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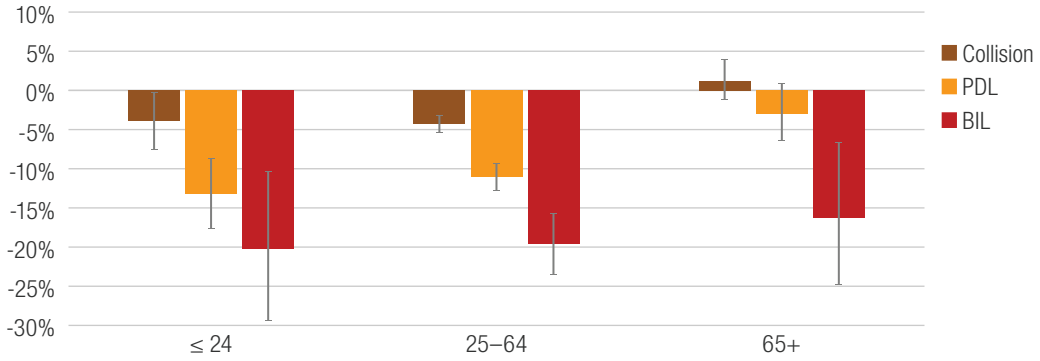
Impact of Honda Accord collision avoidance features on claim frequency by rated driver age

Summary

Previous Highway Loss Data Institute studies have shown that many collision avoidance systems are associated with claim frequency reductions. This bulletin uses insurance loss data for the popular Honda Accord to provide an updated look at how those benefits vary by driver age. This is the fifth time this study has been conducted, deepening our understanding of the potential benefits of these systems. The first analysis conducted in 2015 yielded significant results for six of the 15 estimates for forward collision warning (FCW) and lane departure warning (LDW). The additional exposure in this report has resulted in nearly twice as many significant results. The number of significant results for LaneWatch has increased from five to twelve.

The current results bolster the findings and narrow the confidence bounds of the four prior studies (HLDI, 2015, 2016, 2017, 2021) that indicated the Accord's forward collision avoidance system has the largest benefits for the youngest age group for property damage liability and bodily injury liability coverages. As in those earlier studies, the collision, property damage liability and bodily injury benefits for Honda's LaneWatch blind spot detection system were shown to be highest for the oldest drivers.

Change in claim frequency by rated driver age and coverage type for FCW and LDW



Introduction

The Insurance Institute for Highway Safety (IIHS) and the Highway Loss Data Institute (HLDI) have done a significant amount of research on collision avoidance systems, and the insurance loss benefits for front crash prevention are clear. These systems are associated with claim frequency reductions for all crash-related coverage types. Evaluations of police-reported crashes show reductions in front-to-rear crashes and associated injuries. There are additional questions related to front crash prevention systems that need to be answered, however. One such question is how much the benefits of front crash prevention systems vary by rated driver age. The Honda Accord offers a unique opportunity to gain insights into this secondary question for several reasons. As one of the best-selling vehicles in America, the Accord provides enough data to examine losses by driver age. Additionally, for model years 2013–15, it is available in just three vehicle variants (sedan, coupe and crosstour) with a limited number of features, making this group of vehicles fairly homogenous.

Prior HLDI studies have shown Honda's forward collision warning with lane departure warning (FCW/LDW) and LaneWatch systems are beneficial (HLDI, 2019a), especially for rated drivers younger than 25 (HLDI, 2015, 2016, 2017, 2021). This HLDI bulletin updates those prior analyses with more exposure. The features included in this analysis are as follows:

Forward collision warning (FCW) uses a camera system located behind the windshield to assess the risk of a collision with leading traffic. The warning system has three driver-selectable range settings. When a potential crash is detected, lights flash in the heads-up display, the FCW indicator blinks, and a continuous beep sounds. The system is active only at speeds over 10 mph and can be deactivated by the driver. At each ignition cycle, the system defaults to the previous on/off setting. Vehicles with FCW also have LDW, but the two features can be used independently.

Lane departure warning (LDW) utilizes the same camera as forward collision warning to also identify traffic lane markings. Audio and visual warnings alert the driver if the vehicle is deviating from the intended lane. The system is functional at speeds of 40 to 90 mph, but does not warn the driver if the turn signal is on or the system determines the movement to be sufficiently sudden as to be evasive. The system can be deactivated by the driver. At each ignition cycle, the system defaults to the previous on/off setting.

LaneWatch is Honda's term for a passenger-side-only blind spot monitor. A camera mounted behind the external passenger-side rearview mirror monitors the passenger side of the vehicle and displays an 80-degree field of view on the console-mounted information screen when the turn signal is activated. Reference lines are also provided to indicate proximity. Both the turn signal and reference lines are driver-controllable settings and can be deactivated. Upcoming navigation system instructions/maneuvers can also be given priority over the LaneWatch display. The entire LaneWatch system can be deactivated by the driver. At each ignition cycle, the system defaults to the previous on/off setting.

All the vehicles in this study were equipped with rear cameras. Because there were no vehicles without this feature, camera effectiveness could not be evaluated in this analysis. The vehicles in this analysis also may have been equipped with optional rear parking sensors. The analysis did not control for this feature, because the availability of rear parking sensors on a vehicle was not discernible from the Vehicle Identification Number (VIN).

Method

Vehicles

The vehicles included in this study are available in several different trim levels, which bundle together different equipment and features. Depending on the trim level, the collision avoidance features in this study are either standard or not available. The trim levels can be determined by the first ten digits of the VIN, so it is possible to identify vehicles with and without the collision avoidance features.

