STATUS REPORT
INSURANCE INSTITUTE FOR HIGHWAY SAFETY
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MISMATCH

OF THE FRONT ENDS OF THE VEHICLES IN THIS CRASH TEST IS A PROBLEM. THE SUV'S FRONT-END ENERGY-ABSORBING STRUCTURE RIDES OVER THE CAR'S. IN A REAL CRASH, THIS COULD INCREASE INJURY RISKS FOR THE CAR OCCUPANTS, WHICH IS WHY AUTO MANUFACTURERS HAVE BEEN COMMITTED SINCE 2003 TO

designing the front ends of light trucks (SUVs and pickups) so their energy-absorbing structures overlap those of cars (see *Status Report*, Jan. 3, 2004; on the web at www.iihs.org).

"Compliance with these voluntary commitments already is making a difference, even though automakers don't have to ensure that all of their light trucks comply until the 2010 model year," says former Institute president Brian O'Neill, lead author of a new study that quantifies the benefits of the commitments. Car driver death rates were lower — in some cases dramatically lower — during 2001-04 in front and side crashes with 2000-03 model SUVs and pickups that already met the automakers' commitments, compared with car driver death rates in crashes with light trucks that didn't.

This is the first time researchers have compared death rates in cars in crashes with complying versus noncomplying SUVs and pickups. A previous Institute study considered potential benefits for car drivers in frontal crashes with light trucks if the trucks' front ends had been the same as those of cars of the same weight (see *Status Report*, April 28, 2005; on the web at www.iihs.org).

FRONT-TO-FRONT

Estimated fatality risk reductions for car drivers

	CAR DRIVER BELT USE	RISK REDUCTION
SUV and car	belted	18 to 21%
	unbelted	2 to 3%
Pickup and car	belted	9 to 19%
	unbelted	-3 to 4%

FRONT-TO-SIDE

Estimated fatality risk reductions for car drivers

	RISK REDUCTION
SUV into car	47 to 48%
Pickup into car	1 to 9%

What the automakers agreed to do: Recognizing the importance of preventing override and underride in head-on crashes between cars and SUVs or pickups, automakers committed to increasing the geometric overlap of the front energy-absorbing structures of light trucks and cars.

To meet this commitment, automakers are designing the primary energy-absorbing structures of new SUVs and pickup trucks to overlap at least 50 percent of the federally mandated bumper height zone for cars. Alternatively, automakers may elect to connect a second energy-absorbing structure to the primary one. Then the lower edge of the secondary structure cannot be any higher than the bottom of the car bumper zone.

By September 2009 all new light trucks for sale in the U.S. market will be designed to meet one of these alternatives. The auto manufacturers have agreed to other commitments to address vehicle incompatibilities in front-to-side crashes.

Institute researchers collected information on compliance with front-end matching agreements from 13 automakers to directly assess the benefits for drivers of cars in crashes with light trucks that are in compliance versus those that don't yet comply. The manufacturers that provided information for the study are Audi, BMW, DaimlerChrysler, Ford, General Motors, Honda, Hyundai, Mazda, Mitsubishi, Nissan, Porsche, Toyota, and Volvo. Two other automakers, Isuzu and Subaru, are participating in the voluntary commitments to improve vehicle compatibility but couldn't provide compliance data in time for the study.

The researchers obtained information from the federal Fatality Analysis Reporting System on crashes during 2001-04 in which 2000-03 model SUVs or pickups struck cars head-on or on the driver side, resulting in car driver deaths. Researchers computed the relative risks of car driver deaths in crashes with complying versus noncomplying SUVs and pickups, based on observed numbers of deaths in crashes *(continues on p.6)*

Brian O'Neill retires

Career of president spanned more than 35 years of setting the highway safety agenda

Brian O'Neill arrived in the United States from England in 1966. After joining the Insurance Institute for Highway Safety three years later, he was a founder of the affiliated Highway Loss Data Institute in 1972 and became president of both organizations in 1985. During his tenure, O'Neill directed hundreds of research projects, wrote dozens of scientific papers, and co-authored *The Injury Fact Book*. He also served on the boards and committees of numerous national and international safety groups.

O'Neill recently has been helping to lead a voluntary effort among auto manufacturers to reduce incompatibilities among passenger vehicles in crashes. He is lead author of studies indicating the benefits of improving compatibility in front-to-front crashes between cars and SUVs or pickup trucks (see p.1).

