

CONSUMER RESPONSE TO VEHICLE SAFETY RATINGS

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Paper Number 15-0069

ABSTRACT

This study assessed how the release of the Insurance Institute for Highway Safety's (IIHS) new crashworthiness ratings based on a small overlap front crash configuration and ratings of front crash prevention systems affected consumer behavior. Telephone surveys were conducted with U.S. Volvo dealers after the August 2012 inaugural release of the IIHS small overlap frontal crash test ratings, in which the Volvo S60 was one of two models receiving the highest rating of good, and with U.S. Subaru and Jeep dealers after the May 2013 release of small overlap frontal test ratings of small SUVs, in which the Subaru Forester was the only model rated good and the Jeep Patriot was rated poor. Additional surveys were conducted following the September 2013 inaugural release of IIHS's front crash prevention ratings with U.S. Subaru, Volvo, and Cadillac dealers, automakers that offered automatic emergency braking systems receiving the top superior rating; U.S. Ford dealers, which offered a forward collision warning system rated basic; and U.S. Hyundai dealers, which had no rated system and offered little collision avoidance technology at the time.

Nearly half of Volvo dealers and 75% of Subaru dealers reported increased consumer interest in the S60 and Forester models, respectively, after their good ratings in the small overlap frontal test were broadcast. Volvo dealers reported a 41% increase in sales of the S60 and an 18% increase in sales of all Volvo models the week following this announcement compared with the week before. Subaru dealers reported a 14% increase in sales of the Forester and an 11% increase in all Subaru models compared with the week before the announcement, while Jeep Patriot sales declined slightly and sales of all Jeep models were essentially unchanged. About a third of Subaru, Volvo, and Cadillac dealers and 10% of Ford dealers reported increased consumer interest in front crash prevention systems after the inaugural ratings were released. Sales for all surveyed automakers declined from the week before the front crash prevention rating announcement to the following week. However, sales of Subaru, Volvo, Cadillac, and Ford models with rated systems declined 41% less than sales of Hyundai models, and sales of all models from these automakers declined 6% less than sales of Hyundai models. The findings suggest that well-publicized safety ratings can translate directly into changes in consumer vehicles purchases.

INTRODUCTION

Surveys of the public [1-5] and of recent new vehicle buyers [6] in the United States, Canada, and Europe conducted during the past decade have found that consumers find safety to be an important consideration when purchasing a new vehicle. About half of drivers surveyed in the United States [4] and Europe [3] reported they have researched the protection vehicles would provide in a crash, or that such information has been useful to them in choosing a new vehicle to purchase. Drivers also consider technology that improves vehicle safety when choosing vehicles. In a survey of U.S. vehicle owners [2], 58% reported that a vehicle having proven and tested technology was highly influential in new vehicle purchases. Approximately half said they would be willing to pay extra for enhanced safety features in vehicles.

The Insurance Institute for Highway Safety (IIHS) has provided information to U.S. consumers about vehicle safety since the mid-1990s. IIHS introduced a new vehicle crashworthiness test, the small overlap frontal crash test, in 2012. The test is designed to replicate the vehicle damage and motion that occurs in a collision where a small

portion of the vehicle's front end contacts the struck object, such as when the front corner of a vehicle collides with another vehicle, or when a vehicle strikes a tree or utility pole. In the test, 25% of a vehicle's front end on the driver side is crashed into a rigid barrier at 64 km/h. Compared with the moderate overlap frontal crash test, involving 40% of the vehicle's front end, the small overlap test puts higher stress on the outer part of the vehicle's safety cage, which typically is less protected by the vehicle's crush zone structures. The top rating possible in this and IIHS's other crashworthiness tests is good, followed by acceptable, marginal, and poor ratings.

IIHS expanded its vehicle ratings program in 2013 to include front crash prevention systems. Vehicles that brake autonomously in the event of an imminent frontal collision can earn ratings of advanced or superior based on performance in tests conducted at 20 and 40 km/h. For the top rating of superior, vehicles with autobrake must avoid a crash or reduce speeds substantially in both tests. For a rating of advanced, vehicles with autobrake must avoid a crash or reduce speeds by at least 10 km/h in at least one of the two tests. Vehicles earn a rating of basic if they have a forward collision warning system that meets National Highway Traffic Safety Administration performance criteria.

