



The Our American States podcast—produced by the National Conference of State Legislatures—is where you hear compelling conversations that tell the story of America’s state legislatures, the people in them, the politics that compel them, and the important work of democracy.

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School bus Safety | OAS Episode 19 | Oct. 12, 2017

Welcome to Our American States, a podcast of meaningful conversations that tell the story of America’s state legislatures, the people in them, the politics that compel them, and the important work of democracy. For the National Conferences of State Legislatures, I’m your host, Gene Rose.

School buses are designed to safely carry students to and from school. Statistically, it’s a very safe mode of transportation considering buses travel an estimated 5.7 billion miles annually. Still, accidents do happen and experts and manufacturers continue to look at ways to increase the safety of those vehicles. Our guests on this episode of Our American States will dive into the issue.

Later in the program, we will hear from Tennessee State Representative JoAnne Favors from Chattanooga. She will talk about a wreck in her district in which six schoolchildren died, which led her to propose a school seatbelt law that was nearly passed last year.

First we’ll talk with Dr. Kris Poland an investigator with the National Transportation Safety Board. She’ll walk us through the science of why school buses are safe and what steps are being explored to improve that safety. Here is our conversation with Dr. Poland.

So we’re talking with Dr. Kris Poland of the National Transportation Safety Board. Dr. Poland, talk to us about your background and what led you to the field of studying school bus crashes.

Dr. Kris Poland:

Thank you. I am a biomechanical engineer and I have been working at the NTSB for almost 20 years now, and I was fortunate when I first came to the Safety Board that we were doing a number of investigations on school bus crashes. We came out with a pretty seminal report in 1999 looking at bus crash worthiness issues, and from that report we looked at a number of different crashes with a variety of different severities. I was lucky enough to be able to conduct some of the simulation work where we looked at occupant kinematics, both in an unrestrained condition and then also when they were lap-belted and when they had simulated lap/shoulder belts.

The first one that I worked on when I came to the board was in Monticello, Minnesota, and that was a crash where it was between a truck and a school bus. The truck hit the side of the school bus right near the driver's area, and then there were two subsequent side-slaps where the leading edge of the trailer hit the school bus and then the far end of the trailer also hit the school bus. Unfortunately there were three fatalities right in the area where that last side-slap happened between the trailer and the school bus.

Gene: Talk to us about a typical day in America when school is in session. How many school buses are on the road and how many children on a given day are on school buses?

Poland: The American School Bus Council estimates that about 500,000 school buses carry 25,000,000 children to and from school each day.

Gene: You have said that school buses are one of the safest modes of transportation. Explain that statement to us.

Poland: Yeah, school buses are one of the safest modes of transportation. They transport a huge number of students to and from school and school-related activities, and on average we only see about five to six occupants in the school bus that are killed every year, which is pretty amazing given the number of students that are transported and the miles that they're transported.

In addition, school buses are highly regulated. It is the vehicle with the most federal motor vehicle safety standards that apply to it. So when I say that I'm talking about not just occupant protection for inside the school bus, but also there are standards that dictate the color of the school bus, so the bright yellow, the types of flashing lights, the stop arm; also the construction of the vehicle. So school buses are constructed with strong sidewalls so they protect the occupants in the case of a side crash. It also has roof strength requirements to that so if the bus does roll over, the bus can support its own weight upside-down. And I briefly touched on occupant protection.

So with or without seatbelts, school buses are the safest way for children to get to and from school, and that's because school buses have a passive form of occupant protection called compartmentalization. Compartmentalization is composed of closely spaced, high-backed, energy absorbing seats where, in the case of a frontal crash, the children go just a very short distance forward and then they come in contact with that seat back in front. And that seat back is designed to absorb energy, but also to deform so that the children can ride down the crash.

From our work and others' work we've found that that is very, very effective in frontal- and rear-impact crashes, which of course is what school buses are typically involved in.

Gene: Earlier you talked about the first crash that you investigated, but you've had others that actually did involve seatbelts. Can you explain a little bit about those crashes that you investigated?

Poland: Yeah, of course. So our most recent one where we were looking at children that were belted occurred in Anaheim, California, and in that case the school bus was equipped with lap/shoulder belts at all passenger seating positions. It was also equipped with an onboard video camera system, which looked at the occupants of the school bus and also at the driver of the school bus.