Among O'Neill's major contributions was envisioning and developing the Institute's Vehicle Research Center, a state-of-the-art facility for research and testing that opened in 1992 in central Virginia. Directed by O'Neill, the work conducted at this facility has expanded the Institute's influence worldwide. The crash test programs have contributed directly to more crashworthy vehicles. Lives have been saved because of O'Neill's leadership and enduring vision.

LEAD AUTHOR OF THE INSTITUTE'S NEW STUDY OF CRASH COMPATIBILITY BETWEEN CARS AND SUVS OR PICKUPS IS BRIAN O'NEILL, WHO SERVED AS PRESIDENT OF THE INSURANCE INSTITUTE FOR HIGHWAY SAFETY AND HIGHWAY LOSS DATA INSTITUTE FROM 1985 UNTIL THIS MONTH. ADRIAN LUND SUCCEEDS O'NEILL AS PRESIDENT.

Phoning while driving increases year by year, even as evidence of the risk accumulates

Institute reviews 100+ studies, finding convincing evidence of added risk

More drivers than ever are talking on cell phones. The National Highway Traffic Safety Administration (NHTSA) reports that at any time of day 6 percent of drivers on U.S. roads in 2005 were using hand-held phones — double the rate that was observed 5 years ago. The highest phone use rate in 2005 (10 percent) was among drivers 16 to 24 years old.

"It's troubling that the youngest drivers are the most likely to be talking on phones," says Anne McCartt, Institute research vice president. "These drivers already have higher crash rates than older drivers, including higher fatal crash rates, and the last thing they need is the distraction of using a phone."

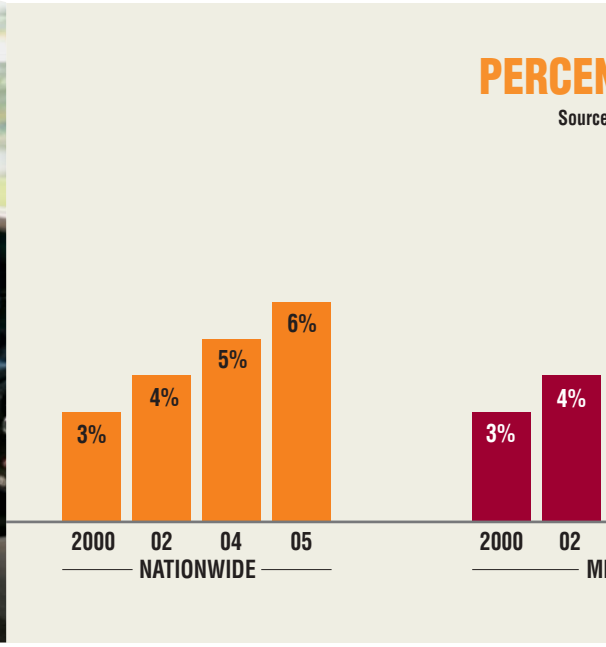
NHTSA's report on hand-held phone use is based on observational studies. Based on these plus telephone interviews, NHTSA also has estimated the use of hands-free phones and other electronics while driving. The agency says as many as 10 percent of motorists of all ages may be using some type of phone, either hand-held or hands-free.

Lots of study approaches, one message: The NHTSA survey results were released last month, the same time as a new Institute review of available evidence about the safety consequences of phoning while driving. McCartt and other Institute researchers reviewed 125 studies in all.

Almost half of the cell phone studies were experimental, involving tests of small numbers of people in driver simulators or instrumented vehicles. Almost all of these studies identified effects on driver performance from the cognitive distractions associated with phone use. For example, the reaction times of drivers using phones were likely to be slower. Drivers on phones also were more likely to deviate from their lanes. However, many of these studies didn't involve driving or phoning tasks that were realistic, so it's hard to draw meaningful conclusions about the risks for real motorists in everyday driving situations.

A handful of studies did involve real drivers on the road with cameras or other technologies in their vehicles to record their behavior. One of these so-called naturalistic studies found that drivers were more likely to take their hands off the steering wheel or their eyes off the road when they were dialing a phone or answering it.

