

# Partners for Child Passenger Safety

## Fact and Trend Report | September 2008



### In this report:

1. Background: Child Restraint Laws in PCPS States	Page 3
2. Restraint Use and Seating	Page 3
3. People and Injuries	Page 7
4. Crash Circumstances and Injuries	Page 8
5. Study Design	Page 11
6. About the Data	Page 11
7. Definitions	Page 11



The Children's Hospital *of* Philadelphia®

Hope lives here.



Partners for  
Child Passenger Safety

# 2008 Fact and Trend Report

The *2008 Partners for Child Passenger Safety (PCPS) Fact and Trend Report*, the fourth in a series providing current data about children involved in U.S. motor vehicle crashes and the injuries suffered in these crashes, includes important new data on LATCH and tether use. It also summarizes some of the important research conducted by PCPS since its inception in 1997.

The world's largest study of children in crashes, PCPS was a research partnership between The Children's Hospital of Philadelphia and State Farm Insurance Companies®. As of Dec. 31, 2007, more than 875,000 children involved in 600,000 crashes reported to State Farm had participated in the study. State Farm concluded its subject enrollment for the child crash surveillance system on Nov. 30, 2007. (See page 11 for information about study design, data and definitions of technical terminology.)

CHOP's research teams continue to analyze the PCPS data, which will remain relevant for several years. These analyses will be shared with industry, regulators, policymakers, public health educators and the media through scientific publication and translational outreach. The Center's child passenger safety research also continues to focus on biomechanics and behavioral science sponsored by other private, state and national funding sources.

CHOP would like to thank State Farm for its remarkable vision and commitment to child passenger safety research. Since PCPS began in 1998, more than 2,000 fewer children have died in crashes, and thousands more have been spared serious injury. This is due to advancements in legislation, public education, and vehicle and restraint system design resulting in part from information generated by this project.

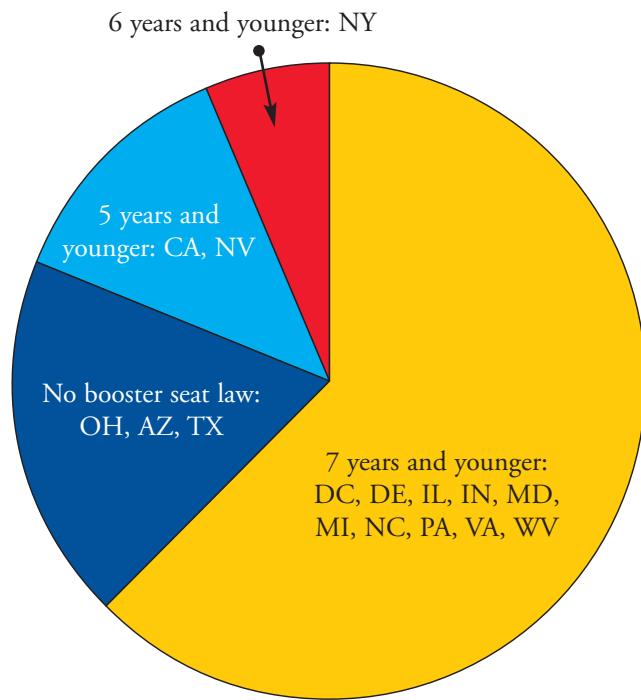
This year's report was published with the generous support of the Association of International Automobile Manufacturers (AIAM).

Please contact Tracey Hewitt ([durhamt@email.chop.edu](mailto:durhamt@email.chop.edu)) with any questions about the uses and/or interpretation of the data.



## 1. BACKGROUND

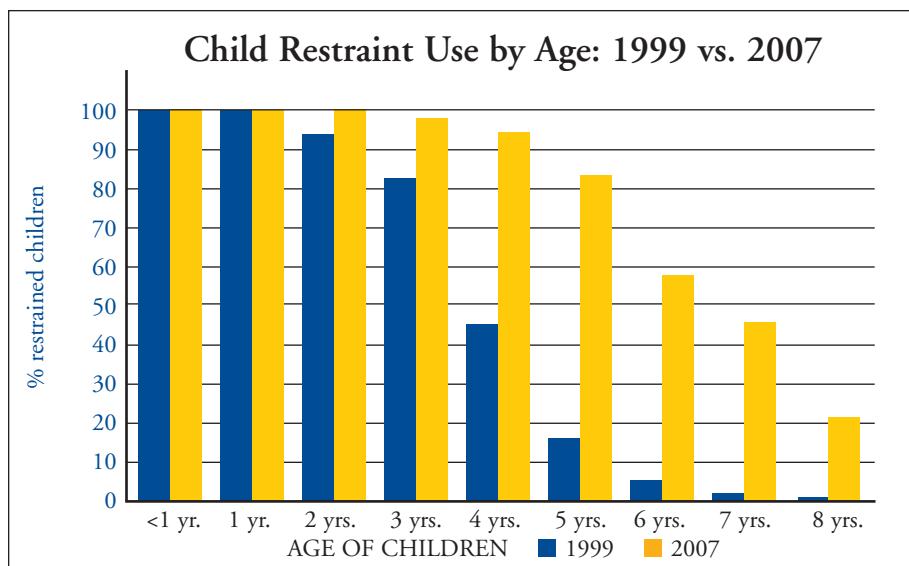
### Child Restraint Laws in states involved in PCPS study as of June 2008



- The 16 states listed in the chart are those in which PCPS collected data on children in crashes from 1998 through 2007. Read more about the study design on page 11.
- States that *do not* require child restraints to at least age 6 are not considered to have a booster seat law.
- Detailed information and updates on child restraint laws are available on the Insurance Institute for Highway Safety's Web site: [www.hwysafety.org](http://www.hwysafety.org).

