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Ever-higher: the dangerous rise of bonnet height, and the case to cap it

Report calls on European law-makers to cap bonnet height by 2035, recommending an 85 cm limit for further study

T&E and Clean Cities Campaign

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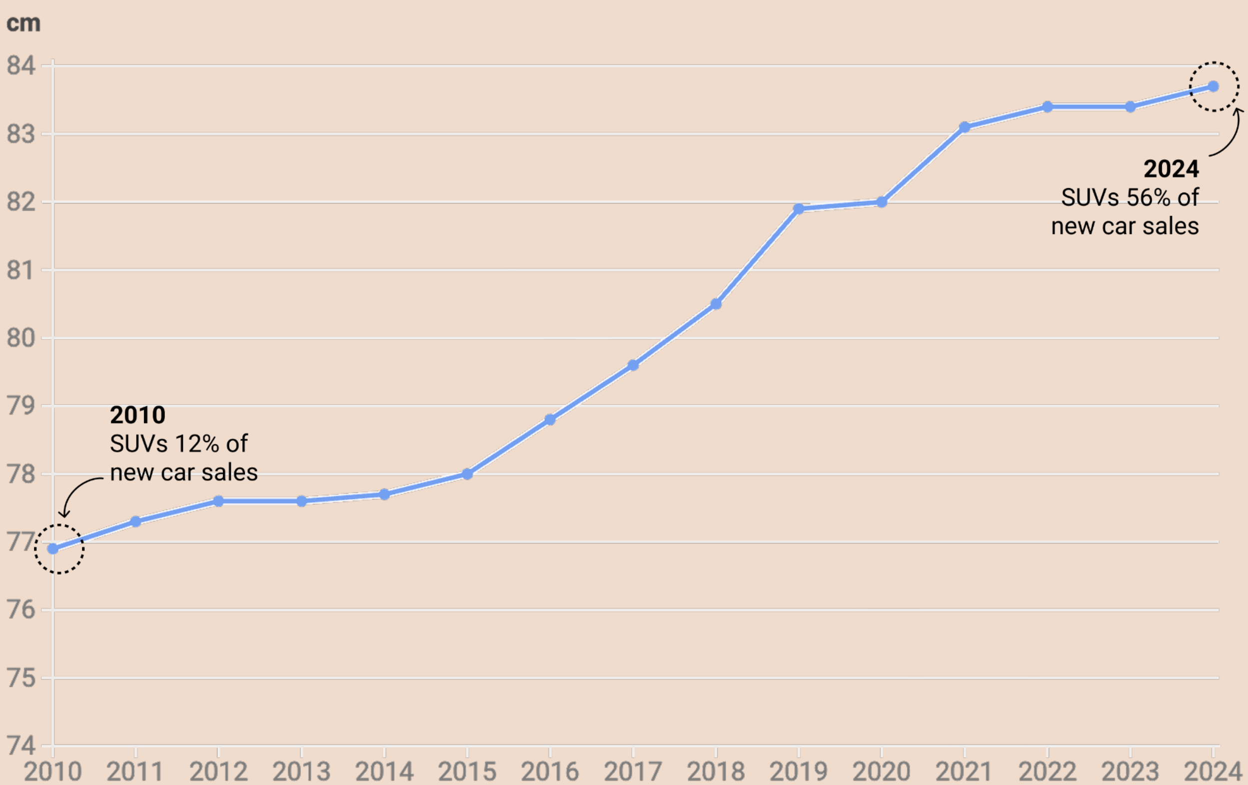
Summary

Vehicles with higher bonnets are more dangerous in crashes - but bonnet height continues to rise. Average bonnet height in newly-sold cars is increasing by half a centimetre (0.5 cm) a year, reaching 83.8 cm in 2024, up from 76.9 cm in 2010, according to T&E's analysis of new registrations in the EU, the UK and Norway. Neither EU nor national laws limit the ongoing rise in bonnet height.

Rising average bonnet height of newly-sold cars in Europe

Data for the EU, UK and Norway



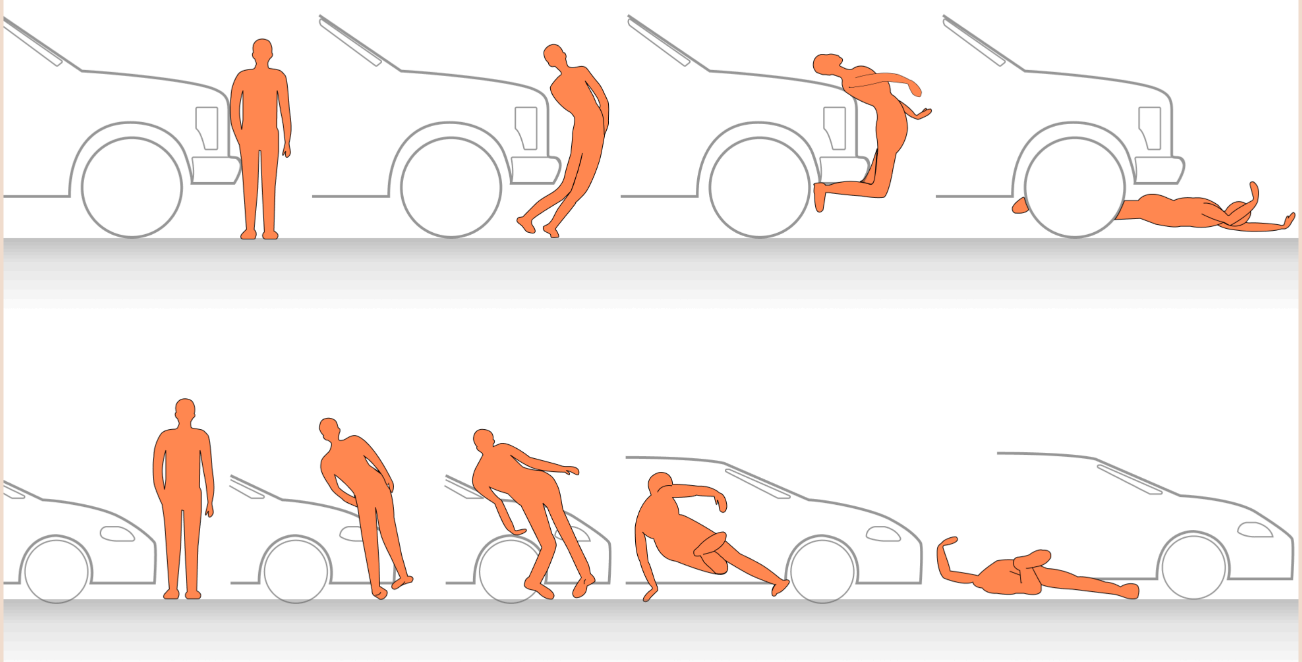
Sources: EEA, Dataforce, GlobalData, Euro NCAP • Average is sales weighed.

Higher bonnets increase collision severity and impair vision

In crashes, high-bonneted SUVs and pick-up trucks typically strike adult pedestrians above the centre of gravity, often first hitting vital organs in the body's core, with a higher likelihood of knocking them forward and down, and a greater risk of driving over them. On the other hand, low bonnets tend to hit pedestrians' legs, giving them greater chances of falling towards the vehicle, or of being deflected.

High bonnets also reduce drivers' vision of other road users - and can entirely compromise it. Drivers behind high bonnets can fail to see children in front of them, for example, when leaving a driveway or parking space. At junctions, compromised vision increases crashes, particularly when turning. Poor vision may also lead to more near-miss incidents, burdening all other road users with higher risks and increased danger.

Higher bonnets more often knock pedestrians under the vehicle rather than deflect them



Source: Ptak (2019). A new method to assess pedestrian kinematics. Transport, Vol 34 Issue 1. These images reflect collisions in urban areas where 70% of pedestrian fatalities are recorded (typical speed < 50 km/h)

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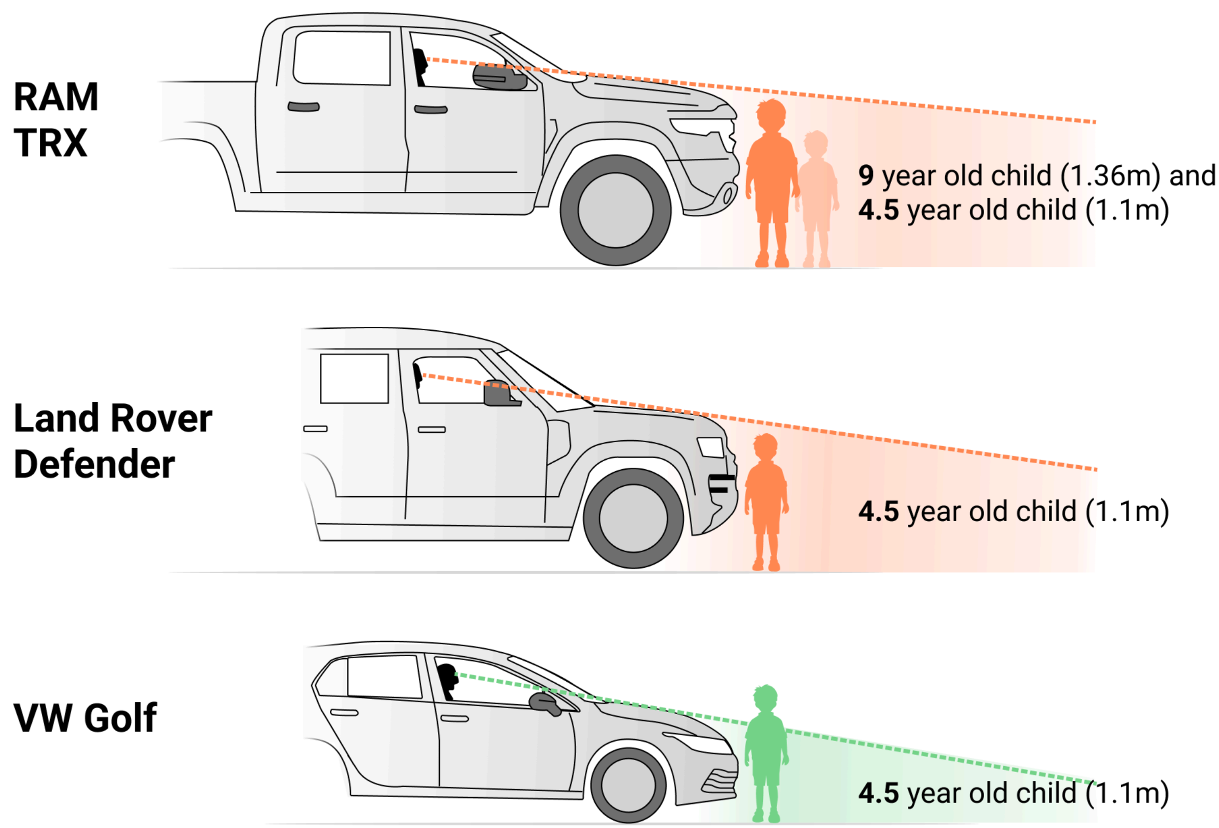
According to Belgian crash data, a 10 cm increase in bonnet height (from 80 cm to 90 cm) raises the risk of death by 27% for pedestrians, cyclists and other vulnerable road users. And when high-fronted SUVs and pick-up trucks crash into regular cars, the higher-bonneted vehicles impose a 20 - 50% greater risk of serious injuries on the occupants of regular cars.