Most studies of real-world crashes have used data obtained from crash-involved drivers or reports by police who queried the drivers about whether a cell phone was being used at the time of a crash. These aren't reliable sources of information. A few studies have used cell phone companies' billing records — much more reliable information



THE INSTITUTE REVIEWED MORE THAN 100 STUDIES OF CELL PHONE USE. TOGETHER THESE STUDIES PRESENT A CLEAR PICTURE: USING A PHONE DOES AFFECT DRIVING PERFORMANCE AND INCREASE THE RISK OF A CRASH.

sources — to verify phone use by drivers who were in crashes. An Institute study based on the billing records of Australian drivers found a fourfold increase in the risk of an injury crash associated with phone use. This risk was consistent among male and female drivers as well as younger and older drivers (see *Status Report*, July 16, 2005; on the web at www.iihs.org). A Canadian study found about the same increase in the risk of a property damage crash.

These two studies of real-world crashes also found about the same risk associated with hands-free and hand-held phones. This is consistent with experimental studies showing that driver performance is affected by hands-free and hand-held phone use alike.

"Such findings have implications for the kinds of laws being enacted or being considered by state legislators to reduce the risks of phone use," McCartt says.

and DC the limit applies to school bus drivers. The effects of the bans have varied.

An initial decline in hand-held phone use right after New York enacted its 2001 law didn't persist (see *Status Report*, Aug. 26, 2003; on the web at www.iihs.org). It dissipated within about 18 months. However, a new study of DC's law indicates a more lasting result. This jurisdiction began banning hand-held phone use while driving in July 2004. The use rate declined from about 6 percent before the law to 3.5 percent 3 months after it took effect. A year later, this decline was being sustained. Hand-held phone use did go up a little bit but not much — and relative to the substantial increases in phone use in nearby jurisdictions the DC use rate still was 50 percent lower than before the law took effect.

"It's unclear why the laws in these two jurisdictions haven't had similar influences

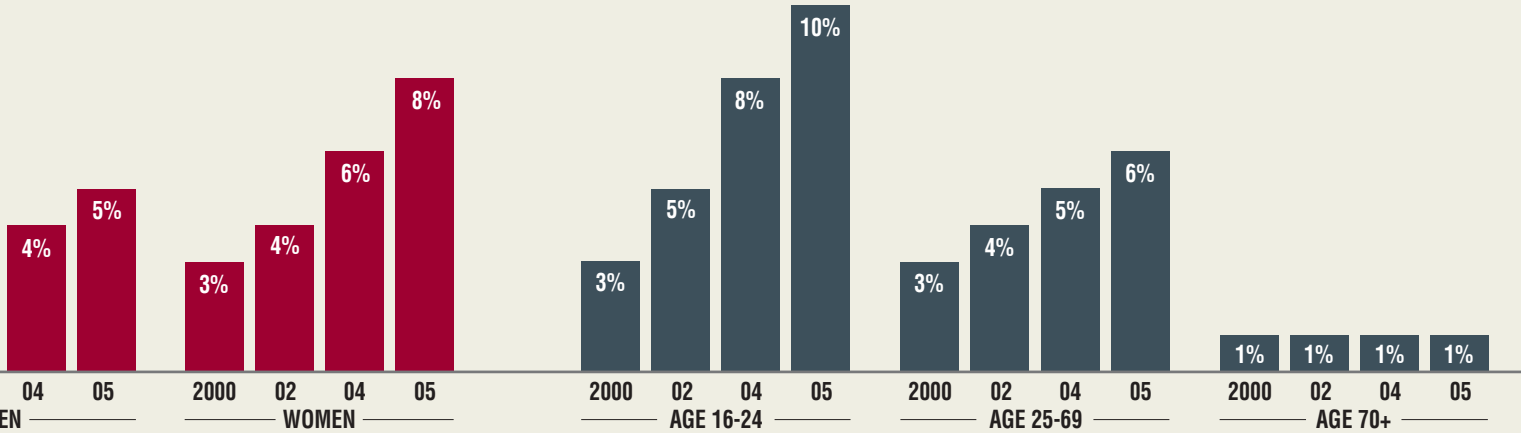
abandon their hand-held phones. But if these drivers were to simply switch to hands-free phones, the effects might not be as beneficial as lawmakers expect. After all, the studies conducted in Australia and Canada found approximately equal increases in the risk of a crash regardless of the type of phone a driver was using.

No jurisdiction prohibits all drivers from using hands-free phones. Why not? A problem is that such a law would be difficult to enforce. It would be hard for police to see if a driver were talking on a hands-free phone.

"Increasing the number of states that ban hand-held phone use might be beneficial to the extent that not all drivers would make the switch to hands-free. Some of them would stop using their phones altogether while they're behind the wheel, which would reduce the risk of crashing," McCartt concludes.

