Folksam's report "How Safe is Your Car?" 2019

Folksam

Foreword

Folksam has a wealth of experience in the field of traffic safety research. Since the early 1980s, we have been collecting and analysing information about road traffic injuries and car safety based on data from real accidents. Every year, we handle more than 50,000 road traffic claims. This means that our work gives us access to a broad range of knowledge about how road traffic accidents occur, how they can be avoided and how the effects of accidents can be alleviated.

Road traffic accidents entail heavy losses for public health and the economy but above all for individuals. We want to help make your journeys by car as safe as possible. The model of car you are travelling in is a decisive factor in the consequences of an accident. Therefore, for the eighteenth time since 1983, we are presenting information about the safety characteristics of different models of car in order to facilitate and guide your car purchase.

This report describes how we have gone about making our assessments and on what data our analyses are based. The survey covers the consequences of real accidents and the results of crash tests, as well as the performance of safety equipment, in order to reflect the safety characteristics that we know to be of greatest importance.

In total, we have assessed the level of safety of 324 car models based on 202,000 real accidents. We have analysed how 59,200 drivers and passengers were injured and assessed the risk of suffering an injury leading to long-term health issues. In order to obtain a broader perspective, we have supplemented these results with crash test data and information on whether or not important safety equipment was available.

In the case of a further 469 models of car, we have referred to results obtained in Euro NCAP crash tests in order to offer consumers advice on the safety of cars we have not yet been able to assess based on data from real accidents.

You can find more information about our road safety research at **folksam.se/hursakerarbilen**.

Anders Kullgren
Research manager

It happened – in real life

The report is based on data from both real accidents and crash tests. You can also see which cars offer effective whiplash protection, which have electronic stability control, and which can be purchased with different types of autonomous emergency braking. We know that these three protective systems currently have the greatest effect in reducing injuries when travelling by car. Essentially, there are two methods for assessing a car's crashworthiness: analysis of real accidents and crash testing. Our analyses are largely based on results from real accidents and, in these, it is possible to compare the safety of different vehicle size classes, something which cannot be done in crash tests. A further limitation of crash testing is that it does not always correspond one hundred per cent with reality. The advantage of crash tests is they can quickly give an indication of the safety level of new cars. You should choose a car primarily based on results obtained from real accidents and secondly on crash test results. It is of course best to choose a car that has good results in all categories. In the list, you will see the "Good Choice" symbol; this indicates cars that fulfil all of our safety requirements. You can find more information at folksam.se/hursakerarbilen.

Analysis in three stages

The results are based on 202,000 road accidents occurring between 1994 and 2018, involving 59,200 people who visited an accident and emergency department between 2003 and 2018. The analysis was carried out in three stages.

Stage 1

Initially, we examined police reports from two-car collisions obtained from the STRADA database (Swedish Traffic Accident Data Acquisition). In this type of collision, it is primarily the crashworthiness and weight of the cars that decide the outcome. By analysing all crashes involving a given car model, we are able to assess how great the risk is of being injured in that model compared with the average car on Swedish roads. So, for each car model, we calculate the total number of collisions resulting in personal injury in that car compared with the total number of collisions resulting in personal injury to the other party. This statistical method is called matched-pair cohort analysis and allows more aspects to be taken into account. The mileage covered by cars does not affect the outcome, as the risk of injury is only studied once a collision has taken place.

Driving style and weight

The effect of driving style on the outcome of an accident is eliminated by the fact that when two cars collide – irrespective of whether they are travelling at different speeds – the total kinetic energy is divided between them. Above all, it is the cars' weights and respective crashworthiness that decides the severity of the occupants' injuries. Variations in the mass of the other party's car does not influence the result as these are equalised over a large number of collisions. However, the impact of a car's mass on the counterparty's injury risk is compensated for, meaning that all cars, irrespective of size, are comparable. With this method, it is also possible

to adjust for the number of accidents that particular year. The average car on Swedish roads is continuously improving. This means that the relative risk of injury in a particular car compared with the average car also changes over time. Another aspect that must be taken into consideration is that larger cars tend to have more passengers than small cars.

