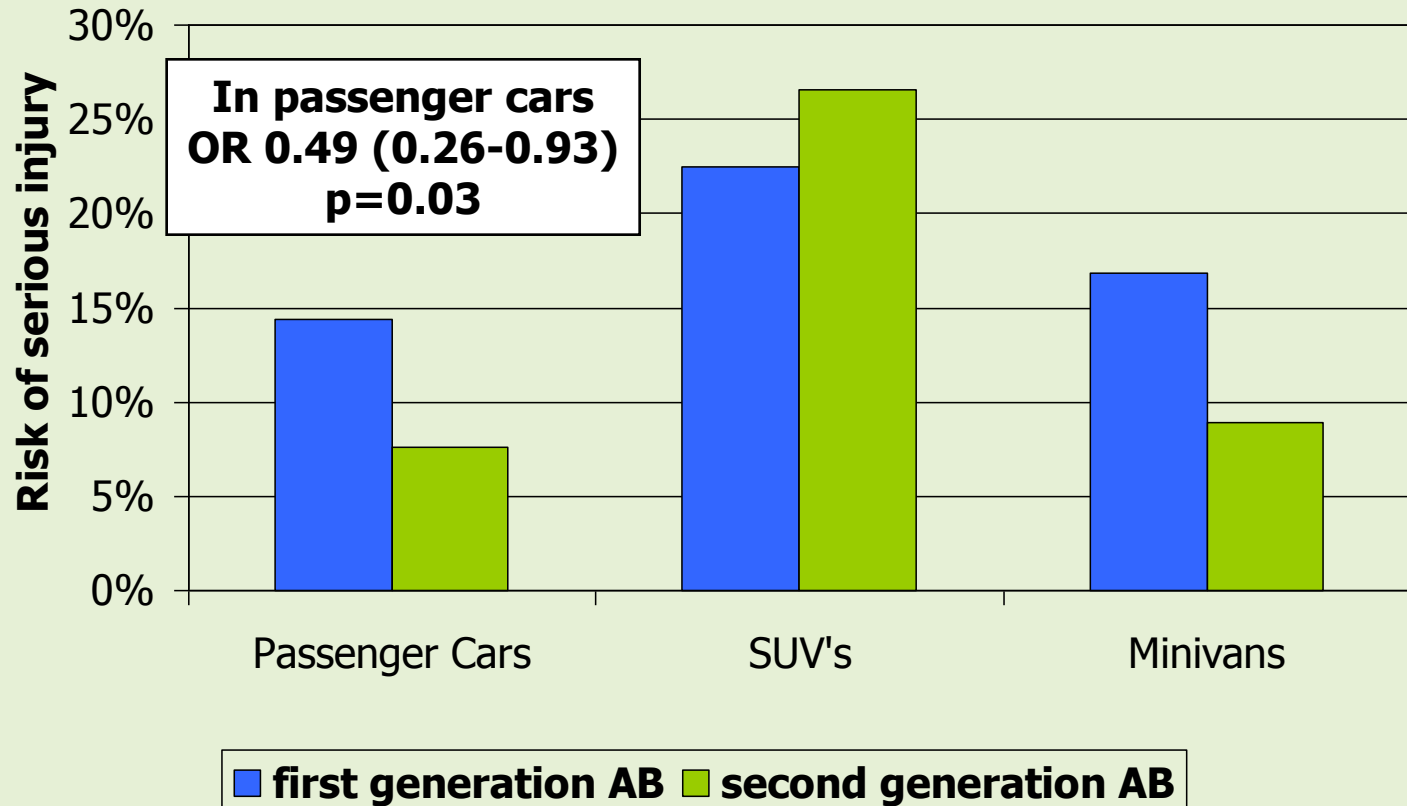


Frontal crashes, belted 3-15, All vehicle types, 12/1/98-11/30/02

Arbogast et al, Arch Pediatr Adolesc Med, 2005

Second Generation Airbags

Effect of vehicle type on injury risk



Frontal crashes, restrained 3-15, 12/1/98-11/30/02

Adjusting for crash severity and child age did not affect point estimates

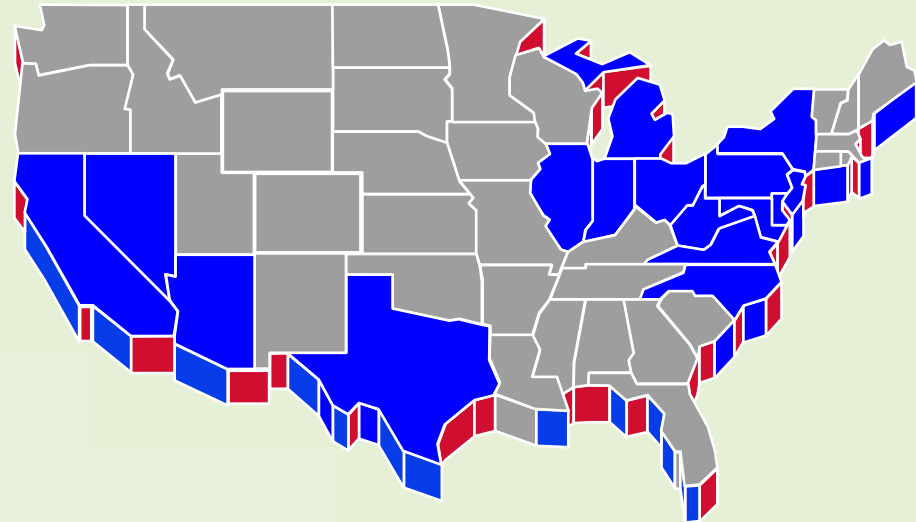
Research question

- Given the advances in protection in the front seat in newer model year vehicles, is the recommendation for <13 years in the back still supported?

Partners for Child Passenger Safety

9th year of data collection

- Unique academic/industry research partnership
- Largest study of children in MVC
 - 442,000 crashes
 - 650,000 children
- Inclusion Criteria
 - Child occupant < 16 years of age
 - State Farm insured
 - Model year \geq 1990