TAGE OF DRIVERS TALKING ON HAND-HELD PHONES, 2000-05

ational Occupant Protection Use Survey, National Center for Statistics and Analysis, National Highway Traffic Safety Administration



Laws restricting cell phone use: A number of jurisdictions worldwide, including several U.S. states, make it illegal to use a hand-held phone while driving. Such bans are in effect in Connecticut, New Jersey, New York, and the District of Columbia. Ten states and DC limit the use of any kind of phone by teenage drivers, and in 11 states

on drivers, but it might have something to do with DC's reputation for strong enforcement of traffic laws," McCartt says. Citations for cell phone violations represented 8 percent of all moving violations in DC compared with 4 percent in New York.

Enacting and enforcing laws like DC's in every state might convince many drivers to

For a copy of "Cell phones and driving: a review of research" by A. McCartt et al., write: Publications, Insurance Institute for Highway Safety, 1005 N. Glebe Rd., Arlington VA 22201, or email publications@iihs.org. Results of NHTSA's survey are available at www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/RNotes/2005/809967.pdf.

(continued from p. 3) with complying vehicles versus expected numbers of deaths if the complying light trucks had the same car driver death rates as noncomplying ones.

Death rates were computed according to the weights of the SUVs and pickups involved in the crashes in which car drivers died. Because so few deaths occurred in cars struck by the lightest and heaviest SUVs and pickups, computations were limited to those weighing 3,000 to 6,000 pounds.

Belted drivers benefit in frontal crashes: The fatality risk was lower for belted car drivers in front-to-front crashes with complying SUVs and pickups, compared with noncomplying ones. In crashes with SUVs, the risk was 18-21 percent lower if the SUV was in compliance with the automakers' commitments. In crashes with complying pickups the estimated risk reduction was 9-19 percent (ranges reflect the uncertainty caused by the small numbers of car driver deaths in each crash type).

FATALITY RISK WAS LOWER FOR BELTED CAR DRIVERS IN FRONT-TO-FRONT CRASHES WITH COMPLYING SUVS AND PICKUPS, COMPARED WITH NONCOMPLYING ONES. IN CRASHES WITH SUVS, THE CAR DRIVER DEATH RISK WAS 18-21 PERCENT LOWER IF THE SUV WAS IN COMPLIANCE.

For unbelted car drivers, the fatality risk wasn't reduced if the light trucks complied with the commitments. That is, death rates for car drivers who didn't buckle up were about the same, whether or not the trucks involved in the head-on crashes complied.

Benefits in side impacts: The design changes to improve front-end compatibility between light trucks and cars are specifically intended to enhance car occupant protection in head-on crashes with SUVs and pickups. The analyses by Institute researchers indicate that some benefits are accruing in side impacts too.

When SUVs struck cars on the driver side, the estimated fatality risk reduction for the car drivers, belted and unbelted, was 47-49 percent when the striking SUVs were in compliance versus when they weren't. The risk reduction was a more modest 1-9 percent for drivers whose cars were struck on the side by complying pickup trucks compared with noncomplying ones. (Note: Death rates weren't computed separately for belted and unbelted car drivers in front-to-side crashes because of the relatively low effectiveness of safety belts in side impacts. Plus the number of unbelted car driver deaths in side impacts was too small to consider separately.)

It's likely that the big fatality risk reduction for complying SUVs that strike the sides of cars, but not for striking pickups, may reflect some other design aspects that also are important. For example, the front ends of many of the SUVs in the Institute's analyses, both complying and noncomplying, are less vertical and more rounded than the fronts of pickups. The combination of lower structures and less vertical front ends could be accounting for the large risk reductions for drivers of cars struck in the sides by SUVs. But the dataset for the study wasn't big enough to address this aspect of front-end design.

"What's important from this study is the encouraging evidence that the voluntary design changes are reducing incompatibilities between SUVs and pickup trucks in front-to-front crashes with cars," O'Neill concludes.

For a copy of "Crash compatibility between cars and light trucks: assessment of the benefits of matching front-end energy-absorbing structures" by B. O'Neill and B.C. Baker, write: Publications, Insurance Institute for Highway Safety, 1005 N. Glebe Rd., Arlington, VA 22201, or email publications@iihs.org.

