



Do Laws Make a Difference?

This is one of the most common questions from legislators debating the merits of a law mandating the use of booster seats for children older than 4 years.

With eight years of crash data in the Partners for Child Passenger Safety (PCPS) surveillance system, The Children's Hospital of Philadelphia (CHOP) and State Farm are uniquely positioned to answer that question. "The answer is YES," says Flaura K. Winston, M.D., Ph.D., principal investigator for Partners for Child Passenger Safety and founder of the Center for Injury Research and Prevention at CHOP.

"Mandating booster seats through booster seat laws for children between the ages of 4 and 8 years increases booster seat use. Booster seats are a very effective way to address car crash injury, the leading cause of death and acquired disability for this age group." In the study, children in states that have passed booster seat laws were much more likely to be properly restrained for their age and size at the time of a crash than children in states that have no laws mandating booster seat use.¹

PCPS data from 2005 show that 54 percent of 4- to 8-year-olds were using child restraints, such as car and booster seats, at the time of a crash, but most 7- and 8-year-olds are still using seat belts and are riding at serious risk of injury. *continues on page 3*

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Since we published our first *CPS Issue Report* in July 2004 on belt-positioning booster seats, the Partners for Child Passenger Safety (PCPS) surveillance system continues to generate important data on children in crashes, providing us with current information on how families respond to shifts in traffic-safety policy.

Since 1998, PCPS has been a major research initiative of the alliance between The Children's Hospital of Philadelphia and State Farm, and it is the world's largest study of children in crashes. As of Dec. 31, 2005, more than 455,000 State Farm customers, transporting 669,000 children, had participated in the study. The study includes 29,675 in-depth interviews and more than 800 crash investigations.

With this report, we revisit the topic of booster seats, specifically to provide additional insight related to the effectiveness of legislative interventions to increase age-appropriate restraint use in motor vehicles.

PCPS is uniquely positioned to analyze the effectiveness of booster seat laws because the surveillance system has tracked child safety seat and booster seat use in 16 states since December 1998, predating all booster seat laws. Our study on the effectiveness of booster seat laws was published this month in the journal *Archives of Pediatric and Adolescent Medicine*.

Also published this month, in the journal *Accident Analysis and Prevention*, is a study of PCPS data that looks at the effect of primary and secondary seat belt laws on restraint use among teenagers aged 13 to 15.

We are supporting these papers with this *CPS Issue Report* because of their strong implications for public policy, which should always be based on the latest scientific evidence.

In the past year, several state booster seat bills have been tabled. Lack of available evidence was a common reason. The data contained in this report provides the evidence that laws do work in promoting appropriate, effective child-passenger restraint in automobiles.

We encourage policymakers to use this report and its accompanying legislative fact sheet as an evidence-based guide to direct policy that will save lives and avoid needless injury and disability to our nation's children. "Using Evidence to Close Gaps in Laws" provides the current statistics from PCPS and replaces the previous "4- to 8-year-old" fact sheets.

If you would like to receive future issues of *CPS Issue Report* and other news from the Center for Injury Research and Prevention at CHOP and the alliance between The Children's Hospital of Philadelphia and State Farm, please contact Tracey Hewitt at durhamt@email.chop.edu and provide your mailing and e-mail addresses. Reports also can be downloaded from www.chop.edu/carseat and www.chop.edu/injury.

Sincerely,
The PCPS research team

DATA sources

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Seat Belt Laws

The history of legislation concerning motor vehicle-occupant safety shows that legislative intervention is effective. The first safety belt law went into effect in 1984 in New York. Since then, all states but New Hampshire have enacted some form of a law mandating use of safety belts. These laws have played a critical role in increasing driver safety belt use, contributing to an increase from 14 percent in 1983 to 81 percent in 2006.^{2,3}

