

**VOLVO**



for life



A SAFETY MANUAL

# CHILDREN IN CARS





**CHILDREN IN CARS**  
has been produced  
by Volvo Car  
Corporation to help  
all those who carry  
child passengers –  
parents, taxi drivers,  
or anyone else –  
reach a better  
understanding of  
child safety matters.

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## KNOWLEDGE SAVES LIVES

All parents want to do everything in their power to keep their children from harm. And that includes kids in cars. But children are still getting hurt and even killed because their car seats haven't been fitted properly, or are simply wrong for the height and weight of the child. Or – even worse – because they haven't been strapped in at all. The cause is often simply a lack of knowledge. Because the parents thought the child seat had been installed right. Because they thought the child could safely switch from a rearward-facing seat to facing forwards when it was only two or three. Because they thought they knew how to adjust the child's seat belt.

### EASY TO GET IT WRONG

A Swedish survey of parents with young children revealed that only one three-year-old in four was still using a rearward-facing car seat. When, in fact, all three-year-olds should still be using seats which face the rear of the car. Only four out of every ten parents knew the right way to adjust the diagonal section of the seat belt. Amongst the smaller children using booster cushions it was not uncommon for the belt to be placed under the child's arm instead of across the shoulder. Many parents were unaware that the lap belt should go across the tops of the thighs, not across the child's stomach.

Airbags were another area where parents revealed serious gaps in their knowledge. Over half the parents surveyed were unaware that anyone sitting in a seat with a passenger airbag should be at least 140–150 cm (4 ft 7 in) in height, unless, of course, the airbag has been disabled.

This publication has been produced to help parents be better informed about the safety of children in cars. We hope it will provide answers to many of the questions you will find yourself asking as a new parent or a parent-to-be.



# THE MOTHER-TO-BE

Women sometimes ask whether it would be better not to use a seat belt when they're pregnant. They're fearful that the belt might harm their unborn baby in some way. The answer is that they should definitely use a seat belt at all times. Right to the end of the pregnancy. But it's equally important that they put it on right.

That is: the diagonal section should wrap over the shoulder then be routed between the breasts and to the side of the belly. The lap section should lay flat over the thighs and as low as possible under the belly. It must never be allowed to ride upward.

Remove all slack from the belt and insure that it fits close to the body without any twists.

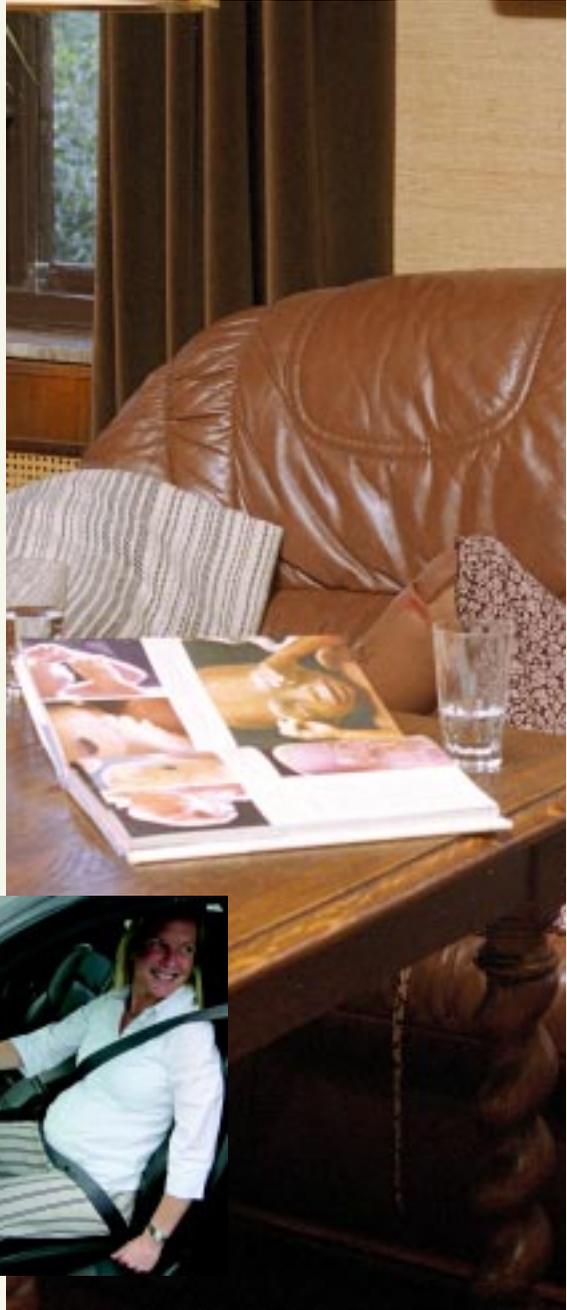
As a pregnancy progresses, pregnant drivers should adjust their seats and steering wheel such that they can easily maintain control of the vehicle as they drive (which means they must be able to easily operate the brake pedal, accelerator pedal and steering wheel). Within this context, they should strive to position the seat with as large a distance as possible between their belly and the steering wheel.

