



TECH UPDATE

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Recent Research: Booster Design Affects How Kids Sit During Travel

Swedish researchers did a study on how kids sit during travel using two different high back booster seats. One booster had smaller head supports and no torso side structure. The other booster had large wings to support and protect the head. It also had larger side structure designed to protect the child in a side impact. They tested six children aged 3 to 6 years. When the kids went for a 45-minute ride with their parents, a video camera in the car recorded their movements. The researchers then analyzed the videos and recorded how the child shifted from side to side as well as forward and backward. The kids sat properly with their backs against the booster 75% of the time in the booster without side structure. They only sat properly 45% of the time in the booster with larger side structures. With the larger side wings, kids leaned forward to see more often.

Take home message: This study shows a benefit to using harnessed restraints as long as possible to keep the child seated with their back against the CRS. Also, remind children using boosters (and their parents) to sit against the back of the booster.

Reference: Andersson M, Bohman K, Osvalder A (2010). *Effect of Booster Seat Design on Children's Choice of Seating Positions During Naturalistic Riding.* Ann Advanced Automotive Medicine 54: 171–180.

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New Product Update: Baby Trend TrendZ FastBack 3-in-1

The Trendz FastBack 3-in-1 car seat is a new combination seat with rigid LATCH connectors. Kids between 22-70 lb and 28.5-52 inches tall can use the 5-point harness forward facing. Kids between 30-100 lb and 38-57 inches tall can use it as a high-back booster. For kids between 40-120 lb and 42-57 inches tall, they can use it as a backless booster.

The rigid LATCH lower connectors provide a solid attachment to the vehicle. They help reduce CRS forward and lateral movement during a crash. The rigid connectors can't be installed upside-down and only require you to press a button and push the CRS toward the seatback for tightening. This feature should reduce installation errors. The manual states that you can only use LATCH for harnessed children weighing less than 50 lb and only if the vehicle manufacturer allows LATCH use up to this weight. You can only use the rigid LATCH connectors when the spacing between the vehicle anchor bars is 11 inches.

The instructions for seat belt installation have some unusual requirements. For kids under 30 lb, when you install without a tether, you must use a serpentine belt path as shown in the photo here. This means the belt routes around the front of the child restraint first, back through the belt path hole, behind the back, back through the other belt path hole, and around the front on the other side. If you install with a top tether, you can use a more traditional belt path that starts and exits from the back of the restraint.

When you use the FastBack as a high-back booster, you can attach it using the lower anchors, with or without the tether. When using it as a backless booster, you can attach it to the lower anchors.

The harness height adjustment does not require any rethreading. You adjust the harness slot height, backrest height, and headrest height together with a large button at the front, just under the headrest pad.



Serpentine Belt Path

Regulatory Review: Government Announces New Changes to FMVSS 213

In February, the US Department of Transportation issued a final rule to improve FMVSS 213, the federal regulation about child restraint systems. The rule will go into effect in two years. The big changes are:

- FMVSS 213 will now cover all child restraint and booster products for children who weigh 80 lb or less
- A new crash test dummy has been added that represents a 10-year-old child. It will be used to test products made for kids who weigh between 65-80 lb.
- A new way to position the 6-year-old and 10-year-old dummies in boosters. During testing, they will be seated more like children really sit instead of perfectly upright.
- Harnessed CRS will need to have LATCH weight limits on labels. They will tell the user that LATCH can be used to install the CRS until the combined weight of the child and the restraint reach 65 lb. So for a product weighing 15 lb, you will be able to install it with LATCH until the child reaches 50 lb.
- Booster seats can be secured using LATCH with children of any weight allowed by the manufacturer.



Ten-Year-Old
Dummy

This final rule is the result of several proposed rules, plus suggestions from manufacturers and the public. You can find the full text here:

http://www.nhtsa.gov/staticfiles/rulemaking/pdf/HIII-10C_Part571-FinalRule_022112_v1.pdf

Seat Check Smarts: Sewn-on Latchplates

Sewn-on latchplates are not very common in newer vehicles. But you may find them once in a while at car seat checks, so you need to know how to use them with CRS. You may sometimes see them in center seating positions, in school buses, or in older vehicles.

The pictures below show examples of sewn-on latchplates. They are seat belts where the webbing goes through a metal slot in the latchplate, and stitching attaches the webbing back onto itself to hold it in place. With a sewn-on latchplate, you cannot slide the metal latchplate up and down on the webbing and the latchplate has no moving parts. It can be found on either lap belt or lap and shoulder belt systems.



Examples of Sewn on Latchplates

This type of latchplate does not lock. If you need to install a child restraint with this type of seat belt, first determine if the seat belt retractor has a locking feature to make the lap portion of the seat belt a fixed length. The types of retractors that lock are those with automatic locking retractors and switchable retractors that have been put in the automatic locking mode. The vehicle owners' manual will have information on how to lock the belt.

