

STATUS REPORT

INSURANCE INSTITUTE
FOR HIGHWAY SAFETY

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WHICH BOOSTER IS BEST FOR ME?

New ratings from the Institute take the guesswork out of selecting boosters most likely to provide good lap and shoulder belt fit in a range of vehicles. The Institute rates 9 belt-positioning boosters as *BEST BETS* and 6 as *GOOD BETS* out of 60 models examined in a new round of evaluations. Eleven boosters aren't recommended at all because they do such a poor job of fitting the belt. Fit is important because safety belts are designed with adults in mind, not kids. Boosters elevate children so belts will fit their small frames better to protect them



in a crash. A good booster routes the lap belt flat across a child's upper thighs and positions the shoulder belt at midshoulder. The Institute released its first booster ratings last year, evaluating 41 seats (see *Status Report*, Oct. 1, 2008; on the web at iihs.org).

"Parents can't tell a good booster from a bad one just by comparing design features and price," says Anne McCartt, Institute senior vice president for research. "What really matters is if the booster you're considering correctly positions the safety belt on your 4-8 year-old in your vehicle. Our ratings make it easier to pick a safer booster for kids who have outgrown child restraints."

The Institute assessed safety belt fit for almost all models sold in the United States right now. Manufacturers provided seat model numbers, and the Institute conducted its own check of retail inventories before purchasing seats.

"We're confident we're giving consumers a solid overview of what they'll find when they shop for their children," McCartt says, adding that "parents don't need to dig deep into their pocketbooks to buy a booster with good all-around belt fit." *BEST BETS* and *GOOD BETS* include several affordable choices starting at about \$20 and ranging up to \$250 or more. Big box retailers stock most of them in stores and online, and the rest can be found at specialty baby-gear sellers.

A few just-released boosters didn't come to market in time for this round of evaluations, but the Institute will rate them soon and share results at iihs.org. The plan is to assess new models throughout the year, much like the Institute evaluates new vehicles for *TOP SAFETY PICK* awards.

Boosters come in 2 main styles, highback and backless. Some highbacks, called dual-use, convert to backless by removing their backs. These boosters get 2 ratings, one for each mode, because belt fit can differ by mode. Highbacks have built-in guides to route shoulder and lap belts and can offer some head support. Backless models have lap belt guides but may need a plastic clip to properly position shoulder belts in many vehicles.

Ten of the highbacks are combination seats that can be used as forward-facing restraints for toddlers and then as boosters as children grow. In booster mode, parents remove the built-in harness and use vehicle lap/shoulder belts to restrain their children. Seven highbacks are 3-in-1 seats. These are similar to combinations but also can be used rear-facing for infants.

***BEST BETS* and *GOOD BETS*:** The best-rated boosters are the Combi Dakota backless with clip, Recaro Young Sport highback (combination seat), Recaro Vivo highback, Maxi-Cosi Rodi XR dual-use highback, Evenflo Big Kid Amp backless with clip, Eddie Bauer Auto Booster dual-use highback, Cosco Juvenile Pronto dual-use highback, Britax Frontier highback (combination seat), and Clek Oobr dual-use highback (see ratings on pp. 4-5; see seat pictures and model numbers at iihs.org).

"The 9 *BEST BETS* should provide good lap and shoulder belt fit for typical 4-8 year-olds in almost any car, minivan, or SUV," McCartt says. "A *BEST BET* that provides good belt fit in Mom's minivan should work equally well in Dad's sedan."

GOOD BETS are the Combi Kobuk dual-use backless with shoulder belt clip, Maxi-Cosi Rodi dual-use highback, Evenflo Symphony 65 3-in-1, Britax Parkway SG dual-use highback, Graco TurboBooster SafeSeat Wander dual-use highback, and Graco TurboBooster SafeSeat Sachi dual-use highback.

"These provide optimal belt fit in almost as many vehicles as the *BEST BET* models," McCartt points out.