Further increases in belt use depend on whether a state has a seat belt law that has a “primary” or “secondary” type of enforcement. Primary enforcement laws allow a law enforcement officer to issue a citation whenever she observes an unbelted driver or passenger. A secondary enforcement seat belt law requires an officer to observe another traffic infraction before being able to issue a citation for not using a seat belt. Research has shown that, on average, the effect of primary enforcement is larger and more consistent than secondary enforcement in increasing use and in decreasing injuries among adult drivers and passengers. Teenage drivers also are more likely to wear seat belts in primary enforcement states.⁴

PCPS examined the effect of primary versus secondary enforcement on the restraint-use patterns of 13- to 15-year-olds. The researchers found that teens in this group were more than twice as likely to ride unrestrained in secondary enforcement states than were their peers in primary enforcement states. (See page 6 for more details on this study.)⁵

Child Restraint Laws

Child passenger safety has come a long way since the first child restraint — a bag with a drawstring that attached to the vehicle seat — was developed in 1898. Early child restraints were designed merely to hold a child in place rather than protect her from injury in a crash. Modern car and booster seats have developed into engineering marvels that reduce a child’s risk of injury to less than 1 percent. For children ages 2 through 6, modern restraints reduce the risk of death by 28 percent compared with seat belts used alone.^{6,7,8}

On Jan. 1, 1978, at the urging of pediatricians led by Robert Sanders, M.D., Tennessee became the first state to require by law the use of safety seats for child passengers. By 1985, all 50 states had enacted some form of a child restraint law, but until recently, the majority of states required safety seats only for children younger than 4 years of age.

A 2001 public policy study analyzed Federal Highway Administration crash data from 1975 to 1994 for all 50 states. The researchers estimated that child restraint laws during this period reduced young-child fatalities by an average of 18 percent, resulting in 1,840 child fatalities that were averted. Furthermore, the larger the age cohorts covered by a child safety seat law, the more lives were saved. Each additional year of age covered lowered fatalities by approximately 5 percent.⁹

In 1999, PCPS data demonstrated that at least 90 percent of children 3 years and younger were using child restraints, implying that legislative and education efforts to increase child restraint use among the youngest children was extremely effective. However, after the fourth birthday, child restraint use dropped dramatically to less than 50 percent for 4-year-olds and to approximately 6 percent for children ages 5 through 8 years.¹⁰

This age group became known as the “forgotten children” to traffic-safety advocates. Child restraint laws did not protect these children, and they also fell through gaps in many state seat belt laws, which required seat belt use only in the front seat.

By 2000, PCPS began to provide advocates with peer-reviewed scientific evidence to support their effort to upgrade 20-year-old state child restraint laws to include booster seat provisions for older children. Through a series of scientific papers published between 2000 and 2004, PCPS findings proved that child safety seats and belt-positioning booster seats provided significant reductions in injury risk compared with seat belts alone for children through 7 years of age.^{11,12} Washington state passed the first booster seat law in late 2000 (enacted in 2002). Since then, 37 other states have followed suit with laws that require child restraints at least until age 6.

PCPS study participants have said that they depend mostly upon state laws and local law enforcement for reliable information about how best to protect their children when transporting them. This attitude has also been found in qualitative focus groups CHOP has conducted for the National Highway Traffic Safety Administration. However, many states’ laws require child restraints only to age 4. “When we transitioned our child to a seat belt, we followed the law, which says the child must be in a car seat up to age 4 and 40 pounds,” says a parent who inappropriately used a seat belt without a booster seat for her school-aged child. “Then the child must be in a seat belt.”¹³ By not including requirements for optimal restraint use according to age, such as car and booster seats, a state law may wrongly imply that seat belts are the safest restraint.

