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From the Expert... School Bus Seat Belts Re-Considered

Martha Warren Bidez, Ph.D. is a Professor, Department of Biomedical Engineering, University of Alabama at Birmingham (Birmingham, AL); Visiting Senior Scientist, Task Force for Child Survival and Development (Atlanta, GA). Dr. Bidez has spent over 15 years on research of passenger safety issues and is regarded nationally as an expert witness on this subject. We are honored to provide you with this commentary by Dr. Bidez.

The ongoing *concerns* of parents and others regarding the lack of seat belts on school buses were brought into the forefront once again on November 20, 2006 in Huntsville, Alabama. Tragedy struck that Monday morning when a school bus transporting Lee High School students to a local trade school careened over a retaining wall on an elevated segment of Interstate 565 and plunged 30 feet headlong onto the ground below. Four teenage girls (16-19 years old) were killed and another 14 students were hospitalized with serious injuries.

A pressing question is whether or not these teenagers would have been killed and/or as severely injured had the school bus in which they were riding been equipped with seat belts. The answer is not a simple yes or no.

School buses have historically utilized a concept of "passive restraint" that is referred to as "compartmentalization" that has proven very effective in frontal crashes of large school buses. The bus seats are positioned close enough together that unbelted children in frontal crashes impact the deformable seat back in front of them, which distributes the impact forces over their entire upper body. Given the large mass (size) of school buses in comparison to other striking vehicles, this type of "restraint" has worked very well in protecting school age children in frontal crashes. According to the National Highway Traffic Safety Administration (NHTSA), from 1990-2000, approximately 26,000 school bus crashes occurred each year with 10 children dying inside a school bus and approximately 9,500 child injuries each year. The child fatalities were often attributed to non-survivable crashes (e.g. impact by a moving train); however, the picture is less clear for the child injuries.

Compartmentalization is proven effective in only one crash mode – frontal. In side impacts and rollovers, school children are completely unrestrained and move outside the confines of their seating positions, often striking their heads on unpadded structures inside the school buses. Fortunately, such impact environments are not as frequently encountered in school bus crashes, generally 15-20% of all bus crashes. However, when they do arise – such as in Huntsville, AL in November 2006, tragic injuries and death inevitably occur. So the debate over putting seat belts in school buses inevitably reduces down to one of economics. Is the expense of equipping school buses with additional belt restraints a worthwhile investment given the likely "return" in terms of child lives saved? Three key considerations, I believe, are paramount in this debate.

- How does a state or local government actually calculate the "return on investment"? What exactly is the tangible "cost" of a single child's death or catastrophic injury in comparison to the tangible costs of re-tooling school buses with a comprehensive, state-of-the-art integrated seat belt system? Even if one sets aside the enormous costs of pain and suffering of surviving family members, the actual economic costs of a single catastrophically injured child can easily exceed $6-8 million in the child's lifetime. If that child is a poor child, the state will have to absorb the cost of that lifetime care.

- What are the "intangible costs" of the mixed message that school age children receive each day when they are required by state law to "buckle up for safety" in their parents' cars, yet not in the state/school district-owned school buses? Do our children really understand the concept of "passive restraint" through compartmentalization? Do parents even understand it?

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- What is a truly safe restraint system for school buses? Retrofitting existing school buses with either a lap belt or lap-shoulder belt is a mistake. Child protection in a crash requires a comprehensive system design that includes the seat, seat belt, and appropriate energy-absorbing padding of any structures within a likely head-strike zone for all foreseeable crash modes. That will require a re-design of school buses from the "bottom up," starting with the bottom seat cushion and extending to the geometry of seat belts designed specifically for the range of child occupants who will be using them.

Currently, states are trying to figure this complex problem out by themselves, without leadership from the federal government. The Federal Standards that regulate school bus design from a crashworthiness and occupant protection standpoint (FMVSS 220/222) are completely inadequate from a biomechanical engineering standpoint. They don't require occupant protection in anything but a frontal crash mode and even then, the regulations don't require dynamic testing with child crash dummies. Only 5 states presently have some form of school bus seat belt law and they vary from lap belts only (Florida) to state-of-the-art seat integrated seat belts in California. Other states, including Alabama, are considering their public policy options.

Appropriate public policy is critically needed at the federal level to provide guidance to the individual states before it is too late. Unfortunately, laws that are passed at the state level in the heat of emotionalism surrounding a tragic crash, such as the November crash in Huntsville, AL, can result in bad public policy that harms more than it helps the cause of child passenger safety. Without question, the safety of school buses can be improved by mandating a comprehensive restraint system that protects children in all foreseeable crash modes. I have delivered the following recommendations to Governor Riley's Special Task Force of School Bus Seat Belts, which I believe to be the most prudent immediate course of action for Alabama.

1. Require a child specific "system design" for child restraint in new buses, which provides child occupant protection
   - In all foreseeable crash modes
   - For full range of child passengers
2. Do not require retrofitting the existing bus fleet with lap-shoulder belts in isolation without a full systems safety review.
3. To the extent allowable by law, establish standards for bus manufacturers to demonstrate child protection through dynamic testing with child dummies with relevant child injury criteria. (Do not rely solely on existing FMVSS compliance for child safety requirements on buses.)

Economics may unfortunately drive the decision of whether to simply require all new buses added to a state's fleet to incorporate the advanced safety features in the years ahead or whether such a comprehensive seat/seat belt system can be retrofitted into the existing fleet. To do nothing, however, to protect those children who are hurt and killed in non-frontal bus impacts, no matter how small the number, is an immoral abdication of the role and responsibility of good government.

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Unfortunately, the answer to this question is not as simple as it may seem and has been debated nationally for decades. After the deadly accident in Huntsville, Gov. Bob Riley appointed a seven-member study group to research this question. The panel heard two days of testimony from national authorities, including Dr. Bidez, on school bus design and safety and finally recommended that the state fund a $1.4 million pilot study over three years to determine if seat belts on buses make children safer. The group also recommended that Riley lead a state charge pressuring the National Highway Traffic Safety Administration to act faster regarding bus safety. The agency, which makes safety recommendations and sets requirements, submitted a report to Congress on bus safety belts in 2002, but new regulations aren't expected to be implemented before 2013.

We, at VOICES for Alabama's Children, will remain at the forefront in advocating for child passenger safety.

VOICES FOR ALABAMA'S CHILDREN
P. O. Box 4576 Montgomery, AL 36103-4576
334-213-2410 -or- 800-444-KIDS (5437) Fax: 334-213-2413
E-Mail: vfac@alavoices.org Visit us at our website: www.alavoices.org