That was fortunate for us because it gives us a lot of information about what happens inside that school bus both before the crash, sometimes during the crash if those videos hold on, and in some other cases also after the crash. So that crash occurred in 2014 in Anaheim, California.

There were two other crashes that we looked at in 2012 that really helped us form our position on looking at seatbelts on school buses, and those occurred in Chesterfield, New Jersey and in Port Saint Lucie, Florida. The Port Saint Lucie, Florida crash was very catastrophic, but also very interesting for us from a research perspective because that was the first time that we were able to look at children involved in a severe side-impact crash where the children were all lap-belted. In that case, again, there were onboard video systems and the video system stayed in place and intact throughout the crash sequence, and then also for about 15 minutes after the crash. So we were able to look at some of the first people that were on the bus and also some of the first responders.

Gene: And you said these crashes helped inform your decision, kind of the position that the NTSB is taking. What is the official position?

Poland: Well, we do have a long history. I mentioned that 1999 report. In that 1999 report we asked NTSA to develop occupant protection standards for school buses that would address all types of crashes; so frontal crashes, rear crashes, side-impact crashes and rollover crashes. As a result of that recommendation, NTSA in 2008 did come out with some performance standards for school buses and they enhanced compartmentalization with that rule making. They also gave some options. They didn't require it, but they gave some options for a well-designed lap belt and a well-designed shoulder belt.

So in 2008 that was kind of the first time where NTSA gave performance requirements for belts on school buses. There were pros and cons with that approach. It was unfortunate that they didn't require one specific system because it still left the decision up to the states or the school districts to decide what they thought was the best form of occupant protection. But on the other hand, they did develop performance standards so that if somebody chose to put lap belts or lap/shoulder belts on the school bus, we knew that they were going to be well-designed and appropriate to the school bus environment. So that was back in 1999 and that's what NTSA did in 2008.

In 2012 as a result of those Chesterfield and Port Saint Lucie crashes, we got a better understanding of what happens to children in these severe side-impact crashes. Now we know that there are some states that require there to be lap-only belts on school buses and we thought that it was important as a result of those two investigations to say that if there are lap belts on the school bus, that we think it's important for the children to be wearing those lap belts and to be wearing them properly.

I point that out because in Chesterfield, one of the aspects we found was that children either weren't wearing the lap belts or, if they were wearing them, they were wearing them inappropriately. When I say inappropriately, these are lap belts that are kind of similar to what you might see in commercial aviation where you buckle the belt and then you have to manually tighten it; there's not a retractor involved.

What we were seeing in Chesterfield is that sometimes the children would buckle the belt, but they would never tighten it. Then you don't really get any benefit from that restraint system. In Chesterfield there was one occupant who was killed and she was seated at the rear of the bus, and unfortunately just due to the crash dynamics, that was the area of the bus that had the highest forces and the highest accelerations and she was unbelted and unfortunately traveled across the width of the school bus and sustained really severe injuries that ultimately resulted in her death.

Then we launched on the Port Saint Lucie crash where, again, we got to see the video. In that case we had children who were wearing the belts and the majority of them were wearing them properly. We had a couple who didn't tighten them as much as we as safety investigators would want to see those lap belts tightened. From that we learned that a well-fitted belt can keep the occupant within the seating compartment, but there are still some risks. Those risks are from the upper body still being able to flail.

So when you think about a lap-only belt, the lap-only belt just retains the occupant's hips within the seating compartment, but the upper body can still move with the motion of the bus. From that we did some simulation work to take a look at what would have happened if some of those critically injured children and the single fatality in Port Saint Lucie, what if they had had a lap/shoulder belt. What we found was that if there had been a lap/shoulder belt and it was worn properly, the children would have been safer.

So from Port Saint Lucie and Chesterfield we came out with a position where we said if states or school districts were going to be purchasing belt-equipped buses, that they should consider purchasing lap/shoulder belt equipped school buses because the lap/shoulder belts provided the best protection for occupants in all crash modes.

Gene: I'm curious. Do the manufacturers of school buses listen to your recommendations and are the newer models that are being built having seatbelts in them now?

