

## WEB TRAFFIC ON IIHS.ORG VEHICLE RATING PAGES

**Matthew L. Brumbelow**

Insurance Institute for Highway Safety  
USA

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### ABSTRACT

The Insurance Institute for Highway Safety (IIHS) has several vehicle safety evaluation programs that it maintains for consumer information. The test results are announced in news releases throughout the year and are made available on the IIHS website. Understanding how the public uses the site could help IIHS, other consumer groups, and automakers identify ways to be more effective in how they communicate vehicle safety information.

Two types of analyses were conducted using Google Analytics web traffic data for the IIHS vehicle ratings pages. First, the traffic for every individual vehicle model webpage during the 2015 calendar year was compiled and linked to 2015 sales data. A nonlinear regression was used to model the relationship between pageviews and sales, allowing the level of interest in the safety ratings of vehicles with different sales volumes to be compared. Differences between vehicle make and class also were examined.

The second type of analysis explored the effect of the three news releases that generated the most web traffic between January 2015 and June 2016. These were releases of midsize car headlight ratings, the initial announcement of 2016 Top Safety Pick (TSP) awards, and the release of seven new midsize SUV small overlap crash ratings. Pageview counts were collected for five one-week intervals beginning with the day of the news release and were compared to the one-week period immediately preceding the release.

Volvo, BMW, Mazda, Audi, Mercedes-Benz, and Honda all had at least 50 percent more pageviews than predicted based on sales volume alone, while GMC, Scion, Chrysler, Lincoln, and Dodge all had at least 50 percent less than expected. Midsize luxury cars and small SUVs had the highest ratios of actual pageviews to predicted, while pickups had the smallest.

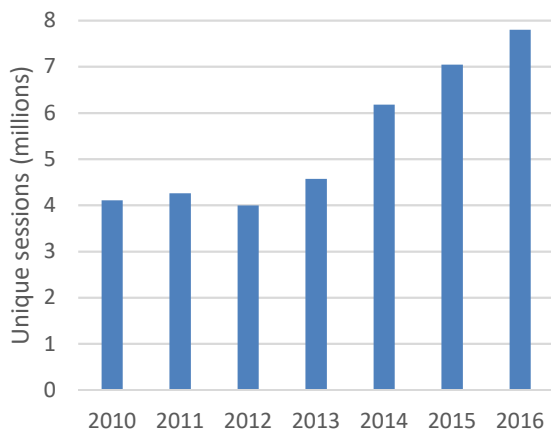
There were increases in web traffic for almost all ratings pages the week following a news release, even for vehicle models which were not a part of the release. However, only vehicles with ratings included in the news release tended to have more views beyond the second week, with the TSP and midsize SUV small overlap releases having the largest effect after five weeks. There was not a consistent trend in the size of the effect for a vehicle based on the rating (Good/Acceptable/Marginal/Poor) or level of award (TSP or TSP+). However, vehicles that lost their 2015 TSP status had an average of 16 percent fewer pageviews after 5 weeks.

Safety-conscious consumers may not be considering certain vehicles based on their make and/or class. While the reasons for this aren't fully known, it is possible that increased safety-oriented marketing could help, especially in the few weeks after a news release when there is greater awareness of the IIHS ratings. Maintaining a TSP award from one model year to the next is an important factor in sustaining interest on the site.

## INTRODUCTION

The Insurance Institute for Highway Safety (IIHS) currently maintains five crashworthiness ratings, two crash avoidance/mitigation ratings, and one usability rating for child seat anchors in vehicles. These evaluation programs are conducted for consumer information, and ratings are released to the public throughout the year. Near the end of each calendar year, overall Top Safety Pick awards are announced based on the crashworthiness and crash avoidance/mitigation ratings. Several studies have demonstrated the relationship between good ratings in specific test programs and improved outcomes in real-world crashes [1]-[4]. Efforts to make consumers aware of the ratings and to encourage purchasing decisions based on them can improve the overall safety of the passenger vehicle fleet. Surveys of dealerships after releases of new ratings suggest there is an effect on vehicle sales [5].

While safety ratings from IIHS and other consumer information programs are communicated to the public through a wide variety of media, in a 2010 survey McCart and Wells found that consumers cited the Internet more often than any other source for vehicle safety ratings [6]. Since then, the number of unique user sessions on the IIHS website has nearly doubled (Figure 1). Understanding how users interact with the ratings information on the site could lead to more effective communication with consumers on the part of IIHS, automobile manufacturers, and other consumer groups.