If the vehicle is over 15 years old (or if the retractor is broken), you might need to use a belt shortening clip to make the lap belt a fixed length. If this is the case, always consult your technician manual to make sure you are using the belt shortening clip correctly. Remember, a belt shortening clip looks very similar to a locking clip but is much stronger. **Do not use a locking clip when you need a belt shortening clip.** Make sure that it is a belt shortening clip by checking the original packaging and knowing where it came from.



Properly Used Belt Shortening Clip (Top) and Properly Used Locking Clip (Bottom)

Reference: National Standardized CPS Training Program Manual, pages 67-69.

Recent Research: Child Passenger Safety for Overweight Children

Researchers from Children's Hospital of Philadelphia and University of Michigan studied how child safety seats worked for children of all body weights. Their data came from a large national database called the National Automotive Sampling System (or NASS). They looked at 650 children who were in car crashes between the year 2000 and the year 2008 in the US. To be in the database, the crash has to be bad enough so at least one car cannot drive away from the crash. All the children were riding in newer cars that were less than 9 years old. All the children were between 1 and 8 years old. More than half were traveling in forward-facing restraints with a harness. The rest were traveling in belt-positioning booster seats.

The researchers studied how the child's body weight effected how badly they were hurt in the crashes. To find out the weight effect, they adjusted the data to take out the effects of seat position in the car, the vehicle type and the crash type. They found that the child's weight was not associated with injury risk.

Take home message: Children who are overweight are not at higher risk of injury in motor-vehicle crashes if they are properly restrained. Following the current CPS best practices provides the best protection for all children.

Reference: Zonfrillo, MR, Elliott, MR, Flannagan, CA, Durbin, DR (2011) *Association Between Weight and Risk of Crash-Related Injuries for Children in Child Restraints Pediatrics, 128: 1148-1152.*

Seat Check Smarts: Locking Clips

Do you know the right way to use a locking clip? A locking clip is sometimes needed for proper CRS installation. The most common reason to use the locking clip is when the vehicle seat belt or child restraint has no built-in locking features. First, check the child restraint product to see if it has a lockoff that can be used to help lock the seat belt. Some convertibles might have rear-facing lockoff but not a forward-facing lockoff. The CRS manual will tell you if you should use only the lockoff. Some products also recommend or allow use of the vehicle's locking features with the CRS lockoff. Next check the vehicle's locking features. All model years after 1995 should have a way to lock the seat belt. Check to see if the vehicle has a switchable retractor or an automatic locking retractor. If not, check to see if the belt has a latchplate that locks. These are found most on lap-only belts and some Chrysler cars.



Properly Used Locking Clip

If it is a lap and shoulder belt and there is no way to lock the belt, use a locking clip. Thread the seat belt through the belt path, buckle it, and tighten it. Then pinch the belt webbing together near the latchplate with one hand while you unbuckle the belt with the other hand. Place the locking clip on both webbing straps and within one inch of the latchplate. It doesn't matter if the center bar is on the top or the bottom. Then rebuckle the seat belt and use the 1" test for tightness. If it is not tight enough, unbuckle, remove the locking clip, and feed a bit more belt from the lap portion to the shoulder portion. Next attach the locking clip, rebuckle, and check tightness again. Make sure parents know how to use locking clips, and warn them that the locking clip must be near the buckle. If the locking clip is further away from the latchplate, there is a greater chance that it will come off during a crash, adding slack to the installation and creating a potentially dangerous piece of flying metal in the vehicle cabin.

Another time you might use a locking clip is when you install a rear-facing restraint with a three-point belt using a switchable retractor. Sometimes when you tighten the seat belt, the shoulder portion pulls up on the child restraint and makes it tip to one side. If it's tipping a lot when you can pass the 1" test, you can use a locking clip instead of the switchable retractor. But always try to install first with the vehicle belt features because they are usually easier to use than locking clips. Locking clips should be the last choice, not the first choice. It would be better to use the switchable retractor to obtain an install with slight tipping that passes the 1" test than to use a locking clip to achieve zero movement and no tipping. Parents and caregivers are more likely to get the install correct without a locking clip.



Either Installation of the Locking Clip is Correct

Reference: National Standardized CPS Training Program Manual, pages 66-67.



Locking Clip Installed Incorrectly on the Retractor Side of the Belt (Away from the Buckle)

Another Teachable Moment

In this picture, a locking clip misuse scenario seen at a car seat check is reconstructed. The locking clip is incorrectly installed on the side of the belt away from the buckle, where it could pop off and be a missile in a crash. Plus the product has a built-in locking clip, so a locking clip should not even be used.

Submitted by UMTRI, Ann Arbor MI.

Focus on Testing: How LATCH Anchorages are Tested for Strength

Requirements for the parts of LATCH that come with the car are described in Federal Motor Vehicle Safety Standard (FMVSS) 225 'Child Restraint Anchorage Systems'. There are rules for the locations and strength of LATCH anchors in a vehicle. In most vehicles, at least two rear seating positions must have lower anchor bars. Three rear seating positions must have top tether anchors. The standard also describes zones where the lower and tether anchors can be located.

