

## Automobile Occupant Protection

### Introduction<sup>1</sup>

*Occupant safety has been a subject of intense debate for nearly as long as automobiles have been on the roads. Seatbelts, credited with being the most important and effective safety feature currently available in cars, have been both a point of contention among and a focal point of efforts undertaken by advocates, manufacturers, and government in improving traffic safety.*

*Seatbelts first appeared in American automobiles in the early 1900s. They were popular not for their role in crash protection but because they kept occupants inside their cars during bumpy rides. Seatbelts were later installed in airplanes to keep pilots from falling out during upside-down maneuvers. Seatbelts were added to race cars in the 1920s. In 1950, the first factory-installed seatbelts in the U.S. appeared, nearly 20 years after U.S. physicians had begun urging auto manufacturers to provide seatbelts in cars.*

### Safety Restraints<sup>2</sup>

Seatbelts work as a restraint by keeping occupants in their cars during a crash and by lessening the impact inside the vehicle. During a crash, three distinct things occur. First, the vehicle collides with another object. Second, the occupant's body collides with the interior of the vehicle and the seatbelt. Third, the occupant's body organs collide against the body's skeletal structure. A seatbelt functions to stop or counteract forces generated by impact. The seatbelt also spreads the energy from the impact over the larger, stronger parts of the body, namely, the pelvis, chest, and shoulders, which are more able to absorb energy without sustaining injury.

### Occupant Safety for Children<sup>3</sup>

One of the most important steps adults can take to protect themselves in a car is to buckle up their seatbelts. Protection for children, however, is not so simple. ***Seatbelts are not designed to protect children, particularly those under the age of 9.*** According to a 2002 report issued by Public Citizen, a nonprofit consumer interest organization, lap/shoulder belts are currently designed to be effective and comfortable for the average (50th percentile) adult male, and the typical belt system is not designed to accommodate an occupant shorter than 4'9" and weighing less than 80 pounds.

Along with children's small size and stature, their immature neck and spinal cord structures make them more vulnerable when restrained by a seatbelt alone. In a 1997 study conducted by Hummel, et al at the Institute

for Vehicle Safety GDV, Germany, children ages 0-11 who were restrained with any type of belt were shown to suffer injury 58% more frequently than children in child restraint systems. Child restraint systems, namely, child safety seats, offer children better age- and development-appropriate protection during a crash. According to the National Highway Traffic Safety Administration (NHTSA), child safety seats reduce the risk of fatal injury by 71% for infants between the ages of 0-1 and 54% for children between the ages of 1-4.

### The "Forgotten Child"<sup>4</sup>

In 1978, Tennessee passed the first state law requiring children riding in cars to be protected by a restraint system other than adult-sized seat belts. By 1985, all 50 states and the District of Columbia had passed similar sorts of laws, requiring infants, and in some cases toddlers, to ride in car seats. When children outgrow safety seats, however, they are usually too small for seat belts.

The result has been what some researchers are calling the "forgotten child" syndrome. Research shows that children who are inappropriately restrained with adult-sized belts suffer needless deaths and injuries in car crashes. Studies also show that as children age, their use of restraints decreases.

To address the safety gap in this in-between age group, policymakers are turning to a new round of regulations for the use of intermediate devices to take children through the growth years until they are large enough to benefit from the protections offered by seat belts. The device that fits these children's needs the best is the booster seat, which "boosts" the user up and forward so that the car's adult-sized seat belt system fits. Booster seats are generally appropriate for a child who weighs between 40 pounds and 80 pounds and stands less than 4 feet 9 inches tall.

Child safety seats represent a complex design challenge: to create a device that is easy to use, adjusts to children's changing sizes, is capable of being properly fitted into the wide variety of vehicles, older as well as new, on the nation's roads—and is affordable. In September 1999, all forward-facing child safety seats were required to comply with stricter head protection safety standards, which included the addition of tethers at the top of the seat that could be attached to an anchor near the car's rear window. The following year, the anchor was required in all new passenger vehicles. And as of September 1, 2002, most new child safety seats and vehicles were required to be equipped with a more complex system, Lower Anchors and Tethers for Children (LATCH). It is hoped that LATCH systems will make it easier to secure child safety seats and reduce reliance on seat belts to hold them in place.



