

Status Report

Insurance Institute for Highway Safety | Highway Loss Data Institute

Preventing driveway tragedies

Rear cameras help drivers see what's going on behind them

ALSO IN
THIS ISSUE
Vol. 49, No. 2
March 13, 2014

- ▶ Benefits of parking sensors
- ▶ Crash avoidance features get high marks in latest survey
- ▶ Don't confuse essential public health research with government spying



Technology shows promise in preventing backover crashes, new IIHS research shows.

Rear cameras are more effective than parking sensors at helping drivers avoid objects while traveling in reverse, but they don't help in every situation, a new IIHS study shows.

The study, conducted with volunteer drivers in an empty parking lot in the Los Angeles area, indicates that cameras would help prevent more backover crashes into pedestrians in the vehicle's blind zone than parking sensors. Surprisingly, cameras by themselves worked better than sensors and cameras combined.

"Right now cameras appear to be the most promising technology for addressing this particularly tragic type of crash, which frequently claims the lives of young children in the driveways of their own homes," says David Zuby, the Institute's executive vice president and chief research officer.

An estimated 292 people are killed and 18,000 injured each year by drivers who back into them, usually in driveways or parking lots. Young children and elderly

people are most likely to be killed in such crashes. Backover risk is increased by the large blind zones of many vehicles, which prevent drivers from seeing objects behind the rear bumper, especially objects that are low to the ground. SUVs and pickup trucks typically have the biggest blind zones, and they are involved in more backover crashes than cars.

Measuring blind zones

The research with volunteer drivers was the second of two IIHS studies that looked at how parking sensors and backup cameras increase visibility and help drivers avoid backovers. The first one measured the visibility of children to an average-size male driver in 21 vehicles, all 2010-13 models, and the degree to which each kind of technology improved visibility and detection.

In the visibility study, researchers used a pole painted with different bands to represent the average height and head size of a 12-15 month-old, a 2½-3 year-old and a

5-6 year-old. The pole was placed at various points behind each vehicle to see which portions of it were visible. The band representing the 12-15 month-old was much harder to see than the bands representing older children. On average, if it was anywhere within about 27 feet of the rear bumper, it couldn't be seen using glances and mirrors alone.

Without added technology, large SUVs were found to have the worst rear visibility, while small cars had the best. In general, the larger the vehicle, the worse the visibility. However, the Hyundai Sonata, a midsize car, was an exception. At 263 square feet, its blind zone for a 12-15 month-old was 42 percent larger than that of the F-150 pickup truck. The Sonata's large blind zone is due in part to an extremely sloped rear window and tall rear trunk lid, while the F-150 benefited from large side mirrors designed to help with towing.

Backup cameras reduced the blind zone by about 90 percent on average. Parking



Parking sensors help reduce property damage crashes

Although parking sensors didn't show much promise in preventing backover crashes in the study with volunteer drivers, there is evidence that they can be effective when it comes to reducing parking lot crashes into other vehicles. An IIHS survey of Buick Lucerne owners shows drivers believe the sensors are helping them.

A 2011 insurance claims analysis by HLDI indicated that rear parking sensors offered on the Lucerne were reducing claims for damage (see *Status Report*, July 3, 2012, at iihs.org). HLDI found that claim frequency under collision insurance, which covers damage to the insured vehicle, was 5 percent lower for vehicles with the park assist feature than for those without, while claims under property



2011 Buick Lucerne

sensors, which use ultrasonic sound waves or radar to detect objects around the vehicle, also reduced blind zones, but not as much. In the eight vehicles that had both technologies, the parking sensors had a small added benefit of 2-3 percentage points beyond the reductions provided by the cameras alone.

How drivers use technology

The study with volunteer drivers built on this work by allowing researchers to see how drivers use the technologies and whether they prevent crashes.

The analysis was based on the experience of 111 volunteers using a 2013 Chevrolet Equinox LTZ. The Equinox was chosen because it was a high-volume midsize SUV, and in the earlier visibility measurements it had neither the smallest nor the largest blind zone. The purpose of the study was disguised from the volunteers, who were told they were there to evaluate the SUV's entertainment and

information systems. After completing some parking maneuvers and tasks such as tuning the radio and reading from a navigation display, they were then told to back out of a spot and return to where they had left their personal vehicles. As they backed out, a foam cutout of a child-size crash test dummy was put in the vehicle's backing path.

