

# Lives saved through the Insurance Institute for Highway Safety's crashworthiness ratings program

June 2026

**Amy C. Schumacher**  
**Eric R. Teoh**  
**Joseph M. Nolan**



**Insurance Institute for Highway Safety**

4121 Wilson Boulevard, 6th floor

Arlington, VA 22203

researchpapers@iihs.org

+1 703 247 1500

[iihs.org](http://iihs.org)



# Contents

ABSTRACT .....	3
INTRODUCTION.....	4
IIHS crashworthiness tests .....	4
Other technologies and crashworthiness tests.....	6
METHOD.....	7
Analysis approach.....	7
Data sets.....	8
Ratings .....	8
Features .....	8
Fatality data.....	9
Calculation of dollars saved.....	10
RESULTS .....	10
Overall lives and dollars saved .....	10
Lives saved by test type .....	11
Front crash tests .....	13
Side crash test .....	14
Roof strength.....	14
DISCUSSION.....	14
Conclusion .....	16
REFERENCES.....	17
APPENDIX.....	18

## **ABSTRACT**

Improvements to vehicle safety over the years have been made in response to both government standards and consumer ratings. The Insurance Institute for Highway Safety (IIHS) began a crashworthiness evaluation program in 1995 to encourage vehicle design improvements that go beyond what is required by federal standards and tests in order to save more lives on the roads. For the 30th anniversary of the IIHS crashworthiness testing program, we have calculated an estimate of the lives saved thanks to improved performance in the IIHS front, side, and roof strength tests. To estimate the number of lives saved, we estimated the number of fatalities that would have occurred each year if the proportion of rated vehicles on the roads rated good for each test was the same as it was the year the test was introduced. The final analysis was stratified by belt use, limited to vehicles with frontal airbags, and, for the years following the publication of relevant federal standards, limited to vehicles with side airbags and electronic stability control. An estimated 48,352 lives were saved from 1999 to 2024 by vehicle improvements made in response to the IIHS crash testing program. This translates into an estimated cost savings of \$538 billion. With \$600 million dollars contributed to IIHS-HLDI from member companies over the years, the ratings program has resulted in a nearly 900-fold societal monetary benefit.

## **INTRODUCTION**

Vehicles on the road today have many safety features that help prevent crashes or protect occupants should a crash occur. Some features, like seat belts, are obvious each time we ride in a vehicle. Others, like airbags or the strength of the occupant compartment, are invisible until the moment they save a life or prevent serious injury. In a clear illustration of the improvements in vehicle safety over the years, the Insurance Institute for Highway Safety (IIHS) performed a front-to-front crash test of a 1959 Chevrolet Bel Air and a 2009 Chevrolet Malibu for the organization's 50th anniversary. The occupant compartment of the 1959 vehicle collapsed, while the occupant compartment of the 2009 vehicle remained intact. Similarly, dummy measures predicted very different levels of injury in the two cars (IIHS, n.d.-b). The driver of the 2009 Malibu would have likely walked away from the crash, while the Bel Air driver would have died.

Improvements to vehicle safety over the years have been made in response to both federal standards and consumer ratings. In the United States, the first set of Federal Motor Vehicle Safety Standards (FMVSS) went into effect in 1968. In the late 1970s, the National Highway Administration (now the National Highway Traffic Safety Administration [NHTSA]) started the New Car Assessment Program (NCAP) to provide consumers with comparative safety information based on testing (O'Neill, 2009). IIHS began its own crashworthiness testing program in 1995 to encourage vehicle design improvements that go beyond federal standards and tests. As this program evolved, research identifying the crash circumstances causing the most fatalities and injuries was used to choose and develop each test. As IIHS marks three decades of its testing program, we have calculated an estimate of the lives saved thanks to improved performance in IIHS front, side, and roof strength crashworthiness tests.

### **IIHS crashworthiness tests**

For each IIHS crashworthiness test, rated vehicles receive an overall rating of good, acceptable, marginal, or poor. Current and historical protocols and other information on each test are available on the IIHS website (IIHS, n.d.-a, n.d.-c).