HOW THE BOOSTER SEATS RATE

NOT RECOMMENDED

- Harmony Secure backless/clip
- Combi Kobuk
- Evenflo Express
- Eddie Bauer Deluxe
- Safety 1st Alpha Omega Elite
- Evenflo Sightseer
- Alpha Omega Elite
- Eddie Bauer Deluxe 3-in-1
- Safety 1st All-in-One
- Alpha Omega Luxe Echelon
- Alpha Omega

BEST BETS

- Combi Dakota backless/clip
- Recaro Young Sport
- Recaro Vivo
- Maxi-Cosi Rodi XR
- Evenflo Big Kid Amp backless/clip
- Eddie Bauer Auto Booster
- Cosco Juvenile Pronto
- Britax Frontier
- Clek Oobr

GOOD BETS

- Combi Kobuk backless/clip
- Maxi-Cosi Rodi
- Evenflo Symphony 65
- Britax Parkway SG
- Graco TurboBooster Wander
- Graco TurboBooster Sachi



GOOD BELT FIT

Boosters elevate children so safety belts designed for adults will fit better. The lap belt should fit flat across a child's upper thighs, not the soft abdomen. Good boosters have belt-routing features that hold lap belts down and forward. The shoulder belt should cross snugly over the middle of the shoulder. Then it's in position to provide effective protection in a crash.



POOR BELT FIT

Not all boosters provide good belt fit. At right, the lap belt is too high on the abdomen, and the shoulder belt is too low on the shoulder.

Eleven boosters that aren't recommended: The Institute doesn't recommend the Harmony Secure Comfort Deluxe backless with clip, Combi Kobuk dual-use highback, Evenflo Express highback (combination), Eddie Bauer Deluxe highback (combination), and Evenflo Sightseer highback. Also on the list are 3-in-1s including the Safety 1st Alpha Omega Elite, Alpha Omega Elite, Eddie Bauer Deluxe 3-in-1, Safety 1st All-in-One, Alpha Omega Luxe Echelon, and Alpha Omega.

Half of the boosters that aren't recommended are 3-in-1s that leave the lap belt too high on the abdomen and the shoulder belt too far out on the shoulder. Another seat, the Harmony Secure, has armrests that push the lap belt away from the hips, way out on a child's thighs.

Shoulder belt fit is the main problem for the rest — the Combi, 2 Evenflos, and the Eddie Bauer Deluxe. Dorel Juvenile Group, the largest US children's gear distributor, makes 7 of the

boosters that aren't recommended. Dorel seats sell under the names Cosco, Dorel, Eddie Bauer, Maxi-Cosi, and Safety 1st.

"Dorel has 3 *BEST BETS* and 1 *GOOD BET*, so this company knows how to make boosters that provide good safety belt fit," McCartt points out. "Dorel tells us it's working on new designs to address issues raised by our evaluations."

Thirty-four seats aren't *BEST BETS*, *GOOD BETS*, or on the list of boosters the Institute doesn't recommend. These seats can pro-