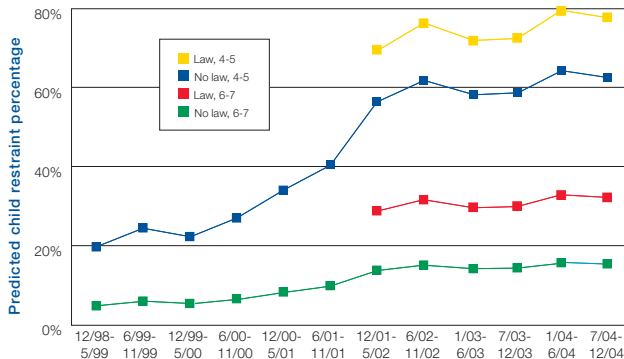


Booster Seat Laws Increase Restraint Use

Children ages 4 through 7 years in states with booster seat laws are 39 percent more likely to be appropriately restrained in a booster seat or child safety seat than children in states without such laws. In states with booster seat laws, children ages 4 to 5 years were 23 percent more likely to be appropriately restrained while those ages 6 to 7 years were twice as likely to be in child restraints such as booster seats than they were in states without booster seat laws. For 6- to 7-year-olds, the effect was much stronger when the law included those 4 through 7 years than when it only included those age 4 to 5 years.¹⁴



Effect of Booster Laws on Child Restraint Use Among 4- to 7-year-olds



These results, published in the *Archives of Pediatric and Adolescent Medicine* in March 2007, quantify the strong independent effect of booster seat laws on increases in appropriate restraint use by children ages 4 through 7 years.

“We strongly recommend that the remaining 12 states, those with outdated child restraint laws, upgrade their restraint laws to include a booster seat provision for older children through at least 8 years,” states Flauro K. Winston, M.D., Ph.D., lead author of the study. “Booster seats are quickly becoming the accepted norm among families as parents learn the importance and purpose of booster seats through the promotion of these laws.”

This cross-sectional study of children aged 4 through 7 years included information on 6,102 children in 5,198 vehicles. The data comes from 16 states and Washington, D.C.,

between Dec. 1, 1998, and Dec. 31, 2004. At the beginning of this study, no states had booster seat provisions in their occupant restraint laws. From 2002 until June 1, 2004, seven of the participating PCPS states and Washington, D.C., had passed booster seat laws. Nine PCPS states had not implemented a booster seat law by June 1, 2004.

During the study period (1999 to 2004), PCPS saw large increases in appropriate restraint use among study participants. Restraint use among children 4 to 5 years increased from 22 percent to 75 percent, while child restraint use among 6- to 7-year-olds increased from 3 percent to 23 percent.

Previously published research from the PCPS study demonstrated that the use of booster seats decreases the risk of injury by 59 percent as compared to seat belts used alone for children ages 4 through age 7.¹⁵ In addition, child restraint systems including booster seats reduce the risk of death to children ages 2 to 6 years by 28 percent, compared with seat belts alone.¹⁶

Cost-outcome Analysis

A study published in the November 2006 issue of the journal *Pediatrics* found that booster seats offer a sound return on investment to society and recommended that laws be passed, publicized and enforced nationwide. Specifically, the researchers found that if you include all the costs of booster seats, from the retail price of a seat to costs related to mandating their use, booster seat laws still offer a return on investment for society of 8.6 to 1. This benefit is due to savings from booster seat use, realized in injuries averted or reduced, outweighing the costs.¹⁷

The Positive Effect of Primary Belt Laws on Teens

When it comes to teen passengers buckling up, children ages 13 to 15 are more than twice as likely to ride unrestrained in secondary enforcement states than are their peers in primary enforcement states. (See page 6 for more details on this study.)⁵

Age and restraint use of the driver is associated with the restraint use of 13- to 15-year-olds, suggesting that these teens may mimic the drivers' behavior. Still, primary-enforcement belt laws have an effect on belt use for pre-driving teens independent of the effects of driver belt use.

“These results provide further evidence to state and federal policymakers for the need to upgrade laws, even in states with relatively high baseline restraint-use rates,” says Dennis

Durbin, M.D., M.S.C.E., the study's lead author and a pediatric emergency physician at The Children's Hospital of Philadelphia. “Primary belt laws establish regular belt-use patterns among this adolescent age group that could carry over to when they become new drivers — the highest risk period they will ever face as occupants of motor vehicles.”