AZ - Arizona	NC - North Carolina
CA - California	NV - Nevada
DC - District of Columbia	NY - New York
DE - Delaware	OH - Ohio
IL - Illinois	PA - Pennsylvania
IN - Indiana	TX - Texas
MD - Maryland	VA - Virginia
MI - Michigan	WV - West Virginia

## 2. RESTRAINT USE AND SEATING

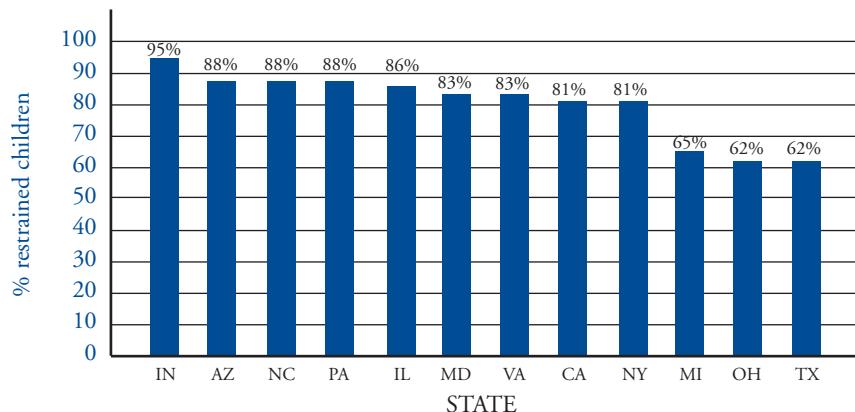


- This graph reports the percentage of restrained children riding in any type of child restraint system (CRS) in 1999 vs. 2007.
- Child restraint use for children through age 8 has increased to 80 percent in 2007 from 51 percent in 1999.
- Child restraint use for 4- to 8-year-olds has increased to 63 percent in 2007 from 15 percent in 1999.

Until reaching 4 feet, 9 inches in height, all children younger than age 9 should ride in a child restraint.

According to PCPS: Children ages 2 to 6 placed in child restraints were 28 percent less likely to be killed in a crash than children restrained in seat belts alone. (*Archives of Pediatric Medicine*, June 2006.)

### Child Restraint Use by State, 0 to 8 years: 2007

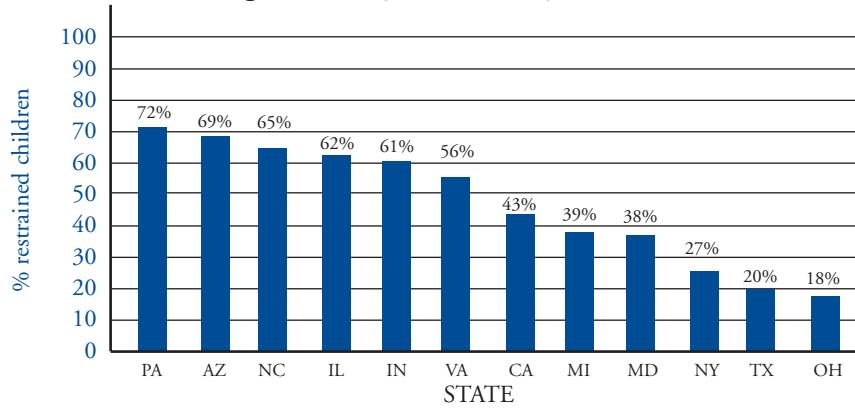


- Among PCPS participants, 99 percent of children ages 0-3 were in child restraints.
- Only 63 percent of restrained children ages 4 to 8 were riding in any child restraints, leaving 37 percent riding in adult seat belts.
- Data samples for Delaware, the District of Columbia, Nevada and West Virginia were too small to include.

According to PCPS: Children aged 4 to 7 years in states with booster seat laws were 39 percent more likely to be reported as appropriately restrained than were children in other states.

*(Archives of Pediatric and Adolescent Medicine, March 2007.)*

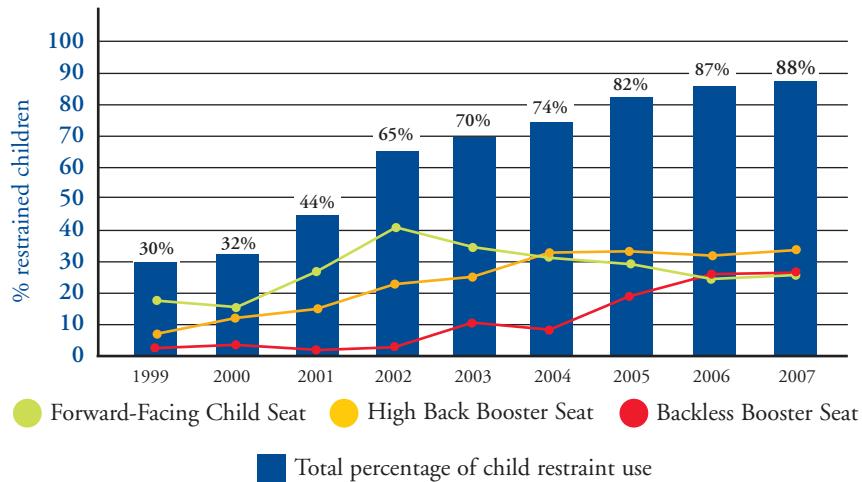
### Belt-positioning Booster Seat Use Among 4- to 8-year-olds by State: 2007