LaneWatch and the combination of FCW and LDW are offered as standard equipment on several 2013–15 Honda Accord models (trims). The Touring trim level of the Accord four-door was excluded from the analysis, because it is equipped with a different FCW system that uses radar instead of a camera and includes adaptive cruise control functionality. A prior HLDI analysis (2019a) indicated this system also is associated with reductions in losses. However, there is too little data by rated driver age to include it in this study. Honda Accord vehicles without these features served as the control vehicles in the current report.

Table 1 lists the exposure (measured in insured vehicle years) for the age groups included in the analysis. Seventy-four percent of the exposure is in the 25–64 age group, followed by 19 percent for drivers 65 and older, and 7 percent for the youngest age group (24 and younger).

Table 1: 2013–15 Honda Accord collision exposure by rated driver age

Age	December 2015 exposure	December 2016 exposure	December 2017 exposure	April 2021 exposure	Current exposure
≤ 24	64,154	113,614	163,871	299,249	401,155
25–64	771,854	1,356,598	1,941,338	3,325,810	4,376,490
65+	197,308	334,576	493,109	837,133	1,121,957

Rated drivers

The rated driver is the driver who is considered to represent the greatest loss potential for the insured vehicle. In a multiple-vehicle/driver household, how a driver is assigned to a vehicle can vary by insurance company and state. Information on the actual driver at the time of a loss is not available in the HLDI database. In the current study, the rated driver age groups were 24 and younger, 25–64, and 65 and older.

Insurance data

Automobile insurance covers damages to vehicles and property in crashes plus injuries to people involved in crashes. Different insurance coverages pay for vehicle damage versus injuries, and different coverages may apply depending on who is at fault. The current study is based on property damage liability (PDL), collision, bodily injury (BI) liability, personal injury protection (PIP), and medical payment (MedPay) coverages. Exposure is measured in insured vehicle years. An insured vehicle year is one vehicle insured for 1 year, two vehicles insured for 6 months, etc.

Because different crash avoidance features may affect different types of insurance coverage, it is important to understand how coverages vary among the states and how this affects inclusion in the analyses. Collision coverage insures against vehicle damage to an at-fault driver's vehicle sustained in a crash with an object or other vehicle; this coverage is common to all 50 states. PDL coverage insures against physical damage that at-fault drivers cause to other people's vehicles and property in crashes; this coverage exists in all states except Michigan, where vehicle damage is covered on a no-fault basis (the policy of each insured vehicle pays for the damage done to it in a crash, regardless of who is at fault).

Coverage of injuries is more complex. BI liability coverage insures against medical, hospital, and other expenses for injuries that at-fault drivers inflict on occupants of other vehicles or others on the road. Although motorists in most states may have BI liability coverage, this information is analyzed only in states where the at-fault driver has first obligation to pay for injuries (in the 33 states with traditional tort insurance systems). MedPay coverage, also sold in the 33 states with traditional tort insurance systems, covers injuries to insured drivers and the passengers in their vehicles, but not injuries to people in other vehicles involved in the crash. Seventeen other states employ no-fault injury systems (personal injury protection coverage, or PIP) that pay up to a specified amount for injuries to occupants of involved-insured vehicles, regardless of who is at fault in a collision. The District of Columbia has a hybrid insurance system for injuries and is excluded from the injury analysis.

Statistical methods

Regression analysis was used to quantify the effect of each vehicle feature by rated driver age while controlling for the other features and covariates. The covariates included calendar year, model year, garaging state, vehicle density (number of registered vehicles per square mile in the garaging zip code area), rated driver gender, rated driver marital status, deductible range (collision coverage only), and risk. For each safety feature studied, a binary variable was included. Claim frequency was modeled using a Poisson distribution, whereas claim severity (average loss payment per claim) was modeled using a Gamma distribution. Both models used a logarithmic link function. A separate regression was performed for each age group for a total of three regressions per feature per coverage.

Estimates for overall losses were derived from the claim frequency and claim severity models. Estimates for claim frequency, claim severity, and overall losses are presented for collision and PDL coverages. For PIP, BI, and MedPay coverages, three frequency estimates are presented. The first frequency is the frequency for all claims, including those that already have been paid and those for which money has been set aside for possible payment in the future, known as claims with reserves. The other two claim frequencies include only paid claims separated into low- and high-severity ranges. Note that the percentage of all injury claims that were paid by the date of analysis varies by coverage: 75.3 percent for PIP, 72.7 percent for BI, and 61.8 percent for MedPay. The low-severity range was less than $1,000 for PIP and MedPay and less than $5,000 for BI; high-severity covered all loss payments greater than that.

For space reasons, only the estimates for the individual crash avoidance features are shown on the following pages. To illustrate the analyses, however, the **Appendix** contains full model results for collision claim frequencies in age group 25–64. To further simplify the presentation here, the exponent of the parameter estimate was calculated, 1 was subtracted, and the resultant multiplied by 100. The resulting number corresponds to the effect of the feature on that loss measure. For example, the estimate of FCW/LDW effect on collision claim frequency for age group 25–64 was -0.0438; thus, for rated drivers 25–64, vehicles with FCW/LDW had 4.3 percent fewer collision claims than vehicles without FCW/LDW (exp(-0.0438)-1×100=-4.3%).

Results

Full results for Honda's collision avoidance systems by rated driver age group are presented in **Tables 2–7**. For each system, there are three tables of results — one for each rated driver age group (≤ 24, 25–64, 65+). Results by rated driver age group for FCW/LDW are contained in **Tables 2–4**; LaneWatch results are in **Tables 5–7**. The lower and upper bounds represent the 95 percent confidence limits for the estimates. Estimates that are statistically significant at the 95 percent confidence level are bolded.