The higher the bonnet, the bigger the blind spot

Linked to work on child-friendly cities, T&E commissioned tests to examine the risks to children from high-fronted SUVs. This involved assessing the visibility of children standing in a central position to the front of popular high-bonneted vehicles. Seated behind the steering wheel of a RAM TRX pick-up truck, a driver of average European adult height cannot see children aged up to nine standing directly in front of the vehicle. Average height drivers in Land Rover Defenders cannot see children aged up to four-and-half standing directly in front.

The higher the bonnet, the bigger the blind spot:

More high-fronted SUVs would mean more children drivers don't see



Analysis based on children of average European height standing to the centre of vehicle fronts. Drivers are of average European adult height. Vehicle assessment and modelling by Summerskill / Loughborough University SDCA (2025)

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Bonnet height cap will support electrification

The average bonnet height of new battery electric vehicles (BEVs) is 2.3 cm less than the average across all sales, according to 2024 data. This highlights that high bonnets are not necessary for vehicle electrification. In fact, lower bonnets reduce energy use, delivering more range for less battery. Enhancing road safety and producing cleaner cars go hand in hand.

Cap the height of new car bonnets by 2035, with 85cm recommended

T&E and the Clean Cities Campaign call on the EU and UK to cap the maximum height of car bonnets. We recommend a maximum height of 85 cm for new cars from 2035, subject to further study. An 85 cm limit aims to protect 95% of adult female pedestrians involved in crashes (only 5% of adult females in Europe have a centre of gravity lower than 86 cm). Being struck below one's centre of gravity increases survival rates.

Urging the European Commission to publish proposals to cap and reverse bonnet height rise by July 2027, the deadline to review EU vehicle safety legislation, and asking UK to meet the same timeframe, the report also recommends:

- Including bonnet height on the Vehicle Registration Certificates of newly-sold cars by 2030,
- Adding the width, length and total vehicle height of new cars to vehicle registration certificates sooner under separate legislation (e.g. type approval), and
- Adopting a Child Visibility Test to reduce vehicle blindspots, which we propose first for inclusion in Euro NCAP's protocols before being brought into EU vehicle safety law.

Reform by countries and cities

- Countries and cities are urged to make taxes and parking charges fairer by linking them to the weight and size of vehicles.
- Across most of Europe, weight is the best available proxy until law-makers make size data more widely accessible.

The rise in high-fronted SUVs poses a clear and growing threat to public safety, especially for children. With no benefit to society and mounting evidence of harm, it's time for lawmakers at all levels to act. Capping bonnet height is a simple, effective step to protect all road users and curb the spread of oversized vehicles. It is neither safe nor credible to let bonnet height continue to rise. At the same time, phasing the cap in over an 8.5-year lead time (with a proposal in mid 2027, and application from the start of 2035) helps minimise any disruption to existing production and designs.

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1. Car bonnet height: trends and impacts

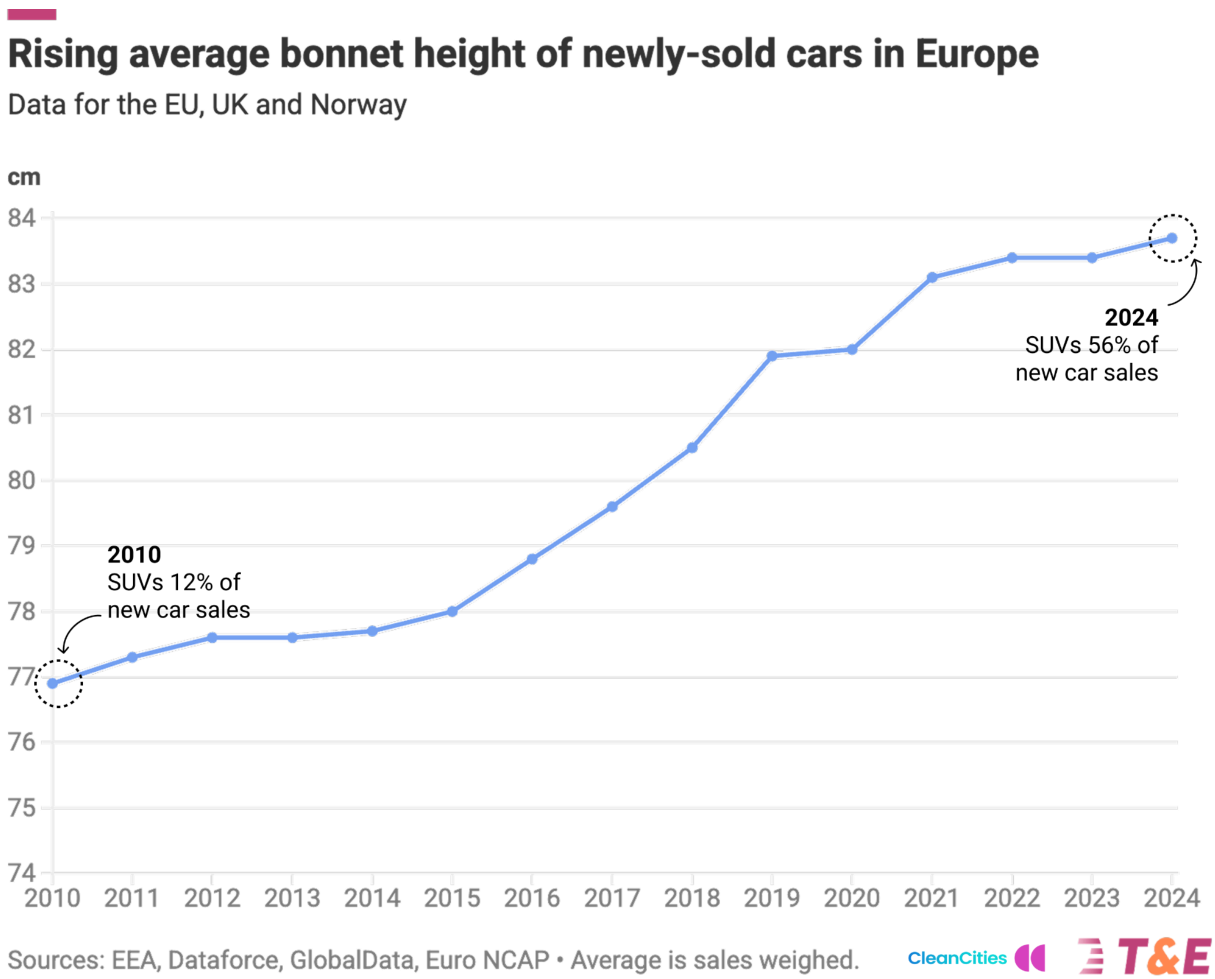
1.1 Bonnet height in new cars rising by 0.5 cm a year

Vehicles with higher bonnets (or vehicle fronts) are more dangerous in crashes. Crash severity and road deaths increase in collisions with high-bonneted SUVs due to the higher point of impact at which pedestrians, cyclists and other vulnerable road users are struck.

Despite this, the evolution of bonnet height in new cars is under-studied. T&E is unaware of any previous Europe-wide assessment of bonnet height trends, and there appears to be just one in-depth national analysis to date.

Based on data provided by Euro NCAP, the safety rating programme for new vehicles, T&E analysed the evolution of bonnet height in newly-sold passenger cars in the 14 years to 2024. The data shows that average bonnet height is continually increasing in newly-sold cars.

Based on newly-sold cars in Europe (the EU, UK and Norway), average bonnet height has increased from 76.9 cm in 2010 to 83.8 cm in 2024 (see graph below). This is a rise of 7 cm (6.9 cm) over 14 years, an average yearly increase of half a centimetre (0.5 cm).



The rise in vehicle fronts closely matches the increase in SUV sales, a trend which dates to around 2010, and has been very significantly accelerated since 2015. In 2010 SUVs made up 11.5% of new sales, according to European Environment Agency data. In 2024 the comparable figure is 55.5%, according to T&E's analysis of data provided by Dataforce.

There is no legal limit on the bonnet height of new cars at European or national level. Without regulation, the bonnet height of new cars and SUVs is set to continue to rise. Average bonnet height in newly-sold cars would reach 92 cm by 2040 based on the trend since 2010.

If the average rises to 92 cm, a high proportion of bonnets would be more than one metre tall. For context, the bonnets of pick-up trucks average 106 cm (according to Belgian data), vehicles which are linked to greater collision severity and reduced vision, as further outlined below.