- Overall, 46 percent of 4- to 8-year-olds are riding in belt-positioning booster seats.
- The two states with the lowest booster seat use, Ohio and Texas, do not have booster seat laws.
- Two of the five states with the highest booster seat use, Pennsylvania and Illinois, have booster seat laws through age 7.
- Data samples for Delaware, the District of Columbia, Nevada and West Virginia were too small to include.

According to PCPS: Booster seat use decreases the risk of injury by 59 percent in children ages 4 to 7, as compared to seat belts alone. (*The Journal of the American Medical Association*, June 2003.)

### Changes in Use of Child Restraints: 1999-2007 (4- to 5-year-old children)



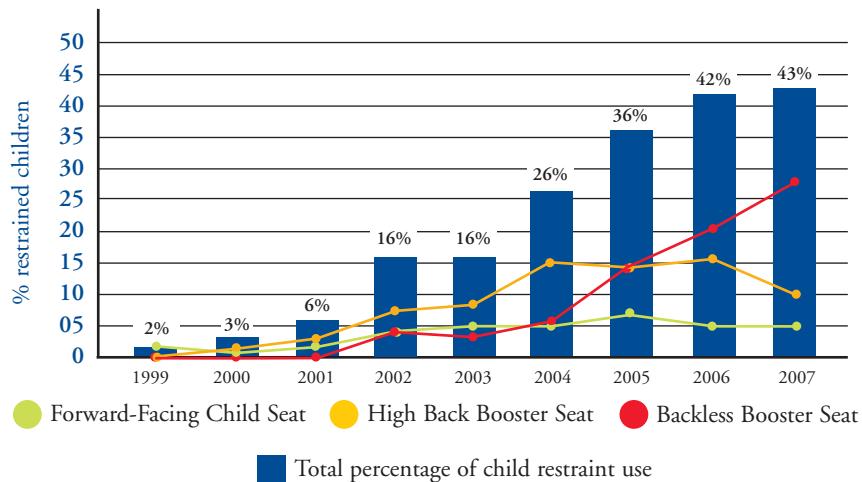
- Overall, 88% of 4- to 5-year-old children were appropriately restrained in harness-based child restraints or booster seats in 2007, a nearly three-fold increase from 1999.

- In 1999, 65% of appropriately restrained 4- to 5-year-old children were using a harness-based CRS but, by 2007, a larger proportion of 4- to 5-year-olds were in booster seats, with 38% and 31% in high back and backless belt positioning boosters, respectively.

Only 31% of appropriately restrained 4- to 5-year-old children were using harness-based CRS in 2007.

According to PCPS: This analysis on older children in booster seats confirmed a reduction in injury risk for children ages 4 to 8 years in belt positioning booster seats over similar aged children in seat belts.  
(Effectiveness of Booster Seats: an Updated Assessment, 2008)

### Changes in Use of Child Restraints: 1999-2007 (6- to 8-year-old children)



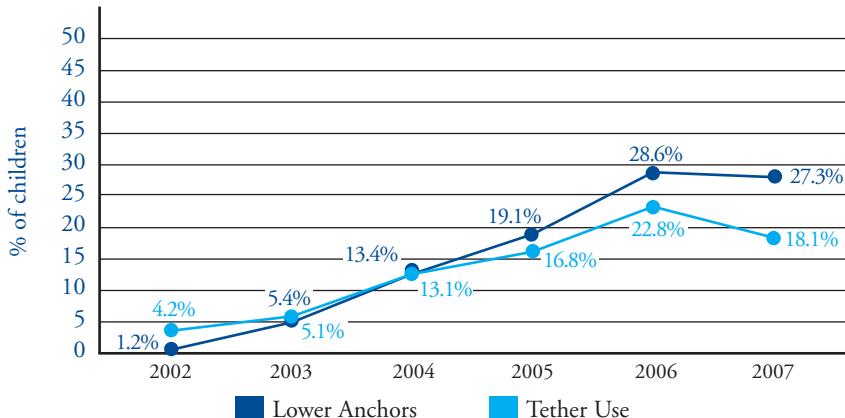
- 6- to 8-year-old children saw the largest increase in appropriate restraint use from 2% in 1999 to 43% in 2007.

- By 2007, the appropriately restrained 6- to 8-year-old children were primarily in booster seats, 23% and 64% in high back and backless booster seats, respectively.

