

INSURANCE INSTITUTE FOR HIGHWAY SAFETY

NEWS RELEASE

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NEW CRASH TESTS OF MIDSIZE CARS: PROTECTION IN SIDE IMPACTS IMPROVES, BUT MOST CARS TESTED STILL AFFORD MARGINAL OR POOR PROTECTION IN REAR CRASHES

ARLINGTON, VA — Occupant protection in side impacts of midsize cars is improving as automakers introduce safer designs and add side airbags as standard equipment. The Insurance Institute for Highway Safety recently completed front, side, and rear tests of seven 2008 model midsize cars, both moderately priced and luxury: Chevrolet Malibu, Dodge Avenger, Infiniti G35, Kia Optima, Mitsubishi Galant, Nissan Altima, and Saturn Aura. All earn the highest rating of good for occupant protection in frontal crashes. All but the Kia Optima earn the top rating of good for side crash protection (Malibu's rating applies to cars built after February 2008). Rear crash protection results vary more widely. Among the seats/head restraints evaluated, only those in the Optima earn a good rating (see attached ratings).

"The side impact results represent a huge change from just four years ago," says Institute senior vice president David Zuby. "In 2004 we tested 10 midsize moderately priced cars, and all 10 were rated poor in their standard configurations without side airbags." In the 2004 tests, only the previous generations of the Honda Accord, Toyota Camry, and Chevrolet Malibu earned good ratings when tested with side airbags, which then were optional equipment.

"Side airbags were mostly optional in our first round of side impact tests of midsize cars," Zuby says. "A major change is that side airbags are standard in every one of the seven midsize cars we tested this time around. Auto manufacturers have been moving quickly to make side airbags standard, even on lower priced models."

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Avenger and Optima improve: When the Institute tested the Avenger's predecessor, the Dodge Stratus, without its optional side airbags it earned a poor rating for protecting people in side crashes. The safety cage didn't hold up well, resulting in a lot of intrusion into the occupant compartment. The driver dummy's head was struck by the intruding barrier, and injury measures recorded on the dummy indicate that broken ribs and a fractured pelvis would be likely to occur in a real-world crash of similar severity.

Chrysler redesigned this car as an early 2008 model, renaming it the Avenger, which also is sold as the Chrysler Sebring. Front and rear head curtain airbags and front seat-mounted torso airbags now are standard.

The Avenger's performance in the side test is "dramatically improved compared with the Stratus," Zuby says. The new model kept intrusion into the occupant compartment to a minimum. The side curtain airbag protected the driver dummy's head from being struck by the barrier. Injury measures indicate the possibility of rib fractures, but other injury measures are low. The Avenger is rated good for side impact protection, and it would win a *TOP SAFETY PICK* award if its seat/head restraints earned a good rating instead of acceptable.

The 2004 Optima (vehicle tested was the Optima's twin, Hyundai Sonata) is rated poor for occupant protection in side impacts, even with its standard combination side airbags designed to protect front-seat occupants' heads and chests. Measures recorded on the driver dummy indicate that rib fractures and internal organ injuries would be likely to occur in a real-world crash of similar severity. Plus the rear passenger dummy's head was struck by the window-sill and the pillar behind the rear door.

The Optima was redesigned during the 2006 model year. The performance of the new model is much improved. Driver injury measures indicate the possibility of a fractured pelvis, but all other measures are low. Kia also changed the side airbag configuration to curtain style that protects the heads of people in both front and rear seats. The new test results apply to Optimas built after June 2006.

Rear crashworthiness ratings aren't as impressive: The seat/head restraints in the Optima are the only ones the Institute tested this time around that earn the top rating of good for occupant protection in rear crashes. Five of the seat/head restraint combinations earn marginal or poor ratings.

When a vehicle is struck in the rear and driven forward, its seats accelerate occupants' torsos forward. Unsupported, an occupant's head will lag behind the forward torso movement, and the differential motion causes the neck to bend and stretch. The higher the torso acceleration, the more sudden the motion, the higher the forces on the neck, and the more likely a neck injury is to occur.

The key to reducing whiplash injury risk is to keep the head and torso moving together. To accomplish this, the geometry of a head restraint has to be adequate — high enough to be near the back of the head. Then the seat structure and stiffness characteristics must be designed to work in concert with the head restraint to support an occupant's neck and head, accelerating them with the torso as the vehicle is pushed forward.

"In stop and go commuter traffic, you're more likely to get in a rear-end collision than any other kind of crash," Zuby says. "It's not a major feat of engineering to design seats and head restraints that afford good protection in these common crashes."

Rear-end collisions are frequent, and neck injuries are the most common injuries reported in auto crashes. They account for 2 million insurance claims each year, costing at least \$8.5 billion. Such injuries aren't life-threatening, but they can be painful and debilitating.

How vehicles are evaluated: The Institute's frontal crashworthiness evaluations are based on results of 40 mph frontal offset crash tests. Each vehicle's overall evaluation is based on measurements of intrusion into the occupant compartment, injury measures recorded on a Hybrid III dummy in the driver seat, and analysis of slow-motion film to assess how well the restraint system controlled dummy movement during the test.