**Figure 1. Total unique sessions on iihs.org by calendar year**

## METHODS

Since 2007, IIHS has used Google Analytics to track traffic on its main website, iihs.org, and all subpages. The current study is an analysis of web traffic on the vehicle rating subpages for the 2015 calendar year. These pages are unique to each vehicle model and model year, and display all of the ratings for that model. The vehicle rating pages are loaded whenever a user on the site selects a specific vehicle, either from the drop-down menu on the main ratings page or from a list of vehicles displayed elsewhere on the site (e.g. the TSP list or a list of vehicles within a size class).

The web traffic metric used in the current study is what Google Analytics calls “unique pageviews” (hereafter referred to as “pageviews”). A pageview is recorded for each specific page that a user accesses within one browsing session. A new session is created each time a user browses to iihs.org from another site. This means that a user who visits the same vehicle rating page multiple times while remaining on iihs.org (or subpages of iihs.org) will only be counted once. But a user who returns to the same vehicle rating page after browsing to a non-IIHS site will be counted again.

### Comparison of Vehicle Models

The current study includes two types of analyses. The first is a comparison of the total pageviews for individual vehicle models during the 2015 calendar year. The total pageviews per model were compared on the basis of the number of vehicles sold during 2015. Sales volume data were obtained from Ward’s Automotive [7]. The “nls” (nonlinear least squares) function in the R programming language [8] was used to calculate a regression modeling the relationship between pageviews and sales taking the form:  $PageViews = \alpha \times Sales^\beta$ , where  $\alpha$  and  $\beta$  are the estimated parameters. The predicted pageviews were calculated uniquely for each vehicle model and then summed based on vehicle make and vehicle class. Finally, the ratio between actual pageviews and the number of pageviews predicted based on sales was calculated. These ratios were used to compare the level of

consumer interest in the safety ratings for different vehicle makes and classes independently of sales volume. Compared to all vehicles on the site, a vehicle make or class with an actual-to-predicted-pageview ratio of 1.0 had a typical number of pageviews given the total sales volume. Makes or classes with ratios above or below 1.0 had more or less pageviews, respectively, than typical based on sales.

Only vehicle rating subpages for the default model year were included. The default model year for a given vehicle is the newest model year with at least one published rating for that vehicle. To be included in the first analysis, the default model year was required to fall between 2014-2016 for the entirety of the 2015 calendar year. In other words, if at any point during 2015 there were no published ratings from the 2014 or newer model year for a certain vehicle, that vehicle was not included. In addition, at least one crashworthiness rating was required for the entirety of 2015 for a model to be included. For example, a vehicle that had only a crash avoidance/mitigation rating for the default model year at some point during 2015 was not included. Finally, some vehicle models were not in production for the entire 2015 calendar year because a model year was skipped during a redesign (e.g. Volvo XC90) or because the model was discontinued after the 2014 model year (e.g. Chrysler 200 convertible). These vehicles were excluded in order to limit comparisons to models that were on the market at the same time.

### Effect of News Releases

The second type of analysis explored the effect of different news releases between January 1, 2015, and June 30, 2016. Figure 2 shows the daily pageviews on all iihs.org pages over this time period, and Table 1 lists the five news releases that were associated with over 60,000 pageviews on the day of the release.

The three news releases associated with the most pageviews were selected for analysis. For each of these releases, the pageview counts for vehicle ratings subpages in the one-week period leading up

to the release (termed the “pre-week”) were compared with the counts during the five one-week periods following the release (termed “week 1”, “week 2,” etc.). The effect of the release on a given vehicle rating page for one of these five post-release periods was determined by dividing the pageviews during that week by the pageviews during the pre-week. Because of large pageview decreases on holidays falling during week 3 and week 4 after the TSP release, these weeks were not included in the analysis.