## SEAT BELT POSITIONERS

A recent addition to the accessories market is the seat belt positioner. This is designed to keep the lap belt pulled downwards, away from the wearer's tummy. As yet there have been no studies which indicate that seat belt positioners enhance user safety in an accident. But there is no evidence that they compromise safety, either.

## BELT NOT LONG ENOUGH

Discomfort is a common problem for women using seat belts towards the end of the pregnancy. Some have trouble getting the belt to reach around them. If you find you can't buckle your seat belt, you should avoid travelling by car. Avoid driving yourself in the final stages of pregnancy too, as the steering wheel or the driver's airbag could injure the baby in an accident.





## THE PREGNANT CRASH-TEST DUMMY

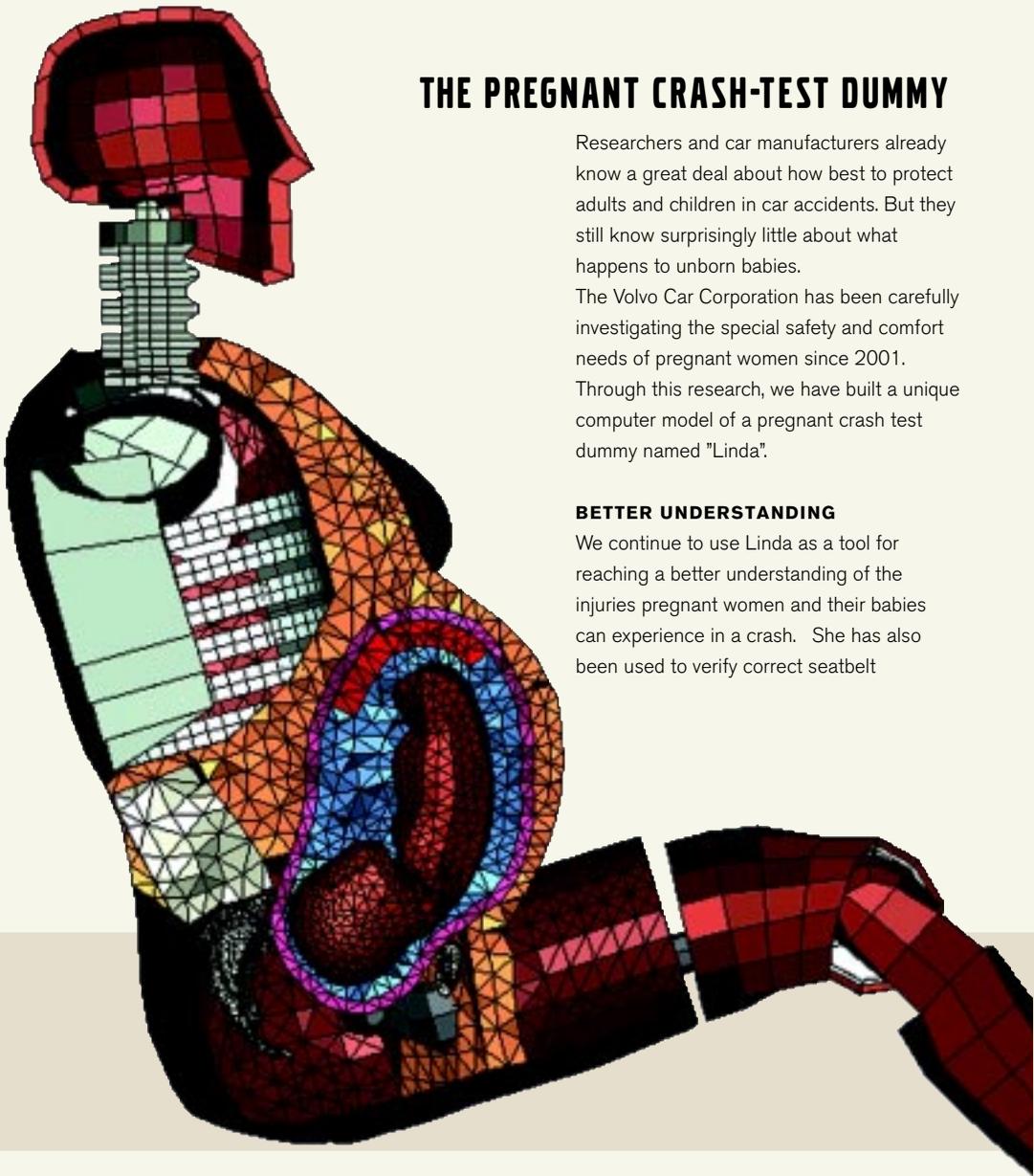
Researchers and car manufacturers already know a great deal about how best to protect adults and children in car accidents. But they still know surprisingly little about what happens to unborn babies.