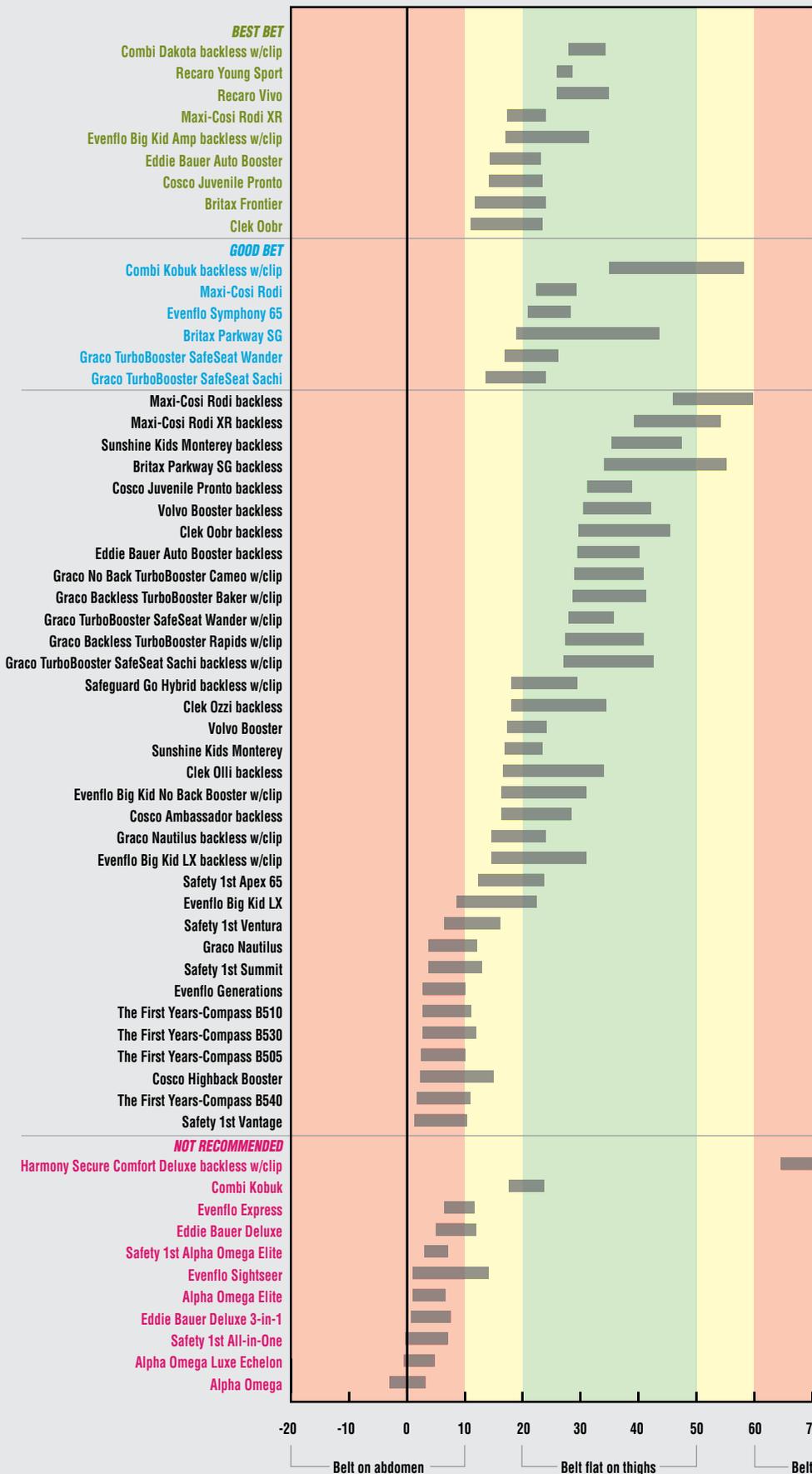
HOW THEY'RE EVALUATED

Engineers assessed boosters using a specially outfitted crash test dummy representing an average-size 6-year-old child. The engineers measured how 3-point lap and shoulder belts fit the dummy in each of the 60 boosters under 4 conditions spanning the range of belt configurations in vehicle models. Each booster gets 4 scores for lap belt fit and 4 for shoulder belt fit. A booster's overall rating is based on the range of scores for each measurement.

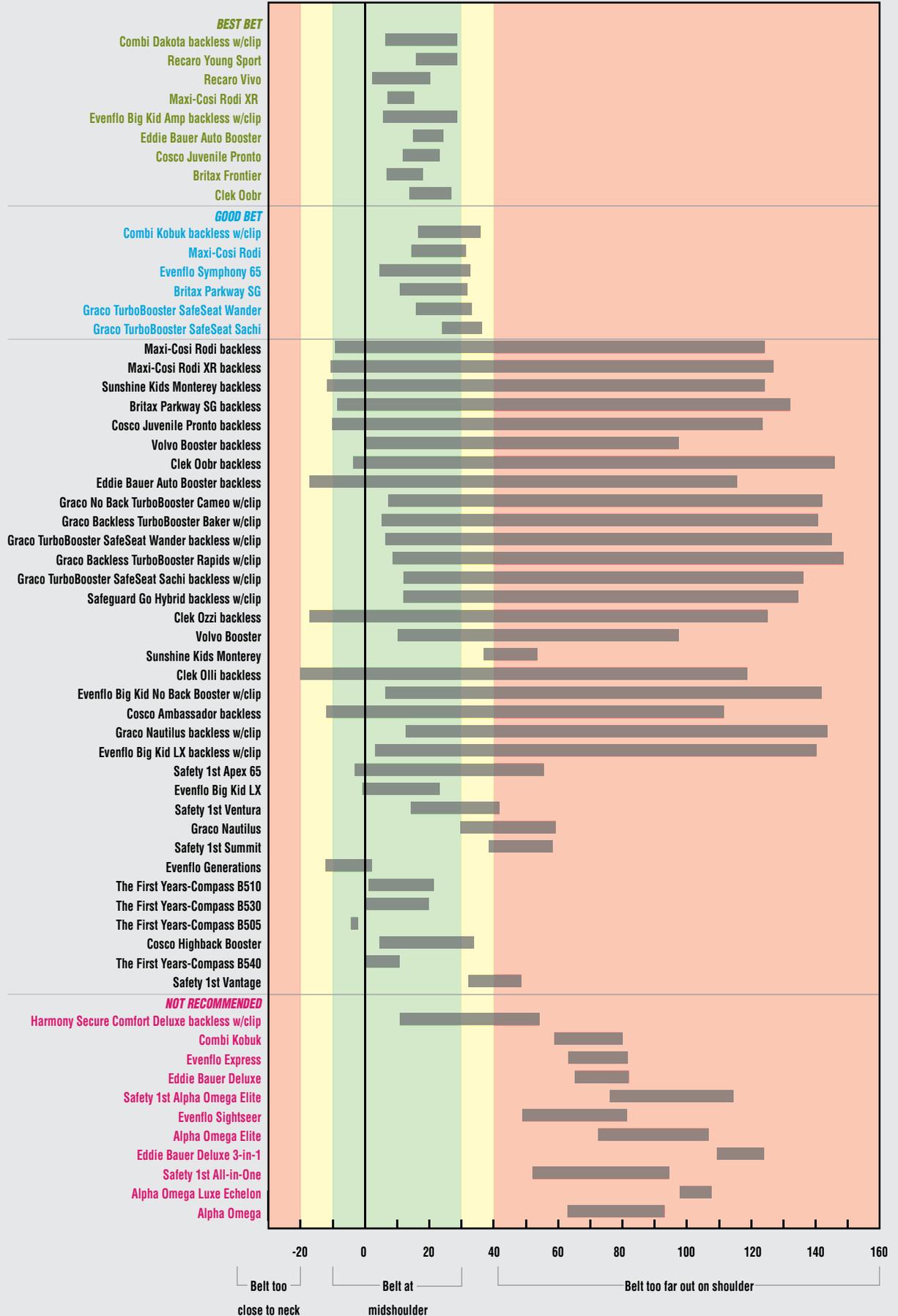
vide good protection for some kids in some vehicles, but not in as many cases as top-rated boosters. The top 23 in this category (see chart, right) provide good lap belt fit across all vehicles. Some parents may find the shoulder belts fit their kids just fine in these boosters. If so, they should provide good protection. Lap belt fit is the problem for the bottom 9 boosters that just miss the not-recommended list. These provide poor lap belt fit most of the time.