In some cases, the foam dummy was stationary behind the vehicle, while in other cases it moved into the vehicle's path from the driver's side. Few of the volunteer drivers hit the object if it was moving, and neither the backup camera nor the parking sensors provided a statistically significant benefit in those cases. The proportion of drivers who collided with the stationary object was 4 times as large as the proportion that collided with the moving object. Drivers with the rearview camera alone had the fewest collisions with the stationary object; 56 percent of them hit it. In contrast, all the

damage liability, which covers damage to other vehicles, were 17 percent lower.

In the IIHS survey of 426 owners of 2010-11 Lucernes with rear park assist technology, nearly all respondents reported that they always leave the system on and would want the feature on their next vehicle. Fifty-six percent said they had heard an alert and then noticed something behind their vehicle that that they didn't expect.

Buick is a popular brand among older drivers, and 95 percent of the owners surveyed were older than 60. Technology such as parking sensors has the potential to help address some common age-related problems, such as difficulty turning one's head, but there are concerns about how easy the features are for older drivers to incorporate into their driving habits. This survey shows that acceptance of Buick's parking sensors is high among older drivers.

For a copy of "Buick Lucerne drivers' experiences with Ultrasonic Rear Parking Assist" by J.B. Cicchino et al., email publications@iihs.org. ■

drivers who had no technology hit the stationary object, while parking sensors alone helped just 1 out of 16 drivers avoid a crash.

For drivers who had both the camera and the sensors, the benefit wasn't as great as with the camera alone. Three-quarters of these drivers hit the stationary object. It may be that the sensors, which detect objects up to 8 feet behind the vehicle at speeds less than 5 mph, gave drivers a false sense of security, so they paid less attention

the stationary object was in the shade, for example, nearly every driver who looked at the display still hit it. In the real world, weather and lighting conditions would likely affect the usefulness of cameras. These issues may help explain why HLDI didn't find consistent reductions in insurance claims when it studied camera systems offered by Mazda and Mercedes-Benz (see *Status Report*, July 3, 2012, at ihs.org).

has urged the agency to require that a certain minimum amount of space around a vehicle be directly visible using backward glances and mirrors.

"Having an available rearview video system on a vehicle model should not justify design choices that restrict direct visibility around the vehicle," the Institute wrote in a July comment.

Manufacturers also may be able to improve the technological options. Both



to the camera display. Slightly fewer drivers who had both cameras and sensors looked at the camera display at least once than drivers who had only cameras, and they spent a smaller proportion of time looking at the camera display while backing, but these differences weren't statistically significant.

"The sensors might be more useful if they had a larger range and could provide an earlier warning," says David Kidd, an IIHS research scientist and the lead author of both studies. "Even when drivers braked in response to the sensor, few collisions were prevented."

Rearview cameras didn't prevent all collisions, even when properly used. When

The research into backing technologies comes as the National Highway Traffic Safety Administration (NHTSA) is considering whether to require cameras on passenger vehicles. Congress directed the agency in 2008 to expand the required field of view behind a vehicle. NHTSA hasn't yet finalized the regulation but previously indicated that cameras are the only technology available that could meet the congressional mandate. The agency announced in September 2013 that it would be adding rearview cameras to the list of recommended features in its vehicle safety ratings.

In comments to NHTSA, the Institute has said it supports efforts to encourage rearview cameras. At the same time, it

cameras and sensors likely would be more effective if they were combined with automatic rear braking technology. Autobrake for front crash prevention has been found to be more effective at preventing or mitigating frontal crashes than warning systems alone (see *Status Report*, Sept. 27, 2013).