PCPS collects data from 16 states and Washington, D.C., which have a mix of primary and secondary belt laws. Four of the states transitioned from secondary to primary law status over the course of the study period (Dec. 1, 1998, through Dec. 31, 2004). Researchers analyzed data of 5,372 children ages 13 to 15 years old.

Using Evidence to Close Gaps In Laws

Good Policy Protects Child Passengers

Partners for
Child Passenger Safety

State Farm Insurance Companies
The Children's Hospital of Philadelphia
Neighbors working together



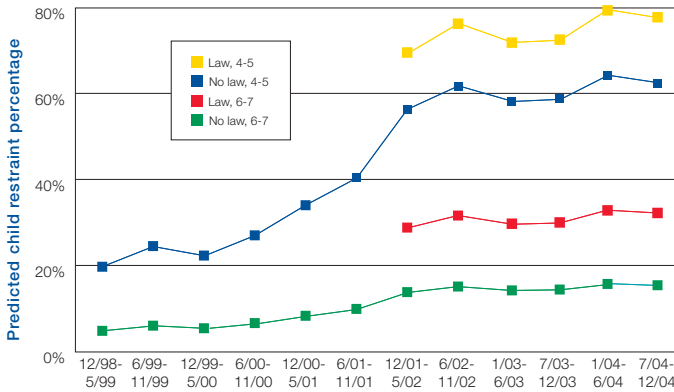
THREE STEPS to Optimizing Child-Passenger Safety Laws

Optimal occupant restraint laws need to include three provisions in order to be sure that all children are as well-protected as possible when riding in motor vehicles: child restraint use to at least age 8, seat belt use for all other passengers and rear seating for children to age 13.

STEP ONE:

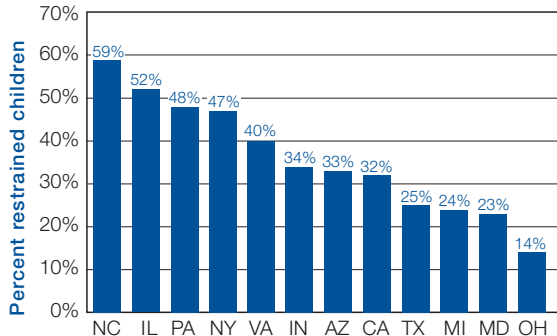
Upgrade child restraint laws to include children through 8 years. These laws are proven effective at getting children into age- and size-appropriate restraints that are effective in reducing risk of injury and death over seat belts alone.

Effect of Booster Laws on Child Restraint Use Among 4- to 7-year-olds



- Children ages 4 through 7 years in states with booster seat laws are 39 percent more likely to be appropriately restrained in a booster seat or child safety seat than children in states without such laws.
- Six- to 7-year-olds were much more likely to be appropriately restrained if the law included 4- through 7-year-olds, rather than only 4- to 5-year-olds.

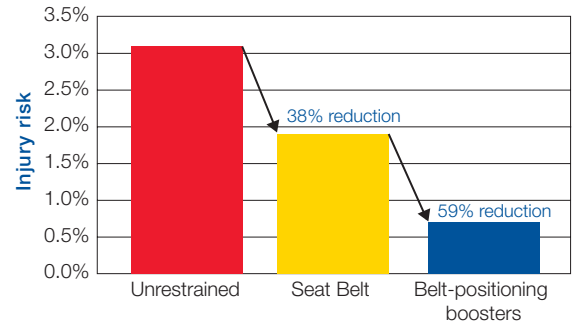
Booster Seat Use by State, 4 to 8 years: 2005



- Overall, 36 percent of children ages 4 to 8 are riding in booster seats.
- Three of the four states with the lowest booster seat use — Ohio, Michigan and Texas — do not have booster seat laws.
- The states with the higher booster seat use — North Carolina, Illinois and Pennsylvania — have booster laws through 7 years.