IIHS has tested crashworthiness in frontal impacts in three configurations. In 1995, the crashworthiness testing program began with the moderate overlap front crash test, which simulated a crash in which one vehicle strikes a similar vehicle head-on with 40% overlap, with both vehicles traveling 40 mph (64 km/h). After investigating the crash circumstances under which occupants of vehicles rated good on the moderate overlap test were dying or becoming seriously injured, IIHS introduced the small overlap front crash test in 2012 (Teoh & Monfort, 2023). The overlap for this test was 25%. In 2017, we introduced the passenger-side small overlap test to ensure improvements were made on both driver and passenger sides of the vehicle. Research has found a lower real-world death risk for drivers of better-rated vehicles for the moderate overlap and small overlap crash tests (Farmer, 2005; Teoh & Monfort, 2023).

In 2003, IIHS introduced a side crash test that used a movable deformable barrier to simulate a typical sport utility vehicle (SUV) or pickup impacting the test vehicle on the side at 31 mph (50 km/h). The intent of the test was to protect vehicle occupants in side impacts by promoting the inclusion of side airbags and vehicle designs that worked with side airbags. Research again found a lower real-world death risk for drivers of better-rated vehicles (Teoh & Lund, 2011).

In 2009, IIHS introduced a roof strength test that measured the strength-to-weight ratio (SWR) of the roof structure above the driver. A good rating on the roof strength test required an SWR of 4 or more, meaning that it would take force equivalent to at least 4 times the weight of the vehicle to crush the roof 5 inches. Before the test was introduced, IIHS researchers found that drivers of vehicles with stronger roofs had a lower risk of fatal or incapacitating injury or ejection in rollover crashes (Brumbelow & Teoh, 2009; Brumbelow et al., 2009). The IIHS roof strength test was discontinued in 2022 because virtually all vehicles were achieving good ratings, and the requirements of updated federal standards were similar to what was needed for a good rating.

Other IIHS tests conducted over the years have evaluated such things as head restraints in rear impacts, front crash prevention technology, and headlight performance. Updated moderate overlap front

and side crash tests were recently introduced, supplanting the original tests. This analysis is limited to the original crashworthiness tests designed to prevent occupant fatalities in crashes.

### **Other technologies and crashworthiness tests**

In a 2024 report, NHTSA estimated the lives saved by specific vehicle technologies and regulations (Kahane & Simons, 2024). In total, the safety improvements of the past half-century were estimated to save 40,348 lives in 2019, with about half of the lives saved that year attributed to seat belts. Many of the technologies, like three-point belts, energy-absorbing steering assemblies, and improved side door beams were introduced before IIHS crashworthiness testing began. Adoption of others such as electronic stability control (ESC), frontal airbags, and curtain and side airbags overlapped with the IIHS crash test program. Most of the estimated lives saved are attributed to FMVSS, but some are attributed to the very early years of NHTSA's New Car Assessment Program (NCAP), which began in 1978. For all but those first few years of NCAP, NHTSA's report did not attribute a number of lives saved directly to a testing program, either NCAP or IIHS, because of concurrent vehicle improvements already counted in the estimate of lives saved (Kahane & Simons, 2024). In this analysis, we aim to isolate the effects of the IIHS crash testing program by restricting the analysis to vehicles with specific features where possible and stratifying by belt use (i.e., performing separate calculations for belted and unbelted occupants).