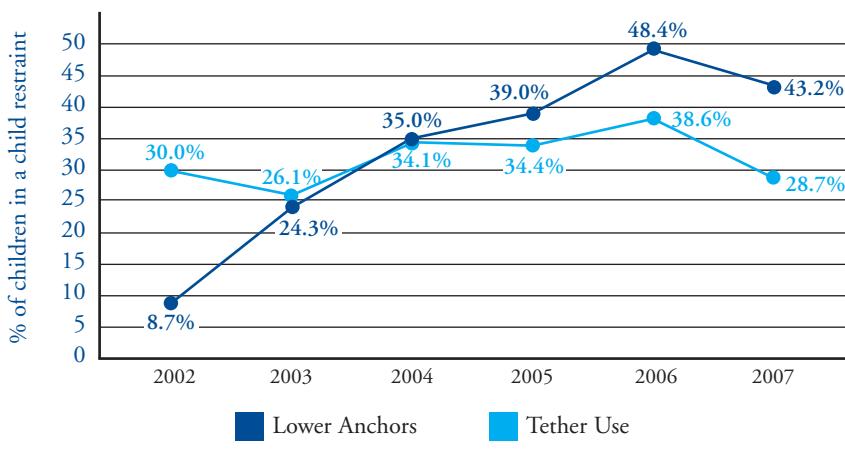
- More than half of 6- to 8-year-old children remain inappropriately restrained in 2007, according to American Academy of Pediatrics (AAP) and National Highway Traffic Safety Administration (NHTSA) recommendations.

\* Please note: Both graphs on this page are limited to restrained children only due to small numbers of unrestrained children in the study sample.

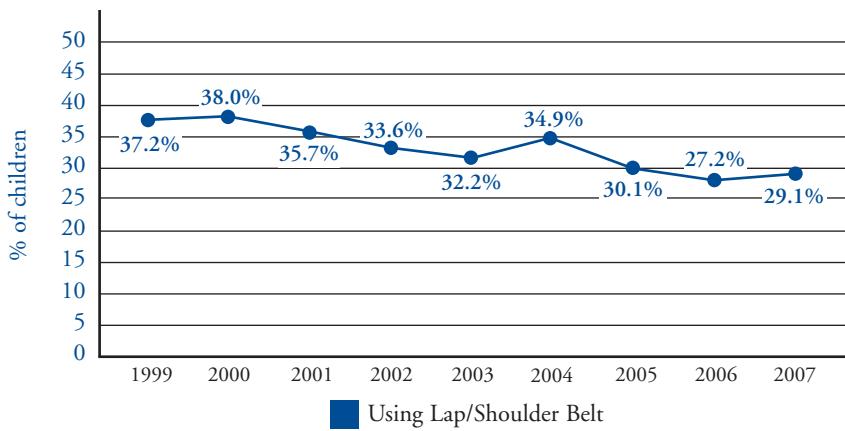
### LATCH Use for All Vehicles in PCPS study: 2002-2007



### LATCH Use for LATCH-equipped Vehicles Only



### Restrained 8- to 12-year-olds Riding in the Front Seat: 1999-2007



- In 2007, more people used lower anchors than tethers.
- The majority of families using child restraints have not adopted LATCH technology. This may be related to the willingness or ability to purchase a LATCH equipped child restraint and/or vehicle.

- In 2007, only 43 percent of all children using child restraints in LATCH-equipped vehicles used the lower anchors of the LATCH attachment system.

- Since 2002, vehicles and child restraints have been required to include the LATCH system. Although child restraints may be attached to vehicle seats with either seat belts or the LATCH system, the LATCH system is intended to make it easier to secure a child restraint to the vehicle seat.

- Although the AAP recommends all children under age 13 sit in the rear seat, approximately one-third of 8- to 12-year-olds are still riding in the front seat.

- For 8- to 12-year-olds riding in both the front and rear seats, the injury rate is 1.5 percent for belted children compared with 2.0 percent for unbelted children.

According to PCPS: The message for families is that children are much safer riding in the rear seat in an age and size appropriate restraint.  
(CPS Issue Report, May 2005.)

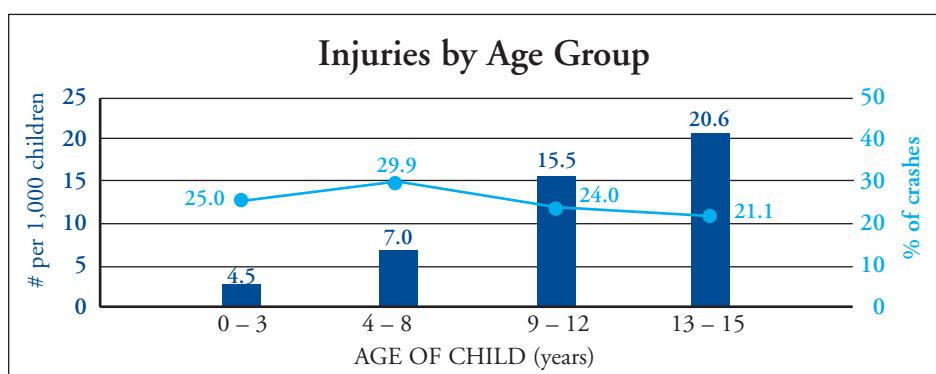
## EXPLANATORY NOTE

The bar graphs in sections 3 and 4 show the number of injuries per 1,000 children under various circumstances and driver characteristics. The percentage of crashes in which these circumstances occurred is provided by the data line.