Poland: Yeah, the manufacturers are taking some interesting steps. There was some concern when we were looking at lap/shoulder belts that there might be reduced capacity on the school buses because a lap belt, generally when you design it you can have a narrower width for the belt because you're only restraining the hips. A school bus seat is only a certain width; you know, you have a limited amount of space inside a school bus.

Typically what happens is for elementary school-aged children you have three children that can sit in a single seat. But then when you get to middle school and high school, you're usually saying only two people can fit in that. There was some initial concern that if you put lap/shoulder belts on, you could only design them to really fit two people because you need to be able to have that lap/shoulder belt fit the older students.

The manufacturers did something clever where they developed these flex seats where the lap/shoulder belt system can actually have some flexibility so that it can serve three elementary school-aged children, and then with very minimal changes can serve on the same route a middle school or a high school student without too many changes. So the manufacturers are being very clever in that sense; also, obviously if there's a request to have lap/shoulder belts on there.

As I mentioned, there are now performance standards that NHTSA developed, so they can put belts on and know that they're designed well and that they meet the federal motor vehicle safety standards.

There are also some options that the manufacturers are providing if there is a district that maybe can't afford to go all the way to belts, but is predicting that they can get there in the future. And in that case they have a seating system where it is basically strong enough to be able to support the belts, but may not be equipped with belts today; by just changing the seat back in the future with some additional expense, obviously, it can be a bus that would be equipped with lap/shoulder belts.

So I think manufacturers are trying to be very flexible to be able to offer lap/shoulder belts for school buses if that's what the district or the state is going towards.

Gene: I know you've spoken to the National Conference of State Legislatures and I'm sure you speak to other public officials across the country. Is there a message that you want legislators and those that develop policy to take to heart?

Poland: I think our message is twofold. What we want to ensure is that people understand that school buses, with or without seatbelts, are the safest way for children to get to and from school. We do not in any way want to give any sort of a message that implies that a school bus without lap/shoulder belts isn't safe.

I speak from personal experience on that aspect of our message because I have heard of people saying: well, in this environment or in this circumstance, I'm just going to drive my student, my child to school in my personal vehicle because they're going to be safer. That's not true. They are safer in the school bus than they are in any other transportation mode getting to and from school. So that's the first aspect of our message is that school buses are the safest way for children to get to and from school or school-related activities with or without seatbelts.

But the second part of that message is that in severe side-impact crashes or in rollovers, lap/shoulder belts provide an additional form of protection to keep those occupants within the seating compartment and to protect them from harm during the crash.

Gene: Thank you Dr. Poland. This has been very fascinating information. Do you have any final thoughts or other pieces of information that you think state legislators and policymakers need to be aware of?

Poland: Yeah, I guess I would point out that we have two investigations that are ongoing. One was a school bus crash that involved a school bus and an MTA bus in Baltimore, Maryland that occurred in November of 2016. Around that same time there was another school bus crash that garnered a lot of media attention that happened in Chattanooga, Tennessee, and that one was a single vehicle crash and unfortunately we had six fatalities in that school bus crash.

I want to point out that we are actively pursuing those investigations; they're ongoing right now. I think there are going to be some very interesting findings and recommendations that come out of both of those investigations.

Gene: If people want to find out more information, where would you direct them Dr. Poland?

Poland: It's [nts.gov/schoolbuses](https://www.nts.gov/schoolbuses) and at that location there's a lot of information about our school bus investigations as well as that short video that we did to look at school bus safety and to give our message a little bit more visibility.

Gene: One of those crashes that Dr. Poland mentioned occurred in the district represented by JoAnne Favors. The incident compelled her to introduce legislation to put procedures in place for seatbelts on school buses.

You've had some legislation that you introduced last session requiring seatbelts on school buses. Can you tell us what prompted you to file that legislation?

Favors: Yes. Last November 21st we had a terrible school bus accident. Six children lost their lives. We do not have a seatbelt law in Tennessee. There had been many efforts to enact a law in the past, especially over the past 10 to 12 years, without success. So I went ahead and introduced this law to see if we could get it passed this time.

Gene: And then did the legislation make it all the way through? What's the status of that?

Favors: Legislation made it all the way through several committees until it got to the Finance Subcommittee, and I didn't feel I had enough votes to get it passed on the House Floor. I decided to take it off notice since that was the farthest it had ever gone in the past. Generally it would stop in the Education Committee or the Transportation Committee on the first hearing.

