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Docket: NHTSA-2019-0093
ANPRM on Rear Seat Belt Reminders

November 13, 2019

To: National Highway Traffic Safety Administration
From: Denise Donaldson, Safe Ride News Publications

Re: Comments on Seat Belt Use Warning Systems for Rear Seats

As an advocate for child passenger safety for over 35 years, Safe Ride News Publications (SRN) strongly endorses efforts to ensure that all vehicle occupants are properly secured during every car ride, and agrees that attention to the lagging seat belt usage rate of rear seat passengers is warranted. As always, SRN's comments will consider how the proposals of this ANPRM would affect child occupants, in particular.

SRN agrees with the ANPRM that a tack that is successful in promoting higher rates of rear seat belt use would benefit children, as children are likely to be seated in the rear. Besides the benefit of reminding caregivers to confirm that children are buckled up before starting a trip, a reminder system would ideally alert caregivers to any status change during a ride, since children sometimes unbuckle themselves at inappropriate times. Such a warning signal might even discourage this behavior in some children. Also, secondary benefits of rear seat belt reminders could include:

- Decreasing the risk that a loose object (whether another person, a pet, or other item) would harm a child by becoming a projectile in a crash.
- Warning a caregiver if a seat belt that's supposed to be holding a child's CRS has been accidentally unbuckled.
- Reducing driver distraction caused by occupants or pets that would otherwise be free to roam the vehicle during travel.

In short, SRN is generally in favor of technology that improves a caregiver's ability to properly secure children and monitor their safety during a trip, and a rear seat belt reminder would definitely provide such an advantage.

However, such technology would need to be designed to anticipate and avoid certain unintended consequences. In this ANPRM, NHTSA describes valid concerns related to balancing the value versus nuisance of warning systems, and SRN agrees that these are important considerations to research and test before ruling; we urge NHTSA to include ample feedback from vehicle owners with children in these efforts. SRN

anticipates there will be certain issues that are specific to the realities of riding with children (and is, in fact, already seeing these problems in voluntarily equipped vehicles), as follows:

A Warning System May Inadvertently Undermine LATCH Use

A key issue for families will be how a warning system reacts to a CRS installed using the lower anchors (LAs) of the LATCH system. If this situation triggers a false warning, caregivers are likely to use a seat belt to install a CRS instead (which presumably would satisfy the belt-use criteria), setting up an unintended consequence of discouraging LATCH use overall.

In situations in which CRS installation using a seat belt happens to be safe and easy, this outcome would be inconsequential. In fact, manufacturers of a handful of CRSs on the market state that seat belt installation is the preferred installation method due to the CRS design. However, this is not the norm. In many cases, CRS installation using the LAs is much easier and/or more effective than installation using the seat belts, and in some situations, it is the only acceptable method (i.e., when belts are forward-mounted or inflatable). As NHTSA-sponsored studies have shown, caregivers generally prefer using LATCH, which can more often result in a proper installation. Furthermore, several studies (such as by IIHS and Safe Kids Worldwide) have shown that caregivers are far less likely to attach the tether when using a seat belt to install a CRS. Therefore, to support NHTSA's commitment to the use of the LATCH (and tethering, specifically) whenever appropriate, a rear seat belt reminder system that doesn't undermine LATCH is ideal.

Belt Reminders Will Need to Account for LA-Installed CRSs

In nearly all cases, installation of a CRS involves using either the lower anchor attachment (of the LATCH system) or a seat belt, but not both. According to SRN's 2019 *LATCH Manual*, there are only a handful of vehicle manufacturers (Ford/Lincoln/Mercury, Mercedes-Benz, Porsche) that specifically state in owner's manuals that the vehicle's seat belt and lower anchors may be used simultaneously for CRS installation, and these manufacturers provide permission only if it is also given by the CRS manufacturer. Nearly all CRS manufacturers prohibit the use of the LA attachments and a seat belt simultaneously.

Therefore, when a CRS is installed using the lower anchors of the LATCH system, the seat belt is typically not in use, so a nondiscerning sensor would conclude that an unbuckled occupant is present. (A CRS definitely has a detectible mass; the weight of a CRS can range from 5 to over 30 pounds, and FMVSS 213 allows the combined CRS-plus-child weight of a CRS installed with LATCH to be as heavy as 69 pounds, when approved rounding is considered.)