The data include only clinically significant injuries — concussions and more serious brain injuries, skull fractures, facial bone fractures, spinal fractures and spinal cord injuries, injuries to internal organs, rib fractures and fractures of extremities. The data exclude cuts, bumps, bruises and burns.

## 3. PEOPLE AND INJURIES 2007

All injuries are per 1,000 children involved in crashes.

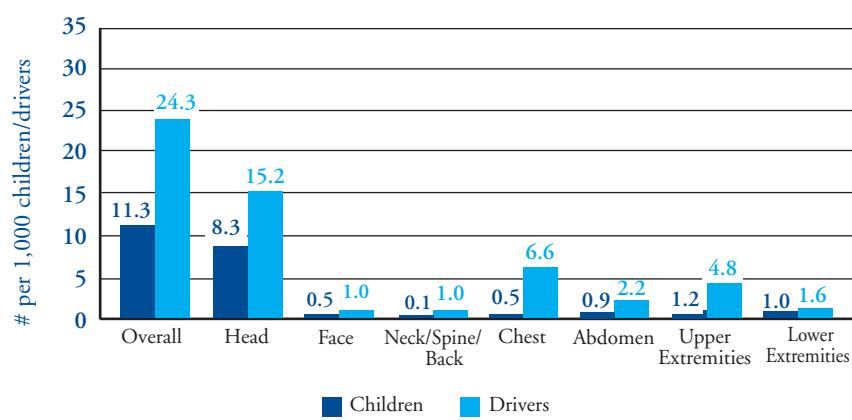


- As children age, their risk of injury in a crash rises. This is due in part to the different ways in which they are restrained at each age, where they sit and other crash characteristics.
- While the burden of injury is highest for 13- to 15-year-olds, the percent of crashes is fairly uniformly spread across all age groups.

According to PCPS: 13- to 15-year-olds were more than twice as likely to be unrestrained in a secondary enforcement state as compared to a primary enforcement state after controlling for driver's age and restraint status and the seating row of the occupant.

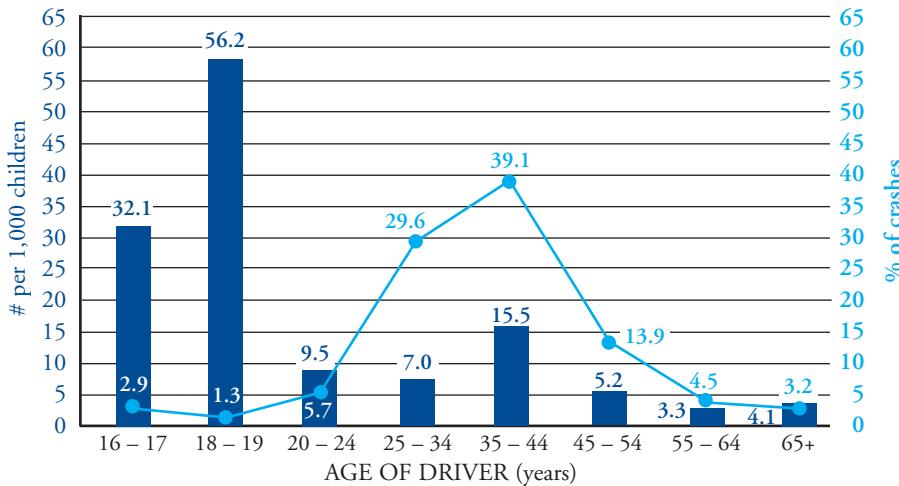
(*Accident Analysis and Prevention*, May 2007.)

## Injuries by Body Region: Children and Drivers



- The overall risk of injury per 1,000 children in crashes was 11.3, approximately half the risk for drivers (24.3 per 1,000).
- Head injury was the most common injury for both children and drivers.
- Seventy-two percent of the drivers were women.
- In 59 percent of the crashes only one child passenger was involved.

### Injuries and Driver's Age



- Children have a much higher risk of injury (39.4 per 1,000) if driven by someone younger than age 20. The risk is reduced to 10.1 per 1,000 if the driver is older than age 20.
- Although only 4.2 percent of crashes involve a 16- to 19-year-old driver, child passengers in these crashes are nearly four times more likely to be injured than if driven by someone age 20 or older.

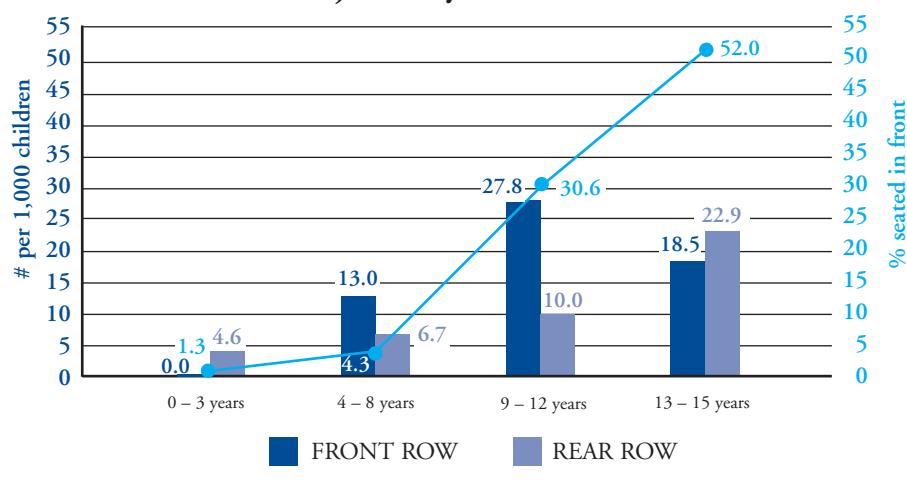
According to PCPS: The excess risk of injury to child passengers in teen driver crashes can be primarily explained by the more serious crashes those teen drivers incurred. Graduated driver licensing laws may be further enhanced to better protect child passengers from the excess injury risk associated with teen crashes.