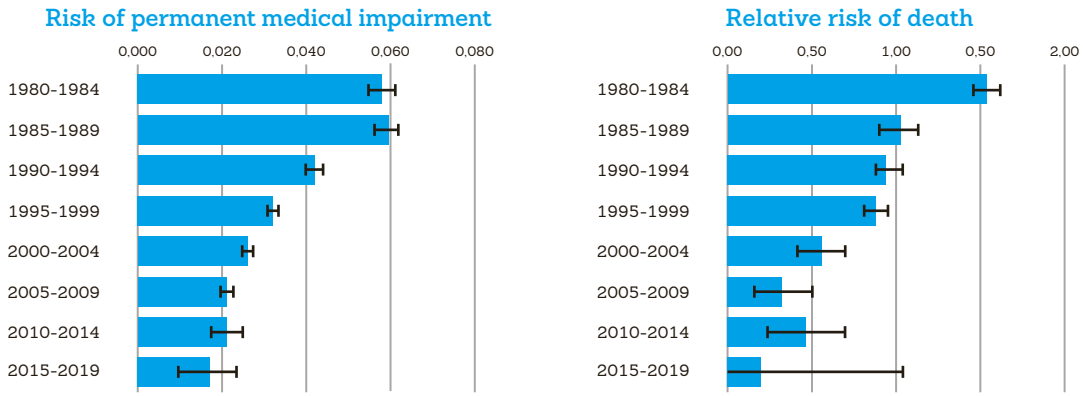
Stage 2

Stage 2 is based on data regarding how serious the injuries inflicted in each car model are, that is to say, given that a person has sustained injuries, how great is the risk that those injuries lead to death or permanent medical impairment? This information is also obtained from STRADA and is based on 59,200 people who visited an A&E department. As an insurance company, over time we have amassed a great deal of knowledge about the risk of different types of injuries leading to permanent disability. For example, the risk of permanent medical impairment is far greater after sustaining a head injury than a rib fracture. A car model therefore receives lower marks if the number of head injuries is high in comparison with the number of fractured ribs. Taken together, this provides an indication of how great the risk of death or permanent medical impairment is when involved in a collision travelling in a given car model.

Stage 3

Finally, in Stage 3, the risk of injury (Stage 1) is combined with the risk of permanent medical impairment (Stage 2) in order to calculate the relative risk of suffering an injury that leads to death or permanent medical impairment for each car model. These results can also be used on an aggregated level, for example, to show the development of the car's crashworthiness over time or how safety differs from car to car. The risk of permanent medical impairment has gone down by about 75 per cent when comparing car models launched in the early 1980s with models launched during the last five years, while the risk of death has decreased by 85-90 per cent for the same period of time.

Developments since the 1980s: risk of death or permanent medical impairment (left) and risk of death (right)



Euro NCAP ★★★★★

In order to allow us to assess newer cars, we have also incorporated results from the European New Car Assessment Programme (Euro NCAP) – an association of European road traffic agencies and organisations. Approximately 650 car models have been crash tested so far. A maximum of five stars can be achieved by aggregating points from a series of frontal and lateral crash tests. Since 2001, extra points have been awarded to cars that have a seat belt reminder.

Euro NCAP 2009 – 2019 ★★★★★

Since 2009, Euro NCAP has evaluated cars using new criteria that are continuously updated. Car models now receive an aggregate score based on protection for those travelling in the vehicle and for pedestrians, as well as accident prevention systems. In 2009, a test was also introduced to reflect the risk of whiplash injury. Since 2012, it has become increasingly difficult to achieve a 5-star rating as points for each individual test are required to exceed a given level. These levels are revised every year and therefore, stars are not directly comparable from one test year to another.

Whiplash tests 3 2 1

According to data gathered via insurance claims, whiplash injuries account for approximately 60 % of all injuries sustained 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 these innovations protect car occupants. Data from real accidents are available for certain car models but by and large the results of crash tests must be used to assess their protective qualities. Studies of real accidents carried out by Folksam have shown that a certain type of whiplash protection, known as reactive head restraints, fails to protect women to the same extent as men. Research is ongoing to discover the reasons behind this disparity.

In the list, the requirements for whiplash protection approval are:

- That the protection is shown to be effective in real accidents, that is to say, at the same level as proven protection, such as that offered by Volvo, Saab and Toyota.
- That the car seat has achieved the best possible result in at least one out of three independent car seat tests. These are performed by Folksam and the Swedish Transport Administration, IIWPG (the International Insurance Whiplash Protection Group) or Euro NCAP, for the purpose of reflecting the risk of whiplash injuries.

Electronic Stability Control (ESC) 3 2 1

In collaboration with the Swedish Transport Administration, we have carried out studies that show that electronic stability controls halve the risk of death and serious injury on slippery road surfaces. In other words, ESC is a very effective system for preventing serious accidents. ESC actively intervenes and stabilises the car when, for example, it is about to go into a skid. A common cause of accidents is swerving to avoid small animals, which can quickly result in a skid that is difficult to correct. In such situations, the car's ESC will automatically apply the brakes to individual wheels and reduce engine power if necessary.

Autonomous Emergency Braking (AEB) to avoid collision with a car, pedestrian or cyclist 3 2 1

Autonomous emergency braking is a safety system that helps the driver to mitigate the severity of a front to rear impact when a collision is unavoidable, or even avoid a collision at low speeds. A study from Folksam has shown that AEB has a significant impact on road safety in urban environments. The results show major advantages on roads with speed limits up to 50 km/h with an overall reduction in personal injuries of a full 57 % in rear-end collisions. In about 40 % of cases, the collision occurred regardless but without personal injury while 25 % of accidents were calculated to have been avoided entirely. There are various types of AEB, working at a variety of speeds and in various types of accidents. This list shows whether a car is fitted with AEB for rear-end collision with another car and with a pedestrian. We have also indicated whether the AEB system can detect pedestrians.

Good choice BRA VAL

A safe car should demonstrate a good result in all categories; however, the amount of emphasis that should be placed on the various results shown in the report differs somewhat. In order to be judged a "Good Choice", a vehicle must have a safety score of Green+ (5) based on real accidents or five stars from Euro NCAP, approved whiplash protection, ESC as standard, and AEB for another car and for a pedestrian as option or as standard. If the results from real accidents and those from Euro NCAP are contradictory, the results from real accidents are of more significance.

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