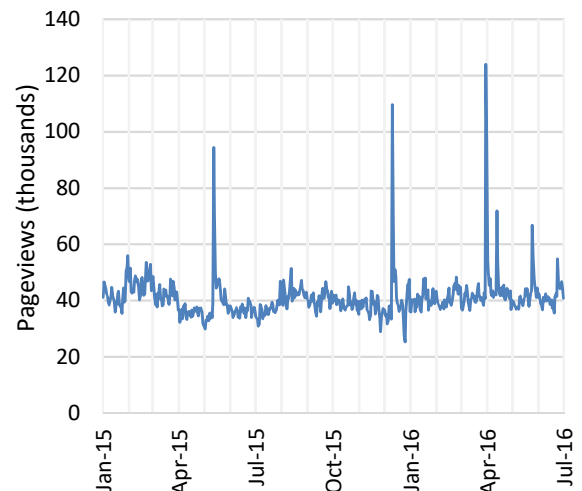


Figure 1. Total daily pageviews on iihs.org

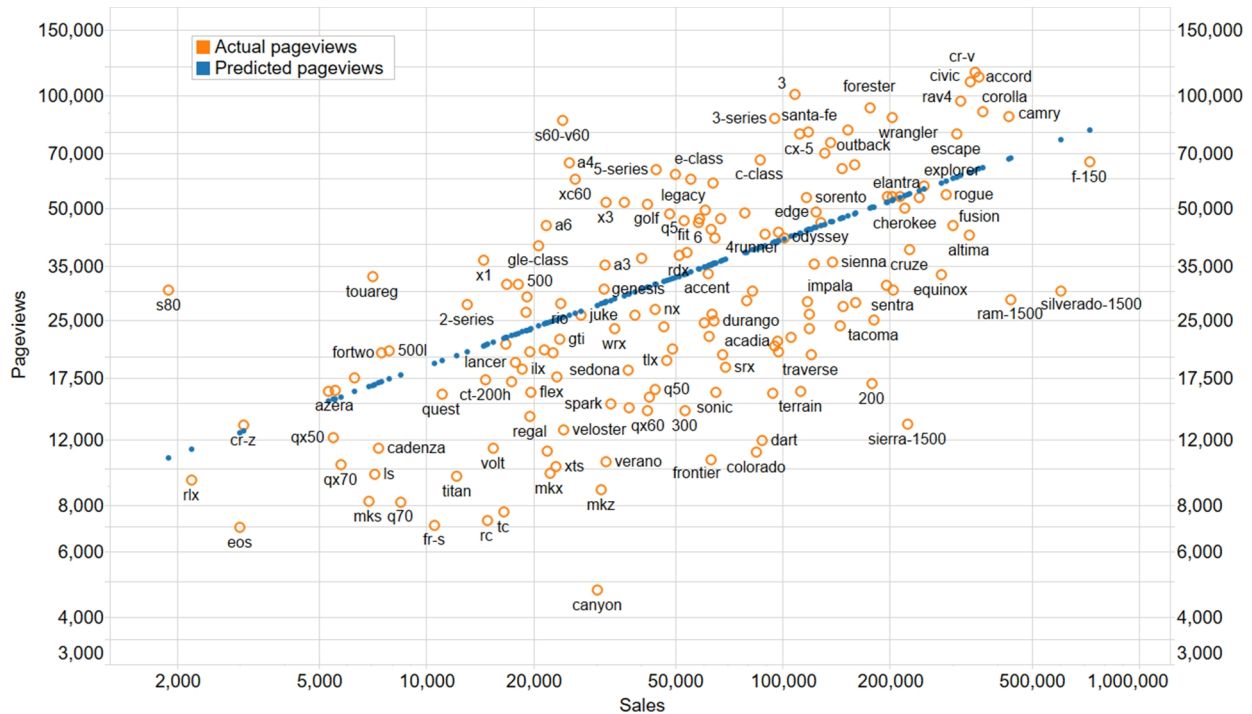
Date	News release topic	Pageviews
5/12/15	Midsize SUV small overlap	94,449
12/10/15	TSP announcement	109,661
3/30/16	Midsize car headlights	123,956
4/12/16	Pickup small overlap	71,877
5/24/16	Muscle cars	66,760

Table 1. IIHS news releases associated with the most pageviews from January 1, 2015-June 30, 2016

## RESULTS

### Comparison of Vehicle Models

There were 160 vehicle models that met the inclusion criteria. Vehicle models with more sales tended to have higher pageviews, but the relationship was not linear. Figure 2 shows the actual and predicted pageviews by sales for each model. The equation for the nonlinear regression line that produced the best fit was  $PageViews = 821.7 \times Sales^{0.341}$ .