The Volvo Car Corporation has been carefully investigating the special safety and comfort needs of pregnant women since 2001.

Through this research, we have built a unique computer model of a pregnant crash test dummy named "Linda".

### BETTER UNDERSTANDING

We continue to use Linda as a tool for reaching a better understanding of the injuries pregnant women and their babies can experience in a crash. She has also been used to verify correct seatbelt

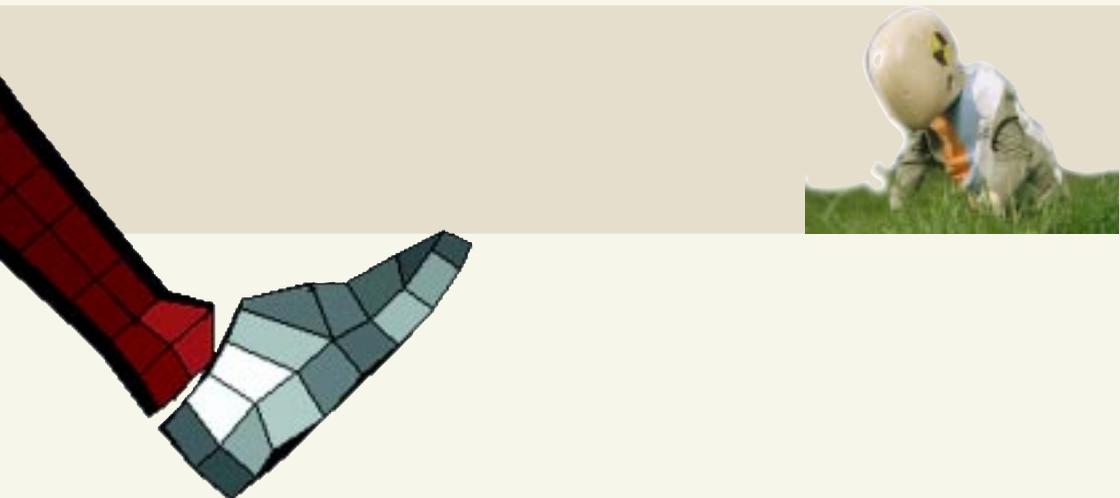


placement and to aid in the development of future safety systems. In addition to examining the medical and safety system performance side of this important issue, we have also looked at comfort by running numerous ergonomics studies of our vehicles, involving over 200 pregnant volunteers.