FCW/LDW system

Results for the Honda Accord's FCW system including LDW for rated drivers younger than 25 are summarized in **Table 2**. For vehicle damage losses, claim frequencies were lower for collision and PDL coverages by 4.0 percent and 13.2 percent, respectively. Both decreases were statistically significant.

For injury losses, claim frequency showed reductions for all three coverage types, with the BI liability reduction being significant. Among paid claims, BI liability claim frequency showed a significant reduction for low- and high-severity claims.

Table 2: Change in insurance losses for FCW and LDW, for rated drivers younger than 25

Vehicle damage coverage type	Lower bound	FREQUENCY	Upper bound	Lower bound	SEVERITY	Upper bound	Lower bound	OVERALL LOSSES	Upper bound
Collision	-7.5%	**-4.0%**	-0.3%	-1.6%	2.3%	6.2%	-6.9%	-1.8%	3.6%
Property damage liability	-17.7%	**-13.2%**	-8.5%	-3.4%	1.8%	7.3%	-18.0%	**-11.7%**	-4.9%

Injury coverage type	Lower bound	FREQUENCY	Upper bound	Lower bound	LOW SEVERITY FREQUENCY	Upper bound	Lower bound	HIGH SEVERITY FREQUENCY	Upper bound
Bodily injury liability	-29.2%	**-20.3%**	-10.3%	-35.7%	**-20.0%**	-0.4%	-34.4%	**-22.1%**	-7.4%
Medical payment	-18.1%	-3.6%	13.5%	-44.6%	-12.7%	37.7%	-15.4%	7.8%	37.5%
Personal injury protection	-14.4%	-4.1%	7.5%	-29.5%	-6.4%	24.4%	-14.5%	-0.4%	16.0%

Results for the Honda Accord's FCW system including LDW for rated drivers 25–64 are summarized in **Table 3**. For vehicle damage losses, claim frequencies showed a significant 4.3 percent decrease for collision and a significant 11.1 percent decrease for PDL. Claim severities were 0.8 percent higher for collision and 3.3 percent lower for PDL, respectively. Only the result for PDL was statistically significant, resulting in a significant 14.0 percent decrease in overall losses for PDL and a significant 3.5 percent decrease for collision.

For injury losses, the claim frequencies were significantly lower for all three coverage types. Among paid claims, claim frequency showed benefits, and nearly all the reductions were significant.

Table 3: Change in insurance losses for FCW and LDW, for rated drivers 25–64

Vehicle damage coverage type	Lower bound	FREQUENCY	Upper bound	Lower bound	SEVERITY	Upper bound	Lower bound	OVERALL LOSSES	Upper bound
Collision	-5.5%	**-4.3%**	-3.1%	-0.6%	0.8%	2.1%	-5.2%	**-3.5%**	-1.8%
Property damage liability	-12.8%	**-11.1%**	-9.3%	-5.2%	**-3.3%**	-1.4%	-16.4%	**-14.0%**	-11.6%

Injury coverage type	Lower bound	FREQUENCY	Upper bound	Lower bound	LOW SEVERITY FREQUENCY	Upper bound	Lower bound	HIGH SEVERITY FREQUENCY	Upper bound
Bodily injury liability	-23.2%	**-19.6%**	-15.9%	-28.8%	**-22.5%**	-15.7%	-27.1%	**-22.0%**	-16.4%
Medical payment	-23.4%	**-19.7%**	-15.8%	-30.7%	**-20.4%**	-8.5%	-26.8%	**-21.7%**	-16.2%
Personal injury protection	-12.5%	**-9.1%**	-5.7%	-12.6%	-3.4%	6.7%	-15.5%	**-11.4%**	-7.0%

Results for Honda Accord's FCW system including LDW for rated drivers 65 and older are summarized in **Table 4**. For PDL coverage, claim frequency was associated with an insignificant 3 percent reduction. Claim severity was reduced by 3.4 percent, resulting in a significant 6.3 percent reduction in overall losses. For collision coverage, claim frequency increased slightly (1.2 percent) whereas claim severity and overall losses were reduced by 4.2 and 3.0 percent, respectively. Only the claim severity reduction was statistically significant.

For injury losses, claim frequencies were lower for all three coverage types, and all three reductions were statistically significant. Among paid claims, claim frequency showed benefits, with half of the reductions being significant.

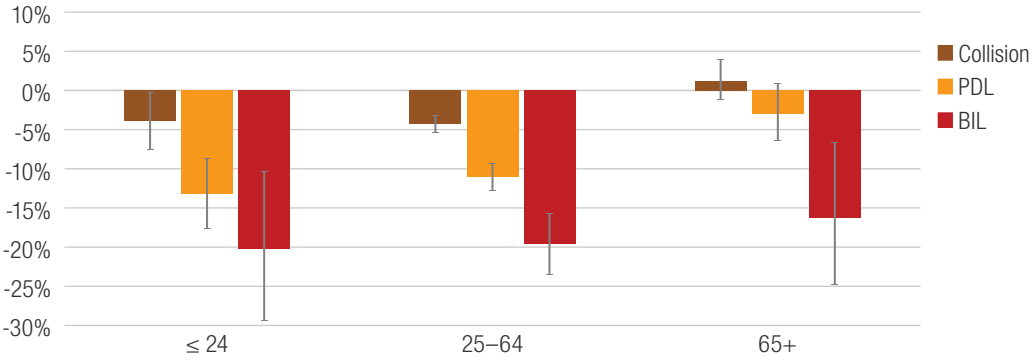
Table 4: Change in insurance losses for FCW and LDW, for rated drivers 65+