New IIHS vehicle safety ratings are typically publicized to the U.S. public through hundreds and thousands of television broadcasts and extensive coverage by print and internet news media. Although there is evidence that many consumers factor safety ratings into their vehicle purchase decisions, it is unknown how safety ratings translate into sales of specific models that receive high and low ratings. To investigate this, IIHS conducted three surveys of dealers about consumer interest in and sales of recently-rated vehicle models.

Volvo dealers were interviewed following the inaugural release of small overlap crash test ratings with midsize luxury vehicles on August 14, 2012, in which the Volvo S60 was one of two of the 11 vehicles tested to earn the top rating of good. Subaru and Jeep dealers were interviewed following the May 16, 2013 release of small overlap crash test ratings of 13 small SUVs. The Subaru Forester was the only vehicle rated good in this round of small overlap crash testing and the first vehicle tested by IIHS in the small overlap configuration with top ratings in all aspects of the test. The Jeep Patriot was one of five vehicles rated poor. Press coverage of the test release tended to highlight the Subaru Forester and Jeep Patriot as examples of good and poor performers, respectively.

A final set of interviews with Volvo, Cadillac, Subaru, Ford, and Hyundai dealers was conducted following the September 27, 2013 inaugural release of front crash prevention ratings of midsize cars and SUVs. The Cadillac ATS and SRX equipped with Forward Collision Alert and Automatic Collision Preparation, the Subaru Legacy and Outback equipped with EyeSight, and the Volvo S60 and XC60 equipped with City Safety and Collision Warning with Full Auto Brake and Pedestrian Detection were six of the seven vehicles rated superior. The Volvo S60 and XC60 equipped only with City Safety, which brakes autonomously at low speeds and was standard equipment on these models, were two of the eight vehicles rated advanced. The Cadillac ATS and SRX equipped with Forward Collision Alert only, which warns of an imminent forward collision but does not include autobrake, and the Ford Edge, Explorer, Flex, and Fusion equipped with Collision Warning with Brake Support were six of the 28 vehicles that earned a basic rating. Hyundai had no models that were rated for front crash prevention in September 2013 and sold few vehicles with front crash prevention systems at the time.

METHODS

Telephone interviews were conducted by OpinionAmerica Group (Cedar Knolls, NJ), a professional survey organization. Phone numbers were obtained for dealerships from publicly available directories. Following the August 14, 2012 and May 16, 2013 small overlap ratings releases, interviews were attempted with all U.S. Volvo dealerships during August 28-September 6, 2012, and with all U.S. Subaru dealerships and a sample of the more than 2,200 U.S. Jeep dealerships during June 17-July 16, 2013. Of the 310 Volvo dealerships called with working phone numbers, interviews were completed with 206 (66%) and 2 (1%) refused. Subaru and Jeep dealerships were

called until 275 interviews were completed with each. Thus, among dealerships with working phone numbers, 47% of the 589 Subaru dealerships called completed interviews, 20 (3%) refused, and 4 (1%) began but did not complete the survey, and 28% of the 982 Jeep dealerships called completed interviews, 116 (12%) refused, and 6 (1%) began but did not complete the survey.

Following the September 27, 2013 announcement of front crash prevention ratings, interviews were attempted during October 28-December 3, 2013 with all U.S. Subaru, Volvo, Cadillac, and Hyundai dealerships, and a sample of the more than 3,100 U.S. Ford dealerships, with the goal of completing as many interviews as possible with Volvo dealers and 275 interviews with each of the remaining automakers. Among dealers with working phone numbers, 275 (48%) of the 572 Subaru dealers called completed interviews, and 59 (10%) refused; 176 (60%) of the 295 Volvo dealers called completed interviews, and 21 (7%) refused; 275 (26%) of the 1,080 Cadillac dealers called completed interviews, 268 (25%) refused, and 1 (<1%) began but did not complete the survey; 275 (35%) of the 792 Ford dealers called completed interviews, 74 (9%) refused, and 11 (1%) began but did not complete the survey; 275 (32%) of the 851 Hyundai dealers called completed interviews, and 125 (15%) refused. In all surveys, dealers that were called and did not refuse or begin the survey typically asked to be called back later or did not answer.