As most improvements in crash test ratings often happen in the early years of a test, the timing of the introduction of NCAP and IIHS tests gives us more confidence attributing lives saved to the IIHS tests. The first NCAP test in 1978 was a frontal impact crash test simulating a head-on collision with an identical vehicle at the same speed and overlapping 100%. When the IIHS moderate overlap frontal test was introduced over a decade later, the effects of the NCAP frontal test had already had time to influence the design of new vehicles. The NCAP side crash test was introduced for model year 1997 (Kahane & Simons, 2024), several years before the introduction of the IIHS side crash test in 2003. NCAP added the side pole test for model year 2012 (Kahane & Simons, 2024), by which time about 90% of IIHS rated vehicles were rated as good on the side crash test. IIHS roof strength ratings were introduced in 2009,

several years after introduction of the NCAP rollover resistance ratings for model year 2001 and their update for model year 2004 (Kahane & Simons, 2024). An updated FMVSS for roof strength was published in 2009, and the new requirements applied to all vehicles by 2016 (Kahane & Simons, 2024). The requirement fell in the low range of the marginal rating for the IIHS roof crush test, so the IIHS test likely had an effect beyond that of the FMVSS.

## METHOD

### Analysis approach

To estimate the number of lives saved, we estimated the number of fatalities that would have occurred each year if the proportion of rated vehicles on the roads rated good for each test had not increased over time. This calculation was performed with a formula used in similar research (e.g., Teoh, 2025) that requires the number of fatalities in a year, the effectiveness of an intervention, and an actual and comparison rate of the prevalence of the intervention in the population. Effectiveness was calculated using fatality rates (fatalities divided by registered vehicles) with the following formula:

$$Effectiveness = 1 - \frac{FR_G}{FR_{AMP}}$$

Where  $FR_G$  is the fatality rate per registered vehicle among vehicles rated good, and  $FR_{AMP}$  is the fatality rate among vehicles rated acceptable, marginal, or poor (AMP). Lives saved were calculated with the following formula:

$$Lives\ saved_{year} = -1 * \frac{Fatalities_{year} \times Effectiveness \times (GoodRating_{Initial} - GoodRating_{year})}{1 - Effectiveness \times GoodRating_{year}}$$

Where  $GoodRating_{Initial}$  is the proportion of vehicles with a good rating in the first year of the test in the data, and  $GoodRating_{year}$  is the proportion of vehicles with a good rating in a subsequent year.

As belt use was found to be lower among occupants of vehicles rated acceptable, marginal, or poor, the lives saved calculation was performed both overall and stratified by belt use. For the stratified

analysis, the number of lives saved was calculated separately for belted fatalities and unbelted fatalities and then summed to produce the final estimate. This involved calculating effectiveness separately for belted and unbelted occupants and excluding fatalities where belt use was unknown.

The years included in the analysis varied by test. For side and roof strength, we included all years beginning with the test introduction through 2024. For the three frontal impact crash tests, we needed to consider both that the moderate overlap test was the first IIHS test and that the three tests aim to prevent fatalities in the same crash type. It took time following the 1995 introduction of the moderate overlap front test for automakers to become familiar with the IIHS testing program and respond to it. For this reason, 1999 was used as the baseline year for the moderate overlap test in the analysis. To separate the effects of the three frontal tests, effectiveness was calculated for the moderate overlap test using the years before the small overlap test was introduced and for the driver-side small overlap test using the years before the passenger-side small overlap test was introduced.

## **Data sets**

### ***Ratings***

Overall ratings for each make/series/model year combination for the five crashworthiness tests were extracted from an internal IIHS database. Ratings for each vehicle in the dataset are derived either from an IIHS crash test, IIHS verification of test data from a manufacturer, or the rating of a vehicle with the same structure. Vehicles were divided into those with a good rating and those with an acceptable, marginal, or poor rating.

### ***Features***

Features for each make/series/model year combination were extracted from an internal database maintained by the Highway Loss Data Institute (HLDI), an affiliate of IIHS. These data were used to limit the vehicles to make/series/model years with standard driver and passenger frontal airbags, driver side airbags (both head and torso), and ESC. Four different samples were used: one with no restrictions and

three that were restricted to vehicles equipped with frontal airbags. The latter three samples were also restricted to vehicles equipped with side airbags and ESC as of different model years tied to the timeline of the relevant FMVSS.