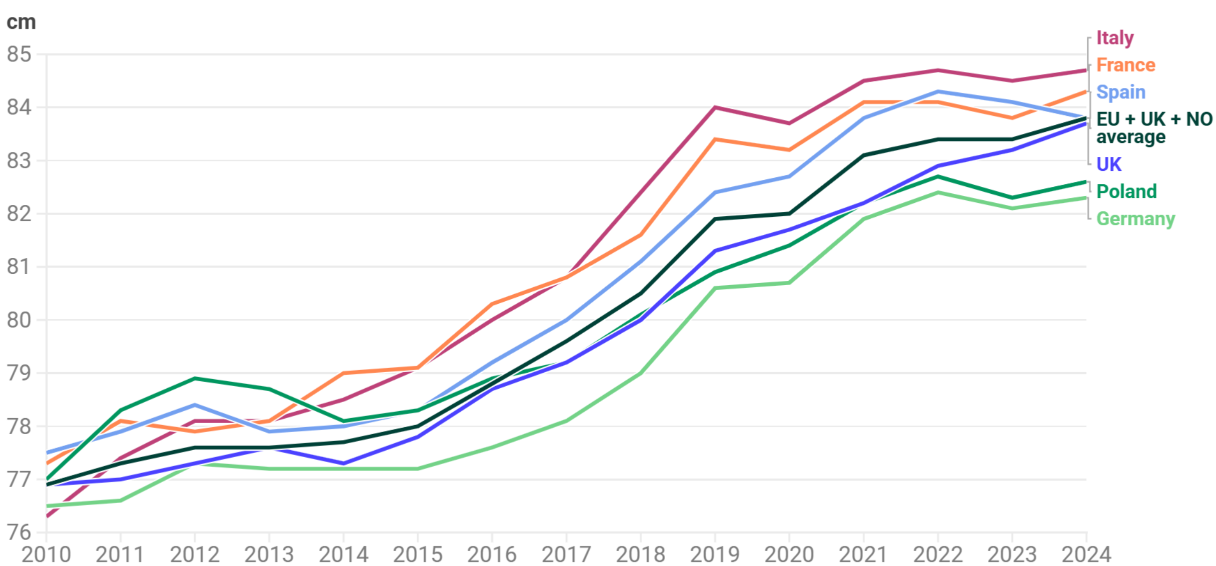
Good practice vehicle design points to bonnet heights between 60 cm and approximately 75 cm. The risk of pedestrians sustaining serious head injuries in crashes increases as bonnet height exceeds 80 cm. Bonnets higher than 100 cm are "more aggressive", linked to increased head injury risk (see further the literature reviewed below).

Comparing bonnet height trends in large European countries

Analysis of 2024 bonnet height in six major national markets - France, Germany, Italy, Poland, Spain and the UK - shows relatively little deviation from the European average (comprising the EU, UK and Norway; see graph below). In fact, average bonnet height in 2024 across all six countries lies between 82.3 cm (Germany) and 84.7 cm (Italy), with none of the six countries more than 1.5 cm above or below the European average of 83.8 cm.

The respective figures for average bonnet height rise from 2010 to 2024 in the six countries shown in the graph below are as follows: France (77.3 to 84.3 cm), Germany (76.5 to 82.3 cm), Italy (76.3 to 84.7 cm), Poland (77.0 to 82.6 cm), Spain (77.5 to 83.8 cm), and the UK (76.9 to 83.7 cm). Click here for year-by-year data for EU countries, the UK and Norway.

Bonnet height rising similarly across major car markets



Sources: EEA, Dataforce, GlobalData, Euro NCAP • Average is weighted by sales

Over the 14 year period to 2024 the trend line in each country generally tracks the European average. Italy, however, moved from having the lowest new bonnets in 2010 to the highest in 2024. Italy's trend is explained by the swift rise in the sale of high-bonneted Jeep SUVs since 2010 coupled with a drop in Fiat sales from 2017. By 2024, Jeep models accounted for 5% of new sales in Italy, compared to approximately 1% on average across Europe.

Germany's comparatively lower average bonnet height is explained by proportionately high-volume sales of lower-slung sedan cars, particularly those made by BMW, Mercedes, Porsche, and Tesla.

The UK mirrored the European average in 2024 but is a particular outlier for high-bonneted sales. The UK accounted for 39% of all sales of SUVs with bonnets more than 1 metre high, despite accounting for just 15% of total new car sales in Europe (EU, UK and Norway).

However, the UK's cohort of high-fronted vehicles (approx 63,000 exceeding 1 m last year, including 53,000 Land Rover sales) is not apparent from its average bonnet height figure. This is because the UK also sees a comparatively large volume of low-bonneted sales (with Tesla, Mercedes-Benz and BMW featuring strongly in 2024). And statistically, the former and latter cohorts offset each other across a large-volume market which recorded 1.9 million new sales in 2024. For further detail on the sales distribution of vehicles with bonnets higher than 1 m between the EU and UK, please see Annex 3.

Vehicle-maker comparison: Jaguar Land Rover & Jeep have the highest bonnets

Jaguar Land Rover and Jeep are the only vehicle-makers that currently have models with a bonnet height above 1 metre

Carmakers: average bonnet height, maximum bonnet, and sales share over 1 m in 2024

Vehicle-maker	Average bonnet height (cm)	Highest bonnet (cm)	Share of sales above 1 m
Land Rover	109	115	100%
Jeep	103	123	78%
Jaguar	96	105	56%
Citroen	92	100	0%
Dacia	91	100	0%
Hyundai	85	100	0%
Renault	85	98	0%
Kia	83	100	0%
Audi	82	98	0%
Mercedes-Benz	81	100	0%

Sources: EEA, Dataforce, GlobalData, Euro NCAP • Brands not mentioned have a lower average bonnet height than those shown

As well as having the highest bonnets, Jaguar Land Rover and Jeep are the only vehicle-makers with type-approved models that exceed 1 m. A number of other models with bonnets higher than 1 m are sold in Europe, but under Individual Vehicle Approval (IVA). The problems linked to the IVA loophole (which span shortcomings on safety, air pollution and climate) are accepted by the European Commission which has committed to table proposals to tighten the rules by the end of 2025. It is currently unclear if the UK government will also commit to addressing this loophole.

Scope, data coverage and terminology

The data assessed by T&E is confined to light duty passenger vehicle registrations formally known as M1. This includes cars, crossovers, SUVs and other light duty passenger vehicles, typically described collectively as cars (despite increasing size differences). Vans and pick-up trucks registered as light duty commercial vehicles (N1) are not included in this analysis of bonnet height (discussed further below).

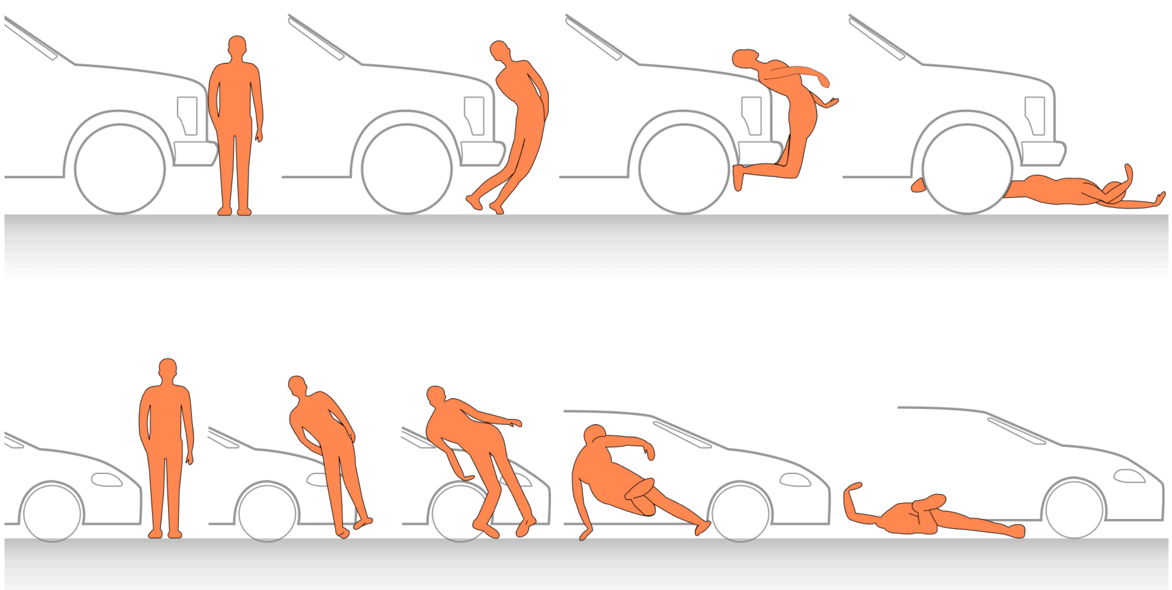
The overwhelming majority of car sales across the EU, UK and Norway are included in the analysis, and data coverage rises over time. Between 2010 and 2018, the data covers an average of 81% of annual sales. From 2019 to 2024, data coverage rises to include an average of 88% of sales each year, and does not fall below 86% in any of these 6 years.

The data reflects what is known as bonnet leading edge height (BLEH). In this report "bonnet height" refers to BLEH. The methodology to measure bonnet height in Europe is detailed under section 3 of Euro NCAP's testing protocol for vulnerable road users.

1.2 Higher bonnets are more dangerous in crashes

High bonnets strike pedestrians higher up in the body, often hitting vital organs near the core, before knocking them forward and down, with a higher risk of driving over them, as illustrated below. On the other hand, low and sloping bonnets tend to hit pedestrians' legs, giving them greater chances of landing on the bonnet and / or being deflected.

Higher bonnets more often knock pedestrians under the vehicle rather than deflect them



Source: Ptak (2019). A new method to assess pedestrian kinematics. Transport, Vol 34 Issue 1. These images reflect collisions in urban areas where 70% of pedestrian fatalities are recorded (typical speed < 50 km/h)

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In Europe, 69% of pedestrian fatalities occur in urban areas, where speeds of 15 - 30 km/h are typical, and where lower speed limits (e.g. 30 km/h) are increasingly being adopted for given streets, roads or city areas. High bonnets are comparatively worse for pedestrians when they are struck by vehicles moving at speeds up to around 50 km/h, a point also made by Ptak. At higher speeds, the chances of survival drop for pedestrians struck by all vehicles, irrespective of bonnet height (as speed is of greater relative importance in high-velocity crashes). In short, the mitigating effects of lower bonnets would be most apparent in urban areas where more than two-thirds of pedestrians are killed.