Source: PCPS data 2005

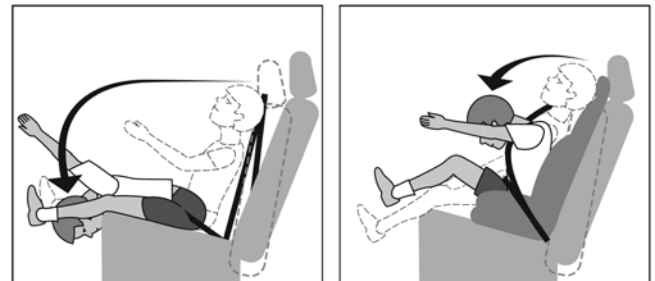
Effectiveness of Belt-positioning Booster Seats in Preventing Injuries to 4- to 8-year-olds



- Belt-positioning boosters are effective for children ages 4 through at least 7 years.
- Using a booster seat with a seat belt instead of using a seat belt alone for a child this age reduces the risk of injury by 59 percent.
- Child restraints, such as car seats and booster seats, reduce the risk of death by 28 percent for children ages 2 to 6 years, as compared with seat belts used alone.

Sources: JAMA, June 4, 2003; Archives of Pediatric and Adolescent Medicine, June 2006

6-year-old in 35 mile per hour frontal crash



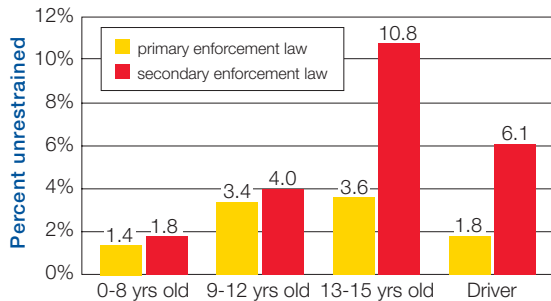
First figure: While any restraint is better than none, a seat belt that does not fit properly can cause severe head, spine and abdominal injuries in a crash. Second figure: The booster seat corrects the fit of the seat belt on the child, reducing the risk of these types of injuries.



STEP TWO

Upgrade laws to include primary seat belt laws in all seating positions. Research has shown that primary belt laws are more effective at getting adults and teens into seat belts than secondary laws. Children are more likely to be properly restrained for their age and size if the driver is buckled up.

Belt Use Among Children Ages 13-15 Years



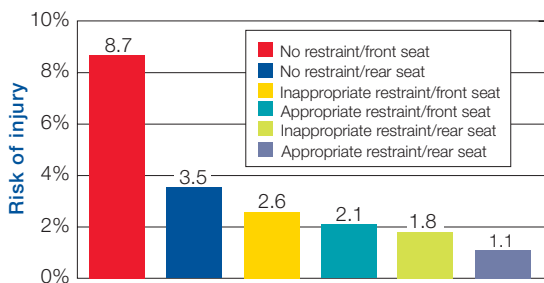
Children ages 13 through 15 years are more than twice as likely to be *unrestrained* in a secondary enforcement state as compared with a primary enforcement state.

Source: Accident Analysis and Prevention, *In press, available online*

STEP THREE:

Include rear-seat requirements for children 12 years old and younger. Children are at a greater risk of injury in the front seat than in the rear seat. By restraining children (newborn to 12 years old) in the rear seat, you reduce their risk of injury in a crash by 38 percent.

Risk of Child Injury by Seat Row and Restraint Type



- Across all age groups, injury risk is lowest (less than 2 percent) when children are restrained in the age-appropriate restraint in the rear seat.
- For every restraint type, there was a higher risk of injury in the front seat than the rear seat.

Source: Pediatrics, March 2005

What is Partners for Child Passenger Safety (PCPS)?

PCPS is a research alliance between The Children's Hospital of Philadelphia and State Farm. Created in 1998, PCPS is the world's largest study of newborns to children age 16 involved in motor vehicle crashes. Data is being collected in Ariz., Calif., Del., Ill., Ind., Md., Mich., Nev., N.Y., N.C., Ohio, Pa., Texas, Va., W.Va. and Washington, D.C. As of Dec. 31, 2005, more than 455,000 State Farm customers, transporting 669,000 children, had participated in the study. PCPS conducted 29,675 in-depth interviews and more than 800 crash investigations.

