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Vehicle seat designs make child restraint installation difficult; Less than a quarter of models surveyed have easy-to-use LATCH

ARLINGTON, Va. — Installing child restraints can frustrate even the most capable of parents. A system called Lower Anchors and Tethers for Children is supposed to make things easier by standardizing attachment hardware, but a new study shows that many automakers aren't paying attention to the key factors that make LATCH work. Only 21 of the 98 top-selling 2010-11 model passenger vehicles evaluated have LATCH designs that are easy to use. This is the main finding of joint research conducted by the Insurance Institute for Highway Safety and the University of Michigan Transportation Research Institute (UMTRI).

The researchers scrutinized LATCH hardware and rear seat designs in a range of passenger vehicles to determine the key vehicle characteristics that would help LATCH live up to its billing. The Institute, UMTRI and other safety groups have previously pointed out usability issues with LATCH.

"Installing a child restraint isn't always as simple as a couple of clicks and you're done," says Anne McCartt, the Institute's senior vice president for research and one of the report's authors. "Sometimes parents blame themselves when they struggle with LATCH, but oftentimes the problem lies with the vehicle, not the user."

The goal of LATCH is to increase the number of children who ride properly restrained by making child restraints easier to install. Consumers who drive 2003 and later models likely have encountered the system. LATCH has two distinct components: lower attachments on child restraints that connect to anchors at the vehicle seat bight (where the bottom cushion meets the seat back) and top tethers on forward-facing restraints that attach to anchors on the vehicle's rear shelf, seat back, floor, cargo area or ceiling. Tethers help prevent child restraints from moving too far forward during crashes, putting children at risk of head or neck injuries.

UMTRI researchers reviewed LATCH hardware and rear seats in cars, minivans, pickups, station wagons and SUVs. To measure and assess how child restraints fit in each vehicle, they used a test fixture and other tools in line with 2009 draft guidelines developed by a Society of Automotive Engineers working group. They then picked 12 vehicles representing a range of LATCH setups and asked 36 volunteers to each install three different types of child restraints in three of the vehicles.

Researchers identified three factors associated with correct lower anchor use: depth, clearance and force.

- Depth: Lower anchors should be located no more than 3/4 inch deep in the seat bight and should be easy to see.
- Clearance: Nothing should obstruct access to the anchors. Safety belt buckles and other hardware plus the foam, cloth or leather material of the seats themselves shouldn't get in the way of attaching child seat connectors. There should be enough room around the anchors to approach them at an angle, as well as straight-on. This makes it easier to hook or snap on connectors and also tighten LATCH straps. In the study, a clearance angle of at least 54 degrees was associated with easier installation.
- Force: Parents should be able to install child restraints using less than 40 pounds of force. Some systems require lots of effort to properly attach child seat hardware with lower anchors, in part because they are deep in the seat bight or surrounded by interfering parts of the vehicle seat.

All three factors are related and are good predictors of how well people are able to correctly install child restraints. Vehicles meeting the criteria were 19 times as likely to have lower anchors used correctly by the volunteers compared with vehicles that don't meet any of the criteria.

"These are things that automakers can do to improve child restraint installations, and most of them aren't hard," McCartt says. "Lower anchors can be designed so they are easy to use."

One common problem researchers encountered in the lab is that safety belt buckles, plastic housing or vehicle seats obscure or interfere with lower anchors. Another issue is that the anchors are sometimes buried deep within the back seats, so parents might have to dig around in the cushions to find them. Lower anchors were visible in just 36 of the 98 study vehicles. Researchers considered the anchors visible if they were easy to see or could be seen by removing a prominently marked cover.

Federal rules dictate the minimum number of seating positions that must have LATCH, the size of the lower anchors and how far apart they can be situated. If the lower anchors aren't visible, markers on the seats must indicate their location. Other design details are left up to automakers. For instance, the regulations don't specify anchor depth within the seat bight or limit how hard someone has to push on a child restraint to connect LATCH. Researchers found that these factors affect the likelihood that people will install child restraints correctly.