How types compare: The Institute doesn't recommend backless over highback boosters and vice versa. Backless (*continues on p. 7*)

LAP BELT: RANGE OF FIT



SHOULDER BELT: RANGE OF FIT



HYBRIDS MAY PROMPT PEDESTRIANS, CYCLISTS TO PRICK UP THEIR EARS

Most grade-schoolers learn to stop, look, and listen before they cross the street. Now the listening part may be getting harder for people of all ages as quiet-engine hybrid vehicles proliferate. A new federal study reports that hybrid electric cars are more likely than models with internal combustion engines to crash with pedestrians and bicyclists, especially during low-speed maneuvers when the hybrids are likely to be running only on electricity.

Conducted by Refaat Hanna for the National Highway Traffic Safety Administration, the study relies on police reports of collisions in 12 states to compute proportions of crashes involving pedestrians and bicyclists colliding with Honda and Toyota hybrids versus similar cars from the same automakers without hybrid engines. In comparing crash rates for the vehicle groups, Hanna noted their wind and tire noise. The hybrids' overall likelihood of crashing with a pedestrian was 40 percent higher than the other cars', increasing to a 50 percent difference in areas where speed limits were 35 mph or slower.

Hanna looked specifically at crashes that occurred when cars were slowing or stopping, backing up, or entering or leaving a parking space because such maneuvers usually occur at very low speeds — important because hybrids operate mostly on electric power at such speeds, so this is when the sound difference is greatest compared with other cars. The percentage of hybrid crashes involving pedestrians in these situations was twice as high as it was for nonhybrids. There was no significant difference between the crash rates of the 2 groups of cars when they were traveling straight down a road.

Rates of bicyclist crashes, like those involving pedestrians, were higher for the hybrids than for the other group of cars. Again, the differences were greatest among crashes that involved maneuvers at very low speeds.

This study isn't based on large numbers, and Hanna concedes that "a larger sample would allow us to perform a more detailed analysis." He adds that the study is too limited to estimate the size of the quiet-engine hazard nationwide.

"Hanna reports some useful findings about an issue that first was raised by the National Federation of the Blind and others," Anne McCartt, Institute senior vice president for research, points out. "The differences in crash rates are substantial enough that we believe quiet vehicles may be a concern for all pedestrians and bicyclists, not just those who are blind."

This concern is likely to grow as hybrid cars proliferate. Back in the 2000 model year there was a single hybrid model, the Honda Insight. In contrast, the total is 33 hybrids among 2010 models. Registrations of new hybrids increased 38 percent between 2006 and 2007 alone.

"Incidence of pedestrian and bicyclist crashes by hybrid electric passenger vehicles" (DOT HS 811 204) by R. Hanna is accessible at www-nrd.nhtsa.dot.gov/Pubs/811204.PDF.