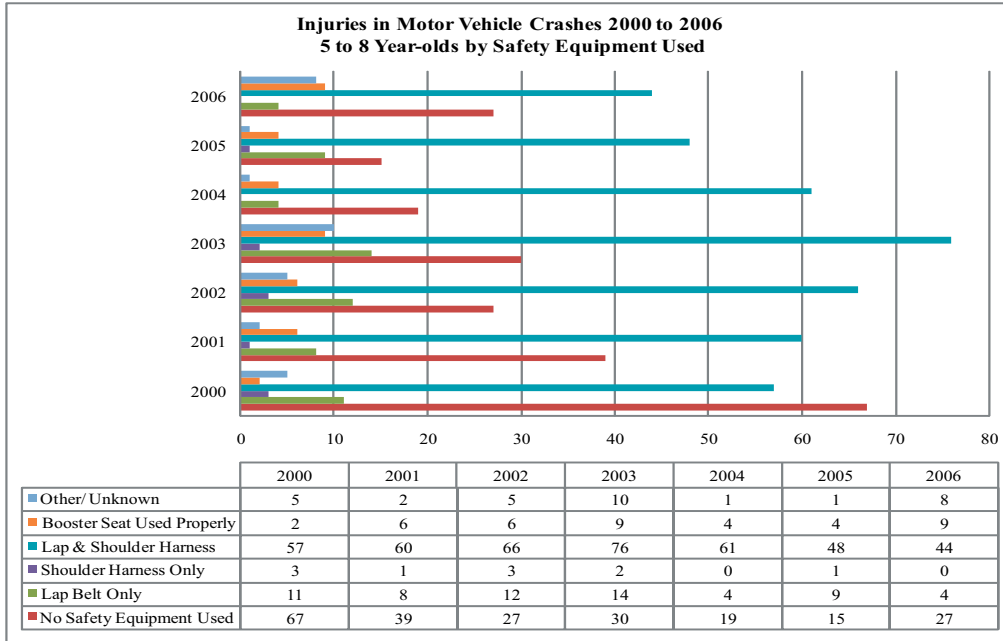
with seat belts.

Although there is no specific state law covering booster seats for older children, it is strongly recommended that booster seats be used to help protect a child. Seat belt systems are designed for a person with a minimum height of 4 feet 9 inches and minimum weight of 80 pounds. A booster seat is designed to lift a smaller child into position so that a seat belt can be properly fitted and protected.

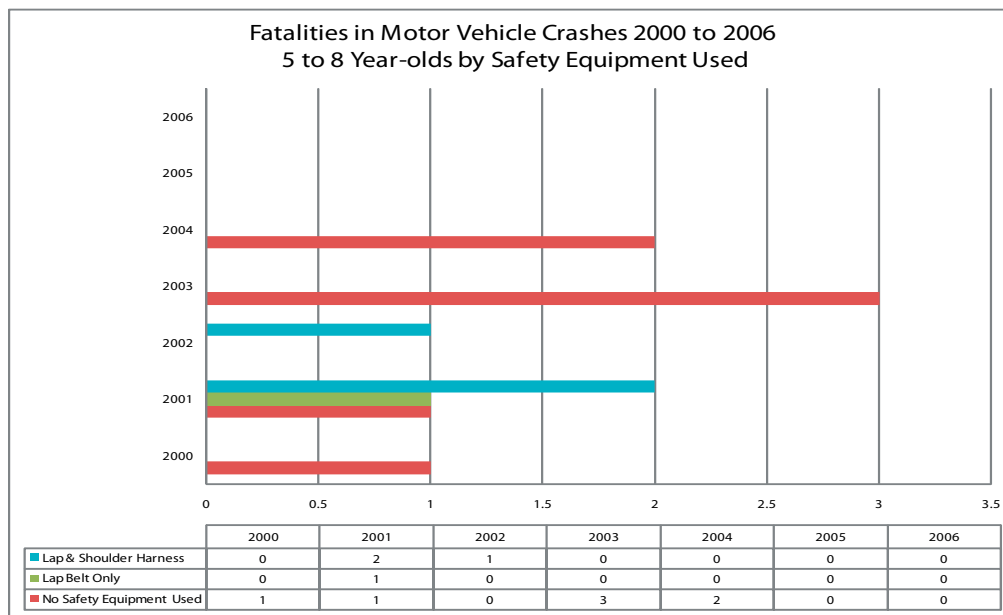
The following chart shows the number of children ages 5 to 8 injured in motor vehicle crashes from 2000 to 2006 in South Dakota. The data show there were 780 children ages 5 to 8