### **THE NEED TO KNOW**

The most frequently documented cause of death is due to the placenta becoming partially or completely detached from the wall of the uterus, preventing the unborn baby from getting enough oxygen. The question is, why? Researchers believe the reason to be that, while the uterus itself is relatively elastic and can therefore change shape readily, the placenta is not equally resilient when subjected to acceleration forces. With the help of the pregnant crash-test dummy, Linda, we can increase our knowledge. We continue to work toward more discoveries to help improve safety and

comfort for pregnant women, we have so far determined that the seat belt, if worn correctly, offers the best protection against injury or death in a crash. That is: the diagonal section should wrap over the shoulder then be routed between the breasts and to the side of the belly. The lap section should lay flat over the thighs and as low as possible under the belly. It must never be allowed to ride upward. Remove all slack from the belt and insure that it fits close to the body without any twists. As a pregnancy progresses, pregnant drivers should adjust their seats and steering wheel such that they can easily maintain control of the vehicle as they drive (which means they must be able to easily operate the brake pedal, accelerator pedal and steering wheel). Within this context, they should strive to position the seat with as large a distance as possible between their belly and the steering wheel.



# THE FIRST CAR RIDE



A baby's first-ever car journey is usually on the day he or she is taken home from the maternity ward. A nervous trip, for many reasons. A new life has come into the world. And it's also the start of a new life for the parents, and for any brothers or sisters too.

So often the car will be driven at a snail's pace. Every bump could bother the baby. Or at least that's how it seems to anxious first-time parents. But in all probability the baby will be safe and sound in its baby seat. Properly anchored and installed, and facing the rear of the car.

A baby seat like this provides the best form of protection for a baby of up to about nine months of age. Until it grows out of it, quite simply. When the baby's head reaches the top end of the baby seat, the time has come to switch to a child seat, but still a rearward-facing one.

## **TAILOR-MADE SAFETY SEATS**

Any parent who has ever had to choose a baby seat will be able to confirm that it's no easy task. Volvo is one of the few car manufacturers who design baby and child seats for their own models, and also test them in their own vehicles. Most seats are designed by car seat manufacturers. They are suitable for use in some cars, but not in others. The methods used for securing baby seats also vary.

The result is that many baby seats are of the wrong type for the car they're used in, or simply incorrectly fitted. The industry as a whole has

been aware of this problem for quite some time. The need for a single industry standard for baby and child seats in all types of car was widely acknowledged, and so a working group was set up by the International Standards Organisation, ISO. After ten years' work, the fifteen countries represented in the project recently reached agreement on the Isofix system.

## **NEW INTERNATIONAL STANDARD**

The Isofix standard can consist of three main elements. Incorporated into the vehicle itself there are two anchorage points, between backrest and seat cushion. A standard frame can be slotted into these, and then the baby or child seat can be easily fitted onto or removed from this as required. Some of the Isofix baby/child seats have no separate frame. They slot straight into the anchorage points.

The Isofix standard was published in 1999. From 2000, all new cars sold in the United States had to have Isofix anchorage points. Europe and the rest of the world will soon introduce similar legislation.

There are already many new cars in use which have Isofix anchorage points, and baby and child seats are available for them, too. So anyone who wishes to and can afford to invest in a new car with Isofix anchorage points now has that option. For the time being, everyone else has to follow the more complex instructions for installing other systems.