Interviewers asked to speak with the dealership’s sales manager or with the general manager or owner if the sales manager was unavailable. Interviews were most often completed with sales managers (72% of interviews completed, ranging from 67%-80% among automakers). Surveys lasted about 5 minutes.

RESULTS

Surveys Following Small Overlap Crash Test Rating Releases

Dealers were asked if there was a change in the number of people who had contacted or visited their dealerships since the mid-August 2012 (Volvo) or mid-May 2013 (Subaru and Jeep) release of small overlap crash test ratings because they were interested in purchasing a Volvo S60, Subaru Forester, or Jeep Patriot, and if more, fewer, or the same proportion of customers who had contacted the dealership since the release had mentioned the safety performance of Volvo, Subaru, or Jeep as a reason for considering the brand. Larger percentages of Subaru (75%) and Volvo (49%) dealers than Jeep (12%) dealers reported an increase in calls and visits from customers interested in purchasing the tested vehicle (see Table 1). Subaru and Volvo dealers were likewise more likely to report that more customers had mentioned the safety performance of the automaker as a reason for considering it (55%-61% vs. 8%; see Table 1).

Table 1.
Customer interest in Volvo, Subaru, and Jeep vehicles and mentions of automakers’ safety and crash test performance since announcement of IIHS small overlap crash test results (percent).

		Volvo (N=206)	Subaru (N=275)	Jeep (N=275)
Change in number of people who contacted or visited dealership because they are considering purchasing a Volvo S60, Subaru Forester, or Jeep Patriot	More	49	75	12
	Same	50	24	86
	Less	1	1	2
	Don’t know/Refused	0	1	0
Change in number of customers who mentioned safety performance of automaker as reason for considering brand	More	55	61	8
	Same	44	35	87
	Less	<1	1	4
	Don’t know/Refused	<1	3	1
Any customers mentioned automaker’s performance in recent crash tests as reason for considering brand	Yes	68	77	12
	No	30	22	88
	Don’t know/Refused	2	1	1

More than two-thirds of Volvo and Subaru dealers reported that since the release at least some of their customers had mentioned performance in recent crash tests as a reason they were considering the automaker, compared with 12% of Jeep dealers (see Table 1). When Jeep dealers were asked if any potential customer since mid-May had mentioned Jeep’s performance in recent crash tests as a reason why they were having second thoughts about buying a Jeep, 14 dealers (5%) said yes.

Volvo dealers were asked about the dealership’s sales of the Volvo S60, and of all Volvo models, for four weeks in 2012: July 29-August 4 (two weeks before the release), August 5-11 (the week before the release), August 12-18 (the week during the release), and August 19-25 (the week after the release). Similarly, Subaru and Jeep dealers were asked about sales of the Subaru Forester or Jeep Patriot, and of all Subaru or Jeep models, for three weeks in 2013: May 5-11 (the week before the release), May 12-18 (the week during the release), and May 19-25 (the week after the release).

Sales numbers for all models and the rated model in each of the four weeks were provided by 156 Volvo dealers (78%), and in each of the three weeks by 261 Subaru dealers (95%) and 269 Jeep dealers (98%). Two Volvo dealers were unable to provide sales data for the period two weeks before the release but did provide data for the subsequent weeks. Response rates for these questions improved in the survey of Subaru and Jeep dealers because interviewers encouraged dealer representatives to look up sales numbers if they did not have them readily available, which was not done in the prior survey of Volvo dealers.

Changes in total sales were examined from the week before the release to the week after the release among dealers that reported data for all weeks (see Table 2). Volvo dealers reported a much larger increase in total sales of the S60 model (41%) than of all Volvo models (18%), and Subaru dealers reported a slightly larger increase in Forester sales (14%) compared with sales of all Subaru models (11%). Jeep dealers reported a small decrease in sales of the Patriot model (2%) and a small increase in total sales for all Jeep models (<1%).

Table 2.
Sales of S60, Forester, Patriot, and all Volvo, Subaru, and Jeep models two weeks before and the week before, during, and after the release of IIHS small overlap test results, among dealers reporting for all weeks.