To test the LATCH strength in seating positions with top tether and lower anchorages, load is applied through a special test device that is a metal frame. The device is "installed" using the lower anchors plus the tether anchor. The same metal frame test device tests the strength of the lower anchor bars without a top tether. The test lab pulls the device slowly forward with 2500 pounds of force and holds it for 1 second. Then they pull it to the side with 1125 pounds of force and hold for 1 second. During the lower anchor pull tests, the anchor bars must not separate from the vehicle. In addition, there is a limit on how far the device can move: 6.9 inches for the forward pull and 5.9 inches for the sideways pull.

CPS Calendar

School Transportation News Expo

July 21-25, Reno, Nevada

www.stnonline.com

A conference centered on safe student transportation.

Kidz In Motion Conference

August 15-18, Orlando, Florida

www.kidzinmotion.org

A conference focused solely on Child Passenger Safety.

Help with Our Next Issue

Do you have ideas for our next issue? Email us at CPSTechUpdate@umich.edu with suggestions for columns. These could include:

- Pictures of unusual child seat installations for the 'Another Teachable Moment' article
- Name and email of a CPS technician who you would like to see interviewed
- Research you heard about on the news
- New product features
- Issues that have come up at seat checks

In seating positions that have a top tether but no lower anchorages, a different test device is used. This device looks a bit like a child restraint. It is installed using the vehicle's seat belt and the tether anchor.



Test Devices for Lower Anchor and Top Tether Anchor Strength Testing

Regardless of which test device is used, the test requirements are the same. The test lab pulls forward on the device at a 10 degree angle with 3371 pounds of force for at least 1 second. The top tether anchor bar must not separate from the vehicle structure during the pull. If there is more than one tether anchor in a row, they must be tested simultaneously if the seats are 15.7 inches or greater apart.

These strength tests are considered "quasi-static" because the test load happens over several seconds. In comparison, LATCH anchors are loaded in less than 1/4 second in a crash. There is no exact formula for converting static strength to dynamic strength. However, NHTSA has just confirmed that LATCH strength tests produce anchorages strong enough to hold 65 lb of combined child and child restraint in a crash.

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Technician Spotlight

Meet **Phyllis Larimore**, a CPST-I who is Program Coordinator at the Center for Childhood Safety at Kansas City Children's Mercy Hospitals and Clinics.

- 1) How long have you been a CPS Tech?** Certified since 2001 and an instructor since 2003.
- 2) Where do you do most of your car seat checks?** I manage a hospital based CPS program through our Center for Childhood Safety. All children 0-8 years have their CPS needs assessed by the provider or the bedside nurse and when needed, a CPS consult is ordered. I also collaborate with our staff and the following community partners to conduct CPS outreach: Safe Kids Johnson County, Safe Kids Metro KC, Jackson Co Head Start Centers, and Kansas City MO Police Department.
- 3) What prompted you to take the training?** I have been a pediatric nurse caring for injured children over 40 years - the last 25 years in a level one pediatric trauma center. Anyone who has been in this work knows so many injuries are preventable if only someone knows what to do, has access to safety products and adopts risk reduction behaviors.
- 4) What is your favorite CPS resource?** I love Google and YouTube for manufacturer videos. You can make contact directly with the manufacturers, the governmental agencies, other CPS educators and researchers! We use the North Carolina Car Seat Recall List daily, and the LATCH manual is a wonderful resource and of course, NHTSA, Safe Kids and the National CPS Board for the curriculum that ensures a standard of practice.
- 5) What is your favorite installation hint?** Take your time and read the manuals!!!! BOTH of them, and lean on the LATCH manual!
- 6) What is the worst weather you've ever experienced at a car seat check?** I remember a June Saturday working a community event with my St. Luke's Hospital CPSTs and other community partners- a complete downpour- absolutely no one had a dry patch of skin or clothes. Plus a few years ago, we were teaching a winter NCPSTC - ice, sleet, bitter cold, working with about 20 candidates to complete the outdoor exercises and skills evaluations.
- 7) What do you think is the best new feature among recent new child restraint products?** As an ER nurse, I appreciate when children arrive on our doorstep restrained properly in a convertible car seat for ambulances, the Pedimate or the Transport. For conventional restraints, I love all the new features: LATCH, rear angle indicators, ease of conversion of RF to FF for convertibles. And I LOVE that we now have restraints for all children (4 to 80 lb) and that we pay attention to both ends of the spectrum: the most fragile and the older children that still need trunk and head support. Thanks for the manufacturers of restraints for children with special needs--the HOPE, the HIPPO and the other higher weight harnesses - you are truly lifesavers as we try to meet these children's needs!

Win Our Contest

Sign up to be notified via e-mail when future editions of Tech Update are published and whenever significant announcements or updates to the CPS Board website are made.

Signing up also makes currently certified CPS technicians and instructors eligible to WIN a free CPS recertification—a \$50 or \$60 value—from Safe Kids Worldwide. To read the rules for the drawing and sign up for the CPS Board e-mail list, visit www.cpsboard.org/elist.htm.

Our most recent contest winner is Tim Turner from Rocky Mount, North Carolina. Congratulations Tim!



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