For ESC, the relevant FMVSS was No. 126. The Notice of Proposed Rulemaking (NPRM) was published in September 2006, the final rule was published in April 2007, and the phase-in deadline was model year 2012. For side airbags, the relevant FMVSS was No. 214. This FMVSS did not explicitly require side airbags, but they were the method through which manufacturers met updated chest and head protection requirements. For those requirements, the NPRM was published in May 2004, the final rule was published in September 2007, and the phase-in deadline was model year 2015 (Kahane & Simons, 2024).

Of the three restricted samples, one was tied to the dates of the NPRMs, a second was tied to the dates of the final rules, and a third was tied to the phase-in deadlines. In the NPRM condition, the starting model year for the side airbag restriction was 2005, and for ESC it was 2007. In the final rule condition, the starting model year was 2008 for both side airbags and ESC. In the condition tied to the phase-in deadline, the restriction for side airbags started with the 2015 model year and the restriction for ESC started with the 2012 model year.

### ***Fatality data***

For each model/series/model year combination included in the analysis, fatality counts were extracted from the Fatality Analysis Reporting System (FARS), a census maintained by NHTSA of fatal crashes on U.S. public roads. VINDICATOR, a proprietary software program maintained by HLDI, was used to identify make/series/model year combinations from the 10-digit Vehicle Identification Number included in FARS. Vehicles with non-U.S. registrations as well as military and police vehicles were excluded.

Occupant seating position, initial point of impact, belt use status, and whether the most harmful event was a rollover were also extracted from the data. For the three front crash tests, fatalities were limited to front-row occupants in crashes in which the initial impact was at the front of the vehicle and the most harmful event was not a rollover. For the side crash test, fatalities were limited to occupants in outboard seating locations in crashes where the initial impact was on the side of the vehicle and the most harmful event was not a rollover. For the roof strength test, fatalities were limited to those in crashes where the most harmful event was a rollover.

### **Calculation of dollars saved**

To calculate the monetary benefit of the lives saved, we followed guidance from the U.S. Department of Transportation (USDOT) and used the value of a statistical life (VSL). VSL estimates the amount society would be willing to pay for safety improvements that result in the prevention of one death (USDOT, 2021). Historical VSL numbers were used (see Appendix Table A1 for the value and source for each year). Following current guidance, sensitivity analyses were performed for 40% above and 40% below the VSL (USDOT, 2021). Monetary societal benefit and member company contributions are both aggregated across the years without adjustment for inflation, so they represent aggregate benefits and costs accrued each year.

## **RESULTS**

### **Overall lives and dollars saved**

Unadjusted estimated lives saved ranged from 50,349 to 55,149 without stratifying by belt use (Table 1). The highest estimates were from the condition without feature restrictions (54,887) and for the condition that restricted only after the phase-in deadlines (55,149), the lowest estimate was from the condition restricting after the publication of the NPRMs (50,349), and the middle estimate was from the condition restricting after the publication of the final rules (52,937). Because it produced the middle estimate, the final rule condition was chosen for further analysis.

When stratified by belt use, the estimated lives saved under the final rule condition is 48,352. The estimated cost savings are \$538 billion with a reasonable range of \$323 billion to \$753 billion.

**Table 1**

Estimated lives and dollars saved from IIHS crash tests, 1999–2024

FMVSS features restriction	Belt use stratification	Lives saved	Cost savings (in billions)		
			100%	60%	140%
None	No	54,887	\$608	\$365	\$851
NPRM	No	50,349	\$566	\$340	\$793
Final rule	No	52,937	\$589	\$353	\$824
Phase-in	No	55,149	\$611	\$366	\$855
Final rule	Yes	48,352	\$538	\$323	\$753

*Note.* FMVSS = Federal Motor Vehicle Safety Standard. NPRM = Notice of Proposed Rulemaking.