European crash literature

The increased danger of higher bonnets was outlined in August 2023 as part of a major longitudinal study by VIAS, a Belgian institute specialising in road safety. VIAS analysed collisions in Belgium between 2017 and 2021, a sample cohort involving 300,000 road users in total.

The crash data studied by VIAS shows that a 10 cm increase in bonnet height (from 80 cm to 90 cm) raises the risk of death by 27% for vulnerable road users. In the VIAS study, VRUs comprise pedestrians, cyclists, motorcyclists and scooter riders. VIAS also found that when high-fronted SUVs, such as pick-up trucks, crash into regular cars, they impose 20 - 50% more risk of serious injuries on the occupants of the regular cars. To better protect vulnerable users, VIAS stresses that the trend to higher bonnets must be arrested.

A 2017 review of almost 600 vehicle-to-pedestrian crashes in Germany found lower bonnets help reduce hip and pelvis injury (Li and others). The lowest bonnet height in the study was 63 cm, the median was 75 cm and highest was 89 cm. An even larger 2018 analysis of 1,221 vehicle-to-pedestrian crashes, also in Germany, links increased bonnet height to more severe head injury, finding it has a "statistically significant influence … on adult pedestrian head injury outcome from ground contact" (Shang and others).

In light of the costs to society, the Shang-led study concludes that the data "provides significant motivation for countermeasures to prevent or moderate pedestrian ground-related injuries" (without exploring such countermeasures). Overall, these three real-world studies present a robust European case to prevent and reverse ever-rising bonnet height. The literature is further reviewed in Annex 2 below.

Euro NCAP notes that "the shape of the hood or bonnet leading edge can play a critical role in the outcome of a vehicle impact with a pedestrian and contribute to injuries", and highlights that its test procedure "promotes energy absorbing structures and a more forgiving geometry that mitigates injuries".

High-fronted SUVs can offer relatively low protection to a pedestrian's pelvis. For example, Euro NCAP testing on the leading edge of the Land Rover Defender's bonnet, which is 115 cm high, "revealed poor protection to a pedestrian's pelvis at nearly all points across [its] width". NCAP also found that the same vehicle is also among those with elevated crash aggressivity towards regular cars, i.e. highly damaging in collisions with typical mid-sized family cars.

Euro NCAP's testing and rating focuses on avoiding and mitigating primary injuries, i.e. as the vehicle first strikes the pedestrian. Assessing the likelihood, and likely severity, of secondary injuries - i.e. as the pedestrian later hits the ground, or is struck again by the vehicle - can be more complex.

However, the literature has assessed both primary and secondary injuries by using modelling and analysing real-world collisions. Reading the literature (see further Annex 2), it is clear that:

- Car bonnets approx 60 to 75 cm high do least harm to pedestrians in crashes.
- Good practice vehicle design points to bonnet heights between 60 cm and approximately 75 cm, and this has been clear since at least 2018.
- The risk of pedestrians sustaining serious head injuries in crashes increases as bonnet height exceeds 80 cm.
- Bonnets at and above 100 cm are "more aggressive" and are linked in particular to increased head injury risk.
- Injury risk and severity are linked to bonnet height, with those struck above their centre of gravity at greater danger (see further the literature reviewed in detail in Annex 2 below).

The centre of gravity of lower-height females (5th percentile) is 86 cm. While it is lower for younger children, the centre of gravity in average height 11 to 12 year olds is comparable to the 5th percentile adult female. In other words, if bonnet height in vehicles produced after a certain date was limited to 85 cm, it would help protect almost all females and offer at least some protection for children from the age at which most will be walking independently. Put another way, the more the height of the bonnet exceeds 85 cm, the more adults and children are at greater risk.

In short, danger to other road users rises with increased bonnet height. High-bonneted vehicles are linked to increased rates of death and serious injury in other road users. While we have focused most here on vehicle-to-pedestrian crash severity, similar issues - and increased risks - arise for cyclists and other vulnerable road users.

Occupants of regular-sized cars can also be at greater risk from high-fronted SUVs, as shown both by the VIAS study, and the vehicle-to-vehicle compatibility testing that NCAP has undertaken since 2020.

Higher bonnets mean more children unseen

As well as increasing collision severity, higher bonnets reduce vision, particularly of children. Reduced driver vision risks increasing the frequency of collisions, and / or near miss situations.

Children are disproportionately killed as pedestrians in road traffic collisions. Of the approx 430 children killed a year on Europe's roads, 31% die as pedestrians, compared to 18% when all age groups are taken together.

Linked to work by Clean Cities on child-friendly cities, T&E commissioned tests to better understand the extent to which drivers in high-bonneted SUVs can see children to the front. This analysis was undertaken by an expert in direct vision, Dr Steve Summerskill at the Loughborough School of Design and Creative Arts (SDCA).

Summerskill assessed the visibility of children of average European height standing in a central position at the front of two well-known high-bonneted vehicles, the RAM TRX and the Land Rover Defender, and one regular car, the VW Golf.

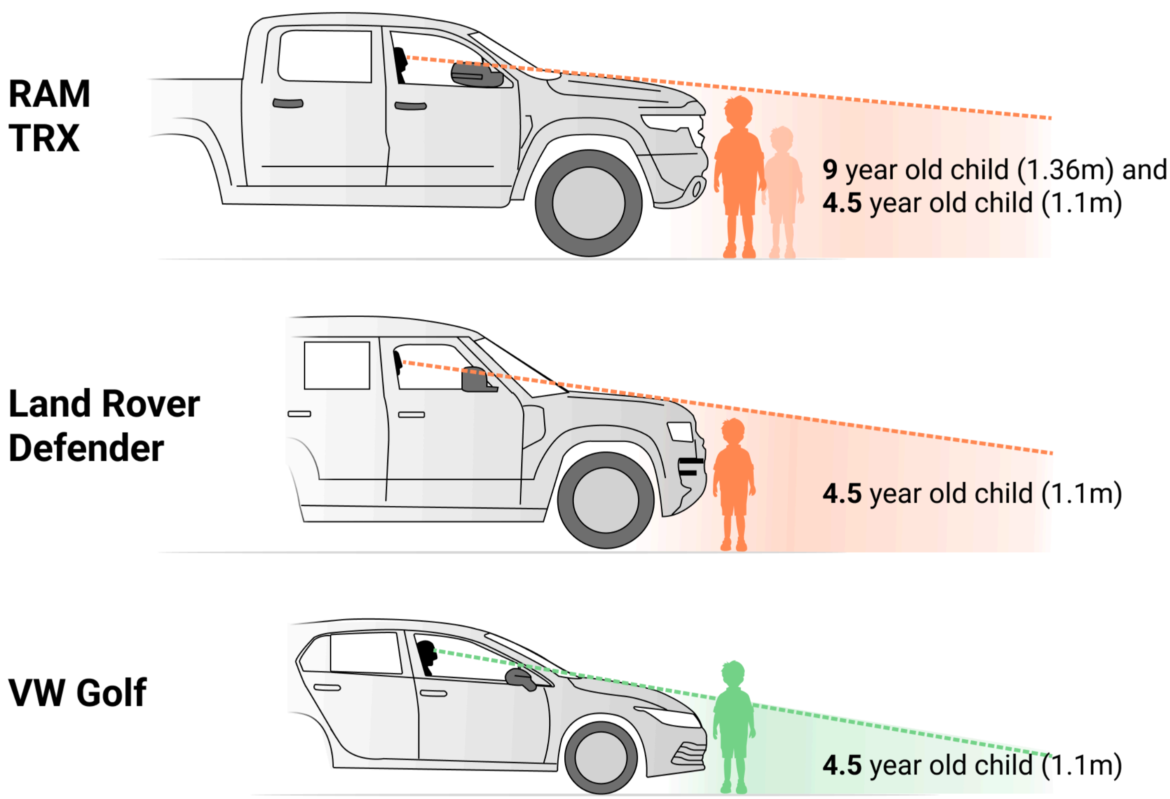
The RAM TRX was chosen as one of highest-fronted light duty vehicles sold in Europe. RAMs are not type approved for the European market, but are registered under Individual Vehicle Approvals (an approval route which is often problematic, and due to be tightened, at least in the EU). The leading edge of the RAM TRX's bonnet is close to 130 cm high and an elevated area nearer the windscreen also contributes to obscuration by raising the line of vision above the bonnet edge, as shown below. At 115 cm, the Land Rover Defender is understood to have the highest bonnet of European-made models.

On the other hand, the VW Golf, with a bonnet height of 75 cm, is intended to act as a proxy for other vehicles with bonnet heights of 60 to 75 cm, which follow best practice in the design of vehicle fronts, according to the literature. Other vehicles with bonnet heights of 60 to 75 cm include the Audi A1, BMW 4 Series, Hyundai Ioniq, Kia Ceed, Mercedes Benz CLA, Opel / Vauxhall Astra, Porsche Taycan, Seat Leon, Skoda Fabia, Tesla Model 3 and Tesla Model Y.

Seated behind the steering wheel of a RAM TRX pick-up truck, a driver of average European adult height cannot see children of average height standing in front aged up to, and including, nine years old. Average height drivers in Land Rover Defenders cannot see children aged up to four-and-half standing in front.

The higher the bonnet, the bigger the blind spot:

More high-fronted SUVs would mean more children drivers don't see



Analysis based on children of average European height standing to the centre of vehicle fronts. Drivers are of average European adult height. Vehicle assessment and modelling by Summerskill / Loughborough University SDCA (2025)

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Such compromised vision helps explain why drivers behind high bonnets often fail to see children in front of them, when leaving a driveway or parking space, for example. At junctions, compromised vision increases crashes, particularly when turning.