		Two weeks before	Week before	Week of	Week after	Percent change, week before to week after
		Jul 29-Aug 4, 2012	Aug 5-11, 2012	Aug 12-18, 2012	Aug 19-15, 2012	
Volvo (N=156)	Volvo S60	317	261	329	369	41
	All Volvo models	1,046	798	822	944	18
			May 5-11, 2013	May 12-18, 2013	May 19-25, 2013	
Subaru (N=261)	Subaru Forester	—	1,243	1,203	1,422	14
	All Subaru models	—	3,970	3,795	4,397	11
Jeep (N=269)	Jeep Patriot	—	426	398	419	-2
	All Jeep models	—	2,314	2,206	2,325	<1

At the end of the survey, dealers were asked if they knew that the S60 or Forester model had earned a good rating or that the Patriot had earned a poor rating in a recent IIHS small overlap crash test. Nearly all Volvo (94%) and Subaru (93%) dealers were aware of the performance of the S60 and Forester, respectively, prior to the survey, but fewer Jeep (38%) dealers were aware of the Patriot’s performance.

Surveys Following Front Crash Prevention Rating Release

Subaru, Volvo, Cadillac, and Ford dealers were asked a series of questions regarding customer interest in vehicles with front crash prevention systems since the late September 2013 inaugural release of IIHS front crash prevention

ratings. Subaru, Volvo, and Cadillac dealers were asked about interest in vehicles with systems rated superior (Subaru’s EyeSight system, Volvo’s City Safety and Collision Warning with Full Auto Brake and Pedestrian Detection systems, and Cadillac’s Forward Collision Alert and Automatic Collision Preparation systems), and Ford dealers were asked about vehicles with a system that earned a basic rating (Collision Warning with Brake Support). The full names of the systems were used in questions to dealers.

When asked if there was a change in the number of people who had contacted or visited their dealerships since late September because they were interested in purchasing a vehicle with front crash prevention, between 25% and 47% of dealers of the automakers with systems rated superior and 10% of Ford dealers reported an increase in interest among consumers (see Table 3). Sixty percent of Subaru dealers, 49% of Volvo dealers, 31% of Cadillac dealers, and 20% of Ford dealers reported that at least some customers interested in purchasing the vehicles with rated systems since late September had mentioned that they had seen the system included in safety ratings (see Table 3).

Table 3.
Customer interest in Subaru, Volvo, and Cadillac vehicles with front crash prevention systems rated superior and Ford models with front crash prevention systems rated basic, and mentions of safety ratings and autobrake since release of IIHS front crash prevention ratings (percent).

		Subaru (N=275)	Volvo (N=176)	Cadillac (N=275)	Ford (N=275)
Change in number of people who contacted or visited dealership because they are considering purchasing a model with front crash prevention system rated superior (Subaru, Volvo, Cadillac) or basic (Ford)	More	47	25	33	10
	Same	50	69	58	82
	Less	4	5	8	7
	Don’t know/Refused	0	1	1	1
Any customer interested in purchasing vehicle with system rated superior (Subaru, Volvo, Cadillac) or basic (Ford) mentioned seeing system included in safety ratings	Yes	60	49	31	20
	No	39	50	69	79
	Don’t know/Refused	1	1	0	1
Any customer interested in vehicle with system rated superior mentioned system’s autonomous braking as reason for considering system	Yes	57	49	37	—
	No	41	49	63	—
	Don’t know/Refused	1	2	<1	—

Dealer representatives of Subaru, Volvo, and Cadillac, which offered front crash prevention systems with autobrake, were asked if customers interested in purchasing the rated vehicles with front crash prevention systems had mentioned the system’s autonomous braking as a reason they were interested in purchasing them. Between 37% and 57% of dealers of each automaker reported that since late September at least some customers had mentioned autobrake as a reason for their interest (see Table 3). Among dealers reporting that customers mentioned autobrake, 58% of Subaru dealers, 51% of Volvo dealers, and 56% of Cadillac dealers said more customers than usual had mentioned autobrake since the release.

Dealer representatives of Ford, which did not offer a front crash prevention system with autonomous braking, were asked if customers interested in purchasing a Ford with front crash prevention had asked since late September if Ford’s system brakes autonomously (not in table). About a quarter (23%) reported that at least some customers asked about autobrake, and among these dealers, 32% said that more customers than usual had asked about autobrake.

