Car safety rating 2015 by Folksam

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Preface

Folksam has a long tradition in the area of traffic safety research. We have been collecting and analyzing information about road traffic crashes and injuries since the early 80s. Every year we are dealing with more than 50,000 injury claims from road traffic accidents. It means that we have an extensive knowledge in how injuries occur and how they can be prevented or mitigated. Road casualties is a large problem regarding health losses, social welfare and for us as individuals in particular. Folksam would like to contribute to a safer traffic environment and that you can drive in a safe car. The car model you are driving has a large influence on the injury outcome of a crash. That is the reason for our consumer report "How Safe is Your Car?", which we publish for the 16th time since 1983, showing information of the safety level of various car models to guide you in your choice of car.

In this report we briefly describe the methodology and the data used for the analysis. The study is based on both results from real-world crashes and results from crash tests. We have also complemented this information with results from crash tests and information of the availability of important safety technologies to mirror the safety aspects we at present know are most important.

In total we present results for 254 car models based on 178,000 real-world crashes. We have analyzed the injury outcome for 50,000 front seat car occupants and calculated the risk for sustaining an injury leading to fatality or permanent medical impairment.

For further 380 car models we show Euro NCAP crash test results to inform consumers on the safety level of cars for which we are not yet able to get results from real-world crashes.

More information about our research activities can be found on:
folksam.se/hursakerarbilen

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It did happen – for real

The report is based on data from both real-world crashes and crash tests. You can also see which cars that have effective whiplash protection and electronic stability control (ESC) and can be bought with autonomous emergency braking (AEB). We know that these three systems currently have the greatest effect in reducing injuries in car crashes. Essentially, there are two methods for assessing a car's crashworthiness: analysis of real-world crashes and crash tests. Our analyses are largely based on results from real-world crashes, and in these you can compare safety between different vehicle size classes, which cannot be done in crash tests. A further limitation of crash tests is that they do not always correspond 100 per cent with real-world outcome. The advantage of crash tests, compared with analysis of real-world crashes, is that they can quickly give an indication of the safety level of new vehicles. You should choose a car primarily based on results from real-world crashes and secondly on crash test results. The best is of course to choose a car that has good results in both. In the list, you will see the "good choice" symbol: that is to say, cars that fulfil all our safety requirements. You can find more information at folksam.se/hursakerarbilen.

Folksam 5, 4, 3, 2 and 1

The results are based on 178,000 car crashes that occurred in Sweden between 1994 and 2015 involving 50,000 injured occupants who needed emergency medical care. The analysis was performed in three steps. The first one used police-reported two-car collisions registered in the Swedish road accident database STRADA. In this type of collision, it is primarily the vehicle's crashworthiness and weight that determines the injury outcome. When we analyse all crashes involving a particular car model, we calculate the risk of being injured in it, compared with the average car on the Swedish roads. In other words, for each car model, we estimate the number of collisions with injuries in that car, compared with the number of collisions with injuries to the other party. The statistical method is called matched pairs and makes it possible to take several aspects into account. The influence of different mileage is not influencing the results as we only look at the outcome when a crash has occurred. Influence of different driving styles on the injury outcome is eliminated by the fact that when two cars collide – even if they are travelling at different speeds - they share the total kinetic energy. Most of all, the cars' weight and crashworthiness determine the occupants' injury risk. The variation of the other vehicle's mass does not affect the result, as this factor is normally stabilized with a relatively larger number of collisions. The effect of the injury risk in the other vehicle due to difference in weight between the studied vehicle and the average vehicle is adjusted for, which allows a comparison in safety level

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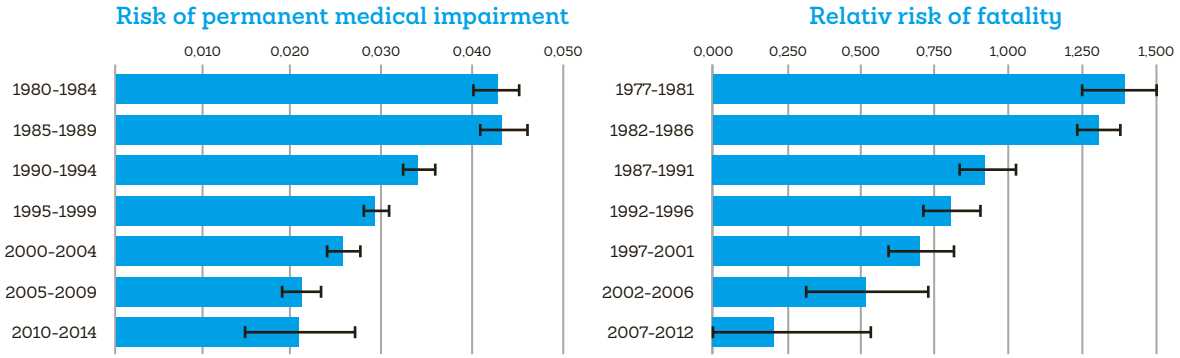
for all car model irrespective of car size. With this method it is also possible to adjust for the crash year. The average car in the Swedish traffic improves continuously, which means that the relative injury risk of a particular car also changes over time. Another aspect to consider is that larger cars tend to have more passengers than small ones.