I decided after talking with some of the cosponsors that we would go ahead and take it off notice and then put it on the first available calendar in 2018.

Gene: So you do intend to push this forward during that session?

Favors: Oh yes, certainly I'm going to push it. I've had an additional sponsor who signed onto it just recently. So I think there are about 23 primary cosponsors who have signed onto the bill in the House and hopefully we'll be able to get enough support to capture 50 votes so that we can pass it in the House.

Gene: Obviously this was a very tragic accident that happened there, but do you think that this really opened the eyes of your colleagues in the legislature there about why this is an important issue?

Favors: Yes, it did open the eyes of my colleagues. However, Tennessee is a primarily rural state and many of the bus drivers in the rural areas are independent owners. For some reason they are opposed to this. So that is a concern that we are trying to overcome. Some of the same arguments we heard... I'm a retired registered nurse and we heard some of these same arguments when the mandatory seatbelt law was passed in the '70s for automobiles, and it's interesting that they are the same concerns: primarily what would happen in the immersion of a bus in water and what would happen if the bus was on fire – would they be able to retrieve the children from the bus.

Gene: Are there other details about the legislation that are coming into play here?

Favors: Yes. I did amend the original bill to require this to be enacted on July 1, 2018 and also instead of having buses retrofitted with child restraint systems, it would just be for new buses that are purchased on or after July 1, 2018.

Gene: And you're seeing some, I guess, response from the manufacturers of school buses?

Favors: Yes. I did visit a company, Immi in Indiana and they did have a reenactment of a crash that was really unnerving for me to have experienced because this crash that occurred in November was in my district and I was there on the site. So it revived some of those feelings that I had. I also had a grandson who was lost in a tragic automobile accident. So I feel strongly about this and we're not sure whether he had a seatbelt on or not. So I am a strong proponent of this.

The response from the general public has been overwhelming: the teachers, principals. It's been really very, very supportive.

Gene: So it does sound like this is a very personal issue for you.

Favors: Yes, it is. And I know some of the parents of the children who lost their lives. You cannot attach a cost to safety and saving lives; you cannot attach a cost. This is a concern of many people and I've gotten a lot of support throughout the state and around the nation really people have contacted me about it.

Gene: Would you have advice to legislators across the country that might be looking into this issue, some things that you've learned that might be valuable to them?

Favors: Yes. I think that it's very important that we as legislators have as a priority the safety of our children. That is something that will rest solely on us when something happens. Nevada has been the last state, the most recent state, to enact child restraint systems on buses and I really, really commend them for having done that knowing what they had to experience in order to get to that point. But all legislators, that is a primary goal that we should all have on our agenda.

At the reenactment of the school bus crash, I was able to meet legislators from other communities and it was helpful to have people to discuss this with who were not there in your community. The networking opportunity, that was excellent meeting people from the National Transportation Association and also meeting the manufacturers – that was excellent too.

Gene: What kind of restraint are you pushing?

Favors: It would be the 3-point restraint system – the restraint system that comes transverse across your chest, and it's referred to as a 3-point system; not just the system that would have the seatbelt across the lap.

Gene: Any final thoughts on things that you'd like your colleagues across the country to know, or anything about this issue that you've learned?

Favors: Well, I've learned that the parents, when a situation occurs like this, the parents will look to you for assistance, and it's a feeling I cannot describe to have that many children, to have any child

lose their life... but to have six children from one school has had an effect on all of us that we will never forget.

So be mindful of that. I would tell my legislative colleagues to be mindful of that and understand that we have to take a step many times even though there may be a few who oppose it. There were those who opposed seatbelts in automobiles, but we all now know that there is conclusive evidence that the seatbelt does save lives.

Gene: Representative, thank you so much for being a guest on Our American States.

Favors: Thank you so very much.

Music and Gene VO:

And that concludes this edition of Our American States. For more information on this topic, we encourage you to go to www.ncsl.org and put in “school bus safety” in the search box to get access to the organization’s deep resources on the issue. As a reminder, we encourage you to subscribe to this podcast on iTunes, Google Play or go to our website, www.ncsl.org/podcast. Until our next episode, this is Gene Rose for the National Conference of State Legislatures. Thanks for listening.