### Lives saved by test type

The rest of the results present lives and costs saved by the individual tests under the final rule condition with the analysis stratified by belt use (Table 2); calculated effectiveness is also compared with effectiveness in published analyses that adjusted for factors like driver age and sex and vehicle weight. While the earlier studies did not use our exact same analysis framework (e.g., making different assumptions about inclusion criteria such as the presence of certain vehicle features), it is still helpful to see that our mostly unadjusted effectiveness estimates are in the ballpark of the adjusted published estimates.

Lives saved by test by year are displayed in Figure 1. Lives saved increased over the years a test was in place, as more vehicles were tested, a larger portion of the vehicle fleet was rated, and more of the rated vehicles earned a good rating.

**Table 2**

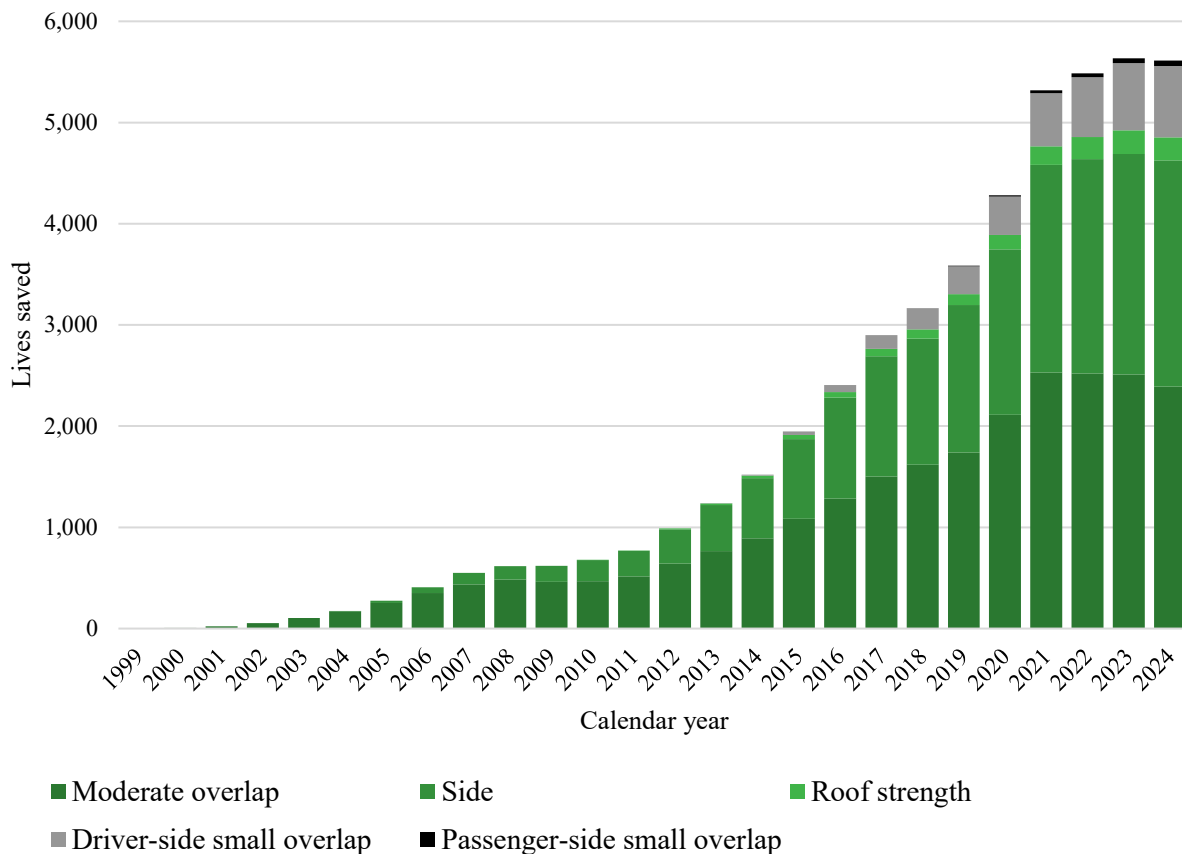
Estimated lives saved and calculated effectiveness by test type and belt use

Test type	Belt use	Lives saved	Effectiveness
Moderate overlap front	Yes	7,831	0.19
	No	17,089	0.44
Driver-side small overlap front	Yes	2,015	0.20
	No	1,577	0.25
Passenger-side small overlap front	Yes	39	0.03
	No	146	0.16
Side	Yes	11,311	0.47
	No	6,913	0.58
Roof strength	Yes	265	0.19
	No	1,167	0.36

*Note.* Due to rounding, the sum of the lives saved by test does not equal the total in Table 1.