For copies of "Visibility of children behind 2010-13 model year passenger vehicles using glances, mirrors, and backup cameras and parking sensors" by D.G. Kidd and A. Brethwaite and "The effects of rearview camera, parking sensor system, and the technologies combined on preventing a collision with an unexpected stationary or moving object" by D.G. Kidd et al., email publications@ihs.org. ■

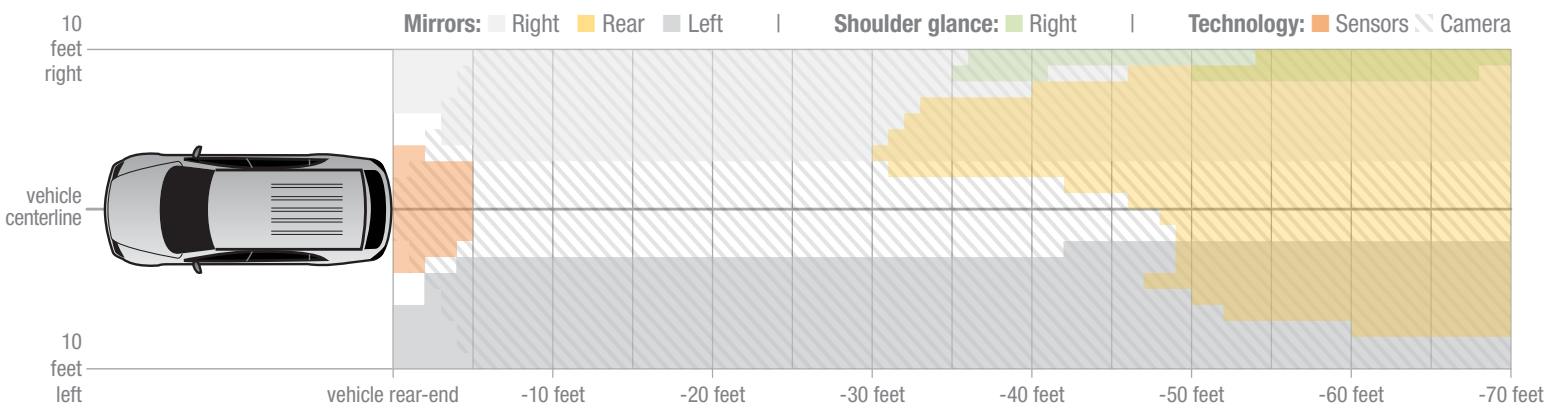
Two studies point to rear camera benefit

Study No. 1: Measuring visibility

Researchers measured the visibility of children to an average-size male driver in 21 vehicles, using mirrors, an over-the-shoulder glance and technology. A pole painted with three bands representing the average heights of a 12-15 month-old, a 2 ½-3 year-old and a 5-6 year-old was placed at various spots behind each vehicle to determine where each of the bands could be seen by the driver.



Rear visibility in a typical SUV: 2013 Chevrolet Equinox LTZ

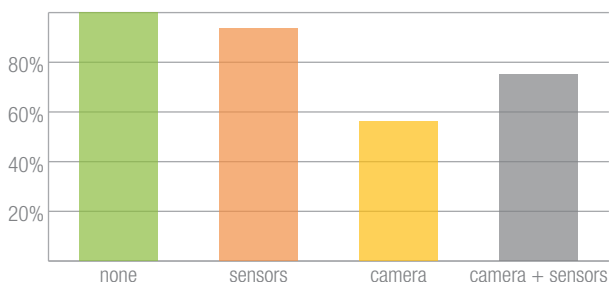


This diagram shows how the Chevrolet Equinox LTZ's rearview camera improves a driver's field of view. The camera provides visibility in the entire striped area, including the section directly behind the vehicle that can't be seen using the mirrors or a shoulder glance. Other colors represent the areas where an average 12-15-month-old child (30 inches tall) could be seen by means of mirrors or a shoulder glance or detected by sensors. On its own, the camera would provide visibility in most of the space measured, but would leave areas near the bumper where a child couldn't be seen. When the camera is used in combination with the side mirrors and parking sensors, the blind zone — represented by the area left white — is greatly reduced but doesn't disappear entirely. Relying on a right shoulder glance alone, the child would be visible only off to the right of the SUV and starting 35 feet from the rear bumper. Little if any of the area being measured would be covered by a left shoulder glance, and for that reason it isn't included in the diagram. **For an interactive version of this diagram, where you can see the results of different combinations of mirrors, glances and technology, go to iihs.org/StatusReport.**

Study No. 2: How drivers use technology

Volunteers drove a 2013 Chevrolet Equinox LTZ. Some drivers had access to the rear camera, others had the parking sensors, and some had both. The rest had neither technology. Before they backed out, a foam cutout of a child was put in their path.