The second step is based on information about the severity of injuries that occurred in each car model. That is, given that an occupant was injured, what is the risk that these injuries will lead to death or permanent impairment? These data are also obtained from STRADA and are based on 50,000 car occupants who have needed emergency medical care. As an insurance company, we have built up a detailed knowledge about the risk of different types of injuries leading to permanent medical impairment. For example, the risk of permanent impairment is far higher with a head injury than with a rib fracture. For this reason, a car model receives lower marks if the number of head injuries is high in comparison with the number of fractured ribs. Taking all this together, it provides a measurement of the risk of death or permanent impairment in a crash in a particular car model.

Finally, in the third step the relative risk of getting an injury leading to death or permanent impairment for each car model was calculated, by combining the relative injury risk (step 1) and the risk of permanent impairment or death (step 2). These results can also be used on an aggregated level to for example show the development of car crashworthiness over the years and the safety level for various car size categories.

The risk of permanent medical impairment has been halved comparing car models introduced in the early 80s with models introduced the latest 5 years, while the risk of fatality has dropped with 85 per cent during the same time period.

Development in crashworthiness since the 80s - risk of permanent medical impairment (left) and the risk of fatality (right)



Euro NCAP ★★★★★

In order to be able to assess newer cars, we have also incorporated the results from Euro NCAP – an association of European authorities and organisations in the field of road traffic. Over 500 car models have so far been crash tested. Calculating results from both frontal and side collision tests provides a score of up to five stars. Since 2001, extra points have also been given to cars that have a seat belt reminder.

Euro NCAP 2009 – 2015 ★★★★★

From 2009, Euro NCAP evaluates cars according to new criteria that are continuously updated. Car models now receive a composite result based on protection for both passengers and pedestrians and crash prevention systems. A test to reflect the risk of whiplash injury was also introduced in 2009. Since 2009, it has become more difficult each year to achieve a 5-star rating, since the points for each test aspect must exceed a certain level. These levels are revised every year. This means that stars are not directly comparable from one year to another.

Whiplash tests 5 4 3 2 1

According to insurance data, whiplash accounts for about 60 per cent of all injuries in car crashes. More effective whiplash protection is being introduced into new cars at an ever faster rate and it is important to be able to assess how well this protects car occupants. For some car models there are results available from real-world crashes, but mainly the results of crash tests must be used to judge protective properties. Folksam's studies of real-world crashes have shown that a certain type of whiplash protection, so-called reactive head restraint, does not protect female occupants to the same degree as men.

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Research is going on to establish the reasons for these differences. In the list, the requirements for whiplash protection approval are:

– that the protection is shown to be effective in real-world crashes, that is to say at the same level as protection that has been proven to be good, such as that of Volvo, Saab and Toyota;

– that the car seat has achieved the best result in at least one out of three independent car seat tests. These are performed by Folksam and the Swedish Transport Administration (STA), IIWPG (an international insurance industry association) or Euro NCAP for the purpose of reflecting the risk of whiplash injury.

Electronic stability control (ESC) 3 2 1

We have performed studies, together with the Swedish Transport Administration, that show that Electronic Stability Control reduces the risk of death or serious injury on slippery road surfaces by approximately 50%. In other words, this is a very effective system for preventing serious accidents. Electronic Stability Control actively stabilises the car when it has begun to skid, for example. A common cause of accidents is swerving to avoid small animals, which can quickly result in a skid that is difficult to recover from. Electronic Stability Control takes over and brakes individual wheels, and can even reduce the engine speed if necessary.

Autonomous emergency braking (AEB) 3 2 1

Autonomous Emergency Braking is a safety system that helps the driver to slow down the vehicle and potentially mitigate the severity of a front to rear impact when a collision is unavoidable. A study from Folksam has shown that Autonomous Emergency Braking is extremely important for road safety in urban traffic. The results show a great effect: it is estimated that about 25 percent of potential accidents are completely avoided. Overall, injuries in rear impacts are reduced by approximately 35 per cent. In crashes at speed limits up to 50 kph the effect was even higher, as much as 57 per cent.

Good choice BRA VAL

A safe car should have a good result in all the tests, but there is some difference in the emphasis that should be put on the results we show in the report. To be awarded the good choice symbol, a car must have a safety score of 5 based on real-world crashes or at least five stars in Euro NCAP, approved whiplash protection, standard Electronic Stability Control and Autonomous Emergency Braking at least available as option. If the Euro NCAP and Folksam results do not match, the result from real-world crashes is more important than the results from Euro NCAP.

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