**Figure 1**

Lives saved through improvements on IIHS crashworthiness tests



### ***Front crash tests***

Improved performance in front crash tests saved an estimated 28,697 lives, with the majority (24,920) coming from the moderate overlap test. Over half were unbelted (18,812).

The estimated effectiveness of scoring good (vs. acceptable, marginal, or poor) on the moderate overlap front test was 19% for belted occupants and 44% for unbelted. Farmer (2005) analyzed crashes between vehicles of the same type rated good and poor in the moderate overlap test. When limiting to head-on crashes, the odds of driver fatality was 74% lower for the driver of the good vehicle than for the driver of the poor vehicle (95% confidence interval [CI]: 28%–91%). For all crashes, the odds of driver fatality was 34% lower for the driver of the good vehicle than for the driver of the poor vehicle (95% CI: –0.22%–0.65%). Our analysis is more comparable to the all-crashes analysis, as we did not require each crash to have another vehicle with a frontal impact. As fatal crashes are a rare event, the odds ratio can be used to approximate the risk ratio, allowing the estimates to be compared. If comparing to the all-crashes estimate, the effectiveness estimates are similar, and if comparing to the head-on crashes, our effectiveness estimate is lower, with the unbelted estimate falling within the confidence interval.

The estimated effectiveness for the driver-side small overlap front test was 20% for belted occupants and 25% for unbelted. Teoh and Monfort (2023) analyzed frontal crashes and found that compared with drivers of poor-rated vehicles, death was 12% less likely for drivers of good-rated vehicles, 11% less likely for drivers of acceptable-rated vehicles, and 5% less likely for drivers of marginal-rated vehicles. Our estimated effectiveness is slightly higher than their numbers, but it follows the pattern of lower effectiveness for the small overlap test than the moderate overlap test.

The estimated effectiveness for the passenger-side small overlap test was 3% for belted occupants and 16% for unbelted. There is no published effectiveness analysis for this test.

### ***Side crash test***

Side crash tests saved an estimated 18,224 lives, with over half belted (11,311). The estimated effectiveness was 47% for belted occupants and 58% for unbelted. Teoh and Lund (2011) analyzed side crashes and found that drivers in vehicles rated good had a 70% lower risk of death compared with drivers in vehicles rated poor. This estimate was 64% for acceptable versus poor, and 49% for marginal versus poor. These estimates are similar to our estimates.

### ***Roof strength***

Roof strength tests saved an estimated 1,432 lives, with the majority unbelted (1,167). The estimated effectiveness was 19% for belted occupants and 36% for unbelted. Brumbelow and Teoh (2009) and Brumbelow et al. (2009) studied roof strength and found that with a one-unit increase in SWR, the reduction in incapacitating or fatal injury was 22% for passenger cars and 34% for midsize SUVs. A one-unit increase is similar to going from marginal to good, meaning our calculated estimate is similar to the previously published estimate.

## **DISCUSSION**

Since the IIHS crashworthiness testing program started in 1995, an estimated 48,352 lives have been saved by crashworthiness improvements specifically targeting improved test performance. The monetary societal benefit is in the range of \$323 billion to \$753 billion dollars. The middle benefit estimate of \$538 billion dollars, divided by the total insurer funding for IIHS-HLDI over the years—\$600 million—yields a ratio of 897:1 with a reasonable range of 538:1 to 1,255:1.