Vehicle damage coverage type	Lower bound	FREQUENCY	Upper bound	Lower bound	SEVERITY	Upper bound	Lower bound	OVERALL LOSSES	Upper bound
Collision	-1.3%	1.2%	3.8%	-6.8%	**-4.2%**	-1.5%	-6.6%	-3.0%	0.7%
Property damage liability	-6.6%	-3.0%	0.9%	-7.2%	-3.4%	0.5%	-11.3%	**-6.3%**	-0.9%

Injury coverage type	Lower bound	FREQUENCY	Upper bound	Lower bound	LOW SEVERITY FREQUENCY	Upper bound	Lower bound	HIGH SEVERITY FREQUENCY	Upper bound
Bodily injury liability	-24.7%	**-16.2%**	-6.8%	-39.1%	**-25.9%**	-9.9%	-32.0%	**-20.5%**	-7.0%
Medical payment	-31.3%	**-23.7%**	-15.2%	-39.3%	-16.9%	13.7%	-34.2%	**-24.1%**	-12.4%
Personal injury protection	-17.4%	**-9.4%**	-0.6%	-27.6%	-8.2%	16.6%	-20.6%	-10.5%	1.0%

Figure 1 shows the changes in collision, PDL, and BI liability claim frequencies for Honda's FCW system including LDW by rated driver age. In general, the claim frequency for BI had the largest reduction in all age groups, followed by PDL. For collision, the prime age (25–64) drivers benefited the most from the FCW/LDW system, with a significant 4.3 percent reduction in claim frequency. The youngest drivers also benefited, with a significant 4.0 percent reduction to collision claim frequency. For drivers 65 and older, FCW/LDW was associated with a slight, but not significant, increase in collision claim frequency. For PDL, reductions ranged from an insignificant 3.0 percent reduction for drivers 65 and older to a significant 13.2 percent benefit for the youngest drivers. For BI liability, the largest effect was for the youngest drivers, for whom there was a significant 20.3 percent reduction in claim frequency. Reductions were also significant for the other age groups, with a 19.6 percent reduction for drivers 25–64 and a 16.2 percent reduction for drivers 65 and older.

Figure 1: Change in claim frequency by rated driver age and coverage type for FCW and LDW



LaneWatch

Results for Honda Accord's LaneWatch system for rated drivers younger than 25 are summarized in **Table 5**. For vehicle damage losses, claim frequency showed a significant 4.5 percent decrease for collision and a significant 8.2 percent decrease for PDL. Claim severities were 1.3 percent lower for collision and 2.5 percent for PDL, respectively. Neither of these results were statistically significant, resulting in a significant 5.8 percent decrease in overall losses for collision and a significant 10.5 percent decrease for PDL.

For injury losses, the claim frequencies were lower for all coverage types. However, only the MedPay reduction was statistically significant. Among paid claims, claim frequency showed benefits with only the high-severity MedPay claim frequency being significant.

Table 5: Change in insurance losses for LaneWatch, for rated drivers younger than 25

Vehicle damage coverage type	Lower bound	FREQUENCY	Upper bound	Lower bound	SEVERITY	Upper bound	Lower bound	OVERALL LOSSES	Upper bound
Collision	-7.8%	**-4.5%**	-1.1%	-4.8%	-1.3%	2.2%	-10.4%	**-5.8%**	-1.0%
Property damage liability	-12.5%	**-8.2%**	-3.6%	-7.1%	-2.5%	2.3%	-16.4%	**-10.5%**	-4.2%

Injury coverage type	Lower bound	FREQUENCY	Upper bound	Lower bound	LOW SEVERITY FREQUENCY	Upper bound	Lower bound	HIGH SEVERITY FREQUENCY	Upper bound
Bodily injury liability	-16.8%	-7.4%	3.1%	-25.3%	-8.9%	11.1%	-21.3%	-8.1%	7.4%
Medical payment	-28.2%	**-16.4%**	-2.6%	-47.0%	-19.5%	22.2%	-42.1%	**-27.3%**	-8.7%
Personal injury protection	-17.7%	-8.5%	1.9%	-29.7%	-8.5%	19.0%	-22.8%	-11.0%	2.7%

Results for Honda Accord's LaneWatch system for rated drivers age 25–64 are summarized in **Table 6**. For vehicle damage losses, claim frequencies were lower for collision and PDL coverages by 3.2 and 8.7 percent, respectively. Both decreases were statistically significant.

For injury losses, the claim frequencies were lower for all three coverage types, and all the reductions were statistically significant. Among paid claims, claim frequency showed a benefit, especially for high-severity claims.