Dealer representatives from Hyundai, which sold front crash prevention on a limited proportion of their vehicles, were asked if any customers had questioned if Hyundai offered forward collision warning since late September. Fourteen percent reported that customers had asked about forward collision warning.

Sales figures were obtained for IIHS-rated vehicles with front crash prevention systems and for all vehicles sold by surveyed dealers during the week before (September 15-21, 2013), during (September 22-28, 2013), and after (September 29-October 5, 2013) the ratings release. The dealers were asked about sales of rated vehicles; Subaru offered a system rated superior, Volvo offered vehicles with systems rated superior and advanced, Cadillac offered vehicles with systems rated superior and basic, and Ford offered a system rated basic. The names of the packages that included the systems were used if package names differed from system names. A total of 269 (98%) Subaru, 168 (95%) Volvo, 257 (93%) Cadillac, 271 (99%) Ford, and 271 (99%) Hyundai dealers reported sales figures for all weeks for all vehicles and, if applicable, the rated vehicles. Sales reported by automakers with rated front crash prevention systems were compared with Hyundai sales.

Total sales and sales of rated vehicles declined for all automakers from the week before the ratings release to the week after (see Table 4). However, the combined sales of Subaru, Volvo, Cadillac, and Ford models with rated systems declined 41% less than sales of Hyundai models, and the combined sales of all models from these automakers declined 6% less than sales of Hyundai models. Sales of models with each rated system declined less

Table 4.
Sales of all Hyundai, Subaru, Volvo, Cadillac, and Ford models, and sales of Subaru, Volvo, Cadillac, and Ford models with IIHS-rated front crash prevention systems the week before, during, and after the release of IIHS front crash prevention ratings, among dealers reporting for all weeks.

		Week before Sept 15-21, 2013	Week of Sept 22-28, 2013	Week after Sept 29-Oct 5, 2013	Percent change, week before to week after
Hyundai (N=271)	All Hyundai models	5,604	4,633	3,900	-30
Subaru (N=269)	MY 2013-14 Legacy and Outback with EyeSight (superior)	579	458	463	-20
	All Subaru models	4,670	4,194	3,669	-21
Volvo (N=168)	MY 2013-14 S60 and XC60 with Technology Package and City Safety (superior)	155	106	110	-29
	MY 2013-14 S60 and XC60 with City Safety and without Technology package (advanced)	696	619	598	-14
	All Volvo models	1,039	882	810	-22
Cadillac (N=257)	MY 2013-14 ATS and SRX with Driver Assist and Driver Awareness packages (superior)	525	457	439	-16
	MY 2013-14 ATS and SRX with Driver Awareness package and without Driver Assist package (basic)	412	380	339	-18
	All Cadillac models	1,323	1,116	968	-27
Ford (N=271)	MY 2013- 14 Edge, Explorer, Flex, and Fusion models with Adaptive Cruise Control and Collision Warning package (basic)	781	659	636	-19
	All Ford models	6,228	4,576	4,005	-36
Total Subaru, Volvo, Cadillac, and Ford models with rated front crash prevention systems		3,148	2,679	2,585	-18
All Subaru, Volvo, Cadillac, and Ford models		13,260	10,768	9,452	-29

than sales of Hyundai models, and total sales for each automaker offering vehicles with rated systems except Ford declined less than total Hyundai sales. There were no consistent differences among automakers in sales when comparing vehicles rated superior, advanced, and basic.

Because a lack of in-stock vehicles with systems could inhibit sales, dealers were asked if they had vehicles in stock with the rated systems at the time of the interview. More than 80% of dealers had vehicles with each optional system in stock, and nearly all (97%) Volvo dealers reported having S60 or XC60 models with the standard City Safety system in stock. It is unknown if dealers maintained the same stock levels in the weeks immediately surrounding the ratings release; historical stock was not assessed.

Dealers were told at the end of the survey that IIHS released front crash prevention ratings in late September and, if applicable, were informed how their systems were rated. Most Subaru (90%) and Volvo (85%) dealers, more than half of Cadillac (58%) dealers, and about a third of Ford (31%) and Hyundai (32%) dealers were aware of the ratings prior to the survey.

