Folksam's report "How safe is your car?" 2021

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 wish to help make your journeys by car as safe as possible. The make and 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 makes of vehicle 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 both 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 383 vehicle models based on real accidents, of which we have studied 184,492. We have analysed how 67,400 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 500 or so vehicle models, we have referred to results obtained in Euro NCAP crash tests, in order to offer consumers advice on the safety of vehicles we have not yet been able to assess based on data from real accidents. We have also added information on important safety equipment.

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

Anders Kullgren
Head of research

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 controls and which can be purchased with different kinds of autonomous emergency braking. We know that these protective systems currently produce 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 in comparison with analysing real accidents is that they can quickly give an indication of the safety level of new vehicles. 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 vehicles that fulfil all of our safety requirements. You can find more information at folksam.se/hursakerarbilen

Three-stage analysis

The results are based on 184,492 road accidents occurring between 1994 and 2020, involving 67,400 people who required treatment at an accident and emergency department. The analyses were carried out in three stages.

Stage 1

Initially, we examined police reports regarding two-vehicle 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 vehicles that decide the outcome. By analysing all crashes involving a given vehicle model, we are able to assess how great the risk is of being injured in that model compared with the average vehicle on Swedish roads. So, for each vehicle model we calculate the total number of collisions resulting in personal injury in that vehicle 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 vehicles 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 vehicles collide – irrespective of whether they are travelling at different speeds – they share the combined kinetic energy. Above all, it is the vehicles' weights and respective crashworthiness that decides the severity of the occupants' injuries. Variations in the mass of each party does not influence the result as these are equalised over a large number of collisions. However, the impact of a vehicle's mass on the counterparty's injury risk is compensated for, meaning that all vehicles, irrespective of size, are comparable. With this method, it is also possible to adjust for the crash year. The average vehicle on Swedish roads is continuously improving. This means that the relative risk of injury in a particular vehicle compared with the average vehicle also changes over time. Another aspect that must be taken into consideration is that larger vehicles tend to have more passengers than small vehicles.

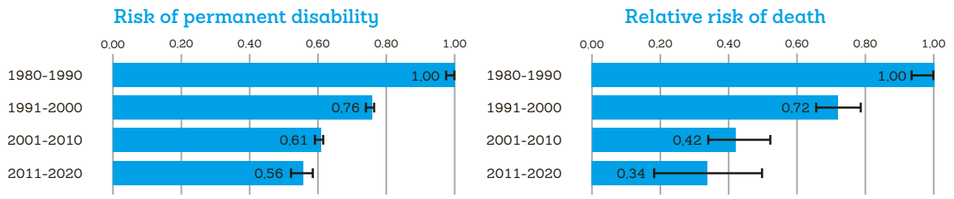
Stage 2

Stage 2 is based on data regarding how serious the injuries inflicted in each vehicle model are. That is, given that a person has sustained injuries, how great is the risk that these injuries will lead to death or permanent disability? This information is also obtained from STRADA and is based on 67,400 people who received treatment at 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 injury leading to permanent disability. For example, the risk of permanent disability is far greater when sustaining a head injury than a rib fracture. A vehicle 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 a measurement of how great the risk of death or permanent disability is when involved in a collision travelling in a given car model.

Stage 3

Finally, in Stage 3 we combine the injury risk (Stage 1) with the risk of permanent disability (Stage 2) in order to calculate the relative risk of suffering an injury that leads to death or permanent disability for each vehicle model. These results can also be used on an aggregated level, for example to show the development of the vehicle's crashworthiness over time or how safety differs from vehicle to vehicle. The risk of disability has been halved when comparing vehicle models launched in the early 1980s with models launched during the past 10 years, while the risk of death has decreased by 60–70%.

Development since the 1980s: risk of disability (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. More than 600 vehicle models have so far been crash tested. A maximum of five stars can be achieved by aggregating points from a series of frontal and lateral crash tests and rear-end collisions. Points are also awarded for important safety equipment and pedestrian protection.

The points for different test years are not directly comparable. In 2009, an aggregate score was introduced, based on protection for those travelling in the vehicle and for pedestrians, as well as accident prevention systems. At the same time, a test was also introduced to reflect the risk of whiplash injury. Since 2009, it has become increasingly difficult to achieve a 5-star rating, as more test elements have gradually been introduced and the points calculation tightened.

Whiplash test 3 2 1

According to insurance data, 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 vehicle occupants. Data from real accidents is available for certain vehicle 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 Prevention 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 or serious injury on slippery road surfaces. In other words, this is a very effective system for preventing serious accidents. For example, ESC actively stabilises the vehicle when 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 vehicle's ESC will automatically apply the brakes to individual wheels, and can even reduce engine power until control is regained.

Autonomous emergency breaking that benefits cars as well as pedestrians and cyclists 3 2 1

Autonomous emergency braking is a safety system that helps the driver to mitigate the severity of a front impact with a vehicle, pedestrian or cyclist 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 approximately 40% of cases, the collision occurred regardless but without personal injury, while approximately 25% of accidents were calculated to have been avoided entirely. There are various types of AEB on the market, working at a variety of speeds and in various types of accident. In this list, we have indicated whether the car has an autonomous emergency braking system for rear-end collisions with cars and for collisions with cyclists.

Good Choice BRA VAL

A safe car should demonstrate a good result in all tests; 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 5 based on real accidents or five stars from Euro NCAP crash tests, approved whiplash protection, ESC and AEB for cars as standard. In the event that results obtained from real accidents and those obtained from Euro NCAP crash tests are contradictory, the results from real accidents take precedence.

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