Reduced vision is also highly likely to lead to more near-miss incidents, burdening all other road users with higher risks and reduced safety. As yet, however, the risk of increased collision frequency does not appear to have been studied in European literature, while near miss situations generally go unrecorded in police reporting, which complicates the analysis of the effects of impaired vision.

For parents of young children cycling or scooting, however, the results of the tests conducted for this report are scarcely news. The testimony below indicates that experiencing such high risk levels turns families away from active travel choices, in turn feeding a negative loop of unwanted car use, physical inactivity, followed by negative health and environmental consequences.

Jemima Hartshorn, founder and director of *Mums for Lungs*, speaking at the launch of the SUV Alliance in London on 26 March 2025:

"I … know that the driver often cannot see a small child on the pavement. My heart has dropped and I have found myself screaming madly on many occasions, screaming at the kids to get away – when a driver is driving but cannot see the small human in front of them.

My experience is clear, the research is clear – SUVs are a super-charged danger on the road. An SUV driver can crash their SUV into a kid that they did not even see, because they sit so much higher in their big car, detached from the noise outside, from the world outside, from the kids just trying to cycle to school… The driver and his passengers are detached from the danger they are posing to everyone outside their danger box.

[A]s long as SUVs are getting bigger and more common, I find it hard to recommend cycling as a family travel plan – drivers in these SUVs pose such a risk to children and indeed all of us, that they prohibit many families and even individuals from including cycling as a normal part of life.

And we are stuck – quite literally, in a cloud of pollution to which SUVs add twice – their own emissions from the brake and tyre wear and exhausts – and the people they stop from cycling safely who then choose to also drive, often in SUVs as well, just wanting to keep their kids safe too.

With this in mind, I am calling on Government and local authorities to get on top of the huge problems SUVs cause – across the country we can see action to reduce driving and attempts to make walking and cycling safer, efforts that create roads that work for all road users – but if the SUVs are not tackled – these efforts will go up in smoke.

We need a change of this vicious cycle, so we all can thrive, safe from road danger, healthier with less air pollution and happier as a society, where children can travel independently by themselves".

Why improvements in both active and passive safety are necessary

Active safety improvements generally involve technological supports designed to avoid crashes, such as Automatic Emergency Braking (AEB). Passive safety improvements generally refer to enhanced vehicle design that lessens injury, such as bonnet heights of 60 to 75 cm.

Since July 2024 AEB has been required on almost all new cars and vans sold in the EU. (At the time of writing, Northern Ireland falls under the same requirement, but no similar legal provision applies in the rest of the UK.) AEB may activate - or not - depending on the technology, the weather and light conditions. Testing on numerous AEB systems shows they frequently don't work in rain, fog, or poor light. Yes, AEB prevents a cohort of crashes. But rising bonnets make other crashes more severe.

There are also a small number of AEB systems - that used in the Jeep Avenger, for example - which have been found by Euro NCAP to perform poorly even in standard daylight situations. Unfortunately, however, a vehicle-maker may continue to fit poor-to-marginal AEB essentially because these systems satisfy EU type approval tests; being rated poor-to-marginal by NCAP does not prevent their use. A recommendation to improve the type approval process for AEB systems is included below.

Looking at the bigger picture, Europe is at risk of failing to meet its objective to halve road fatalities by 2030 (compared to 2019), and remains particularly challenged in reducing pedestrian road deaths. The literature underlines that improved road safety involves enhancing both active and passive safety - not an either/or approach. In short, there is a need *both* to lower bonnet height, *and* deploy and improve technologies such as AEB.

All other things being equal, a car with a good AEB system and a bonnet height between 60 and 75 cm will always be safer than a high-bonneted vehicle with the same AEB.

2. Bonnet height distribution

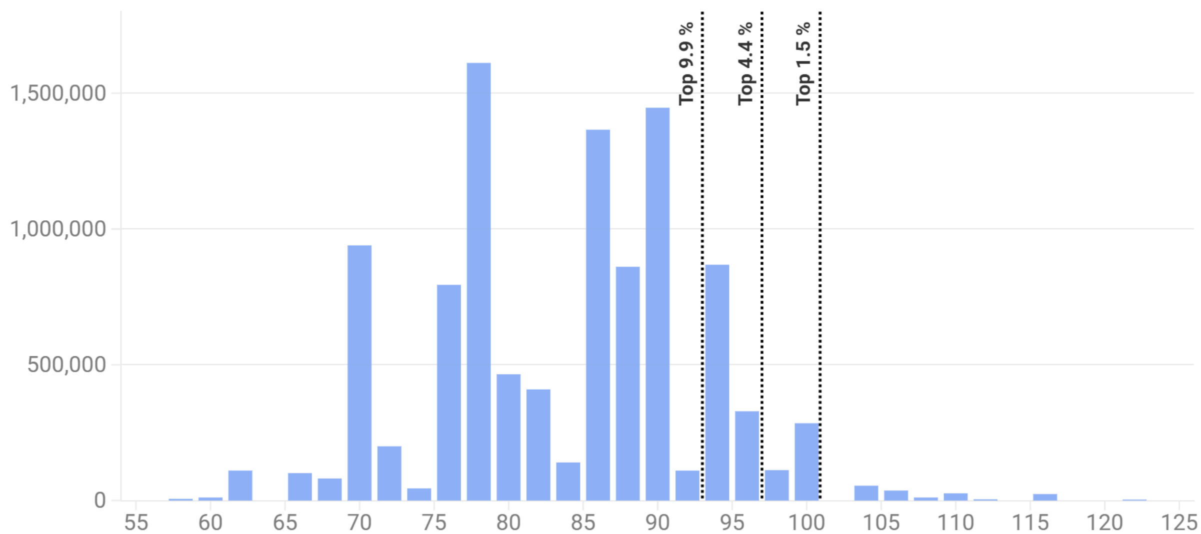
2.1 Share of new sales with bonnets exceeding 85 cm

This section presents the distributional analysis of bonnet height. As we advocate for regulators to focus on car sales, we exclude van body types (or 'VBTs'; see infobox below).

After VBTs are excluded, approximately 46% of new sales exceed 85 cm. Some 10% of new sales surpass 93 cm, while 4.4% are above 97 cm, and 1.5% exceed 1 metre. The focus on vehicles with bonnets higher than 1 m is linked to greater crash severity, as outlined in the literature review (see above and Annex 2 below).

1.5% of new cars have bonnet heights over 1 metre high

Number of registrations per bonnet height (cm) in the EU, UK and Norway after excluding van body types



Sources: EEA, Dataforce, GlobalData, Euro NCAP

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Van Body Types (VBTs)

Depending on the year, van-type vehicles make up approx 3 - 5% of new sales of light duty passenger vehicles (M1), referred to here as van body types, or VBTs for short. Examples include the Ford Transit Custom, VW's Transporter and the Toyota Proace, which are bought, registered and driven as non-commercial private vehicles (M1), notwithstanding the fact that the dominant sales channel for these models is as light commercial vehicles (i.e. pre-dominantly registered as N1).

Common uses for VBTs as private vehicles include as campervans, and for other personal recreational uses, such as carrying surfboards, motorbikes, dogs, etc. VBTs often have high vehicle fronts, as illustrated by the models mentioned above: Ford Transit Custom (105 cm), VW's Transporter (109 cm) and the Toyota Proace (110 cm).

2.2 Breakdown of new sales with bonnets exceeding 1 m

Vehicles with bonnets higher than 1 m comprise 1.5% of new sales. Looking at the location of their purchase and production, a number of points may be worth noting:

- The UK accounts for a very disproportionate amount of sales where bonnet height exceeds 1m. More specifically, the UK makes up 15% of new car sales in Europe, but 39% of sales with bonnets higher than 1 m, namely 63,000 of 161,000 sales. In other words, of the 1.5% of sales over 1m in Europe, almost two fifths are sold in the UK.
- The converse is that the EU, with 85% of new car sales, accounts for 61% of sales with bonnets higher than 1m (98,000 vehicles in 2024). Of the 1.5% of sales over 1m in Europe, three-fifths are sold in the EU.
- Two vehicle-makers account for all sales with bonnets above 1 m, namely Jaguar Land Rover (JLR) and Jeep.
- For the EU, the 98,000 new sales in 2024 of vehicles with bonnets above 1 m split 50/50 between sales by JLR and Jeep (i.e. 49,000 each).
- In the UK, JLR accounts for almost all of its 63,000 high-bonnet sales (53,000 Land Rover and 8,300 Jaguar), with just 1,500 Jeeps.

Relatively few models with bonnet height exceeding 1 m
There are just 10 models with bonnet heights exceeding 1 metre, seven of which are made by JLR, and three by Jeep. The seven JLR models are the Land Rover Defender (with a bonnet height of 115 cm), Land Rover Discovery (112 cm), Range Rover Sport (110 cm), Land Rover Discovery Sport (107 cm), Jaguar F-PACE (105 cm), Range Rover Evoque (104 cm) and Range Rover Velar (104 cm). The three Jeep models are the Wrangler (123 cm), Compass (105 cm) and Renegade (103 cm).