Percent of participants who hit stationary object, by technology condition





Dodge/Jeep and Toyota owners say they like their crash avoidance features

As advanced crash avoidance features spread through more of the vehicle fleet, the technologies are proving popular with drivers of mainstream brands and not just owners of the luxury cars that got the systems first.

The Institute recently surveyed owners of Dodge/Jeep and Toyota models with adaptive cruise control, front crash prevention and other features. The researchers wanted to learn whether these drivers' experiences differed from those of previously surveyed luxury-car owners. Most participants said they found the systems useful and would want them again on their next vehicle, which was similar to what Volvo and Infiniti owners told researchers in the previous surveys (see *Status Report*, Dec. 20, 2012, and Nov. 18, 2009, at iihs.org). However, one new finding is that younger drivers may be reaping more benefits from the technologies than older drivers.

Reactions to crash avoidance features are important because many systems provide only warnings and require drivers to take action. Drivers who find the systems irritating may decide to deactivate them, forgoing their benefits. In addition, researchers want to be sure that having the features doesn't prompt people to become too reliant on them and drive less safely as a result. So far, that doesn't seem to be a major problem, the surveys show.

Dodge and Jeep owners

In the survey of Dodge and Jeep owners, interviews were conducted with 215 owners of 2011 Dodge Charger, Dodge Durango and Jeep

Grand Cherokee models with adaptive cruise control and forward collision warning and with another 215 owners of models with blind spot detection and rear cross-traffic detection. Most people said they always keep the systems turned on, and more than 90 percent of owners with each system said they would want it again in their next vehicle.

More than half the owners said they believed forward collision warning had helped prevent a crash. While the actual number of crashes prevented is almost certainly much lower, this result is an indication that drivers trust the system and believe it is helping to keep them safe. On the flip side, about 3 in 5 owners said the system sometimes warned them when there was no risk of crashing.

Thirty-six percent of owners who had used adaptive cruise control — which is similar to cruise control but automatically slows the vehicle to maintain a set following distance when the vehicle encounters leading traffic — said they followed the vehicle in front of them less closely when using the system, while only 4 percent followed more closely.

Drivers age 40 and younger were most likely to report that forward collision warning had prevented a collision and that they follow the vehicle ahead less closely with adaptive cruise control. Drivers 60 and younger were more likely than their older counterparts to always keep forward collision warning turned on, even though they also were more likely to say the alerts were annoying. Annoyance was highest for drivers 40 and younger.

Don't confuse essential public health research with government spying

An effort to collect information about impaired driving through a voluntary survey has led to a backlash amid concerns about privacy. Researchers conducting the National Roadside Survey of Alcohol and Drugged Driving work with local police to safely stop drivers, who are then asked to participate. Survey workers collect breath, saliva and blood samples, but no names are taken. Those who agree to provide saliva or blood are paid a small amount. Alternate transportation is provided for any drivers found to be impaired, but no charges are brought. Nevertheless, the participation of police has raised concerns in the wake of revelations about federal surveillance programs, and some police departments say they will no longer assist with the survey. Below, **IHS President Adrian Lund** responds to the controversy.

Collecting anonymous data about a serious public health threat is a far cry from government spying. The National Roadside Survey of Alcohol and Drugged Driving helps highway safety researchers evaluate how well we as a nation are dealing with the known scourge of alcohol-impaired driving and the potential problem of impairment by other drugs. In order to reduce the toll from impaired driving, we need to know how prevalent these substances are among drivers.

Great strides were made in the 1980s and early 1990s to reduce the contribution of alcohol to motor vehicle crashes. Thanks to the activities of organizations such as Mothers Against Drunk Driving and the enactment of laws making punishment for driving under the influence more certain and banning the sale of alcohol to those younger than 21, the proportion of fatally injured drivers with blood alcohol concentrations (BACs) of 0.08 percent or higher fell from nearly half in 1982 to about a third in 1994. The policies worked.