(continued from p. 4) ones generally provide better lap belt fit, and highbacks generally do a better job of positioning shoulder belts correctly in all vehicle configurations.

“There’s a good mix of highbacks and backless among the boosters we recommend,” McCartt points out. “Bigger kids might be more comfortable in backless, but either is fine as long as the vehicle belts fit right.”

Highbacks can keep fidgety kids upright, in position for good shoulder belt protection. Shoulder belt guides also deter kids from putting the belt under an arm.

“Some companies claim their highbacks offer extra protection in side crashes,” McCartt notes. “It makes sense that extra padding and reinforced structures would keep kids safer if the family car is broadsided, but so far research doesn’t show a greater benefit for highbacks over backless.”

When it comes to the not-recommended boosters, parents may want to reconsider 3-in-1s for their booster-age kids. The selling point for these is they grow with children, so parents don’t have to trade up.

“The 3-in-1s should be fine when used as child restraints. The problem is that once the harness is removed for booster use most 3-in-1s lack good belt fit,” McCartt explains. “Still, parents using boosters the Institute doesn’t recommend shouldn’t rush to stop using them in favor of belts alone. Any booster is better than none at all. Take a look at the belt fit, and if it’s not doing a good job replace it when you can with one that works better.”

New ratings procedure: The Institute can’t directly compare the new booster ratings with last year’s results to see if particular seats have improved because engineers have modified the test device and protocol. The change makes it easier for manufacturers to reliably reproduce the results. The Institute also evaluated many brand new models.

“Several manufacturers are readying new seats that should do well next time around,” McCartt says, “so we’re expecting to see fewer not-recommended boosters in the future. Already there’s been progress. Manufacturers have discontinued many of the 13 boosters we didn’t recommend last year.”

BOOSTERS OFFER BETTER PROTECTION THAN SAFETY BELTS ALONE IN A CRASH

Children 4-8 years old who ride in booster seats are 45 percent less likely to sustain crash injuries than children restrained by vehicle safety belts alone. This is a main finding of a new analysis from the Children’s Hospital of Philadelphia (CHOP) updating previous work. Results show boosters provide the biggest benefits for youngsters in side crashes. A separate observational study by the Riley Hospital for Children indicates widespread booster misuse.

CHOP examined 1998-2007 State Farm insurance claims data from crashes in 16 states and the District of Columbia. The study includes 6,591 crashes involving 4-8 year-olds in vehicle back seats who were restrained in boosters or by belts alone. Seventy percent were restrained by just belts and 30 percent were in boosters. After adjusting for potential confounding factors such as crash severities, researchers found the overall risk of injury was reduced by 45 percent when kids were in boosters compared with safety belts alone.

Kids in side crashes benefited the most. The injury risk reduction was 68 percent in near-side impacts and 82 percent in far-side impacts for kids in boosters.

Sixty-one percent of children were in highbacks while 39 percent were in backless boosters. Benefits weren’t significantly different for children in either type of seat.

CHOP’s earlier study found a 59 percent reduction in injury risk for children ages 4-7 in boosters compared with children using belts alone. That analysis used 1998-2002 data and focused on 4-5 year-olds who typically are smaller and the most susceptible to poor belt fit. Since then appropriate restraint use has risen 3-fold. CHOP’s new analysis includes a greater percentage of 6-8 year-olds.

More children ride in boosters today, due in part to increasing age requirements in many states for child safety seat use. The National Highway Traffic Safety Administration reports that booster use among 4-7 year-olds was 43 percent in 2008, up from 37 percent in 2007.

Indiana’s Riley Hospital for Children indicates that misuse of booster seats is a problem. Researchers observed booster use during 2006-07 at 25 sites in rural and urban areas throughout the state. In all, 2,287 children were observed, including 570 in boosters, and nearly 65 percent of the children riding in boosters had at least 1 belt misuse. The most common problem was the shoulder belt over the booster armrest (36 percent). About a third of the shoulder belt guides weren’t used properly. Other problems were shoulder belts not positioned at mid-shoulder, lap or shoulder belts too loose, and a shoulder belt either behind a child’s back or under an arm. Lap belts should be low on the hips, but they were improperly positioned in 14 percent of cases.

“Effectiveness of belt positioning booster seats: an updated assessment” by K. Arbogast et al. is accessible at pediatrics.org. “Seat belt misuse among children transported in belt-positioning booster seats” by J. O’Neil et al. is accessible at elsevier.com.



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