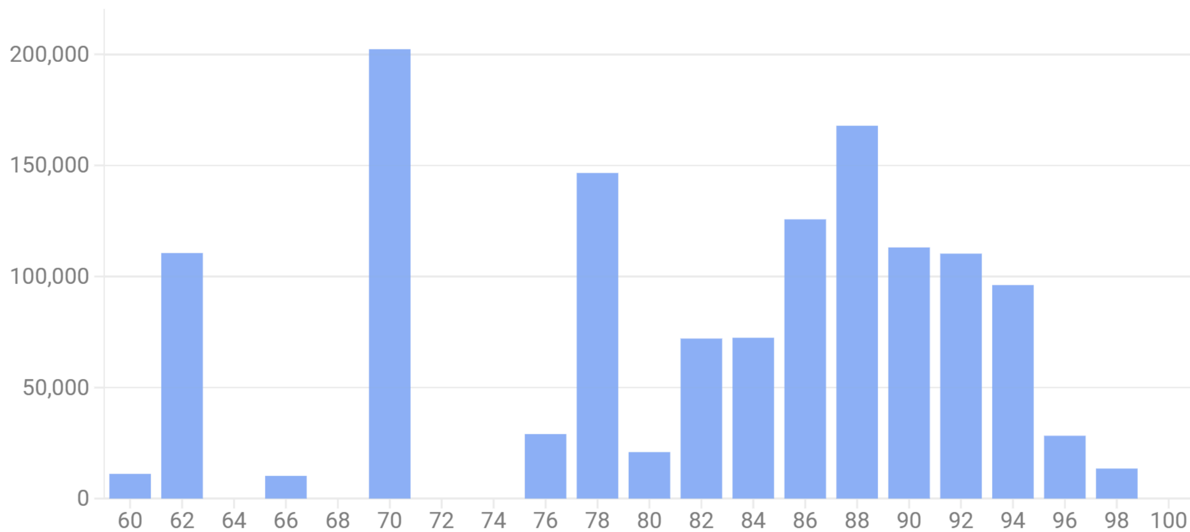
In short, very few vehicles made in the EU exceed a bonnet height of 1m, and those exceeding this figure comprise less than 1% of sales within the 27 member states.

2.3 Bonnet height distribution of new battery electric vehicles (BEVs)

The average bonnet height of new BEVs in 2024 was 81.5 cm, or 2.3 cm less than the market average. After excluding van body types, 60% of new BEVs sold in 2024 have bonnets lower than 85 cm, which is appreciably higher than the comparative figure for sales across all powertrain types (46%). Currently, no BEV exceeds a bonnet height of 1 metre (the bonnet height of the Kia EV9 is at 1 m).

No EV exceeds a bonnet height of one metre

Number of registrations per bonnet height (cm) in the EU, UK and Norway after excluding van body types



Sources: EEA, Dataforce, GlobalData, Euro NCAP

Measured by bonnet height, the single highest BEV segment is around 70 cm, and there are large concentrations from 78 to 94 cm. Recently-launched BEVs with bonnets not exceeding 85 cm include the Audi A6 e-tron (80 cm), BYD Sealion 7 (80 cm), Mini Cooper E (75 cm) and the VW ID.7 (80 cm).

3. Recommendations

3.1 Cap the height of new car bonnets sold in the EU and the UK by 2035

T&E and the Clean Cities Campaign call on the EU and UK to cap the maximum height of car bonnets. We recommend a maximum height of 85 cm for new cars from 2035, subject to further study.

An 85 cm limit aims to protect 95% of adult female pedestrians involved in crashes (only 5% of adult females in Europe have a centre of gravity lower than 86 cm). Being struck below one's centre of gravity increases survival rates.

The limit ultimately placed on bonnet height should also provide a reasonable level of protection for child pedestrians, particularly from approx 11 years of age, in line with increased independent mobility at this time.

Urging the European Commission to publish proposals to reverse and cap bonnet height rise by July 2027, the deadline to review EU vehicle safety legislation, and asking UK to meet the same timeframe, this report also recommends:

- Including bonnet height on the Vehicle Registration Certificate of newly-sold cars by 2030,
- Adding the width, length and total vehicle height of new cars to vehicle registration certificates sooner under separate legislation (e.g. type approval), and
- Adopting a Child Visibility Test to reduce vehicle blindspots, which we propose first for inclusion in Euro NCAP's protocols before being brought into EU vehicle safety law.

Reform by countries and cities

- Countries and cities are urged to make taxes and parking charges fairer by linking them to the weight and size of vehicles.
- Across most of Europe, weight is the best available proxy until law-makers make size data more widely accessible.

The certification process for Automatic Emergency Braking (AEB) systems also needs to be tightened up, something to be considered in the evaluation EU type approval legislation due for completion by Sept 2026 (further discussed below).

3.2 Discussion of the recommendations

Timing and legislative route

Here we discuss the recommendations further, with particular emphasis of enabling the car industry to prepare during the lead-in time to 2035.

We propose that the width, length and total vehicle height be added to the Vehicle Registration Certificates (VRCs) of new cars by 2028, and that this can be mandated under type approval legislation which is due to be evaluated by September 2026. This is a key first step, providing European consumers with vital information regarding their intended purchase. Germany already includes vehicle width and height on its VRCs, but does so voluntarily; EU law does not currently require their inclusion.

We advocate that proposals to cap and reverse bonnet height rise are published by July 2027, the deadline to review EU vehicle safety legislation. From the time of its publication, a proposal acts to change the design parameters governing new model development, discouraging the emergence of new models with bonnets exceeding the limit proposed for 2035 (with 85 cm recommended here, subject to further study).

A proposal in mid 2027, followed by the application of new rules from the start of 2035, would give 8.5 years lead time for industry to adjust. Development timeframes for new models are reducing, and many models will be renewed two to three times between 2027 and 2035.

Even taking infrequent model renewal (e.g. a six-year interval between different model generations), there is ample time for lower bonnets to be integrated during the model renewal process. By steadily ramping up SUV output from 12% in 2010 to 56% in 2024, vehicle-makers have increased average bonnet height in new sales from 77 cm then to around 84 cm today. Close to half (46%) of new sales now have bonnets exceeding 85 cm. Change will take some time, and 8.5 years from a 2027 proposal to 2035 application supports vehicle-makers in adapting development and production cycles. We foresee little or no disruption to today's production and designs. Looking ahead, vehicle-makers will need to take the Commission's 2027 proposal into account, and plan accordingly.

Specific elements recommended for inclusion within the proposal achieve the following targeted outcomes:

- Adding bonnet height to the Vehicle Registration Certificates (VRCs) of newly-sold cars by 2030 will empower consumers to make more informed choices. Recording bonnet height on VRCs is intended to complement the inclusion of other dimensions - width, length and total vehicle height - recommended above for inclusion on new VRCs by 2028;

- Ending type approval for new models exceeding the bonnet height limit set for 2035 at a certain point in the early 2030s, e.g. 2032. Such a provision supports the phase-out of higher bonnets and ensures perverse effects are avoided (e.g. increased production of high-bonneted vehicles before the 2035 reform takes effect).

A new child visibility test is also recommended for vehicles, first for adoption by Euro NCAP, before being brought into EU vehicle safety law. Aimed at improving the visibility of two to eight year olds from the driver's seat, it may be possible to include such a test in Euro NCAP's safety assessment as soon as 2026/7. We also propose that child visibility testing is included in the July 2027 proposals to update the EU vehicle safety legislation. A concept level proposal for such a test is included in Annex 1.

Van body types (in M1) and commercial vehicles (N1)

To facilitate the private use of vans as campers and other leisure purposes, we advocate that van body types (VBT) registered under M1 would be exempted from the 2035 limit. For clarity, the intended VBT exemption does not include pick-ups, a pick-up truck not being a van body type.

An anti-avoidance provision will be needed to prevent potential gaming linked to the VBT exemption. Such a rule could, for example, require that the model is predominately registered as an N1 light commercial vehicle, with a model losing its VBT exemption if its M1 registrations in the previous year outnumbered its N1 registrations. Vehicle-makers predominately targeting the M1 market will then design within the parameters of the 2035 limit.

Further work is needed to improve the bonnet profile of light commercial vehicles (N1). It is particularly important to progress the reform of Individual Vehicle Approval, the registration route for the largest pick-up trucks (which are imported, predominantly from North America). The Commission has committed to publishing proposals to tighten IVA by the end of 2025.

Bonnet height within newly-sold light commercial vehicles (N1) could also be further addressed by regulating specific examples of N1 vehicles, such as pick-up trucks, for example, by limiting their bonnet height from 2035.

Reforming taxes and parking charges

In parallel with addressing manufacturing, measures that discourage the purchase and use of ever-larger and heavier vehicles are also needed. At the national and local levels taxes and parking charges can be made fairer by linking them to vehicle weight and size.

France is the leading example of a country that varies Vehicle Registration Tax by weight. At the municipal level, four cities in France (Bordeaux, Grenoble, Lyon, and Paris), four in Germany (Aachen, Cologne, Koblenz, and Tübingen) and a London borough (Haringey) are among those that have made parking charges fairer by linking them to vehicle weight or size.

4. Conclusion: reasons for law-makers to act

European road users face increased danger from large SUVs and pick-ups with bonnet heights above 85 cm, and further risk still from those exceeding 1 m. Children face the most acute risks.

Ever-higher bonnets feed an arms race that serves no useful function to society as a whole. Ever-higher bonnets are promoted by the makers of the largest vehicles, knowing they feed 'mine is bigger' competition that pits road users against each other. The intention behind using a firearms metaphor such as "Locked and loaded" (to market the Land Rover Defender), or the slogan "Built to impress, known to intimidate" (to sell RAM pick up trucks) is clear: such companies are trading on the intimidation that comes with high-fronted vehicles, ignoring their related dangers. To continue a do-nothing approach is to upend the common good in favour of a particularly aggressive approach to marketing vehicles.

High bonnets harm vehicle electrification. A bonnet height limit will help electrification because lower vehicle fronts reduce the use of energy and materials, delivering more range for less battery, together with more EVs overall (thanks to lower material consumption per vehicle).

Europe risks missing its 2030 road safety target to halve fatalities and serious injuries (compared to 2019), particularly on pedestrian deaths. Law-makers can send a clear signal to influence the design of future vehicles. Car-makers will respond with lower bonnets, reducing road deaths over the coming years. Safer, cleaner cars can come hand in hand.

Overall, limiting bonnet height is part of wider effort to discourage carspreading, which, intended or otherwise, amounts to a multi-pronged attack on public space, public safety and the common good that is steadily being advanced by the manufacturers of the biggest SUVs in particular. Putting a cap on bonnet height focuses on vehicle-making, tackling carspreading at source, as do width limits for new cars (proposed by T&E in 2024).