Unlike the earlier published estimates of effectiveness for these crash tests (Brumbelow & Teoh, 2009; Brumbelow et al., 2009; Farmer, 2005; Teoh & Lund, 2011; Teoh & Monfort, 2023), the estimates in this report do not control for factors like driver age and sex or vehicle weight and type. Despite only controlling for belt use and restricting to vehicles with some features, the effectiveness estimates calculated for this analysis followed the same pattern as those earlier estimates (e.g., higher effectiveness

for the side crash test than for the small overlap crash test), and most of the estimates in the current analysis were close to those earlier ones.

There are limitations to this analysis that both potentially underestimate and overestimate the lives saved.

First, we included only vehicles with specific safety features based on regulation timing, but IIHS efforts likely contributed to the proliferation of those features. The IIHS and NCAP side crash tests likely encouraged the adoption of side airbags (Kahane & Simons, 2024), so limiting to vehicles with side airbags may have undercounted lives saved. IIHS research and safety awards—although not crash testing—also contributed to the adoption of ESC. On the other hand, limiting to vehicles with certain features does not account for improvements in those features over time. There was not a large difference between the estimate under the condition of no features restrictions and the conditions with features restrictions.

Second, the analysis stratified by belt use did not include fatalities for whom belt use was unknown. If belt use was known for all fatalities, the estimate of lives saved would be expected to be higher.

Third, some of the improvements to vehicles over the years may have been the result of NCAP evaluations or federal standards. Based on the timing of the introduction of different tests and standards, we feel that the improvements can be attributed to IIHS with some certainty. For the side and front crash tests, the IIHS crash testing program differs from NCAP in the inclusion of the measurement of intrusion into the vehicle compartment. Measuring intrusion in addition to measurements from a dummy helps account for different body sizes and seating positions (O'Neill, 2009).

Fourth, we were only able to analyze rated vehicles, but there may have been improvements to the unrated part of the fleet that came about because of changes manufacturers made in response to the crash testing program. Therefore, this estimate could be undercounting the lives saved.

In addition, the estimate of monetary societal benefit based on VSL does not include the expenses directly related to the crash itself, such as medical, legal, and insurance costs. It does, however, include the individual's lost contributions to their household in terms of after-tax wages and responsibilities in the home (Blincoe et al., 2023). While historic VSL estimates are available for each year of the analysis, estimates of the more direct economic costs of a fatal crash are not. Our estimate of monetary benefit would be higher if all economic factors were included in the calculation.

The estimates in this report also do not include lives saved from IIHS ratings for front crash prevention, headlights, seat belt reminders, and LATCH systems. The moderate overlap test and side test have also been updated in recent years, but there were not enough years of data available to estimate lives saved from these updated tests.

## **Conclusion**

If the proportion of vehicles rated good on the IIHS front and side crash tests and roof strength tests had not increased over time, an additional 48,000 people would have died on the roads since 1999. Each of these lives represents an individual who was able to survive a crash that otherwise would have taken their life. There are parents, children, and friends alive today who would not be here without the safety improvements the IIHS crash testing program has promoted. The IIHS crash testing program is an extremely cost-effective way to save lives in crashes on our roads.