DISCUSSION

This study examined consumer interest in and sales reported by dealers of top- and poorly-rated vehicles in IIHS's small overlap crash test and of vehicles with and without front crash prevention systems rated by IIHS. A good rating in the small overlap crash test was associated with increased sales of the Volvo S60 and Subaru Forester models from the week before the ratings were released to the week after. These increases were larger than the rise in sales of all Volvo and Subaru models during this time, while sales of the poorly-rated Jeep Patriot remained flat. About half to three-quarters of Volvo and Subaru dealers also reported that customers mentioned seeing the vehicles included in crash tests, and that more customers were interested in purchasing the top-rated vehicles and mentioned the brand's safety performance as a reason they were considering them. These findings are consistent with prior research showing that consumers value safety when choosing vehicles [1-6] and demonstrate that this preference for safety extends to sales of specific vehicle models whose safety had received recent media attention.

Changes in consumer behavior following the inaugural release of IIHS front crash prevention ratings are less clear. Results indicated that some customers mentioned seeing systems included in safety ratings and some dealers reported increases in customer interest. However, reports varied by automaker and positive effects on sales were not as apparent as with the good ratings in the small overlap crash test. Sales declined for all vehicles examined from the week before the front crash prevention rating release to the week after. Sales trends likely reflected in part industry-wide factors, given that sales declined for all automakers surveyed, although it is unknown what such factors might have been. Thus, it is promising that declines were smaller among models with rated front crash prevention systems than among all vehicles and among Hyundai models, which sold few vehicles with front crash prevention at the time and did not offer vehicles with rated systems.

Consumer response to front crash prevention ratings may have been less positive than consumer response to small overlap crash test ratings because the public is less familiar with collision avoidance technologies than with crash tests. IIHS and the National Highway Traffic Safety Administration have been conducting crash tests in the United States since 1995 and the late 1970s, respectively. In comparison, front crash prevention is relatively new. A survey of Canadians during 2011-12 [7] found that only 24% were aware of forward collision warning.

Some limitations should be noted. Response rates were higher among automakers with top-rated vehicles, particularly among Volvo and Subaru dealers, than among other automakers. Volvo and Subaru dealers were also much more likely than other dealers to have known how their vehicles rated in IIHS tests. Dealers' enthusiasm to participate may have influenced their responses to questions on perceived consumer interest, and because of this limitation, it is encouraging that sales trends following small overlap crash test ratings corroborated subjective

judgments. Safety-conscious consumers may be attracted to particular automakers, which could also affect how potential customers of different automakers respond to safety ratings.

The Jeep Wrangler two-door model's marginal rating in the small overlap test was announced along with the ratings of the Subaru Forester and Jeep Patriot. Consumers' opinions of Jeep may have been affected by news reports regarding the performance of both the Patriot and Wrangler models. Finally, changes in vehicle sales were compared only between two weeks. Sales fluctuate week-to-week, and it is unknown if changes in sales persisted.

CONCLUSIONS

The goals of IIHS's vehicle ratings programs are to inform the public about vehicle safety and to encourage automakers to improve vehicle designs to enhance safety. Since IIHS introduced its ratings programs [8], automakers continue to quickly modify vehicle designs to improve crashworthiness in response to safety ratings, and this has led to safer vehicles. For instance, virtually all new vehicles are now rated good in IIHS's moderate overlap frontal crash test, and drivers of vehicles with good ratings in this test have a lower risk of dying in a head-on collision than drivers of poorly rated vehicles [9].

Automakers also have improved the performance of their vehicles in the small overlap frontal crash test and added front crash prevention systems since the new ratings were introduced. Among 2012 vehicle models that underwent the small overlap test, 28% received the top two ratings of good or acceptable; among 2015 models, 64% had received good or acceptable ratings as of February 2015. Only 20 2013 model year vehicles had front crash prevention systems rated advanced or superior, compared with 63 2015 model year vehicles as of February 2015. Both of these ratings systems are now incorporated into IIHS's *TOP SAFETY PICK* and *TOP SAFETY PICK+* awards. The current evidence demonstrates that improving vehicle designs to boost safety ratings benefits not only consumers with safer vehicles but also automakers with increased sales.

ACKNOWLEDGEMENTS

This work was supported by the Insurance Institute for Highway Safety.

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