**Figure 2. Actual pageviews and predicted pageviews by sales for vehicle models in 2015. Data are plotted on a log-log scale.**

After attempting to control for the relationship between sales and pageviews, there still are large differences between different models. For example, out of all 160 models in the analysis, the ratings page for the Mazda 3 had the 4<sup>th</sup> highest number of pageviews but this vehicle was 49<sup>th</sup> in terms of sales volume. The Volvo S60 had the 11<sup>th</sup> highest number of pageviews but was 114<sup>th</sup> in terms of sales.

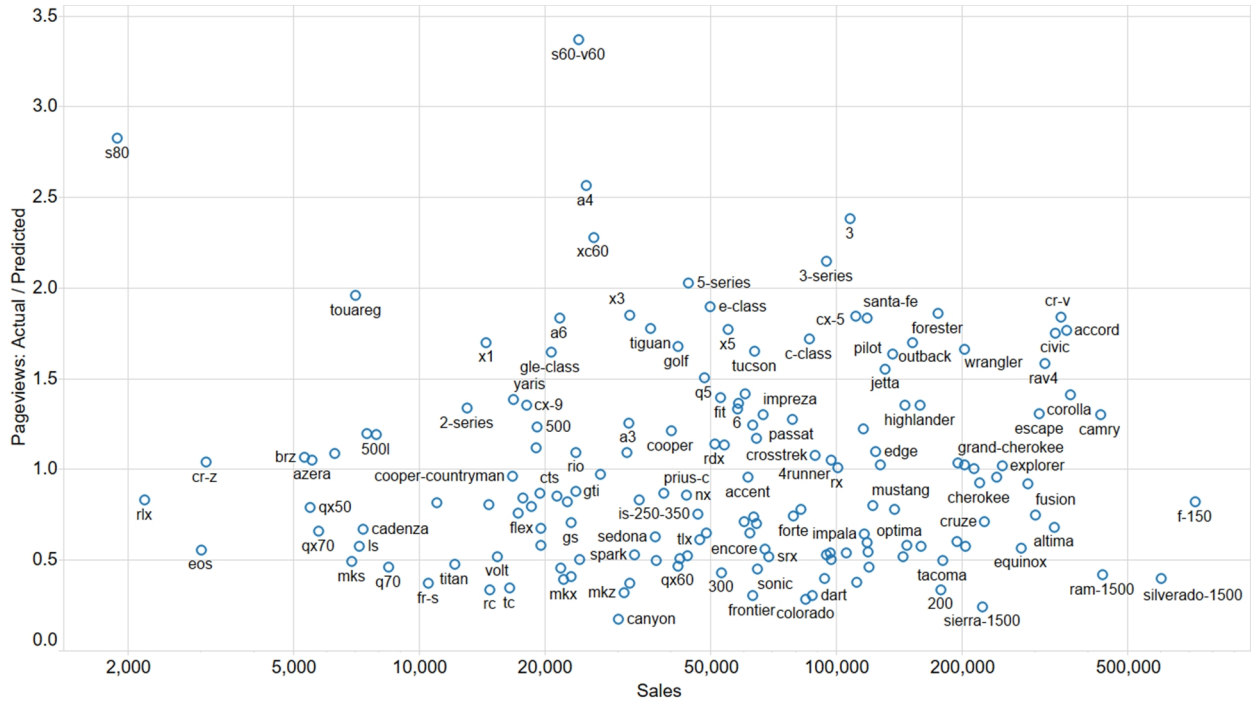
Categorizing the models by make and by class shows that these factors contribute to the number of pageviews for a specific model. Figures 3-5 show the ratios of actual to predicted pageviews by vehicle model, vehicle make, and vehicle class, respectively. Taken together, ratings pages for Volvos had 180 percent more pageviews than predicted based on sales, while GMC models had 70 percent fewer pageviews than predicted. In addition to Volvo, models manufactured by BMW, Mazda, Audi, Mercedes-Benz, and Honda all had at least 50 percent more pageviews than predicted based on sales. GMC, Scion, Chrysler, Lincoln, and Dodge all had at least 50 percent fewer than predicted. Luxury cars, luxury

SUVs, and small SUVs had 13-36 percent more pageviews than predicted based on sales, while large SUVs, minivans, large cars, and pickups had from 29-66 percent fewer.