Among the few current vehicles in which this feature is available, SRN has encountered problems in the field when an installed CRS causes a sensor to emit an unnecessary warning, causing significant annoyance for the vehicle owner. Therefore, vehicle manufacturers must ensure that the design of a rear seat belt reminder be able to 1) discern when a CRS occupies a seating position, 2) be bypassed by following instructions in the child restraint section of the owner's manual, and/or 3) allow the driver to dismiss the warning. These features are considered below, in order of desirability:

1) <u>CRS-Discerning Systems:</u> This solution would be the most effective at consistently preventing inappropriate warnings when a CRS is installed using

LATCH, but also, presumably, the most complex/costly. An inexpensive approach would be to set a minimum threshold weight of 69 pounds (the maximum combined weight of a CRS and child using the lower anchors for installation) to trigger a warning. However, such a system would allow many small children who no longer ride in a CRS (and who should be using boosters or seat belts) to slip through the cracks. (An average child of 69 pounds is over 8 years old.) Therefore, designing an alternative method for discerning a CRS would be preferable (a capacitive system? camera-recognition? lower anchors that detect pressure from attached hooks?).

2) System-Circumventing Instructions: In general, techniques to dodge a warning system (such as buckling a belt and then sitting on top of it) should be blocked or, at least, hindered. However, for purposes of LATCH installation instructions, users could be instructed to include a step that intentionally bypasses the warning system. For instance, instructions could say to first buckle the belt before a CRS is installed using LATCH or run the belt through the belt path and buckle it after a CRS has been installed using the lower anchors. In fact, these techniques are already taught by child passenger safety technicians as ways to prevent a child from becoming entangled in a seat belt that's not in use. SRN asked manufacturers of CRSs and vehicles to specify guidance to reduce the risk of entanglement for publication in the 2019 *LATCH Manual*, but these instructions are rarely found in owner's manuals. Therefore, new instructions would need to be clearly stated in the child restraint section of vehicle owner's manuals. Additionally, this approach would require coordination with CRS manufacturers, as the CRS instructions may need to be revised so as not to contradict the vehicle instructions. (Note: Depending on the system design, this bypass approach may not work in every situation because, in some vehicles, a LATCH-installed CRS blocks the seat belt's buckle hardware.)
3) Warning-Dismiss Capability: An unwarranted warning could simply be allowed to time out. However, if an unwarranted warning is deemed too much of a nuisance, the driver could be given a method to turn off the warning. This option seems the least desirable, as it would be available to all owners (not just ones using a CRS), so it would enable too many people to ignore important warnings. Also, owners who are conditioned to turn off a warning signal because a CRS is present may overlook the fact that other rear seat occupants are, indeed, unbuckled.

CPSTs Should Be Informed

There are currently nearly 43,000 certified child passenger safety technicians (CPSTs) in the U.S., individuals trained through the standardized NHTSA course to educate caregivers in the use of CRSs. Like vehicle owners, these CPSTs need to know when a vehicle has a rear seat belt reminder and how it affects CRS installation. This information should be stated in the child restraint section of the owner's manual (especially if the system isn't sophisticated enough to automatically detect a CRS).

Consider, for instance, a scenario in which a CPST provides education to a caregiver on the use of a CRS, including installation using the lower anchors. The training takes place in a parked vehicle. The CRS may be installed using the LAs, but once the caregiver drives away from the checkup, the properly installed CRS sends a false warning signal to the driver. (This is an outcome that SRN has already encountered in the field.) This, at the very least, prompts embarrassment and time-

consuming revisions to the educational experience. At worst, it could undo the benefits of the education and discourage the caregiver from using a CRS.

SRN has reviewed some instructions for vehicle models that already have this feature; while the feature is mentioned in the instructions, we have not seen it noted in the *child restraint* section. CPSTs are trained to consult both vehicle and CRS owner's manuals for information about proper installation and use, but expecting them to search for this detail throughout a manual is unrealistic (especially today, when the feature exists in only 13% of new vehicles). If there are steps that must be taken for CRS installation to coexist with a rear seat belt warning system, these steps should be stated in the section with child restraint instructions.

In addition, it is unrealistic to assume that owners will alert CPSTs to the presence of this feature in their vehicle, because they may be entirely unaware of it. Often, having a baby (and, ideally, seeking the assistance of a CPST) spurs vehicle owners to begin noticing the various details of rear seats for the first time.