*(Injury Prevention, February 2005.)*

### 4. CRASH CIRCUMSTANCES AND INJURIES: 2007

All injuries are per 1,000 children involved in crashes.

### Injuries by Seat Row

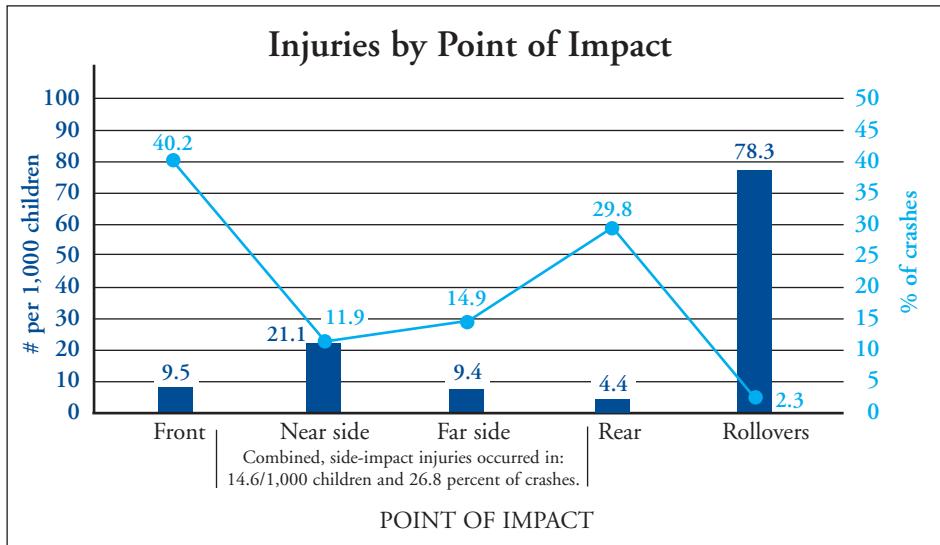


- The older the child, the more likely to sit in the front seat.
- Although experts recommend all passengers under age 13 ride in the rear seat, 45 percent of those riding in the front seat are age 12 or younger.

According to PCPS: Across all age groups of children through age 15, those in the front seat were 40 percent more likely to be injured compared to rear-seated children. For appropriately restrained 13- to 15-year-olds, there was no additional risk when they were seated in the front row as compared to the rear rows.

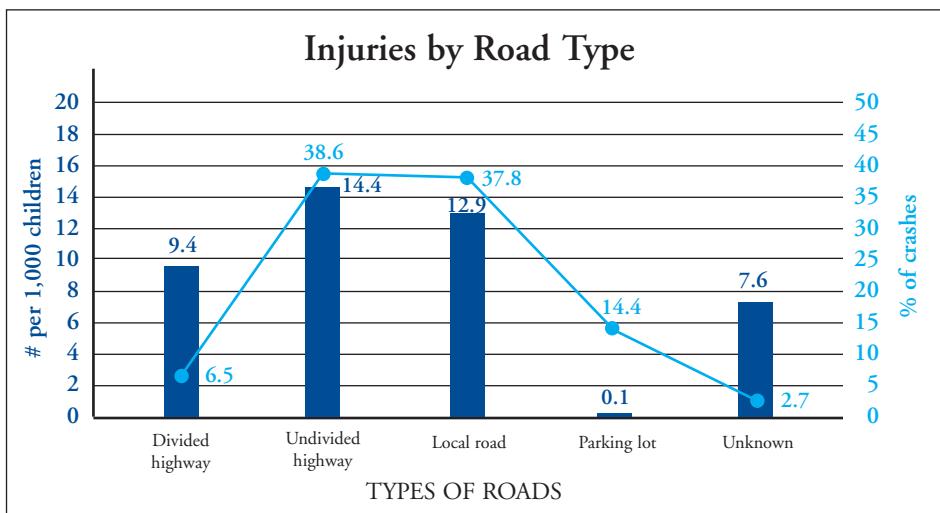
*(Pediatrics, March 2005.)*

All injuries are per 1,000 children involved in crashes.