injured in motor vehicle crashes. Of those 780 children who were injured, 5% were using a booster seat properly; 53% were in a lap/shoulder belt; 29% did not use any safety equipment, and 13% were using either a lapbelt only, a shoulder harness only, or it was unknown.

The next chart shows 11 child (ages 5 to 8) fatalities in motor vehicle crashes from 2000 to 2006 in South Dakota. Of those 11 child fatalities, 27% were in a lap/shoulder belt; 64% did not use any safety equipment, and 9% were using only a lapbelt. For this time period there were no child fatalities in a properly used booster seat.



Source: South Dakota Department of Public Safety - Office of Accident Records.



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SD KIDS COUNT Project  
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### The South Dakota KIDS COUNT Project

([www.sdkidscount.org](http://www.sdkidscount.org)) is a national and state-by-state effort, sponsored by the Annie E. Casey Foundation, to track the status of children in the United States. By providing policymakers and citizens with benchmarks of child well-being, KIDS COUNT seeks to enrich local, state, and national discussions concerning ways to secure better futures for children and families. Additional funding for the state project comes from the South Dakota Departments of: Education, Human Services, and Social Services.

### Website Resources:

Child Safety Seat Inspection Station Locator: <http://www.nhtsa.dot.gov/cps/cpsfitting/FindFitting.cfm>

Traffic Safety Center (TSC), The mission of the UC Berkeley Traffic Safety Center is to reduce traffic fatalities and injuries through multidisciplinary collaboration in education, research, and outreach. <http://www.tsc.berkeley.edu/>

National Highway Traffic Safety Administration (NHTSA). <http://www.nhtsa.gov/>

The Center for Child Injury and Prevention Studies (CChIPS) at the Children's Hospital of Philadelphia, works to ensure child safety by facilitating scientific inquiry into child, youth, and young adult injuries and translating these findings into commercial applications and public education programs. [http://stokes.chop.edu/research/centers/child\\_injury\\_prevention\\_studies/](http://stokes.chop.edu/research/centers/child_injury_prevention_studies/)

### Notes:

<sup>1,3</sup> Gantz, Toni (2002) Child Occupant Protection: Current Issues. Oakland, CA: Prevention Institute. Retrieved November 30, 2007, from <http://www.preventioninstitute.org/UITSpubs.html>.

<sup>2,4</sup> Traffic Safety Center, School of Public Health, University of California, Berkeley, Online Newsletter Volume 1, Number 2: December 2002. Retrieved November 20, 2007, from <http://www.tsc.berkeley.edu/links/>.

<sup>5</sup> Insurance Institute for Highway Safety, Highway Loss Data Institute. Retrieved November 30, 2007, from <http://www.iihs.org/laws/restraintoverview.aspx>

<sup>6</sup> National Highway Traffic Safety Administration Retrieved January 30, 2008, from [http://www.nhtsa.dot.gov/people/injury/childps/BoosterSeatLaws\\_OverviewMaps07.pdf](http://www.nhtsa.dot.gov/people/injury/childps/BoosterSeatLaws_OverviewMaps07.pdf)

<sup>7</sup> Traffic Safety Facts. Strengthening Child Passenger Safety Laws. (January 2006) Retrieved November 20, 2007, from <http://www.nhtsa.dot.gov/staticfiles/DOT/NHTSA/Traffic%20Injury%20Control/Articles/Associated%20Files/ChildPassengerSafetyLaws2005.pdf>.

<sup>8</sup> South Dakota Department of Public Safety, Seat Belt Law. Retrieved November 30, 2007, from <http://www.state.sd.us/dps/hs/newlaw.htm>.

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