## REFERENCES

- Blincoe, L., Miller, T., Wang, J.-S., Swedler, D., Coughlin, T., Lawrence, B., Guo, F., Klauer, S., & Dingus, T. (2023). *The economic and societal impact of motor vehicle crashes, 2019* (Revised) (DOT HS 813 403). National Highway Traffic Safety Administration.
- Brumbelow, M. L., & Teoh, E. R. (2009). Roof strength and injury risk in rollover crashes of passenger cars. *Traffic Injury Prevention, 10*(6), 584–592. <https://doi.org/10.1080/15389580903168474>
- Brumbelow, M. L., Teoh, E. R., Zuby, D. S., & McCartt, A. T. (2009). Roof strength and injury risk in rollover crashes. *Traffic Injury Prevention, 10*(3), 252–265. <https://doi.org/10.1080/15389580902781343>
- Farmer, C. M. (2005). Relationships of frontal offset crash test results to real-world driver fatality rates. *Traffic Injury Prevention, 6*(1), 31–37. <https://doi.org/10.1080/15389580590928981>
- Insurance Institute for Highway Safety. (n.d.-a). *About our tests*. <https://www.iihs.org/ratings/about-our-tests>
- Insurance Institute for Highway Safety. (n.d.-b). IIHS's 50th anniversary. <https://www.iihs.org/about/50th-anniversary>
- Insurance Institute for Highway Safety. (n.d.-c). *Test protocols and technical information*. <https://www.iihs.org/ratings/about-our-tests/test-protocols-and-technical-information>
- Kahane, C. J., & Simons, J. F. (2024). *Fatalities, injuries, and crashes prevented by vehicle safety technologies and associated FMVSS, 1968 to 2019 – passenger cars and LTVs* (Report No. DOT HS 813 611). National Highway Traffic Safety Administration.
- O'Neill, B. (2009). Preventing passenger vehicle occupant injuries by vehicle design—a historical perspective from IIHS. *Traffic Injury Prevention, 10*(2), 113–126. <https://doi.org/10.1080/15389580802486225>
- Teoh, E. R. (2025). The human cost of allowing unhelmeted motorcycling in the United States. *Journal of Safety Research, 93*, 292–297. <https://doi.org/10.1016/j.jsr.2025.03.002>
- Teoh, E. R., & Lund, A. K. (2011). IIHS side crash test ratings and occupant death risk in real-world crashes. *Traffic Injury Prevention, 12*(5), 500–507. <https://doi.org/10.1080/15389588.2011.585671>
- Teoh, E. R., & Monfort, S. S. (2023). IIHS small overlap frontal crash test ratings and real-world driver death risk. *Traffic Injury Prevention, 24*(5), 409–413. <https://doi.org/10.1080/15389588.2023.2199342>
- U.S. Department of Transportation. (2021). *Departmental guidance: Treatment of the value of preventing fatalities and injuries in preparing economic analyses*. <https://www.transportation.gov/sites/dot.gov/files/2021-03/DOT%20VSL%20Guidance%20-%202021%20Update.pdf>

## APPENDIX

**Table A1**

Value of a statistical life amounts by year and source

Base year	VSL (millions)	Source
1999	\$2.7	<a href="https://www.everyersreport.com/reports/R41140.html#_Toc257281251">https://www.everyersreport.com/reports/R41140.html#_Toc257281251</a>
2000	\$2.7	
2001	\$3.0	<a href="https://www.transportation.gov/sites/dot.gov/files/docs/VSL_Guidance_2008_and_2009rev.pdf">https://www.transportation.gov/sites/dot.gov/files/docs/VSL Guidance 2008 and 2009rev.pdf</a>
2002	\$3.0	
2003	\$3.0	
2004	\$3.0	
2005	\$3.0	
2006	\$3.0	
2007	\$5.8	
2008	\$6.0	
2009	\$6.0	
2010	\$8.86	<a href="https://www.transportation.gov/sites/dot.gov/files/docs/VSL_Guidance_2013.pdf">https://www.transportation.gov/sites/dot.gov/files/docs/VSL Guidance 2013.pdf</a>
2011	\$8.98	
2012	\$9.1	
2013	\$9.2	<a href="https://www.transportation.gov/office-policy/transportation-policy/revised-departmental-guidance-on-valuation-of-a-statistical-life-in-economic-analysis">https://www.transportation.gov/office-policy/transportation-policy/revised-departmental-guidance-on-valuation-of-a-statistical-life-in-economic-analysis</a>
2014	\$9.4	
2015	\$9.6	
2016	\$9.9	
2017	\$10.2	
2018	\$10.5	
2019	\$10.9	
2020	\$11.6	
2021	\$11.8	
2022	\$12.5	
2023	\$13.2	
2024	\$13.7	