Plan to boost strength of vehicle roofs is worthwhile but goes only partway

Institute tells NHTSA to get on with developing dynamic test procedures

A federal proposal to strengthen passenger vehicle roofs won't produce big benefits. The National Highway Traffic Safety Administration (NHTSA), which issued the proposal, estimates that fewer than 50 lives would be saved each year. Still the new standard would represent a step in the right direction.

There are two main aspects of NHTSA's proposal to upgrade Federal Motor Vehicle Safety Standard 216. One would require the roofs of passenger vehicles to withstand a force of 2.5 times vehicle weight — up from 1.5 times under the current standard — without intruding too close to occupants' heads. The other key aspect is that the new standard would apply to vehicles weighing up to 10,000 pounds, extending the requirements to bigger SUVs and pickups. The current standard only goes up to 6,000 pounds.

"The extension of the requirements to heavier vehicles is important because so many of these vehicles, which are used to drive families, are more prone than cars to rolling over. They need strong roofs to reduce the high proportion of occupant deaths that occur in rollover crashes," says Institute president Adrian Lund.

Institute analyses of motor vehicle deaths in 2004 indicate that almost half of all SUV occupant deaths, compared with about 20 percent of car occupant deaths, occurred in single-vehicle rollovers. Strengthening vehicle roofs helps to reduce these deaths

by keeping the tops of rolling vehicles from collapsing and intruding into the space around the occupants.

Ensure adequate headroom: The Institute supports NHTSA's proposal to require occupant compartments to retain enough headroom to accommodate an average-size man. But in some cases what the agency proposes could lead to the weakening, not the strengthening, of vehicle roofs. To address this, the Institute has advised NHTSA to modify its proposed rule to guarantee that complying vehicles also would meet the old rule. Then roofs couldn't be weakened and still comply with the new standard.

Another concern is that NHTSA is considering relaxed requirements for vehicles with low rooflines and, hence, limited headroom. The Institute advises the agency to abandon this idea. It wouldn't make sense for NHTSA to ease the requirements for the very vehicles with the greatest need for stronger roofs — those with rooflines designed the lowest and therefore closest to occupants' heads.

Modify the test procedures too: The static test that applies force to vehicle roofs also needs to be changed. The Institute recommends specifying a range of angles, not just one, under which a roof would have to hold up under the force.

"Another important change would be to test vehicles without their windshields because it's unclear how often windshields remain in place during rollover crashes and how much a windshield helps to reduce roof crush," Lund explains. "Applying the test force to the tops of vehicles without their windshields would encourage automakers to design stronger roofs."

Critics take note of the modest gains: NHTSA estimates that 13 to 44 lives would be saved each year. This benefit is modest in part because more than half of all vehicles that would be subject to the new standard already meet its requirements.

THE DRIVER OF THIS SUV DIED WHEN HIS VEHICLE ROLLED OVER IN A CRASH. A PROPOSED FEDERAL STANDARD COULD HELP TO REDUCE DEATHS IN ROLLOVER CRASHES BY REQUIRING STRONGER VEHICLE ROOFS. IN THE FUTURE NHTSA ALSO NEEDS TO DEVELOP A NEW TEST TO ASSESS ROOF STRENGTH.

Critics say the proposal won't accomplish much of anything. One safety advocate dubs it "virtually a nothing burger."

Lund counters, "There's substance to NHTSA's current proposal, although it's true this isn't all the agency needs to do. The problem is that there's not enough empirical evidence to justify more stringent roof strength requirements. We suggested some changes NHTSA could make to the static test that's used to assess roof strength, but what's really needed is a dynamic test."

Need new test of vehicle roof strength: A major impediment to establishing a dynamic test is the absence of good research to guide the development of a repeatable rollover test. Another problem is that researchers aren't yet able to estimate the benefits of designing passenger vehicles to comply with a dynamic test. Plus the test itself won't be easy to develop.

"Rollovers are complicated. Many factors influence their outcomes," Lund says. "It will be a challenge to develop a dynamic test that will assess the interactions of a vehicle's structure, its restraint systems, and occupant kinematics. NHTSA needs to get going on the research needed to meet this challenge."

In the meantime, the agency reports that its current proposal to upgrade roof crush resistance, based on static testing, could become a final rule this year. The current standard has been in effect since 1971.

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PERCENTAGE OF DRIVERS TALKING ON HAND-HELD PHONES, 2000-05

Source: National Occupant Protection Use Survey, National Center for Statistics and Analysis, National Highway Traffic Safety Administration