Collision Avoidance – Updates on Advanced Driver Assistance Systems

2019 P&C Insurance Symposium
ICT/AFACT
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IIHS-HLDI Research on driver assistance systems
Provided first evidence of real-world benefits
Most crash avoidance technologies are living up to expectations

Effects on insurance claim frequency

<table>
<thead>
<tr>
<th>Technology</th>
<th>More claims</th>
<th>Fewer claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward collision warning</td>
<td>-25%</td>
<td>-15%</td>
</tr>
<tr>
<td>FCW with autobrake</td>
<td>-20%</td>
<td>-10%</td>
</tr>
<tr>
<td>Adaptive headlights</td>
<td>-15%</td>
<td>-5%</td>
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<tr>
<td>Lane departure warning</td>
<td>-10%</td>
<td>0%</td>
</tr>
<tr>
<td>Side-view assist (blind spot)</td>
<td>-5%</td>
<td>5%</td>
</tr>
<tr>
<td>Property damage liability</td>
<td>0%</td>
<td>10%</td>
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<tr>
<td>Bodily injury liability</td>
<td>5%</td>
<td>15%</td>
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The chart shows the percentage change in claim frequency for various technologies:

- **Forward collision warning**: 25% fewer claims
- **FCW with autobrake**: 20% fewer claims
- **Adaptive headlights**: 15% fewer claims
- **Lane departure warning**: 10% fewer claims
- **Side-view assist (blind spot)**: 5% fewer claims

These technologies are statistically significant in reducing claims frequency.
Most crash avoidance technologies are living up to expectations
Effects on relevant police-reported crash types

- Forward collision warning: -20%
- Low-speed autobrake: -40%
- FCW with autobrake: -60%
- Lane departure warning: -80%
- Side-view assist (blind spot): -80%

(all severities) (injury) (statistically significant)
2019 *TOP SAFETY PICK* requirements

- **G** Good ratings in the driver-side small overlap front, moderate overlap front, side, roof strength and head restraint tests
- **G** Good rating in the passenger-side small overlap front test
- **G** Good headlight rating

- **G** Acceptable or good rating in the passenger-side small overlap front test
- **G** Acceptable or good headlight rating
Speed reduction in 12 and 24 mph tests

Volvo S60 2 point advanced
Dodge Durango 3 point advanced
Subaru Outback 6 point superior
20 automakers have committed to make AEB a standard feature by September 2022.

99+% of U.S. market
Front crash prevention ratings
2013 – 19 models, as of July 2019
Pedestrian AEB
U.S. pedestrian fatalities

- 1975: 8,000
- 1980: 7,500
- 1990: 4,500
- 2000: 3,000
- 2010: 2,500
- 2016: 4,000

46% decrease from 1975 to 2016.
Subaru EyeSight and pedestrians

HLDI Analysis:

Pedestrian-related insurance claims reduced by 35 percent
Pedestrian test scenarios

**Perpendicular adult**
- Adult walks across road
- Tests run at 12 & 25 mph

**Perpendicular child**
- Child runs into road; parked vehicles obstruct view
- Tests run at 12 & 25 mph

**Parallel adult**
- Adult in right lane near edge of road, facing away from traffic
- Tests run at 25 & 37 mph
Adult walking from the right side
25 mph condition
Child running from the right side
12 mph condition
Pedestrian ratings
Small SUVs

<table>
<thead>
<tr>
<th>Pedestrian Ratings</th>
<th>Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SUPERIOR</strong></td>
<td>2018-19 Honda CR-V</td>
</tr>
<tr>
<td></td>
<td>2019 Subaru Forester</td>
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<tr>
<td></td>
<td>2019 Toyota RAV4</td>
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<td></td>
<td>2019 Volvo XC40</td>
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<tr>
<td><strong>ADVANCED</strong></td>
<td>2019 Chevrolet Equinox</td>
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<tr>
<td></td>
<td>2018-19 Hyundai Kona</td>
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<tr>
<td></td>
<td>2019 Kia Sportage</td>
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<tr>
<td></td>
<td>2018-19 Mazda CX-5</td>
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<td></td>
<td>2019 Nissan Rogue</td>
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<tr>
<td><strong>BASIC</strong></td>
<td>2019 Mitsubishi Outlander</td>
</tr>
<tr>
<td><strong>NO CREDIT</strong></td>
<td>2018-19 BMW X1</td>
</tr>
</tbody>
</table>
Rear AEB
Benefit of rear autobrake
Rear crash prevention ratings

- Rear parking sensors
- Rear cross traffic alert
- Rear autobrake

reversing car-to-car, 16" overlap

reversing car-to-car, 45° angle

reversing car-to-car, 10° angle

reversing toward fixed pole
What's next for AEB?
Not all rear-end crashes are the same
Vehicles with AEB are overrepresented in some types of rear-end crashes (model results)

Percent increase in likelihood that crash involved a vehicle with AEB

- striking vehicle turning, changing lanes, passing, merging
- struck vehicle turning, changing lanes, passing, merging
- struck vehicle not a passenger vehicle or special use (vs. car)
- snowy or icy road (vs. dry)
- speed limit 70+ (vs. 40-45)
Not all rear-end crashes are the same
Unrealized benefits
Status of crash avoidance systems
Percent with system on: mean values and value range

- Front crash prevention: 87 – 98%
- Lane departure warning: 23 – 77%
Understanding Level 2
Functional performance and user experience

- 2016 Tesla Model S with Autopilot software ver. 7.1
- 2017 BMW 5 series with Driving Assistant Plus
- 2017 Mercedes E-Class with Drive Pilot
- 2018 Volvo S90 with Pilot Assist
- 2018 Tesla Model 3 with Autopilot software ver. 8.1
Lane keeping in curves

- **BMW 5 series** (n=16)
- **Volvo S90** (n=17)
- **Mercedes E-Class** (n=17)
- **Tesla Model S** (n=18)
- **Tesla Model 3** (n=18)

Legend:
- Blue: remained in lane
- Yellow: crossed lane line
- Orange: on lane line
- Dark blue: disengaged
Adaptive cruise control trusted more than active lane keeping
Percentage of drivers who agreed or strongly agreed

- Tesla Model S Autopilot
- Volvo S90 Pilot Assist
- BMW 5 series Driving Assistant Plus
- Infiniti QX50 ProPilot Assist
- Mercedes E-Class Drive Pilot

I trust the automation to maintain speed and distance to vehicle ahead
I trust the automation to keep me in center of lane
Advertisement: Lane valet