Another finding is that only seven of the 98 vehicles surveyed have dedicated LATCH anchors in the center, second-row seats, even though that is the safest place for children to travel. Nine vehicles allow borrowing of anchors from the outboard seats, and 82 have no center anchors at all. In the 21 minivans and SUVs with third rows, 11 have no lower anchors at all in these seats.

The National Highway Traffic Safety Administration requires passenger vehicles with rear seats to have a minimum of two seating positions with lower anchors and three seating positions with tether anchors. Few vehicles offer more than the minimum number of required anchors, researchers found. Only 16 of the 98 models surveyed had three or more pairs of lower anchors in back seats, while just 10 vehicles offered more than the three required tether anchors.

Volunteer installations: In the study, parents correctly used the lower anchors 60 percent of the time. Volunteers who correctly used anchors were more than three times as likely to get a tight fit as volunteers who didn't use them the right way. When anchors were misused, common mistakes included not orienting the connectors properly, attaching them to the wrong hardware and not snapping them in all the way. Twisted straps also counted as an error.
Certified child passenger safety technicians evaluated the installations. They deemed them tight if the restraint didn't move more than an inch sideways or back and forth when pulled. All of the participants currently used child seats in their own vehicles. If they had questions about how to install the seats in the study they could consult owners' manuals but received no other assistance.

Tethers aren't optional: Volunteers used top tethers just 48 percent of the time with forward-facing child restraints. When tethers were used, 54 percent of the installations were incorrect. Leaving too much slack in the strap was a common error. Another was attaching tethers to the wrong hardware.
Overall, parents and caregivers correctly installed seats with lower anchors and top tethers to get a tight, secure fit at the right angle in just 13 percent of the cases.

"With tethers, the main issue is use, not usability," says Kathy Klinich, assistant research scientist at UMTRI and the study's lead author. "Many parents don't realize they are supposed to use the tether."

Previous studies have shown that many people neglect to use tethers. A 2010 Institute survey found tethers in use 43 percent of the time, about the same as in the mid-1970s.

"Tethers should be used with all forward-facing child restraints, even if parents opt to secure seats with safety belts instead of lower anchors," Klinich says. "We need to better educate people about tether use."

Making LATCH easier to use might encourage more parents to use child restraints and install them correctly, McCartt says. In 2010, 29 percent of children 1-3 years old and 12 percent of infants younger than 1 who died in crashes were riding unrestrained. Those numbers mark a sharp improvement over 1985, when 71 percent of children ages 1-3 and 35 percent of infants killed in crashes were unrestrained.

"Getting kids into the right restraints for their age and size is the first step," McCartt says. "The next is to install the seats correctly because research shows this improves protection. This is where LATCH can help."

2011 models that meet all 3 easy-installation criteria

- Audi A4 Quattro
- Cadillac Escalade
- Chevrolet Equinox LT
- Chevrolet Silverado 1500 crew cab
- Chevrolet Suburban LT
- Chevrolet Tahoe LS
- Chrysler Town & Country (2010)
- Dodge Caliber Mainstreet
- Dodge Grand Caravan Crew

- Dodge Ram 1500 crew cab
- Ford Escape XLT
- Ford F-150 SuperCrew Cab
- GMC Sierra 1500 crew cab SLE
- Honda Pilot EX-L
- Kia Sedona LX
- Land Rover Range Rover Sport
- Mercedes-Benz C300
- Mercedes-Benz E350
- Mitsubishi Eclipse coupe GS
- Mitsubishi Lancer ES
- Toyota Tacoma extended cab

2011 models that don't meet any easy-installation criteria

- Buick Enclave CX
- Chevrolet Impala LT
- Dodge Avenger Express
- Ford Flex SEL
- Ford Taurus Limited
- Hyundai Sonata Limited
- Toyota Sienna XLE