Table 6: Change in insurance losses for LaneWatch, for rated drivers 25–64

Vehicle damage coverage type	Lower bound	FREQUENCY	Upper bound	Lower bound	SEVERITY	Upper bound	Lower bound	OVERALL LOSSES	Upper bound
Collision	-4.3%	**-3.2%**	-2.0%	-3.9%	**-2.6%**	-1.4%	-7.3%	**-5.7%**	-4.1%
Property damage liability	-10.4%	**-8.7%**	-7.0%	-2.1%	-0.2%	1.7%	-11.3%	**-8.9%**	-6.5%

Injury coverage type	Lower bound	FREQUENCY	Upper bound	Lower bound	LOW SEVERITY FREQUENCY	Upper bound	Lower bound	HIGH SEVERITY FREQUENCY	Upper bound
Bodily injury liability	-14.4%	**-10.7%**	-6.9%	-14.0%	-7.1%	0.5%	-17.3%	**-11.9%**	-6.2%
Medical payment	-9.8%	**-5.6%**	-1.3%	-12.6%	-0.3%	13.6%	-11.1%	-5.3%	0.9%
Personal injury protection	-11.5%	**-8.3%**	-5.0%	-14.2%	-5.7%	3.6%	-12.1%	**-8.1%**	-3.8%

Results for Honda Accord's LaneWatch system for rated drivers 65 and older are summarized in Table 7. For vehicle damage losses, claim frequencies showed a significant 6.6 percent decrease for collision and a significant 13.1 percent decrease for PDL. The changes in neither collision claim severity nor PDL claim severity were statistically significant. Overall losses under both collision and PDL coverages were significantly reduced by 7.0 percent and 13.9 percent, respectively.

For injury losses, claim frequencies were lower for all coverage types, and the BI liability and PIP estimates were significant. Among paid claims, claim frequency showed benefits, and high-severity claims were significant for two of the three injury-related coverage types.

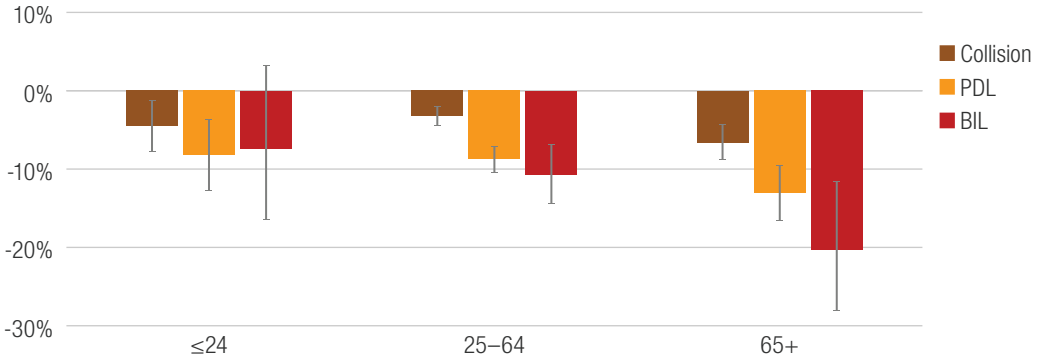
Table 7: Change in insurance losses for LaneWatch, for rated drivers 65+

Vehicle damage coverage type	Lower bound	FREQUENCY	Upper bound	Lower bound	SEVERITY	Upper bound	Lower bound	OVERALL LOSSES	Upper bound
Collision	-8.9%	**-6.6%**	-4.2%	-3.2%	-0.4%	2.4%	-10.4%	**-7.0%**	-3.5%
Property damage liability	-16.3%	**-13.1%**	-9.6%	-4.8%	-0.9%	3.1%	-18.5%	**-13.9%**	-9.0%

Injury coverage type	Lower bound	FREQUENCY	Upper bound	Lower bound	LOW SEVERITY FREQUENCY	Upper bound	Lower bound	HIGH SEVERITY FREQUENCY	Upper bound
Bodily injury liability	-28.2%	**-20.4%**	-11.6%	-26.1%	-10.5%	8.3%	-28.9%	**-17.1%**	-3.5%
Medical payment	-16.1%	-6.9%	3.2%	-32.3%	-7.5%	26.4%	-21.0%	-9.1%	4.6%
Personal injury protection	-23.5%	**-16.2%**	-8.3%	-33.0%	-15.4%	7.0%	-28.2%	**-19.2%**	-9.1%

Figure 2 shows the changes in collision, PDL, and BI liability claim frequencies for Honda's LaneWatch system by rated driver age. Benefits were seen across all age groups and coverage types. All of the reductions were statistically signifiant with the exception of BI coverage for the youngest drivers. Of the three age groups, drivers 65 and older benefited the most from the Lanewatch system with significant reductions ranging from 6.6 percent for collision to 20.4 percent for BI.

Figure 2: Change in claim frequency by rated driver age and coverage type for LaneWatch



Comparison results

Table 8 shows the differences in the claim frequency estimates for the FCW system with LDW by rated driver age for the current study and the four prior versions of this study. The collision coverage results for the FCW/LDW system showed small yet significant benefits for drivers under 65. For PDL, claim frequency was reduced for all ages but the reduction was only statistically significant for those under 65. For the injury coverages, reductions were seen across all coverage types and age groups. Most of the injury coverage reductions were significant in this latest analysis. The BI claim frequency reduction remained significant, although with each successive study, the size of the effect was smaller than the prior estimates for the youngest drivers.