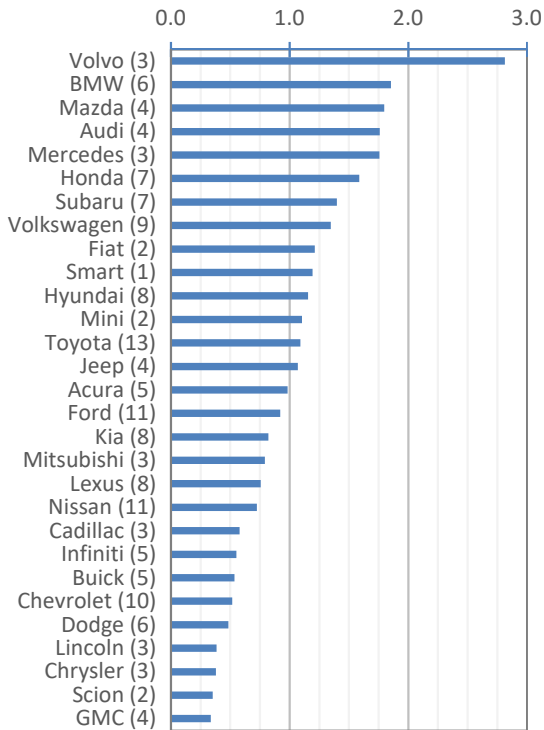
### Effect of News Releases

The model-specific pageviews for ratings pages in the weeks following a news release were divided by the pageviews during the week leading up to the release. Figures 6-8 illustrate the average pageview ratios for vehicles in different categories surrounding the three news releases that were studied.

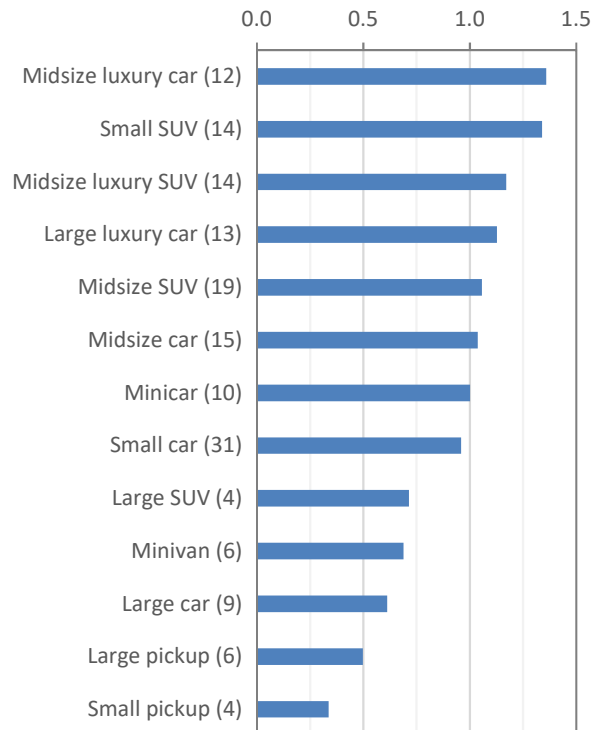
For all three releases, there was an increase in pageviews. This included pages for vehicles that were not involved in the release. However, the pageviews for unaffected vehicles increased less and returned to their pre-release levels sooner. For vehicles that were affected, the magnitude and duration of the increase in pageviews differed for the three releases. The release of headlight ratings for the midsize cars, which was the first release of any headlight test