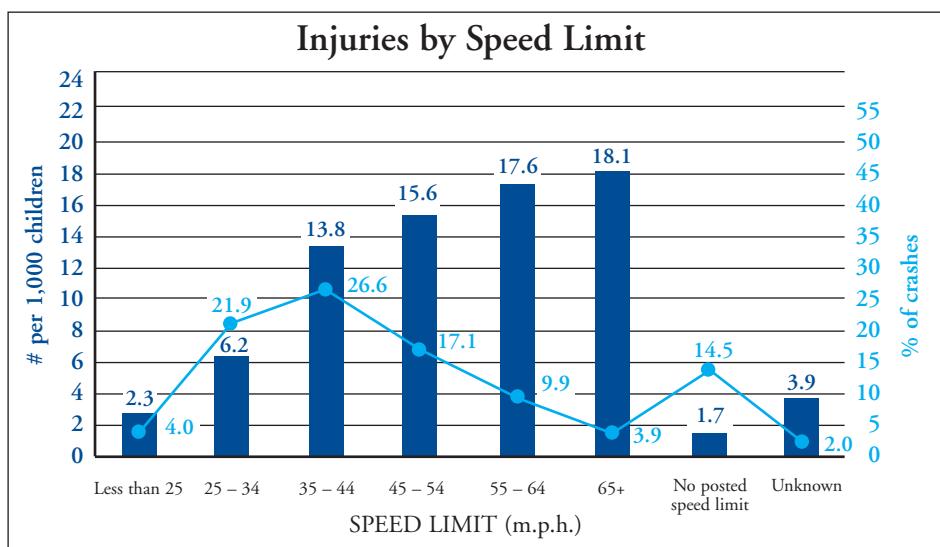
- Frontal impact crashes are the most common at 40.2 percent.
- Although only 2.3 percent of all crashes involve rollovers, they have the highest risk of injury at 78.3 per 1,000 children.

According to PCPS: Children in belt positioning boosters were at a 58 percent reduction in risk of injury than those in seat belts in side impact crashes. (*Annual Proceedings of the Association for the Advancement of Automotive Medicine*, 2005.)



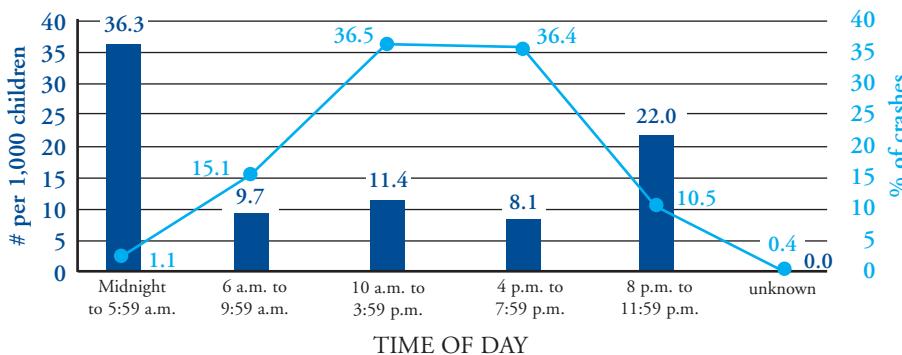
- More than three-fourths of crashes occur on either local roads or undivided highways. These road types are associated with the highest risk of injury for children.

Note: A divided highway is one in which opposing traffic lanes are separated by grass, a raised median strip or a barrier. Lanes separated by painted medians or a continuous left turning lane are not considered divided.



- Only 14 percent of crashes happen on roads with a posted speed limit of 55 m.p.h. or higher, however they result in the highest rate of injury.
- Nearly half (48 percent) of crashes involving children occur on roads with posted speed limits of 25 to 44 m.p.h.

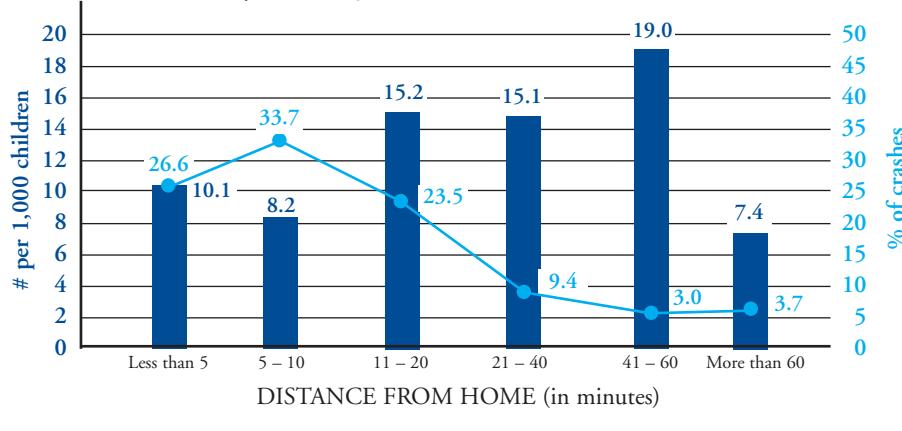
### Injuries by Time of Day



- While only 11.6 percent of crashes occur between 8 p.m. and 5:59 a.m., this time period is the most dangerous for children, with an average injury rate of 23.3 per 1,000 children.

According to PCPS: Some situational characteristics of trips, such as time of day and number of passengers, were associated with inappropriate restraint and front row seating behaviors of young children. Educational initiatives should aim to increase parents' awareness of the potential crash risk of everyday trips.  
(*Injury Prevention*, August 2005.)