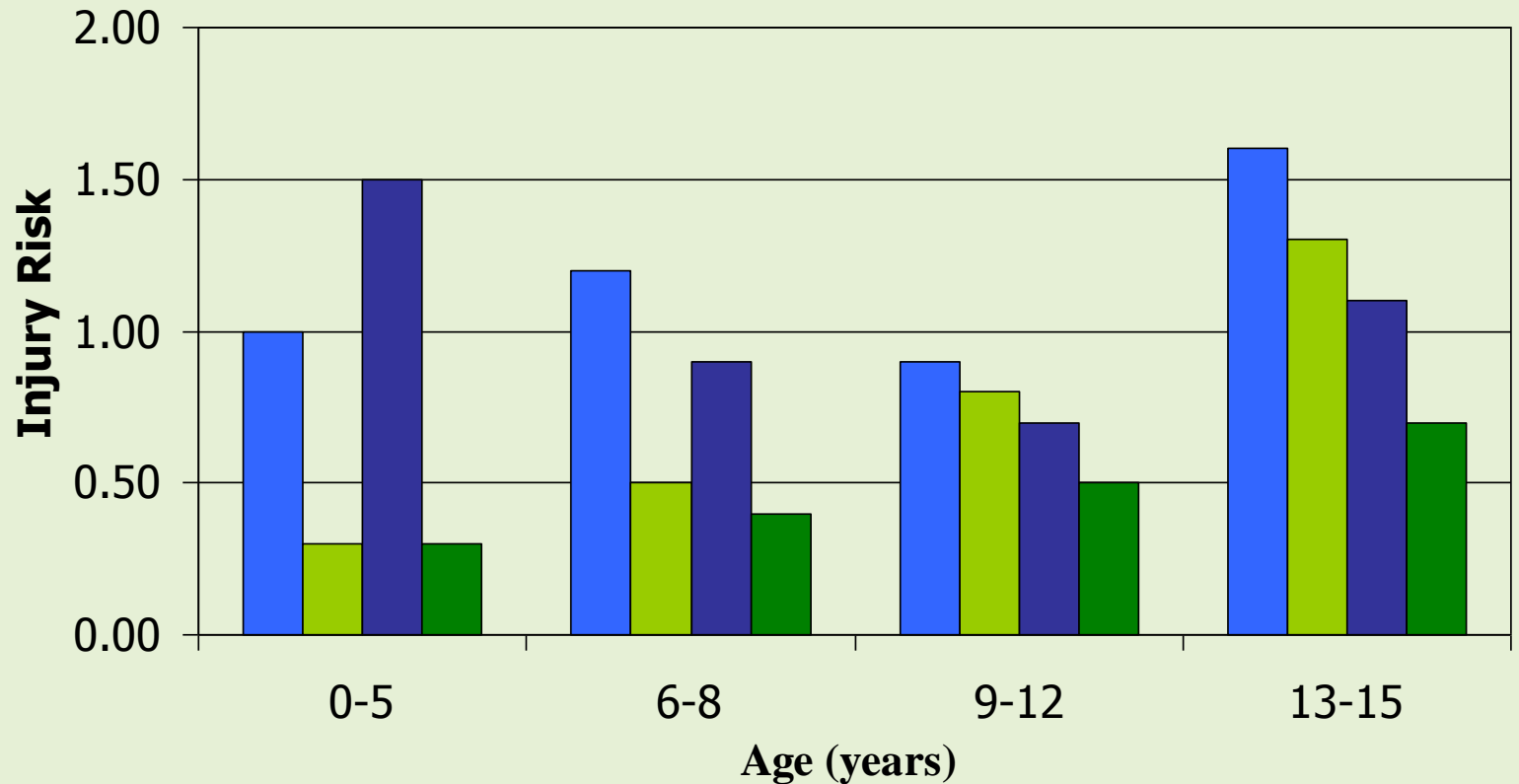
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Methods