The societal harm imposed by high-fronted vehicles is increasingly understood. It is no longer safe or reasonable to leave bonnet height unregulated. The trend highlights the urgency of the situation. Law-makers interested in road safety need to progress a limit on bonnet height. Clear political commitments will stop the growth of the most dangerous high-fronted SUVs, and reduce risks for all road users. The case to act is compelling.

Annexes

Annex 1: Child Visibility Test (concept level proposal)

Higher bonnets reduce drivers' vision of children, as documented above. The aim here is to chart at a concept level one potential approach to test vehicles for the extent to which they permit drivers to see nearby children.

As noted above, European data indicates that children die disproportionately as pedestrians in road traffic collisions. Of the approximately 430 children killed a year on Europe's roads, 31% die as pedestrians, compared to 18% when all age groups are taken together. While this is likely linked to significant improvements in vehicle occupant safety for children, it could also be seen as highlighting a corresponding need to make streets safer for children.

Linked to their height relative to high bonnets, children are more likely to be unseen as vehicles leave driveways or parking spaces. Such risks increase as bonnet height rises, underlining the case for a driver visibility test.

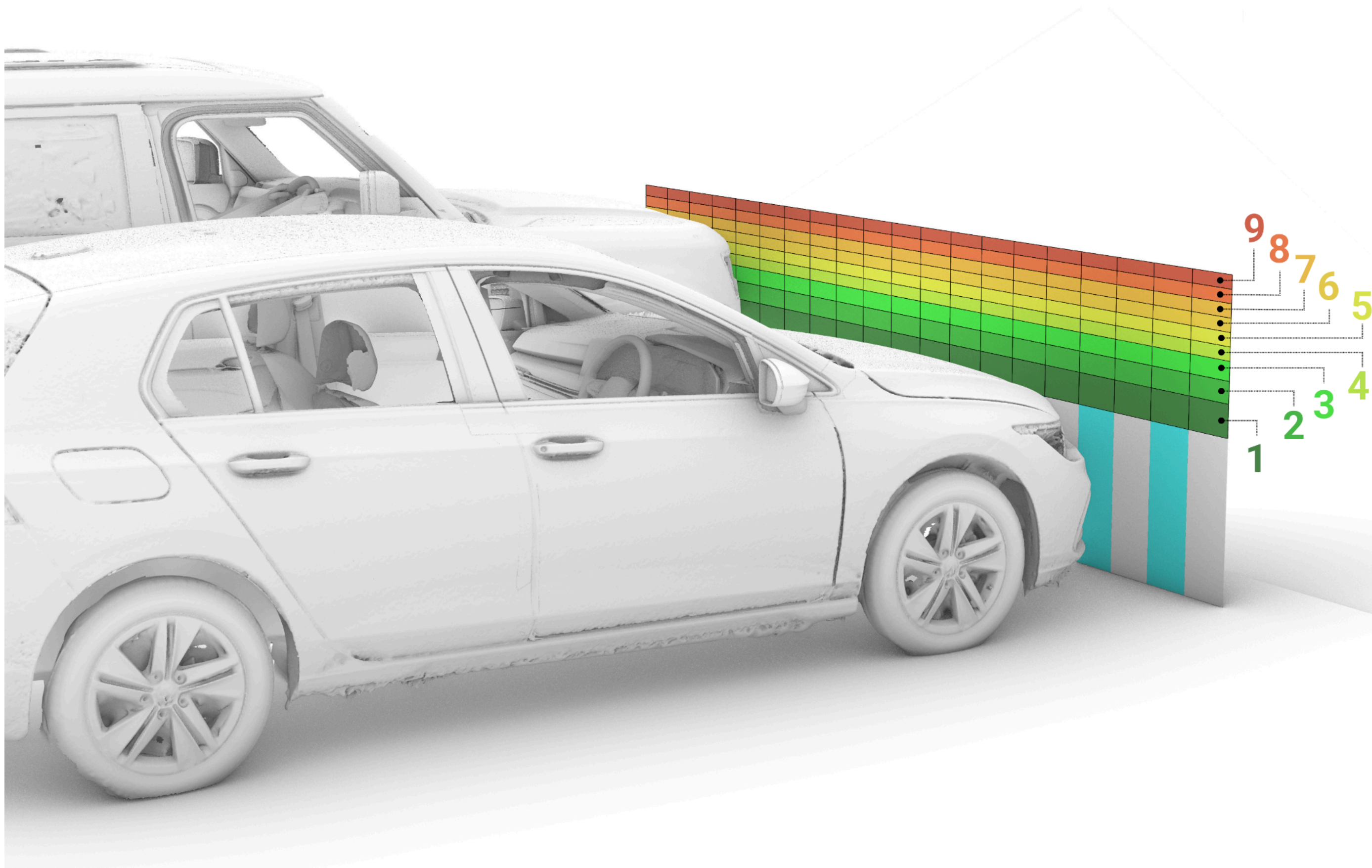
We take it as a starting point that children should, so far as possible, be visible from the driver's seat. Any vehicle-maker that does not accept this as the starting point is essentially declining to follow good practice design for passenger vehicles. To defend reduced vision, a vehicle-maker would have to argue that automatic emergency braking

(AEB) was intended to support the design of vehicles with poorer child visibility in the hope reductions in vision would be caught at the very last moment by an emergency system.

The reality is that pedestrian AEB was never intended to support more dangerous designs. Rather, it was and is intended to complement safer designs, in the objective to halve road deaths by 2030 and bring them to near zero by 2050. As noted above, the effectiveness of pedestrian AEB systems can depend on the weather, level of light and technology fitted. They are a failsafe, a system which everyone hopes will deploy in a situation where the driver fails to someone - not to add risk with reduced child vision.

There is also a more global point regarding risk, both real and perceived, informed by testimonies such as that of director of *Mums for Lungs*, Jemima Hartshorn (see text box above). Footpaths are frequently crossed by vehicles exiting and entering. As parents sense the increase in risk as a child moves further away, parental stress can rise. Parents often then urge their children to remain very close to them - even on footpaths - which in turn reduces childhood independence. In other words, child fatality data does not - nor will not - capture how increased road danger hinders active travel, particularly for children. This elevated risk is not adequately captured for a wide spectrum of reasons, for example, as parents increasingly shield children from danger by keeping them in buggies, insisting they stay immediately by their side, or deciding to make the journey inside a vehicle themselves.

As part of the sample test below, a panel is placed in front of the vehicle. The horizontal lines of the panel correspond approximately to the height and growth of children aged from one to nine years old (see the numbering to the right of the panel).



The bottom lines are wider because children grow faster in their initial years before tapering down to around 5 cm per year from around five years of age. The data behind the panel above is set out in the table below. In short, however, the lower boundary of the dark green row is at 60 cm while the upper bound of the dark red row is at 118 cm.

Taking population averages, the position of the head of a 1.5 year old child, measured from the ground, is around 60 to 80 cm. Linking this to the proposed test: when it is possible for a driver in a vehicle to see the dark green strip, that driver can see the average 1.5 year old child. The proposed test continues vertically to assess older children accordingly.

There are various possibilities in assessing vision within each row, e.g. counting fully-visible cells, or e.g. using computer aided design methods to assess the percentage of the row that is visible. It is also recommended to test the vehicle with a similar panel to the vehicle's passenger side. Strong arguments can also be made to test at least an arc of vision to the driver's side to tackle obscured vision linked to the configuration of the A-pillar in certain cars. The case to test visibility all around the vehicle from the driver's seat (perhaps weighing different areas accordingly) should also be considered.

Whatever final format is adopted, we propose that the test should at least assess the visibility of seeing children aged one to nine, based on seeing their head (approx. 20 cm to the crown). We are not aware of potential unfairness at the aggregate level of such a test.

Assessing drivers' visibility of children

Band of vision to be tested relates to child age

Age (years)	Mid-year average height (cm)	Position of band to be tested (cm)
9	133	113 – 118
8	128	108 – 113
7	123	103 – 108
6	118	98 – 103
5	113	93 – 98
4	107	87 – 93
3	100	81 – 87
2	93	72 – 81
1	82	60 – 72

Source: height estimates based on WHO data for European countries

CleanCities T&E

Overall, the aim of the test, and its resulting structure, should enable clear conclusions to be presented to buyers. Sample conclusions for such vehicle test results could be:

- This vehicle performed very poorly on the child visibility test. The test was not satisfied for children aged from 1.5 to 5 years old. The vision test also showed poor results for six year olds. While children aged seven and eight could be seen, vision was intermittent, with large blindspots obscuring even these older children.

- Or: This vehicle has excellent direct vision, with very high visibility of children from one year of age upwards.

Our recommendation is that Euro NCAP progresses work on such a test as soon as possible, for example, targeting its deployment in assessing new models from 2026/7. We further propose that a child visibility test is included in the July 2027 proposals to update the General Safety Regulation (GSR) for mandatory application by the early 2030s. The GSR should improve the visibility of children both by setting a standard that denies type approval to future models with poor child visibility - and also by recognising vehicle designs that ensure good and excellent child visibility.

Finally, some words of explanation regarding the test proposed here, and the vision assessment undertaken on three vehicles in section 1.2 above (of a RAM pick-up, Land Rover Defender, and VW Golf). In the images shown above, an average driver in a Land Rover Defender looks out over the head of a 4.5 year old standing directly in front, not seeing this child. Similarly, from behind the steering wheel of a RAM TRX pick-up truck, the average driver looks out over the head of a nine year old standing directly in front.

In contrast, the test described in this section requires the average driver to see the head of the child from, roughly speaking, the chin up. After each relevant ‘chin level’ (a band at least 5 cm high) is assessed, the analysis then moves on to the next age cohort (downward, if it starts by studying the visibility of nine year olds). In short, the test here requires almost all the head to be seen, whereas the test above only sought to see at least some of the child’s hair. In turn, this helps explain questions that may arise regarding the infographic shown here and that in section 1.2.