Table 8: Change in FCW and LDW claim frequencies, initial vs. updated results

	≤ 24					25–64					65+				
Vehicle damage coverage type	**Dec. 2015**	**Dec. 2016**	**Dec. 2017**	**April 2021**	**Current**	**Dec. 2015**	**Dec. 2016**	**Dec. 2017**	**April 2021**	**Current**	**Dec. 2015**	**Dec. 2016**	**Dec. 2017**	**April 2021**	**Current**
Collision	0.4%	-0.1%	-1.6%	**-4.6%**	**-4.0%**	**-2.9%**	**-3.0%**	**-3.9%**	**-4.5%**	**-4.3%**	0.9%	2.3%	2.8%	1.8%	1.2%
Property damage liability	**-14.9%**	**-12.5%**	**-15.6%**	**-16.5%**	**-13.2%**	**-10.4%**	**-11.8%**	**-11.6%**	**-11.5%**	**-11.1%**	-7.4%	**-7.4%**	**-5.5%**	-3.0%	-3.0%
Injury coverage type															
Bodily injury liability	**-44.5%**	**-35.6%**	**-25.5%**	**-22.3%**	**-20.3%**	**-19.7%**	**-19.2%**	**-19.9%**	**-21.2%**	**-19.6%**	-25.2%	-19.2%	**-19.6%**	**-12.8%**	**-16.2%**
Medical payment	-9.1%	-6.2%	-0.7%	-6.3%	-3.6%	**-23.1%**	**-21.1%**	**-23.2%**	**-22.3%**	**-19.7%**	-18.4%	**-29.7%**	**-22.2%**	**-22.7%**	**-23.7%**
Personal injury protection	21.5%	3.6%	9.6%	-0.9%	-4.1%	-8.5%	**-8.6%**	**-10.4%**	**-9.9%**	**-9.1%**	-11.5%	**-16.9%**	-10.7%	-8.8%	**-9.4%**

Table 9 shows the differences in the claim frequency estimates for LaneWatch by rated driver age for the current study and the four prior HLDI bulletins. The results showed significant reductions across the age groups for collision and PDL. Results for the injury coverages were encouraging, with many significant reductions.

Table 9: Change in LaneWatch claim frequencies, initial vs. updated results

	≤ 24					25–64					65+				
Vehicle damage coverage type	**Dec. 2015**	**Dec. 2016**	**Dec. 2017**	**April 2021**	**Current**	**Dec. 2015**	**Dec. 2016**	**Dec. 2017**	**April 2021**	**Current**	**Dec. 2015**	**Dec. 2016**	**Dec. 2017**	**April 2021**	**Current**
Collision	-7.8%	**-8.8%**	**-8.4%**	**-6.1%**	**-4.5%**	**-3.5%**	**-4.4%**	**-4.2%**	**-3.4%**	**-3.2%**	**-7.4%**	**-8.7%**	**-8.8%**	**-7.3%**	**-6.6%**
Property damage liability	-7.1%	**-10.4%**	**-9.2%**	**-8.6%**	**-8.2%**	**-9.4%**	**-8.9%**	**-9.7%**	**-9.3%**	**-8.7%**	-7.9%	**-8.9%**	**-11.3%**	**-13.2%**	**-13.1%**
Injury coverage type															
Bodily injury liability	—	4.8%	-7.2%	-10.6%	-7.4%	**-18.7%**	**-15.8%**	**-14.4%**	**-11.8%**	**-10.7%**	-3.2%	-12.8%	**-17.8%**	**-24.3%**	**-20.4%**
Medical payment	-16.5%	-17.0%	**-23.9%**	**-15.7%**	**-16.4%**	-3.1%	-4.3%	-3.8%	-3.8%	**-5.6%**	-8.9%	4.7%	-9.6%	-9.9%	-6.9%
Personal injury protection	-22.5%	-17.0%	**-20.8%**	**-13.0%**	-8.5%	**-11.2%**	**-13.0%**	**-10.4%**	**-8.2%**	**-8.3%**	-17.5%	-13.9%	**-16.1%**	**-17.9%**	**-16.2%**

Discussion

FCW systems are designed to prevent or mitigate front-to-rear crashes, which typically result in PDL and sometimes BI claims. In a prior HLDI analysis of the Honda FCW/LDW system, large significant claim frequency benefits were observed (2019a).

The current study found benefits of the FCW/LDW system for all rated driver age groups, which is consistent with the 2021 HLDI study. However, the benefit was diminished for rated drivers over 65 compared with those under 65. The finding that the benefits of the FCW/LDW system are lowest for the oldest rated drivers is consistent with prior HLDI research. A study on the Subaru's EyeSight system (HLDI, 2019b) also found lower PDL claim frequency benefits for older drivers. Earlier studies (HLDI, 2014) have also shown that claim frequencies are higher for younger drivers and they have more frontal crashes than drivers of other ages. Those results are consistent with the findings in this research that the younger drivers may benefit more from front crash prevention systems like FCW/LDW. However, the youngest rated driver age group (24 and younger) has the least exposure and the estimates have fairly large confidence bounds.

LaneWatch, a passenger-side blind spot detection system, is designed to prevent incursion into an occupied adjacent lane that would be expected to result in a two-vehicle crash leading to a PDL claim against the encroaching driver. With the additional exposure, many of the results for LaneWatch are now statistically significant. For all coverage types but MedPay, the benefits for the oldest group were higher than the other two groups. For all age groups, the estimated reduction in PDL claims is larger than the reduction estimated for collision claims. That is likely because many collision claims stem from single-vehicle crashes that are unaffected by the LaneWatch system.

Limitations

There are limitations to the data used in this analysis. The features in this study can be deactivated by the driver, and there is no way to know if they were switched on or off when the documented crashes occurred. Surveys conducted by IIHS indicate that large majorities of drivers with these types of systems leave them on (Reagan, Cicchino, Kerfoot, & Weast, 2018). If a significant number of drivers do turn these features off, however, any reported reductions may actually be underestimates of the true effectiveness of these systems.

Additionally, the data supplied to HLDI does not include detailed crash information. The specific crash types addressed by the different technologies cannot be isolated in these analyses. For example, it is not known how many of the crashes in the rear-vision camera analysis involved backing up, which is the only maneuver during which this camera is active. All collisions, regardless of the ability of a feature to mitigate or prevent the crash, are included in the analysis.

All of these features are optional and associated with increased costs. The type of person who selects these options may be different from the person who declines to purchase them. While the analysis controls for several driver characteristics, there may be other uncontrolled attributes associated with people who select these features.