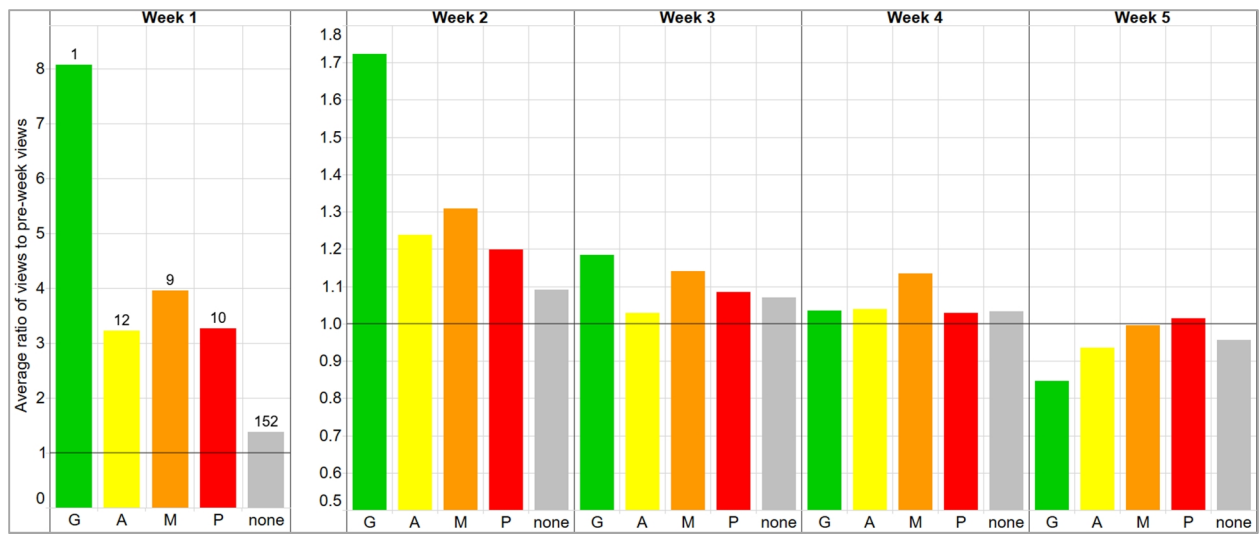
**Figure 3. Ratio of actual to predicted pageviews by sales for vehicle models in 2015. Sales data are plotted on a log scale.**



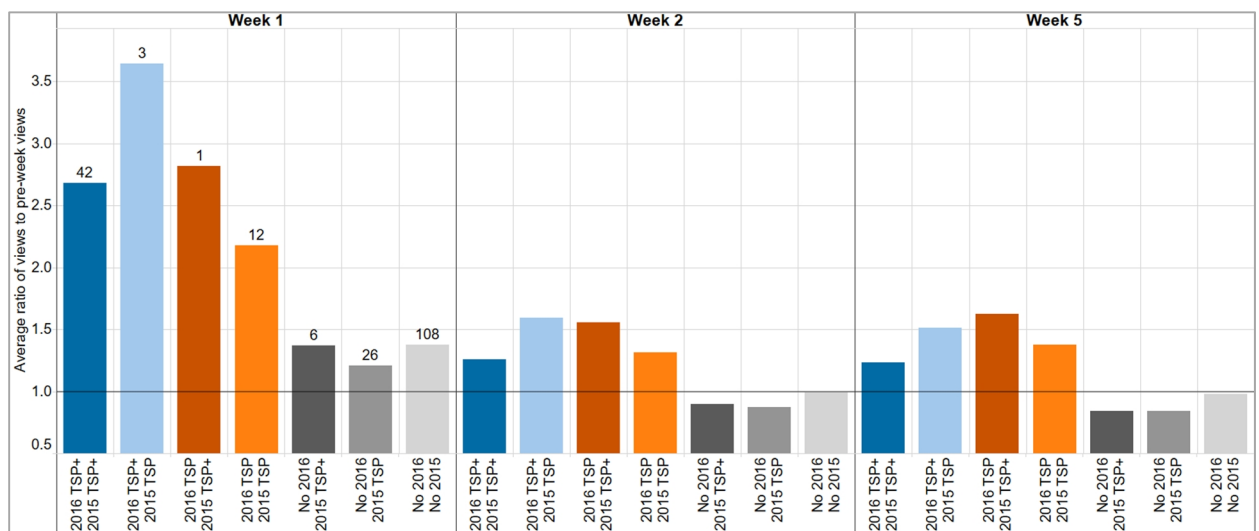
**Figure 4. Ratio of actual to predicted pageviews by make, with number of models in parentheses**



**Figure 5. Ratio of actual to predicted pageviews by class, with number of models in parentheses. There was only 1 microcar and 1 midsize convertible; these classes are excluded.**



**Figure 6. Average ratio of pageviews following the midsize car headlight rating release to pageviews in the week prior to release, by headlight rating. Counts of unique models in each category are shown in Week 1.**