Side evaluations are based on performance in a crash test in which the side of a vehicle is struck by a barrier moving at 31 mph. The barrier represents the front end of a pickup or SUV. Ratings reflect injury measures recorded on two instrumented SID-IIIs dummies, assessment of head protection countermeasures, and the vehicle's structural performance during the impact. Injury measures obtained from the two dummies, one in the driver seat and the other in the back seat behind the driver, are used to determine the likelihood that a driver and/or passenger in a similar real-world crash would sustain serious injury to various parts of the body. The movements and contacts of the dummies' heads during the test also are evaluated. Structural performance is based on measurements indicating the amount of B-pillar intrusion into the occupant compartment.

Rear crash protection is rated according to a two-step procedure. Starting points for the ratings are measurements of head restraint geometry — the height of a restraint and its horizontal distance behind the back of the head of an average-size man. Seats with good or acceptable restraint geometry are tested dynamically using a dummy that measures forces on the neck. This test simulates a collision in which a stationary vehicle is struck in the rear at 20 mph. Seats without good or acceptable geometry are rated poor overall because they can't be positioned to protect many people.

**End of 4-page news release on crashworthiness ratings of midsize cars
Attachment: front, side, and rear crashworthiness evaluations of cars
VNR on 4/10/2008 at 10:30-11 am EDT (C) AMC 6/Trans. 20 (dl4100H)
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For more information go to www.iihs.org

ATTACHMENT: CRASHWORTHINESS EVALUATIONS, p.1 of 1

Midsize cars	FRONT EVALUATION	SIDE EVALUATION	REAR CRASH PROTECTION	ELECTRONIC STABILITY CONTROL
<p>DODGE AVENGER CHRYSLER SEBRING Midsize moderately priced cars WITH FRONT AND REAR HEAD CURTAIN AIRBAGS & FRONT TORSO AIRBAGS front, side and rear: 2008 Avenger models and 2007-08 Sebring models</p>	G	G	A	optional
<p>INFINITI G35 Midsize luxury/near luxury car WITH FRONT AND REAR HEAD CURTAIN AIRBAGS & FRONT TORSO AIRBAGS front, side and rear: 2007-08 models</p>	G	G	M	standard
<p>NISSAN ALTIMA Midsize moderately priced car WITH FRONT AND REAR HEAD CURTAIN AIRBAGS & FRONT TORSO AIRBAGS front, side and rear: 2007-08 models</p>	G	G	M	optional
<p>CHEVROLET MALIBU Midsize moderately priced car WITH FRONT AND REAR HEAD CURTAIN AIRBAGS & FRONT TORSO AIRBAGS front and rear: 2008 models side: 2008 models (mfg. after February 2008)</p>	G	G	M	optional
<p>SATURN AURA Midsize moderately priced car WITH FRONT AND REAR HEAD CURTAIN AIRBAGS & FRONT TORSO AIRBAGS front, side and rear: 2007-08 models</p>	G	G	M	optional
<p>MITSUBISHI GALANT Midsize moderately priced car WITH FRONT AND REAR HEAD CURTAIN AIRBAGS & FRONT TORSO AIRBAGS front and rear: 2004-08 models side: 2007-08 models</p>	G	G	P	unavailable
<p>KIA OPTIMA Midsize moderately priced car WITH FRONT AND REAR HEAD CURTAIN AIRBAGS & FRONT TORSO AIRBAGS front and rear: 2006-08 models (mfg. after September 2005) side: 2006-08 models (mfg. after June 2006)</p>	G	A	G	optional

GOOD **G** **M** MARGINAL
 ACCEPTABLE **A** **P** POOR

ORDER OF VEHICLES REFLECTS RATINGS IN FRONT, SIDE, AND REAR TESTS
 FOR MORE DETAILED CRASHWORTHINESS EVALUATIONS, GO TO WWW.IIHS.ORG

FRONTAL RATINGS are based on performance in a 40 mph frontal offset crash test into a deformable barrier. **CAUTION:** Frontal ratings cannot be compared across vehicle type and weight categories because the kinetic energy involved in the frontal test depends on the speed and weight of the test vehicle, and the crash is more severe for heavier vehicles. Given equivalent frontal ratings for heavier and lighter vehicles, the heavier vehicle typically will offer better protection in real-world crashes.

SIDE RATINGS are based on performance in a crash test in which the side of the vehicle is struck by a moving deformable barrier with a front end that represents the front of a typical SUV or pickup. The moving barrier strikes the vehicle at 31 mph in a perpendicular impact. **NOTE:** Side ratings can be compared across vehicle type and weight categories while frontal ratings cannot.

REAR CRASH PROTECTION RATINGS are based on a two-step evaluation. In the first step restraint geometry is rated. Seats with good or acceptable geometric ratings then are subjected to a dynamic test. Seats with head restraints rated marginal or poor, based on geometry, aren't tested because they cannot protect taller occupants.