### Injuries by Distance from Home



- More than 60 percent of crashes involving children occur 10 minutes from home or less.
- Nearly one-quarter of all crashes happen 11 to 20 minutes from home.

## 5. STUDY DESIGN

From 1998 through 2007, Partners for Child Passenger Safety existed as a research partnership of The Children's Hospital of Philadelphia and State Farm Insurance Companies®. State Farm-insured children younger than age 16, riding in a model year 1990 or newer vehicle that had been involved in a crash, were eligible to be included in the study. Consenting State Farm Automobile Insurance policyholders provided their crash information.

The data included were from the District of Columbia and 16 states: Arizona, California, Delaware, Illinois, Indiana, Maryland, Michigan, Nevada, New Jersey (through November 2001), New York, North Carolina, Ohio, Pennsylvania, Texas (since June 2003), Virginia and West Virginia.

A stratified cluster sample was used to select vehicles involved in crashes for inclusion in the study. Vehicles containing children who received medical treatment are over-sampled so that the majority of those injured were selected while still representing the overall population. Those who were selected and agreed to participate took part in a 30-minute telephone interview designed to give researchers a comprehensive picture of the characteristics of the crash, as well as the severity of the injuries. On-site crash investigations provide further information on injury mechanisms.

As of Dec. 31, 2007, more than 600,000 State Farm customers had participated in the study. The crashes represented in the study involved more than 875,000 children. Included were more than 33,000 in-depth interviews and more than 800 crash investigations.

## 6. ABOUT THE DATA

- The data are from Jan. 1, 2007 to Nov. 30, 2007, unless otherwise noted.
- Trend graphs cover nine years of the study through Nov. 30, 2007.
- Child restraint use is presented by the age of the child and not by optimal restraint as defined by the American Academy of Pediatrics (see Definitions).
- All children in the PCPS study were involved in crashes.
- The data are from an insured population; uninsured drivers may have different practices.

## 7. DEFINITIONS

**Divided Highway** – One in which opposing traffic lanes are separated by grass or a raised median strip or a barrier. Lanes that are separated only by painted medians or a continuous left turning lane are not considered divided.

**Far-side crash** – A side-impact crash in which a child sits on the opposite side from the impact.

**LATCH** – An acronym for “Lower Anchors and Tethers for Children.” It refers to the child restraint anchorage system for vehicles specified in the Code of Federal Regulations Standard 225 and the corresponding top tethers and lower attachment for a child restraint system identified in Standard 213.

**Near-side crash** – A side-impact crash in which a child sits on the same side as the impact.

**Optimal restraint** – The American Academy of Pediatrics set the following guidelines as best child restraint practices:

- Use a rear-facing seat until a child is at least 1-year-old and at least 20 pounds.
- Use a forward-facing seat with a harness until a child is too tall or too heavy for the seat. Generally, this is when a child weighs 40 pounds (usually around age 4).
- Use a belt-positioning booster seat until an adult seat belt fits (usually when a child's height reaches 4 feet 9 inches).
- For a child too big for a booster seat, use the lap-and-shoulder seat belt (usually older than age 8).
- All children 12 years and younger should sit in the back seat.

**Primary enforcement law** – An officer can pull over and ticket a driver for non-compliance with a particular law.

**Secondary enforcement law** – An officer may issue a ticket for non-compliance to a law only after stopping the vehicle for another traffic infraction.

**Side-impact standard** – All passenger cars are required to comply with Standard 214 concerning side-impact protection. Currently, this standard applies to all passenger vehicles. The standards were phased into the U.S. fleet beginning in 1994, with full compliance required by 1999.



## Keeping Kids Safe During Crashes

[www.chop.edu/carseat](http://www.chop.edu/carseat)

[www.chop.edu/asientos\\_infantiles](http://www.chop.edu/asientos_infantiles)

Information on child passenger safety and videos on child safety seat installation in both English and Spanish.

The results in this report are the interpretation solely of the Partners for Child Passenger Safety research team at The Children's Hospital of Philadelphia and are not necessarily the views of State Farm Insurance Companies® or the Association of International Automobile Manufacturers.



The Association of International Automobile Manufacturers (AIAM) member companies include American Honda Motor Co., American Suzuki Motor Corp., Aston Martin Lagonda of North America, Inc., Ferrari North America, Inc., Hyundai Motor America, Isuzu Motors America, Inc., Kia Motors America, Maserati North America, Inc., Mitsubishi Motors North America, Inc., Nissan North America, Inc., Peugeot Motors of America, Renault SA, Subaru of America and Toyota Motor North America, Inc. AIAM also represents original equipment suppliers and other automotive-related trade associations. For more information, please visit our website at [www.aiam.org](http://www.aiam.org).



The Children's Hospital of Philadelphia®

Hope lives here.

Founded in 1855, The Children's Hospital of Philadelphia is the birthplace of pediatric medicine in America. Throughout its history, a passionate spirit of innovation has driven this renowned institution to pursue scientific discovery, establish the highest standards of patient care and train future leaders in pediatrics. For a century and a half, Children's Hospital has served as a haven of hope for children and families worldwide.

The Children's Hospital of Philadelphia, the CH logo, the XC logo and Kids First are registered marks of The Children's Hospital of Philadelphia.

©2008 The Children's Hospital of Philadelphia, All Rights Reserved.