# FAQS ON BABIES IN CARS

## **What should I look for when choosing a baby seat?**

It must be of the right type for your car. A list of car models should be specified on the seat.

## **What are the things to think about if I buy a second-hand baby seat?**

Don't buy a second-hand one unless it is relatively new. Baby seat design has come a long way in a short time, and modern seats are much safer than older ones. Make sure it is completely undamaged, that it complies with the relevant national safety standards, and that it still has all the fittings and installation instructions.

### **What is Isofix?**

A standardised anchorage system for baby and child seats.

## **How do I go about fitting a baby seat?**

Follow the specific instructions for the seat you have chosen. Seats using the Isofix anchorage system are easy to install. Other systems are not as easy. If you have any problems, ask the seat retailer for advice.

## **Is it a safe alternative to use the removable carry-cot section of a pram with anchorage straps?**

No. The carry-cot would be anchored, but the baby inside it would not be restrained.

## **Where in the car should the baby seat be installed?**

That depends... Many prefer to have the baby within easy reach of the driver's seat, i.e. on the front passenger seat. But the baby must not be put on that seat if it has a passenger airbag which has not been disabled. If the airbag were to inflate, the baby could be seriously injured or even killed. So if that seat has an airbag, the baby seat must go in the back seat of the car. Some cars are equipped with a airbag cut off switch that allows you to temporarily disable the airbag. Please check the owners manual for guidance. The alternative is to have the passenger airbag permanently disabled. This task should only be entrusted to an authorised dealership for your brand of the car. Make sure that you are given a document verifying that the airbag has been disabled. In some countries, including the United States, permission has to be obtained from the relevant authorities before an airbag can be disabled.

## **Can you be absolutely sure that the airbag has, in fact, been disabled?**

Yes, the Volvo Passenger Airbag Cut Off Switch (PACOF) is very reliable. However, you must always be absolutely sure that the switch is in the correct mode. An airbag permanently disabled at an authorised dealership for your car brand, is also safe. If you are in any doubt about whether it has actually been disabled, ask at your authorised dealership.

## **Do side airbags pose any risk to the baby?**

No, not if the baby is in a Volvo.