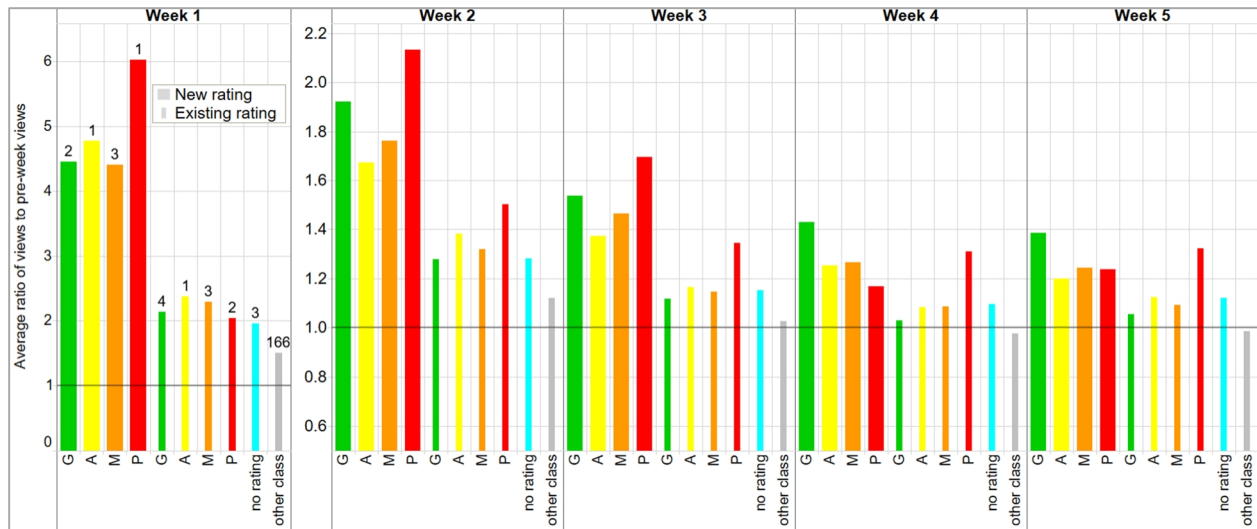


**Figure 7. Average ratio of pageviews following the 2016 Top Safety Pick release to pageviews in the week prior to release, by TSP award status for 2016 and 2015. Counts of unique models in each category are shown in Week 1. There were significant pageview decreases on public holidays falling in Weeks 3 and 4, so these weeks were not studied.**

results, was associated with the greatest pageview increase in the first week. However, by the second week the SUV small overlap release was associated with a larger increase. After five weeks, pageview increases remained for the TSP and small overlap releases (29 and 28 percent, respectively, for the affected vehicles), but not for the headlight rating release (-3 percent).

The only vehicle with a good headlight rating had a greater initial pageview increase than those with

other ratings, but beyond this there was no consistent relationship between the change in pageviews and the level of the headlight or small overlap rating. In the first week after the TSP release, pageviews increased more for vehicles receiving a TSP+ than those receiving a TSP, but this difference did not continue. Vehicles that received a 2015 TSP/TSP+ but did not earn a 2016 award averaged 12 percent fewer pageviews by week 2. By week 5 this decline reached 16 percent. While pageviews for the 108 models with neither a 2015 nor 2016 award did not show this decline



**Figure 8. Average ratio of pageviews following the midsize SUV small overlap release to pageviews in the week prior to release, by small overlap rating. The “no rating” category includes the midsize SUVs that still had not been tested in the small overlap configuration. Counts of unique models in each category are shown in Week 1.**

relative to their pre-week views, the raw number of pageviews in week 5 still was lower on average than for the 32 models that had a 2015 but no 2016 award (471 vs 648).

## DISCUSSION

Ideally, a study of the effectiveness of publicizing vehicle safety ratings would be able to identify the purchases that are influenced by the information that is communicated. The current study is unable to track the effect of the ratings after they are viewed on the site. Despite this, the two types of analyses indicate that consumers are interested in vehicle safety and that their level of interest varies based on vehicle model, make, and class. The multi-week increase in web traffic on iihs.org ratings pages after a news release reflects a higher level of safety interest than would be indicated by a spike lasting only a few days as the release made its way through the news cycle.

Many factors likely contribute to the differences between vehicle models, makes and classes, such as the demographics of internet users. However, the results provide one means of comparing the safety-related interest in certain vehicles or groups of vehicles. Differences between makes may reflect short-term variation between manufacturers’ investment in safety-related advertising as well as

long-term efforts to build a reputation around advancements in safety technology [9].