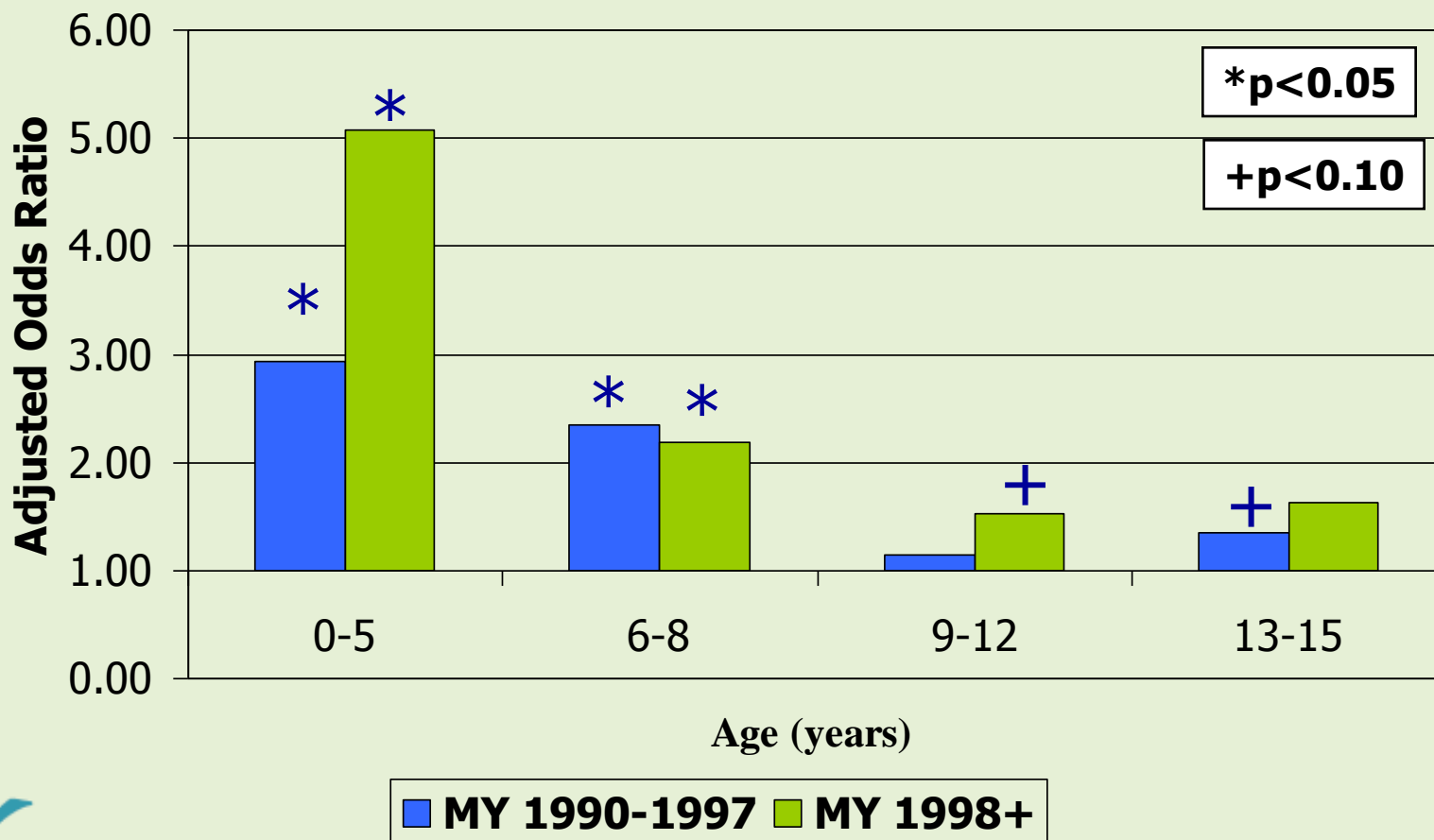
- Data from 12/1/98-12/31/06
 - Ages 0-15 years
 - All crash directions
 - 30,998 children weighted to represent 464,207 children
- Analysis
 - Injury defined as AIS 2+ excluding concussions
 - Injury risk of front vs. rear seating stratified by model year, vehicle type, and child age
 - Logistic regression adjusted for restraint use and driver age