Frequently Asked Questions

What is a booster seat law?

It is a state law to protect older children by requiring them to ride in a belt-positioning booster seat beyond age 4.

Do belt-positioning boosters really work?

Yes. Booster seats reduce a child's risk of injury in a crash to less than 1 percent by correcting the fit of an adult seat belt across a child who is less than 4 feet, 9 inches tall.

How much do booster seats cost?

Booster seats can cost less than \$20. Private- and state-funded free or low-cost distribution programs are available.

Where can you buy a booster seat?

Booster seats are available at department, discount and child specialty stores, as well as on the Internet.

Child Passenger Safety Internet Resources

Learn the basics of child passenger safety and watch videos showing correct installation of car seats at www.chop.edu/carseat.

For information on state child restraint and seat belt laws, visit www.saferoads.org.





for your family

Partners for Child Passenger Safety

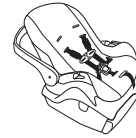
Protect my children on every trip

This sheet can be filled out by a parent, child passenger safety technician or physician and then shared with the drivers who transport your children. Download it again and again from www.chop.edu/carseat.

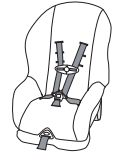
Use the proper restraint for each child's age and size

- Keep your baby in a rear-facing seat until she is at least 1 year old and at least 20 pounds. Never place a rear-facing infant seat in the front seat with an active airbag.
- Use a forward-facing seat with a harness after your child has outgrown her rear-facing seat and she is at least 20 pounds and 1 year of age. She should stay in this seat until she weighs approximately 40 pounds or her ears reach the top of the seat.
- Use a booster seat when she has outgrown the forward-facing seat. Be sure to check the height and weight limits for the seat you own. Your child needs to use a booster seat from about 4 to at least 8 years old or until she reaches about 4 feet, 9 inches.
- Keep her in a booster seat until the adult lap-and-shoulder belt fits properly. The shoulder belt should lie across the chest between the neck and arm and the lap belt must be across the upper thighs, not the soft stomach.
- An adult lap-and-shoulder belt can be used when your child is tall enough (usually about 4 feet, 9 inches) to sit against the back of the car's seat with her legs bent at the knees and feet hanging down.

Types of Restraints



Infant seat with base



Convertible seat



3 in 1 convertible



High-back booster



Backless booster



Lap/shoulder seat belt

Here's where the children sit.

(child's name)	(child's name)	(child's name)
(restraint type)	(restraint type)	(restraint type)
(child's name)	(child's name)	(child's name)
(restraint type)	(restraint type)	(restraint type)
(child's name)	(child's name)	(child's name)
(restraint type)	(restraint type)	(restraint type)

Driver You are a role model. Always wear a seat belt.

www.chop.edu/carseat

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 - ▶ Effectiveness of booster seat laws
- Legislating restraint use
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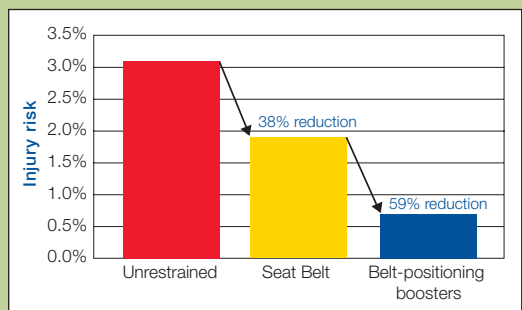
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CPS Issue Report

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Evidence-based educational resources from Partners for Child Passenger Safety are available for free download from www.chop.edu/injury.



Graph showing the effectiveness of belt-positioning booster seats in preventing injuries to 4- to 8-year-olds

Legislative fact sheet

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Graphics showing proper car seat restraint