Next steps

Future analysis includes performing similar analysis on other collision avoidance systems previously evaluated by HLDI.

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Appendix

Appendix: Illustrative regression results — collision frequency in age group 25–64									
Parameter		Degrees of freedom	Estimate	Effect	Standard error	Wald 95% confidence limits		Chi-square	P-value
Intercept		1	-8.8704		0.0308	-8.9308	-8.8101	82942.20	<0.0001
Calendar year	2012	1	-0.2107	-19.0%	0.0604	-0.3291	-0.0922	12.15	0.0005
	2013	1	0.3446	41.1%	0.0115	0.3221	0.3672	896.09	<0.0001
	2014	1	0.3876	47.3%	0.0086	0.3708	0.4044	2041.51	<0.0001
	2015	1	0.3934	48.2%	0.0075	0.3788	0.4081	2766.94	<0.0001
	2016	1	0.3900	47.7%	0.0072	0.3758	0.4042	2895.04	<0.0001
	2017	1	0.3480	41.6%	0.0073	0.3336	0.3624	2248.84	<0.0001
	2018	1	0.3383	40.3%	0.0074	0.3239	0.3528	2100.15	<0.0001
	2019	1	0.3197	37.7%	0.0075	0.3051	0.3344	1838.72	<0.0001
	2021	1	0.1890	20.8%	0.0079	0.1736	0.2044	579.75	<0.0001
	2020	0							
Vehicle model year and series	2013 Accord 2D	1	0.0904	9.5%	0.0303	0.031	0.1498	8.89	0.0029
	2014 Accord 2D	1	0.1124	11.9%	0.031	0.0517	0.1731	13.16	0.0003
	2015 Accord 2D	1	0.1275	13.6%	0.0313	0.0661	0.1888	16.59	<0.0001
	2013 Accord 4D	1	-0.0030	-0.3%	0.0295	-0.0607	0.0547	0.01	0.9182
	2014 Accord 4D	1	0.0172	1.7%	0.0295	-0.0406	0.0749	0.34	0.5604
	2015 Accord 4D	1	0.0429	4.4%	0.0295	-0.0149	0.1008	2.12	0.1458
	2013 Accord Crosstour 4dr 2WD	1	0.0035	0.4%	0.0342	-0.0635	0.0706	0.01	0.9175
	2013 Accord Crosstour 4dr 4WD	1	0.0469	4.8%	0.0360	-0.0238	0.1175	1.69	0.1934
	2014 Accord Crosstour 4dr 2WD	1	0.0041	0.4%	0.0402	-0.0748	0.0829	0.01	0.9192
	2015 Accord Crosstour 4dr 2WD	1	0.0145	1.5%	0.0417	-0.0673	0.0963	0.12	0.7288
	2015 Accord Crosstour 4dr 4WD	1	0.0118	1.2%	0.0420	-0.0705	0.0940	0.08	0.7794
	2014 Accord Crosstour 4dr 4WD	0							
Rated driver age group	25–29	1	0.1404	15.1%	0.0058	0.1291	0.1517	592.78	<0.0001
	30–39	1	0.0115	1.2%	0.0049	0.0020	0.0210	5.58	0.0182
	50–59	1	-0.0579	-5.6%	0.0051	-0.0678	-0.0480	131.46	<0.0001
	60–64	1	-0.1132	-10.7%	0.0066	-0.1262	-0.1003	294.65	<0.0001
	40–49	0							
Rated driver gender	Male	1	-0.0545	-5.3%	0.0036	-0.0615	-0.0475	233.24	<0.0001
	Unknown	1	-0.0939	-9.0%	0.0222	-0.1374	-0.0504	17.88	<0.0001
	Female	0							
Rated driver marital status	Single	1	0.2261	25.4%	0.0038	0.2187	0.2335	3606.76	<0.0001
	Unknown	1	0.1281	13.7%	0.0209	0.0871	0.1691	37.53	<0.0001
	Married	0							
Risk	Nonstandard	1	0.2851	33.0%	0.0076	0.2703	0.3000	1409.25	<0.0001
	Standard	0							
State	Alabama	1	0.0279	2.8%	0.0161	-0.0037	0.0595	3.00	0.0832
	Alaska	1	0.1373	14.7%	0.0943	-0.0476	0.3222	2.12	0.1455
	Arizona	1	0.0840	8.8%	0.0149	0.0548	0.1131	31.80	<0.0001
	Arkansas	1	0.0459	4.7%	0.0258	-0.0047	0.0965	3.16	0.0756
	California	1	0.3389	40.3%	0.0070	0.3251	0.3527	2312.34	<0.0001
	Colorado	1	0.0618	6.4%	0.0198	0.0230	0.1006	9.76	0.0018