Since the mid-90s, however, that proportion hasn't budged. Does that mean our policies have stopped working? Do we need to change them? Should we double-down on some of them, for example, by lowering the legal BAC limit from 0.08 percent to 0.05 percent? The national roadside survey — anonymous, voluntary and conducted four times previously without ill effects to participants — can help answer those questions.

Previous roadside surveys, conducted in 1973, 1986, 1996 and 2007, show a steady decline in drinking drivers on the road. Our alcohol policies still seem to be working to get impaired drivers off the roads. But we need a better understanding of why alcohol continues to be involved in fatal crashes at such a high rate.

Only by gathering more data can we hope to solve this puzzle so that we can continue our progress in reducing the impaired-driving toll. From a public health perspective, it would be irresponsible not to do so. ■

The roadside survey provides needed information to help craft effective policies.

Regarding blind spot detection, nearly 4 of 5 drivers said the feature prevented them from colliding with a vehicle in another lane. The same number said the rear cross-traffic warnings had prevented a collision while backing out of a driveway or parking space. (Again, such answers illustrate drivers' perceptions but may not be accurate estimates of the numbers of crashes prevented.) There was some evidence that the drivers were coming to rely on the technology, with one-third saying they turn their heads less often to check blind spots with blind spot detection.

Toyota owners

The second study focused on 2010-13 Toyota Sienna and Prius models equipped with adaptive cruise control, front crash prevention and lane departure warning. A total of 183 people were interviewed.

Ninety percent of respondents said they would want the front crash prevention system again in their next vehicle. Twenty-seven percent of those who had ever driven with the system on thought a collision warning had helped prevent a crash, and 20 percent thought automatic braking had. Sixteen percent said the system had issued alerts when there was no risk of crashing. Thirteen percent said the same about automatic braking.

Like front crash prevention, adaptive cruise control was popular among Toyota owners. Ninety-two percent said they would want it again. Nearly two-thirds of survey participants said they always use the feature on high-speed roads, while just 13 percent said they never had used it.

As in previous surveys, lane departure warning was less popular. Seventy-one percent of participants said they would want the system again. Only 13 percent said they always turned the system on. More than a quarter of respondents said they had experienced false alarms with this feature.

Many respondents reported that they used turn signals more often with lane departure warning and followed less closely with adaptive cruise control. As in the Dodge/Jeep survey, these reports of safer driving were more common among drivers 40 and younger.

Although the purpose of the studies was to look at the acceptance of crash avoidance technologies among drivers of mainstream vehicles, the owners of these particular Dodge, Jeep and Toyota models may not be typical. Optional crash avoidance technologies sometimes add thousands of dollars to the cost of a vehicle and often are available only as part of more expensive packages. The resulting prices can approach those of luxury models. That might help explain why the reactions to the technologies didn't appear to differ much from those of luxury-car drivers, except for the effect of driver age.

For copies of "Experiences of Dodge and Jeep owners with collision avoidance and related technologies" by J.B. Cicchino and A.T. McCartt and "Toyota drivers' experiences with Dynamic Radar Cruise Control, the Pre-Collision System, and Lane-Keeping Assist" by A.H. Eichelberger and A.T. McCartt, email publications@ihs.org. ■

Status Report

Rear cameras look more promising than sensors for backover prevention ▶ 2

Parking sensors prove popular among Buick drivers ▶ 3

Drivers give thumbs-up to crash avoidance features in nonluxury brands ▶ 6

IIHS President Adrian Lund on the national roadside survey controversy ▶ 7

Vol. 49, No. 2
March 13, 2014

1005 N. Glebe Road
Arlington, VA 22201 USA
t 703/247-1500
f 703/247-1588

Inquiries/print subscriptions:
StatusReport@iihs.org

Copy may be republished with attribution. Images require permission to use.