Annex 2: Literature on bonnet height in vehicle-to-pedestrian crashes

2015 study: Crocetta and others

A 2015 modelling study led by Crocetta finds a “significant difference” in the way low and high-fronted vehicles strike adult and child pedestrians in crashes. Simulating the initial impact of different bonnet heights, the authors found that when struck by bonnets up to 73 cm:

> “the adult pedestrian is impacted below the pelvis and the kinetic outcome of the impact is always a wrap-type trajectory [of the human body over the vehicle front]. With the small SUV, the first impact with vehicle front occurs around the pelvis and less whole body rotation is imparted to the pedestrian”.

For large SUVs and vans, impact severity is more dependent on the height of the pedestrian. Lower-height pedestrians are more vulnerable to being propelled forward by high-fronted vehicles, with far higher risks for children.

At impact speeds at or below 30 km/h, Crocetta and others find that "low-fronted vehicles (cars) provide a better containment of the pedestrian on the bonnet, ultimately reducing the head-ground impact speed". The low-fronted cars referred to here had bonnet heights of 69 cm and 73 cm.

On the other hand, "vehicles with a high bonnet leading edge relative to the pedestrian height" are likely to cause higher head-ground contact speeds and "might represent a serious threat to pedestrians in terms of ground-related injuries even at low impact velocities". The bonnet heights of the small SUV, large SUV and van were 80 cm, 94 cm and 105 cm respectively. The high head-to-ground (head-ground) impact speeds recorded after being struck by high bonnets at 20 or 30 km/h may, according to the study, be related to the fact that:

> "for low-fronted vehicles the head-ground impact occurs later than for high-fronted vehicles and there is therefore a longer pedestrian interaction with the vehicle front before separation and ground contact occur. In particular, when the bonnet leading edge is lower than the pelvis, the pedestrian wrap trajectory [over the vehicle front] leads to further interaction with the vehicle which reduces the whole-body angular velocity and hence the head-ground impact speed".

The Crocetta-led study also highlights issues with bonnet heights lower than 60 cm. Simulating vehicle-to-pedestrian crashes on a sports car with a bonnet 54 cm high pointed to excessive rotation of the human body, as measured from a normal upright position before impact. More specifically, the simulation showed the 54 cm bonnet to "cause whole body rotations in excess of 270° and high average head-ground impact speeds for adult pedestrians". Whole-body rotations of more than 270° were also recorded in the vast majority of simulations when the sports car struck the six-year old child pedestrian.

Three 2017 studies: Li, Yang & Simms; Li and others; Yin and others

In a 2017 optimisation study, Li, Yang and Simms modelled how to configure car fronts to minimise the severity of all major injury types sustained by adult and child pedestrians in crashes. Considering the key injury types and age groups, they find a bonnet height of "around 75 cm" to be optimal in mitigating pedestrian injuries.

Designing vehicles with bonnets around 75 cm, according to this study, maintains "a balance between head, pelvis and leg protection" across age groups.

A study published the same month (by the above-mentioned authors and others) analysed almost 600 vehicle-to-pedestrian crashes which took place in Germany. In the crashes studied - where the lowest bonnet was 63 cm, the median was 75 cm and highest was 89 cm - lower bonnets were found to reduce injury to the pelvis and hip.

A study led by Yin, also published in 2017, simulates head-ground injuries typically sustained by pedestrians after being struck by passenger cars at speeds of 20 to 40 km/h. Bonnet heights were modelled at 10 cm intervals from 50 cm to 100 cm. When struck by bonnets 60 and 70 cm high, "the body bends at a lower impact point, which increases the moment generated by the gravity of the upper body, [and] facilitates rotation motion".

But this more favourable rotation pattern, which tends to mitigate pedestrian injuries, decreases with bonnet heights of 80 cm and beyond, leading to the conclusion that "the posture and head injury at the instant of head-ground impact vary dramatically with increasing [bonnet] height because of the significant rise of the body bending point and the movement of the collision point".

Bonnet height is the primary "governing factor" in vehicle-to-pedestrian crashes, according to the authors, with the study also finding that bonnets 1 metre high "tend to be more aggressive" in vehicle-to-pedestrian collisions at impact speeds of 40 km/h.

The more favourable rotation pattern shown to mitigate pedestrian injury (described above), was not found at a 50 cm bonnet height. Overall, the 2015 to 2017 literature tends to support a conclusion that there's a height band at which car bonnets do least harm to pedestrians in crashes, with its front edge positioned approx 60 to 75 cm above ground level.

2018 studies: Shang and others; Ptak

A 2018 study led by Shang confirms bonnet height as "a significant predictor" of the severity of head-ground injuries sustained by pedestrians in vehicle collisions. The study, which analyses 1,221 vehicle-to-pedestrian crashes recorded in Germany between 2000 and 2015, links more severe head injury to increased bonnet height.

Taking bonnet height relative to the hip height of pedestrians struck in crashes (normalised bonnet leading edge height), the study "shows for the first time a statistically significant influence of normalised bonnet leading edge height (NBLEH) on adult pedestrian head injury outcome from ground contact" (at page 15).

In light of the high societal cost of head injuries sustained in pedestrian crashes (and the statistically significant influence of normalised bonnet height), the authors conclude that "the data therefore provides significant motivation for countermeasures to prevent or moderate pedestrian ground-related injuries". The study does not explore such countermeasures.

Ptak, among others, finds that "current vehicle testing methods do not fully assess the actual risks posed to pedestrians by SUVs". In his analysis, assessments that separately test artificial body parts (known as impactors) against the vehicle "do not include the full kinematics of vehicle impact with a pedestrian, which are very significant in terms of injuries sustained by pedestrians".

In lower speed collisions involving high-fronted vehicles, Ptak explains that "the pedestrian's entire body is accelerated forward almost instantaneously, with little to no initial rotation", meaning reduced (or no) contact between the upper body and the upper bonnet or windscreen. Struck by a higher bonnet, the energy of the collision "is transferred more directly into the torso and internal organs, which significantly increases the risk of severe or fatal injuries. In contrast, lower-fronted cars usually hit the legs first, leading to a type of rotation onto the bonnet. Therefore, lower bonnets help spread the force of impact both over time and body surface, often resulting in less severe injuries" (Ptak, personal correspondence, May 2025).

Since high-fronted SUVs tend to be more dangerous to pedestrians, especially at lower urban speeds, Ptak recommends additional testing using life-size crash dummies designed to closely mirror the biomechanical response of the human body. Positioned near the pelvis, the centre of gravity of the human body is typically located at 55% to 57% of one's standing height from the ground. In the additional tests Ptak and others propose, the relationship between a vehicle's bonnet height and the centre of gravity plays a key role.

2019 study: Shi and others

A 2019 modelling study led by Shi, also focusing on head injuries, builds on the analyses described above, and finds bonnet height central to the severity of both primary and secondary injuries.

Taking a baseline bonnet height of 74 cm, the simulations indicate that head injury risk increases in a near-linear pattern as bonnet rises above 80 cm, with relatively little variation between collision speeds of 30 to 50 km/h. Bonnet height was not assessed below 59 cm.

2022 study: Gunasekaran and others

A 2022 study by Gunasekaran and others simulated the risk of brain injury to pedestrians, ranging from a six-year old child to a tall male (95th percentile). The two cars assessed in the study had bonnet heights of 75 cm and 77 cm, while the SUV bonnet was 107 cm high.

Crash test simulations were conducted at 30, 40 and 50 km/h. The study found that "if the car bonnet is higher than the pedestrian's centre of gravity, the head experiences higher rotational velocity which could potentially increase the risk of traumatic brain injury".

This led to the conclusion that lower bonnet height "could help to reduce the risk of head injury", at least under the conditions of the study (which include comparing bonnet heights of approx 75 cm to 107 cm).

The findings were consistent at impact speeds of 30 and 40 km/h, and "strongest at the impact velocity of 50 km/h". Many previous studies do not link high bonnets to increased head injury risk or severity at impact speeds of 50 km/h, or are less clear on this point.

Further study and other policy options

More recent research has focused on improving the bio-fidelity of both crash test mannequins and modelling to more accurately simulate injury severity. The use of AI in modelling is also undergoing significant study, for example, to test its comparability to using the most bio-faithful crash test mannequins.

To complement the recommendations of this report, a robust case can also be made to develop performance-based testing under which EU regulation and / or Euro NCAP's assessment would also also analyse the likelihood of secondary injuries in crashes. Such testing would focus the severity of injuries with the aim of reducing overall injury risk (closely linked to pedestrian kinematics; see further Ptak, above).

Based on the literature to date, such an approach would likely highlight the benefits of positioning the bonnet leading edge around 60 to 75 cm high, with vehicle-makers modifying new designs accordingly. Going further, some may advocate comprehensive testing to assess secondary injury severity as an alternative, or a near-complete alternative (i.e. to replace, or largely replace, this report's recommendations, not simply to complement them).

Further discussion of the last-mentioned point is beyond the current scope. But we do acknowledge that in the ambition to secure safer bonnet heights, there may be more than one route to get there.

Annex 3: Breakdown of sales with bonnet heights above 1 metre

Brand	Model	Bonnet height (cm)	Total sales (EU + UK + NO)	EU + NO sales	UK sales
Jeep	Jeep Wrangler_ICE	123	3566	3193	373
	Jeep Compass_ICE	105	26,283	25,270	1013
	Jeep Renegade_ICE	103	20,926	20,772	154
Subtotals			**50,775**	**49,235**	**1540**
Land Rover	Land Rover Defender_ICE	115	23,863	11,047	12,816
	Land Rover Discovery_ICE	112	4480	1021	3459
	Land Rover Range Rover Sport_ICE	110	26,668	15,231	11,437
	Land Rover Discovery Sport_ICE	107	11,222	4333	6889
	Land Rover Range Rover Evoque_ICE	104	23,848	10,310	13,538
	Land Rover Range Rover Velar_ICE	104	9891	4986	4905
Subtotals			**99,972**	**46,928**	**53,044**
Jaguar	Jaguar F-PACE_ICE	105	**10,566**	2278	8288
Subtotals			**10,566**	**2278**	**8288**
Overall totals			161,313	98,441	62,872
			100%	**61%**	**39%**