Additional Comments

Aside from the comments above, SRN has input for some of the 26 comment areas specified by NHTSA:

1) SRN believes the warning should have both audio and visual components, like the current warnings for the front seat. An audible warning when a belt is unbuckled during a ride would be especially advantageous for caregivers (and a potential deterrent for children).
2) Warnings are warranted before beginning a ride and for any change of status. A change-of-status warning should trigger at any vehicle speed, as injury to children can occur at low speeds.
3) A rear seat warning system should be coordinated with the driver warning. An ideal approach would be to provide a pictogram of the vehicle (like the one commonly used to indicate whether a door is ajar) that has icons showing the seat belt status for each seating position. This dashboard image could be combined with the door-ajar image, and it could even be enhanced to indicate whether a door's child safety lock feature is engaged.
4) As noted in the ANPRM, occupant detection for the rear seats could present technical and cost challenges. The comments above have already addressed why a detection system would be ideal, since a CRS could be in use. In addition, many of the "alternative uses" of the rear seat that are described in the ANPRM are potentially dangerous for other occupants (and particularly children in the rear) due to the risk of loose items injuring people in a crash. Therefore, there is some value to a reminder system that encourages people to stow heavy items elsewhere (a trunk, hatch, or, at least, on the floor) and secure pets.

   If detection systems were mandated, a standardized compliance solution would be ideal for caregivers and CPSTs.
5) An enhanced warning would be appropriate for change-of-status situations. However, such a warning would need to be noticeable without rattling the driver. If a child has become unrestrained, the driver should remain calm and look for a safe place to pull over to take care of the child. Because the unbuckled child is at risk, any warning should be easy to distinguish, but not cause over-excitement during this process. Also, any signal should not be an attractive nuisance to a child.
6) Any "seat belt use" criteria should take into account whether a bypass system for CRS installation would be employed to prevent false warnings caused by using

the LAs of LATCH. If a caregiver must bypass the system when installing a CRS, that step should be easy to accomplish (including considering the challenge of working around a bulky CRS that may be occupying the seat).

7) If occupant weight is the triggering factor, SRN believes that the threshold must be low. While it is true that setting the 6-year-old ATD weight (46.5 pounds) as the minimum to trigger the system would prevent some false warnings caused by a CRS, it would fall far short of solving this problem entirely. (Many CRSs weigh well over 20 pounds, and therefore a combined child-plus-CRS weight greater than 46.5 pounds is not uncommon.) Also, using the average 6-year-old size as the trigger would prevent the system from benefiting many small children (younger and older than age 6) who use boosters or seat belts. So this weight threshold does not seem suitable. It could also encourage some caregivers to transition a child out of a CRS with a harness prematurely.

   If one considers, instead, the smaller HIII 3-year-old (36 pounds) as the minimum weight threshold: This ATD's weight roughly represents the 95th percentile 2-year-old and the 5th percentile 5-year-old. Since nearly 60% of 4- and 5-year-old children do not ride in a CRS with a harness (NSUBS, 2017), many of the most vulnerable seat belt users (very young children using the belt alone or in conjunction with a booster) would fail to trigger the alarm if unbuckled. This omission would be a great failing in a so-called warning system.

8) These comments have already addressed a positive reason for allowing the warning system to be defeated: allowing a CRS to be installed using LATCH. Therefore, methods to defeat circumvention—which are warranted—should take into account how false warnings due to LA-installed CRSs have been addressed.

9) Like other vehicle improvements, a rear seat belt warning system is likely to require more wiring and hardware in seating. Similar updates to front seats (especially due to advanced air bag sensors) have had unexpected consequences to the use of rear seats, especially regarding warnings to limit pressure on the seatback (from rear-facing CRSs, child legs/feet, rear tethers, etc.). It's entirely possible that new wiring in the rear seats, therefore, could have even more interaction with CRSs installed on those seats. Any system, therefore, would need to coexist with all current methods for installing CRSs, including but not limited to the common instructions in CRS and vehicle manuals directing owners to put pressure on the seat cushion and seatback, adjust the seat cushion's fore/aft position, tilt the seatback, and adjust the head restraint.

10) As already mentioned, instructions should be provided in a dedicated area of the owner's manual. If the system is not able to discern when a CRS is installed using the vehicle LAs in order to cancel a warning, the system should also be noted in the child restraint section of the manual, along with any instructions for steps to take that will prevent a false warning when a CRS is installed.

11) No comment.

12) In general, harmonization with existing requirements in other markets is desirable, and undoubtedly lessons can be learned from the experiences of the ECE and Euro-NCAP. However, methods for transporting children vary between the U.S. and Europe, so these differences should be taken into account before following a strict harmonization approach. For instance, for reasons described above, an occupant detection system would be ideal for determining whether an occupant is riding in a CRS, and European standards don't required this feature.