Appendix: Illustrative regression results — collision frequency in age group 25–64									
Parameter		Degrees of freedom	Estimate	Effect	Standard error	Wald 95% confidence limits		Chi-square	P-value
	Connecticut	1	0.1254	13.4%	0.0158	0.0945	0.1563	63.17	<0.0001
	Delaware	1	0.1464	15.8%	0.0266	0.0942	0.1985	30.30	<0.0001
	Dist of Columbia	1	0.6056	83.2%	0.0278	0.5512	0.6600	475.79	<0.0001
	Florida	1	-0.1010	-9.6%	0.0090	-0.1186	-0.0834	126.41	<0.0001
	Georgia	1	0.0291	3.0%	0.0106	0.0084	0.0498	7.58	0.0059
	Hawaii	1	0.1510	16.3%	0.0265	0.0989	0.2030	32.35	<0.0001
	Idaho	1	-0.0746	-7.2%	0.0440	-0.1608	0.0116	2.88	0.0899
	Illinois	1	-0.0262	-2.6%	0.0114	-0.0485	-0.0039	5.28	0.0215
	Indiana	1	-0.0643	-6.2%	0.0179	-0.0993	-0.0293	12.94	0.0003
	Iowa	1	-0.1644	-15.2%	0.0330	-0.2292	-0.0997	24.77	<0.0001
	Kansas	1	-0.1026	-9.8%	0.0258	-0.1532	-0.0519	15.76	<0.0001
	Kentucky	1	-0.2216	-19.9%	0.0241	-0.2688	-0.1744	84.62	<0.0001
	Louisiana	1	0.2726	31.3%	0.0129	0.2472	0.2980	443.80	<0.0001
	Maine	1	0.0409	4.2%	0.0456	-0.0485	0.1303	0.81	0.3695
	Maryland	1	0.3045	35.6%	0.0101	0.2847	0.3242	912.28	<0.0001
	Michigan	1	0.3288	38.9%	0.0187	0.2922	0.3655	309.07	<0.0001
	Minnesota	1	-0.1157	-10.9%	0.0187	-0.1523	-0.0791	38.38	<0.0001
	Mississippi	1	0.1412	15.2%	0.0206	0.1008	0.1816	46.93	<0.0001
	Missouri	1	-0.1103	-10.4%	0.0192	-0.1481	-0.0726	32.86	<0.0001
	Montana	1	-0.2622	-23.1%	0.0781	-0.4154	-0.1091	11.27	0.0008
	Nebraska	1	-0.1597	-14.8%	0.0359	-0.2301	-0.0894	19.80	<0.0001
	Nevada	1	0.0685	7.1%	0.0215	0.0263	0.1107	10.11	0.0015
	New Hampshire	1	0.1754	19.2%	0.0279	0.1207	0.2302	39.45	<0.0001
	New Jersey	1	0.0366	3.7%	0.0095	0.0181	0.0552	14.98	0.0001
	New Mexico	1	0.0318	3.2%	0.0310	-0.0288	0.0925	1.06	0.3037
	New York	1	0.3272	38.7%	0.0083	0.3110	0.3434	1563.29	<0.0001
	North Carolina	1	-0.1508	-14.0%	0.0117	-0.1738	-0.1279	166.13	<0.0001
	North Dakota	1	0.0295	3.0%	0.0589	-0.0860	0.1450	0.25	0.6166
	Ohio	1	-0.1228	-11.6%	0.0116	-0.1455	-0.1001	112.08	<0.0001
	Oklahoma	1	-0.1055	-10.0%	0.0225	-0.1495	-0.0615	22.07	<0.0001
	Oregon	1	-0.0260	-2.6%	0.0223	-0.0697	0.0177	1.36	0.2434
	Pennsylvania	1	0.2095	23.3%	0.0104	0.1892	0.2298	408.95	<0.0001
	Rhode Island	1	0.2300	25.9%	0.0257	0.1797	0.2804	80.15	<0.0001
	South Carolina	1	-0.0410	-4.0%	0.0148	-0.0699	-0.0121	7.71	0.0055
	South Dakota	1	-0.0484	-4.7%	0.0631	-0.1721	0.0753	0.59	0.4433
	Tennessee	1	0.0313	3.2%	0.0145	0.0030	0.0597	4.69	0.0303
	Utah	1	-0.1060	-10.1%	0.0262	-0.1574	-0.0546	16.35	<0.0001
	Vermont	1	0.0855	8.9%	0.0577	-0.0276	0.1985	2.19	0.1385
	Virginia	1	0.0631	6.5%	0.0104	0.0428	0.0834	37.14	<0.0001
	Washington	1	0.0007	0.1%	0.0159	-0.0304	0.0319	0.00	0.9627
	West Virginia	1	-0.1881	-17.1%	0.0419	-0.2704	-0.1059	20.11	<0.0001
	Wisconsin	1	-0.0850	-8.1%	0.0201	-0.1244	-0.0457	17.92	<0.0001
	Wyoming	1	-0.0974	-9.3%	0.0906	-0.2749	0.0801	1.16	0.2822
	Texas	0							

Appendix: Illustrative regression results — collision frequency in age group 25–64									
Parameter		Degrees of freedom	Estimate	Effect	Standard error	Wald 95% confidence limits		Chi-square	P-value
Deductible range	0–250	1	0.1626	17.7%	0.0046	0.1536	0.1717	1243.78	<0.0001
	501–1000	1	-0.2425	-21.5%	0.0051	-0.2524	-0.2325	2298.66	<0.0001
	1001+	1	-0.6329	-46.9%	0.0240	-0.6798	-0.5859	696.68	<0.0001
	251–500	0							
Registered vehicle density	0–99	1	-0.2180	-19.6%	0.0066	-0.2309	-0.2051	1096.24	<0.0001
	100–499	1	-0.1499	-13.9%	0.0044	-0.1585	-0.1413	1177.64	<0.0001
	500+	0							
LaneWatch		1	-0.0322	-3.2%	0.0061	-0.0441	-0.0203	28.21	<0.0001
FCW/LDW		1	-0.0438	-4.3%	0.0064	-0.0563	-0.0312	46.86	<0.0001

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The Highway Loss Data Institute is a nonprofit public service organization that gathers, processes, and publishes insurance data on the human and economic losses associated with owning and operating motor vehicles. DW202212 NL Runs 1186, 1187, 1188