Editor: Kim Stewart
Writer: Sarah Karush
Art Director: Steve Ewens

 www.iihs.org

 iihs.org/rss

 youtube.com/IIHS

 [@IIHS_autosafety](https://twitter.com/IIHS_autosafety)

 m.iihs.org



The **Insurance Institute for Highway Safety** is an independent, nonprofit scientific and educational organization dedicated to reducing the losses — deaths, injuries and property damage — from crashes on the nation's roads.

The **Highway Loss Data Institute** shares and supports this mission through scientific studies of insurance data representing the human and economic losses resulting from the ownership and operation of different types of vehicles and by publishing insurance loss results by vehicle make and model.

Both organizations are wholly supported by the following auto insurers and funding associations:

MEMBER GROUPS	
Acceptance Insurance	Liberty Mutual Insurance Company
ACE Private Risk Services	Louisiana Farm Bureau Mutual Insurance Company
Affirmative Insurance	Maryland Automobile Insurance Fund
Alfa Alliance Insurance Corporation	Mercury Insurance Group
Alfa Insurance	MetLife Auto & Home
Allstate Insurance Group	Michigan Millers Mutual Insurance Company
American Family Mutual Insurance	MiddleOak
American National Family of Companies	Mississippi Farm Bureau Casualty Insurance Company
Ameriprise Auto & Home	MMG Insurance
Amica Mutual Insurance Company	Mutual of Enumclaw Insurance Company
Auto Club Enterprises	Nationwide
Auto Club Group	New Jersey Manufacturers Insurance Group
Auto-Owners Insurance	Nodak Mutual Insurance Company
Aviva Insurance	Norfolk & Dedham Group
Bankers Insurance Group	North Carolina Farm Bureau Mutual Insurance Company
Bituminous Insurance Companies	Northern Neck Insurance Company
California Casualty Group	Ohio Mutual Insurance Group
Capital Insurance Group	Old American County Mutual Fire Insurance
Chubb & Son	Old American Indemnity Company
Colorado Farm Bureau Mutual Insurance Company	Oregon Mutual Insurance
Commonwealth Mutual Insurance Company of America	Pekin Insurance
Concord Group Insurance Companies	PEMCO Insurance
Cotton States Insurance	Plymouth Rock Assurance
COUNTRY Financial	Progressive Corporation
CSAA Insurance Group	QBE Group
CSE Insurance Group	The Responsive Auto Insurance Company
Dallas National Insurance Company	Rockingham Group
Direct General Corporation	Safe Auto Insurance Company
Erie Insurance Group	Safeco Insurance Companies
Esurance	Samsung Fire & Marine Insurance Company
Farm Bureau Financial Services	SECURA Insurance
Farm Bureau Insurance of Michigan	Sentry Insurance
Farm Bureau Mutual Insurance Company of Idaho	Shelter Insurance
Farmers Insurance Group of Companies	Sompo Japan Insurance Company of America
Farmers Mutual Hail Insurance Company of Iowa	South Carolina Farm Bureau Mutual Insurance Company
Farmers Mutual of Nebraska	Southern Farm Bureau Casualty Insurance Company
Florida Farm Bureau Insurance Companies	State Auto Insurance Companies
Frankenmuth Insurance	State Farm Insurance Companies
Gainsco Insurance	Tennessee Farmers Mutual Insurance Company
GEICO Corporation	Texas Farm Bureau Insurance Companies
Georgia Farm Bureau Mutual Insurance Company	Tower Group Companies
Goodville Mutual Casualty Company	The Travelers Companies
Grange Insurance	United Educators
Hallmark Insurance Company	USAA
Hanover Insurance Group	Utica National Insurance Group
The Hartford	Virginia Farm Bureau Mutual Insurance
Haulers Insurance Company, Inc.	West Bend Mutual Insurance Company
Horace Mann Insurance Companies	Western National Insurance Group
ICW Group	Westfield Insurance
Imperial Fire & Casualty Insurance Company	Zurich North America
Indiana Farmers Mutual Insurance Company	
Infinity Property & Casualty	FUNDING ASSOCIATIONS
Kemper Preferred	American Insurance Association
Kentucky Farm Bureau Insurance	National Association of Mutual Insurance Companies
	Property Casualty Insurers Association of America