Front vs. Rear Row Passenger Cars & Minivans

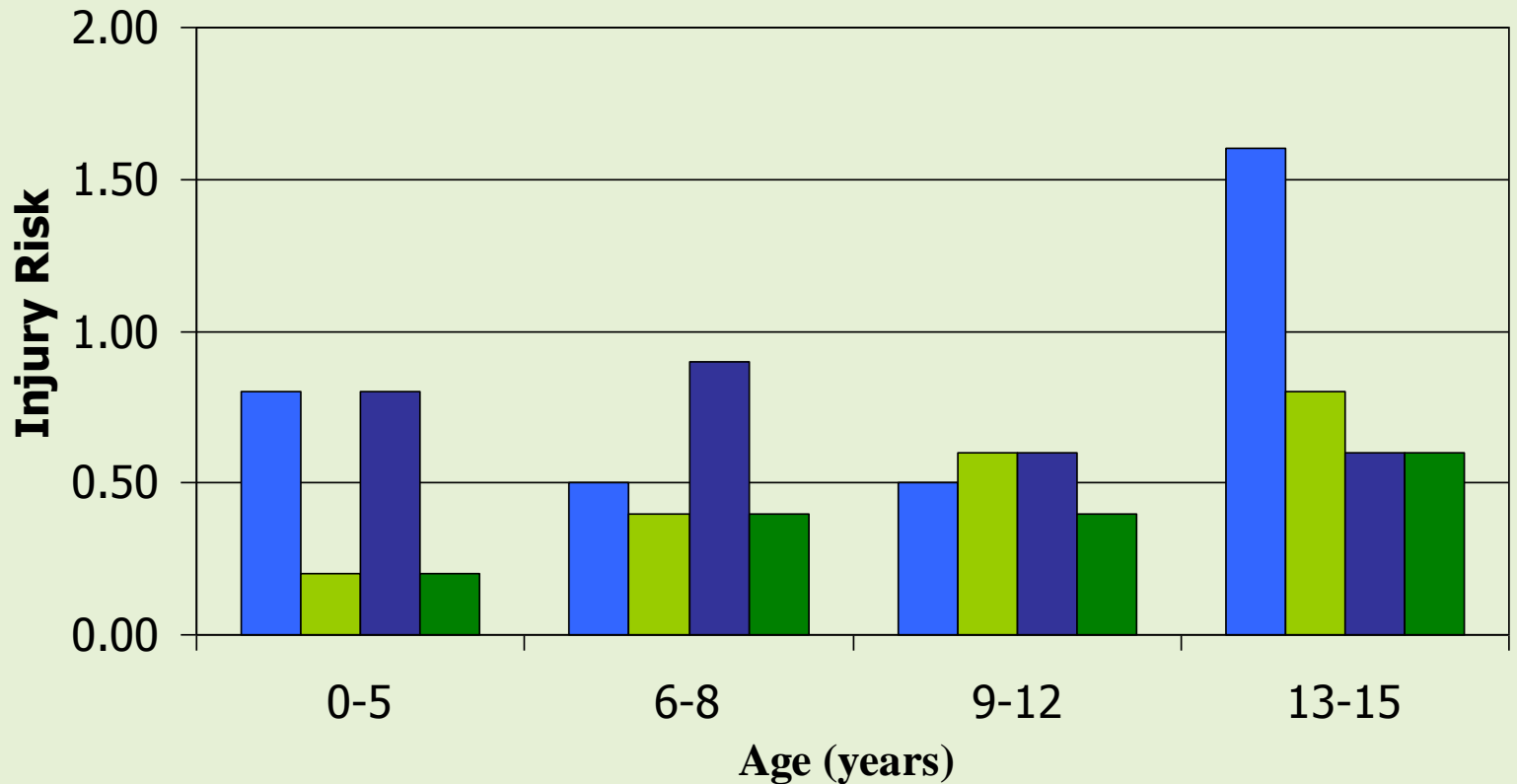


■ Front MY 90-97 ■ Rear MY 90-97 ■ Front MY 98+ ■ Rear MY 98+

Front vs. Rear Row Passenger Cars & Minivans



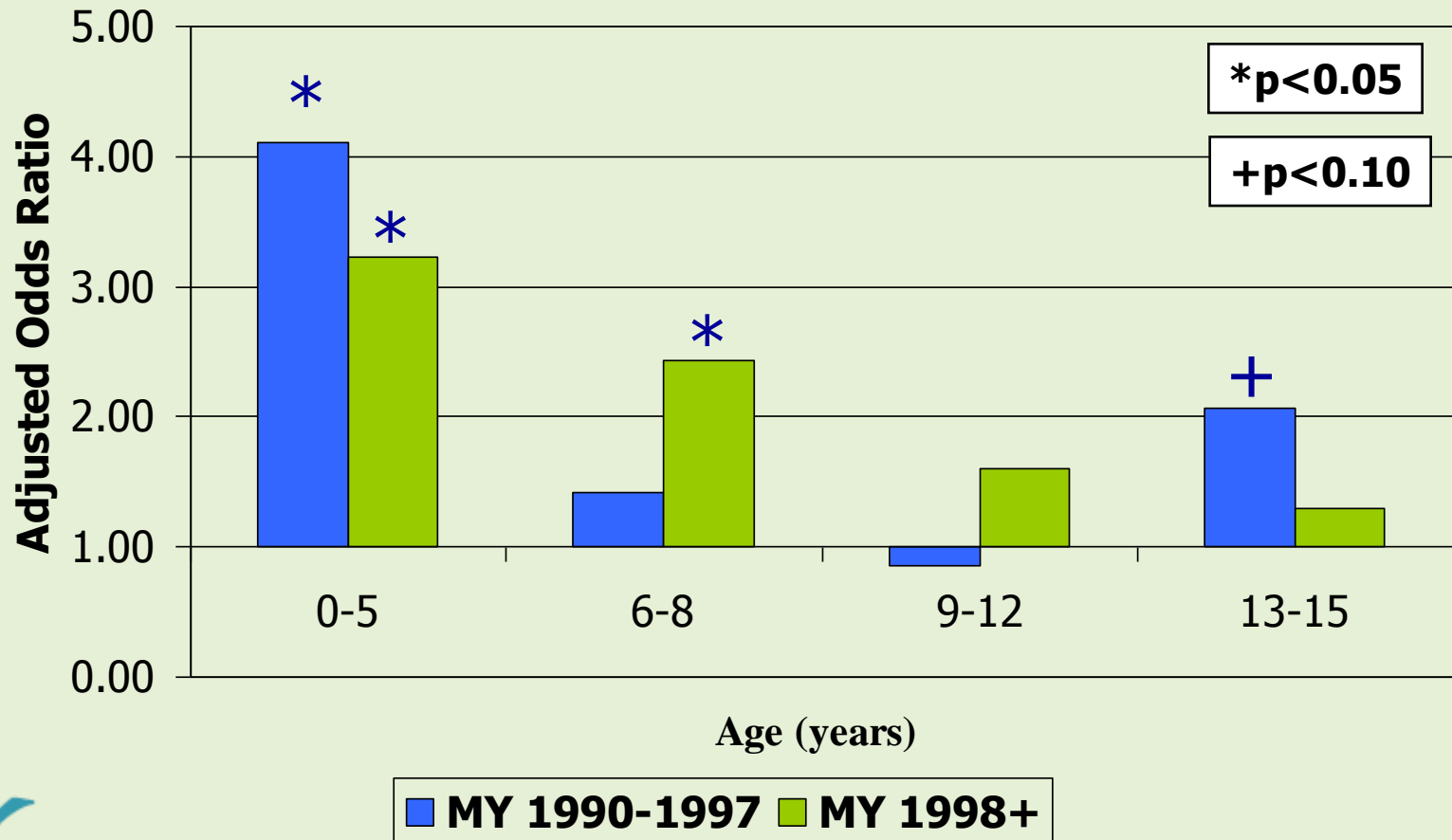
Front vs. Rear Row SUVs & Pickups



■ Front MY 90-97 ■ Rear MY 90-97 ■ Front MY 98+ ■ Rear MY 98+