European makes composed seven of the ten with the highest number of pageviews relative to what was predicted based on sales alone. The three exceptions were brands from Japanese manufacturers. US makes tended to have fewer pageviews than those from other countries. While each luxury class had higher pageview ratios than the nonluxury class of the same vehicle size and type (e.g. midsize luxury cars vs. midsize cars), four manufacturers (Honda, Toyota, Nissan, and Ford) had lower pageview ratios for their luxury brands than for their nonluxury brand. The Acura, Lexus, Infiniti, and Lincoln brands may represent unique opportunities for increased safety-related marketing since several of their vehicle models fall within classes with generally higher levels of interest on iihs.org.

There are several potential explanations for the low interest in ratings pages for pickups. Pickups may be more likely to be used as work vehicles and less likely to be used as family vehicles. It is harder to explain the lower interest in minivan ratings compared to other classes. However, one common feature between trucks, minivans, and the other two classes with lower pageview ratios (large cars and large SUVs)



was that there were fewer unique models within each of these classes. Consumers shopping for a vehicle within a class with less selection could generate fewer pageviews because they do less research or because they use factors other than safety (e.g. styling) to distinguish between their choices. While it may be more challenging to capture consumer attention with safety-related information about vehicles in these less populated classes, the payoff could be greater for a manufacturer that is able to do so. For example, some percentage of consumers shopping for pickups likely prioritizes safety in their purchasing decisions. While this may be a smaller percentage than people shopping for other vehicle types, these consumers could be drawn towards one or two manufacturers who stood out as a safety-conscious choice.

In general, the news releases appear to be effective at increasing interest in ratings on the site, including even unaffected vehicles in the first 1-2 weeks after each release. Interest in the affected vehicles was higher and lasted longer, but it did continue to taper off between weeks 2 and 5, especially for the headlight and small overlap releases. The first few weeks after a release may be an ideal time for manufacturers to capitalize on the increased public awareness of the ratings by offering sales incentives.

Some differences between the three releases suggest the TSP award is meeting the need for an overall safety rating. While the headlight and small overlap ratings releases produced increased pageviews, there was not a consistent difference for vehicles with better ratings. On the other hand, the TSP release increases exposure for vehicles with the best overall ratings. The reduction in pageviews for vehicles that had a 2015 but not a 2016 award indicates that the previous awards had an effect even in the last week before the new awards were announced. This reduction also emphasizes the benefit of maintaining a TSP from one year to the next.

Public engagement with the safety ratings on iihs.org highlights the value of consumer information rating programs as well as the need for such programs to produce meaningful comparative safety information. As it becomes increasingly difficult to identify passive

safety differences among new vehicles, IIHS and other testing groups must continue to develop evaluations of active safety technologies that are relevant to the real-world. Communicating the results of active safety testing to the general public in a compelling fashion also presents certain challenges that do not exist with crash test ratings. This could be one reason that the effects of the headlight rating release had a shorter duration than the other two news releases.

A major limitation of the current study is the lack of information about consumer motivation for using the site or their behavior after viewing ratings. After a news release, many users may check the ratings of a vehicle they already own. They may compare their own vehicle to one they perceive as being safe even though they have no intention of making a purchase. Even the relationship between pageviews and sales is not completely clear. One potential explanation for the higher actual-to-predicted-pageview ratio for Volvos is that a relatively high percentage of people who research ratings on iihs.org decide not to purchase Volvos for some other reason. While this seems less likely than the possibility that Volvo customers are more safety-conscious, the current study cannot distinguish between these alternative explanations.

The current study is not a comprehensive analysis of consumer use of the IIHS ratings. Consumers can access the ratings from sources other than iihs.org, such as *Consumer Reports*, cars.com and edmunds.com. Levels and patterns of interest in the ratings could differ elsewhere.

## CONCLUSIONS

Web traffic on iihs.org during 2015 indicates that consumers research safety information for certain makes and classes more than others. This information could be helpful for manufacturers seeking to assess public perception of the safety of their vehicles. Analyses of three news releases shows that web traffic has a high initial peak but can be affected for several weeks afterwards. The effect of earning or not maintaining a TSP award can last until the following year's awards are announced.



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