13) It is essential that the driver, as the person responsible for all occupants, see the visual warning. Although SRN lacks scientific data, it seems unlikely that an additional *visual* warning for rear seat riders would change the behavior of many unbuckled children.
14) A positive-only warning icon at the start of a ride would allow responsible caregivers to actively check if all children are buckled and would also allow a caregiver to disregard an unbuckled seating position that's occupied by a CRS or other object. This icon, coupled with a change-of-status visual/audible warning, would be helpful for families and beneficial for conscientious parents. However, it would not be as valuable as a warning triggered by negative-only status as a way to change the behavior of those occupants who are lax or reluctant to buckle up.
15) Comments above touch on the topic of a telltale for a change in buckling status. A telltale should be noticeable but not anxiety provoking (especially for the change-of-status warning, for situations where a child might be especially at risk). Standardized telltales are ideal, as many caregivers use multiple vehicles.
16) Icons at the beginning of a trip should appear for at least 60 seconds. The rear seat belt reminder icons should sync up with the driver pictogram, ideally showing all seating positions, so that positive and/or negative feedback is provided for each seating position (similar to current "door ajar" warnings that indicate the particular door that is ajar, which are more effective than general "door ajar" warnings of the past).
17) A change-of-status warning could be especially useful for alerting caregivers to children who have unbuckled, and the continuation of the signal should lead to rectifying this dangerous situation. A 30-second audible signal seems reasonable for an initial warning. However, it would be appropriate for the warning sound to resume if the vehicle continues to move while the system determines that an occupant remains unbuckled; perhaps another 30-second warning could follow a 30-second break.
18) Earlier comments urge NHTSA to carefully consider a warning sound that is noticeable, without prompting the driver to become so alarmed as to endanger a vulnerable, unbuckled child.
19) While SRN is in favor of all occupants buckling up in all vehicles, we have reservations about mandating rear seat belt reminders on school buses at this time.

    Currently, federal regulations require belts on only very small school buses—those weighing 10,000 pounds GVWR or less. These buses make up an exceedingly small portion of the national bus fleet, as most buses deemed "small" actually weigh more than 10,000 pounds. (However, anecdotal evidence shows that some transporters voluntarily add belts to their buses that weigh slightly more than 10,000 pounds.) In the last few years, the climate has shifted in favor of including lap-shoulder belts on larger school buses, particularly since 2015, when NHTSA announced support for lap-shoulder belts on all new school buses. Five states and several school districts now require lap-shoulder belts on new school buses of all sizes, and bills have been proposed federally and in many other states.

    This positive momentum should be considered tenuous, however. We agree with NHTSA that requiring a rear seat belt warning on school buses could impose too much added cost, which could dissuade pupil transporters from voluntarily equipping buses with seat belts, as well as provoke objections to laws

that require them. In addition, reports from most early adopters of lap-shoulder belts show strong general acceptance, with especially glowing reports of positive changes in student behavior. Adding new technology to this transition could be disruptive at this early stage of adoption, especially given the chance of unforeseen/unintended consequences.

In the future, when belts are more commonplace on school buses, reexamining this topic may be appropriate. While some may argue that it would be too difficult to incorporate a rear seat belt warning in a bus setting, technology is constantly rising to such challenges, as NHTSA is undoubtedly aware. In fact, at the recent BusCon 2019 show, InterMotive Vehicle Controls displayed the Safe-T-Seat it developed for Freedman Seating Company. The first-of-its-kind school bus seating displays and tracks the occupancy and belt status of all passenger seats and provides audio-visual warnings to the driver. The system uses wireless seat-sensing modules that can be adapted for use on up to 90 seats, and it even has a battery-operated option that allows the system to be retrofitted onto older buses. The system can be operated using a downloadable app on the driver's tablet.

Please note that the preceding concerns are specific only to the adoption of rear seat belt reminders on *school buses*. SRN is in favor of reminders on other vehicles used by school districts, such as vans and SUVs, which lack compartmentalized seating.

20) SRN believes a rear seat belt reminder system would be an effective tool that would be appreciated by most parents. It would remind them to buckle up their children (which would be a nuisance to few parents) and let them know when a child has unbuckled a belt during a ride. Also helpful, it would remind them to stow away loose objects that could become dangerous projectiles and alert them when a belt used for CRS installation is accidentally unbuckled.
21) See #20.
22) No comment.
23) No comment.
24) No comment.
25) SRN believes that the rear seat belt reminder feature should be added to NCAP recognition, as was done for similar testing in other markets around the world. However, as in Europe, this recognition should be in addition to a regulatory mandate that the warning system be a standard feature.
26) SRN agrees with the amendment with respect to the former maximum signal of 8 seconds.

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