Front vs. Rear Row SUVs & Pickups

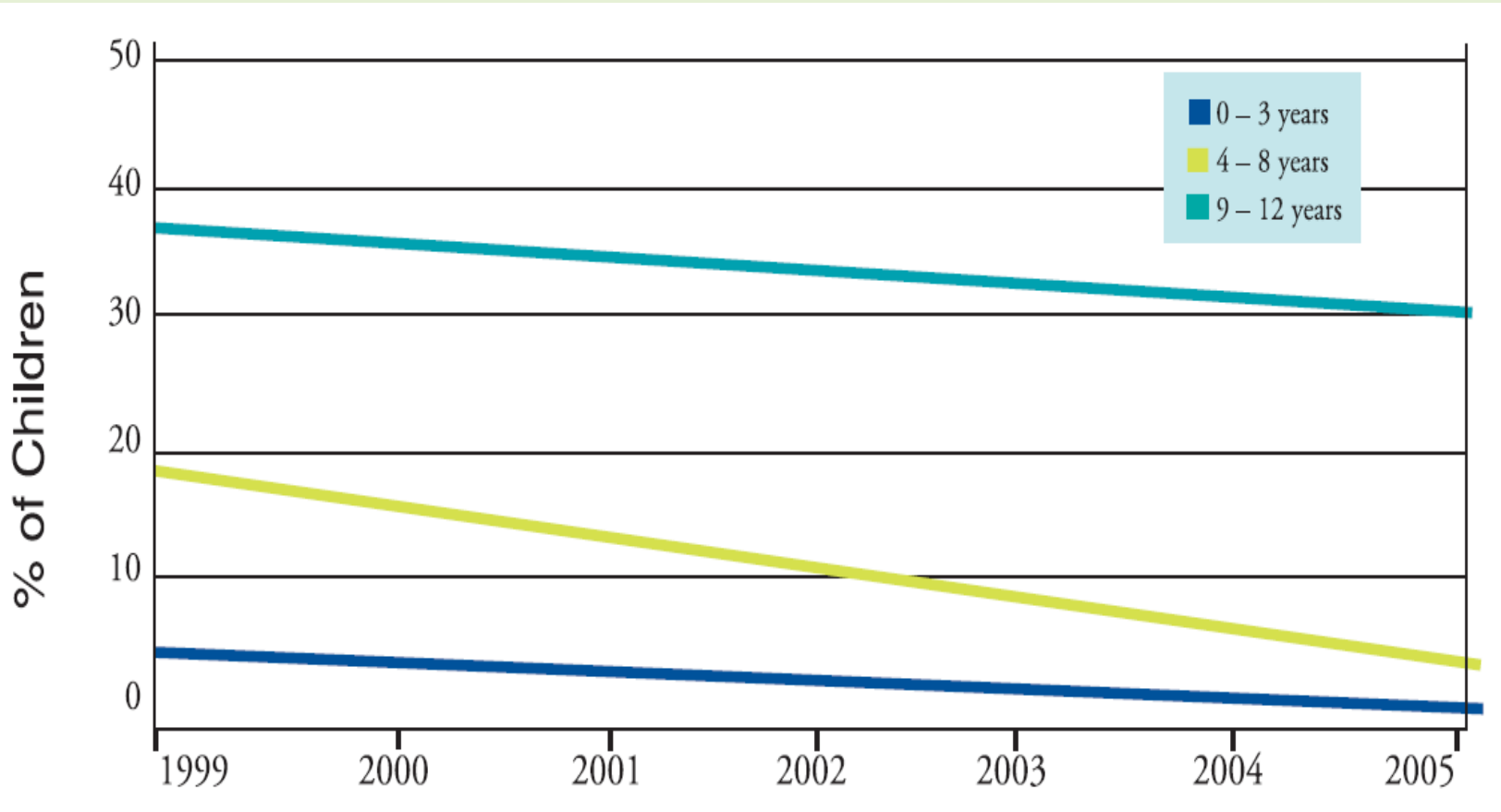


Findings

In newer model year vehicles

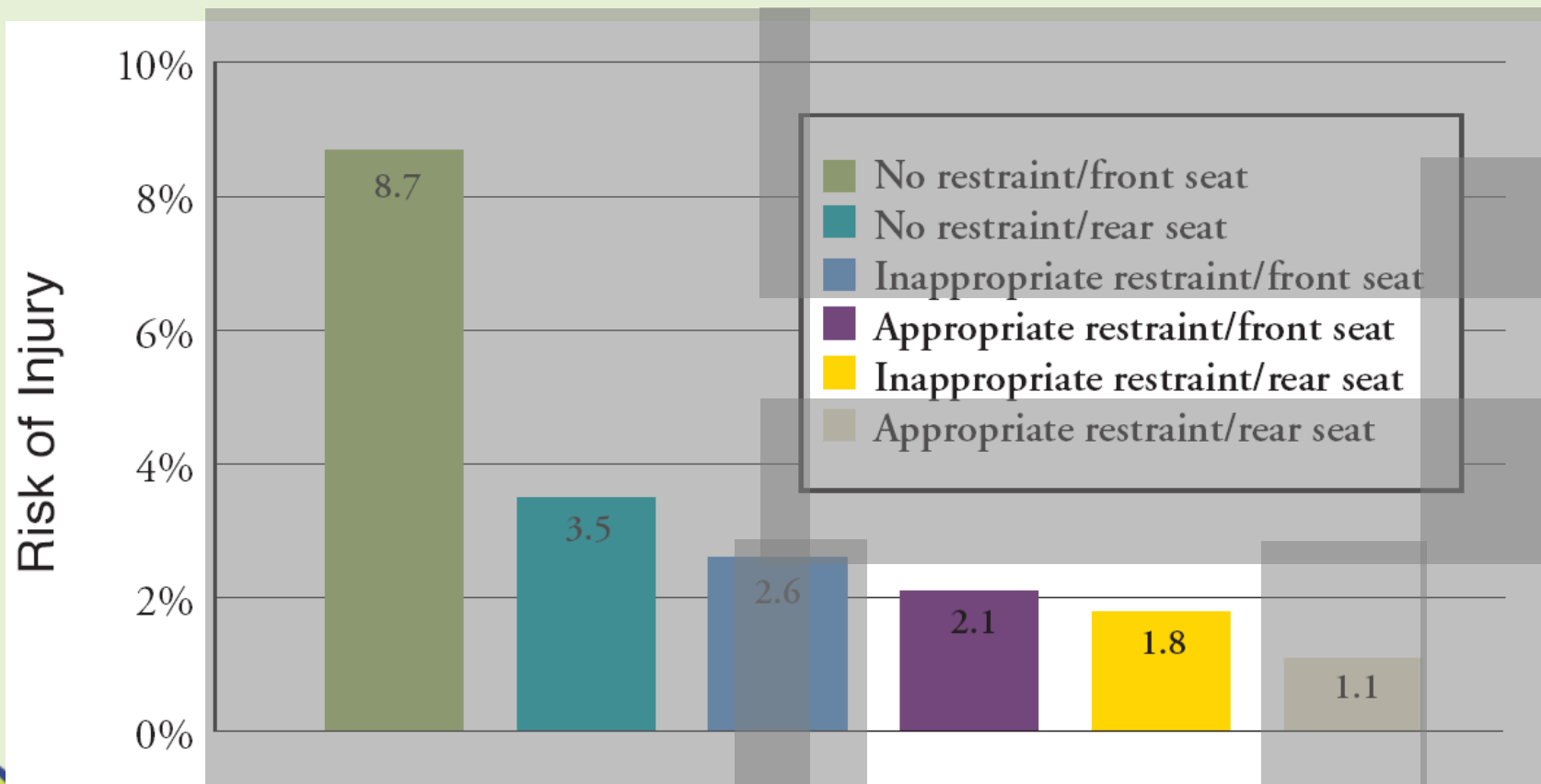
- Younger children (0-8 years) see the largest benefits of rear seating
- For 9-12 year olds, benefits of rear seating continue through age 12 for passenger cars and minivans
 - Trend toward reduction in injury risk for rear seating in SUVs and pickup trucks
- For 13-15 year olds, the point estimate trends toward reduced injury risk in the rear rows – not stat significant

Front row seating trends



Rear seat for children <13

Risk of injury by seat row & restraint type



Front row seating

- Evidence that rear seating for <13 continues to be beneficial for newer model year vehicles
 - Best when accompanied with age-appropriate restraint
- Education
 - 1/3 of 9-12 year olds in the front seat
 - Older vehicles may now be used by different socio-economic subgroups
 - New safety advances may carry conflicting messages

Maintenance of rear seating message is recommended