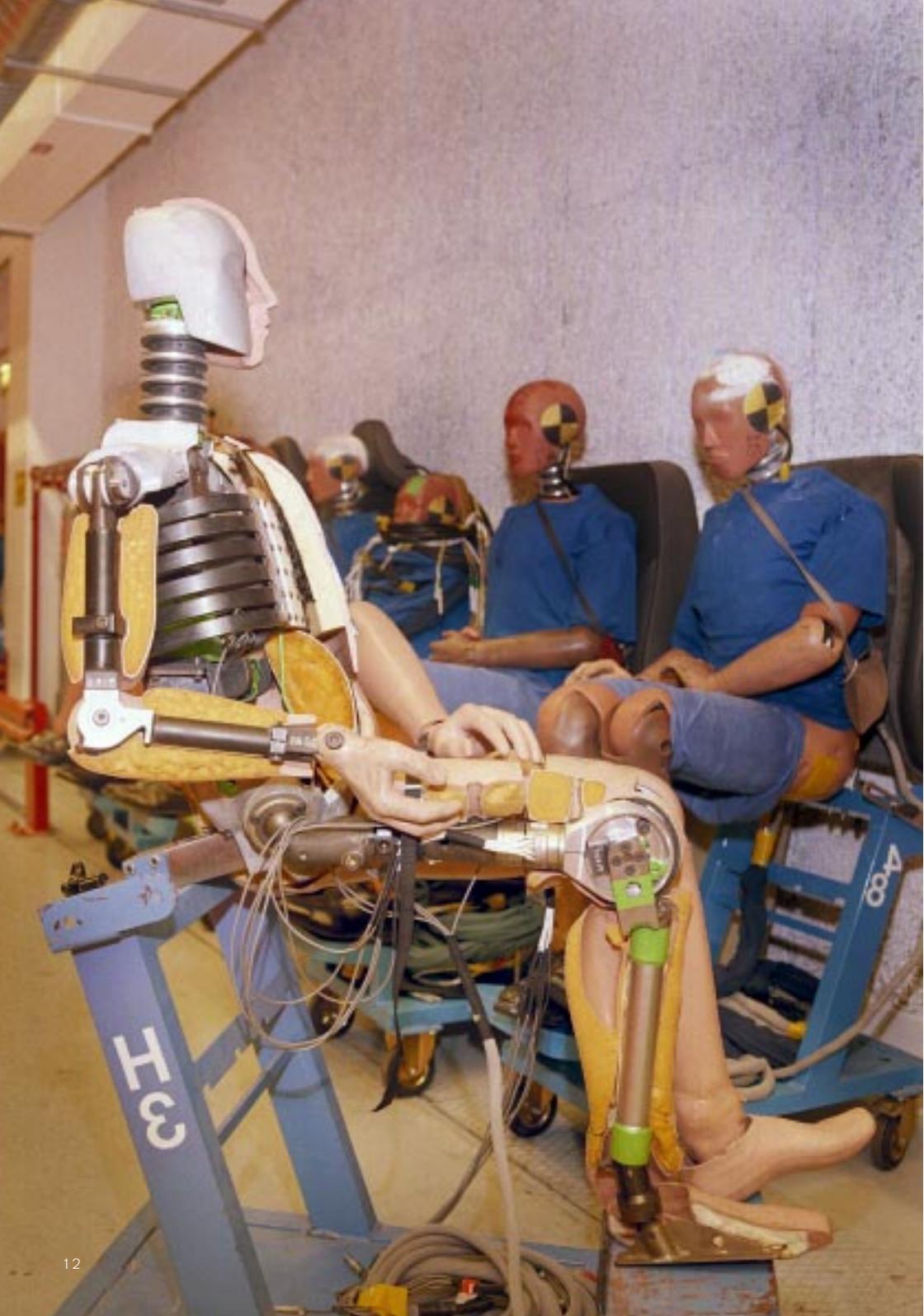
## **Why do babies have to sit facing the rear of the car?**

A baby's head is large and heavy in relation to the rest of its body, and its neck is not very well-developed yet, so it has to be prevented from being flung forwards if the car collides.

## **How long should you use the baby seat?**

For as long as possible; until the baby can sit up properly, at around nine months. When its head reaches the top of the baby seat, then it's time to switch to a larger rearward-facing child seat.





# ALMOST LIKE HUMANS



The world's first crash-test dummy was called Sierra Sam. The size of an adult male of large build, he was created in 1949 to test ejector seats for the US Air Force.

In 1956 the air force shared its findings with the automotive industry. The first dummy to be developed specifically for research on car crashes appeared six years later.

Today's crash dummies have little in common with Sierra Sam. All of the early ones were rather rudimentary, built to confirm that safety systems such as seat belts were effective. They had few measurement points, and were really not very much like humans at all.

## **SOPHISTICATED INSIDES**

Modern crash dummies, however, are built to respond much more like humans. They have the same weight, size and proportions as the type of human they are made to emulate. Their heads are designed to react like real heads, as are other details of their anatomy such as the neck, the knees and the thorax.

Inside them they have sophisticated electronics, to measure acceleration/deceleration, displacements and various loads and forces the body is subjected to in a crash.

## **HOW THE BODY REACTS**

Deceleration needs to be measured to find out exactly how the human body is restrained and

comes to a halt if the car is stopped abruptly.

Displacement measurements are used, for instance, to study compression of the thorax.

Twisting motions of various parts of the body are studied, as well as the loads they are subjected to. Shear displacement measurements can be used to find out more about how human vertebrae behave in an accident.

Measurements of many kinds allow scientists and engineers to amass large quantities of data and to draw conclusions about the likely effects of real accidents on the human body.

## **NEW CARS SAFER**

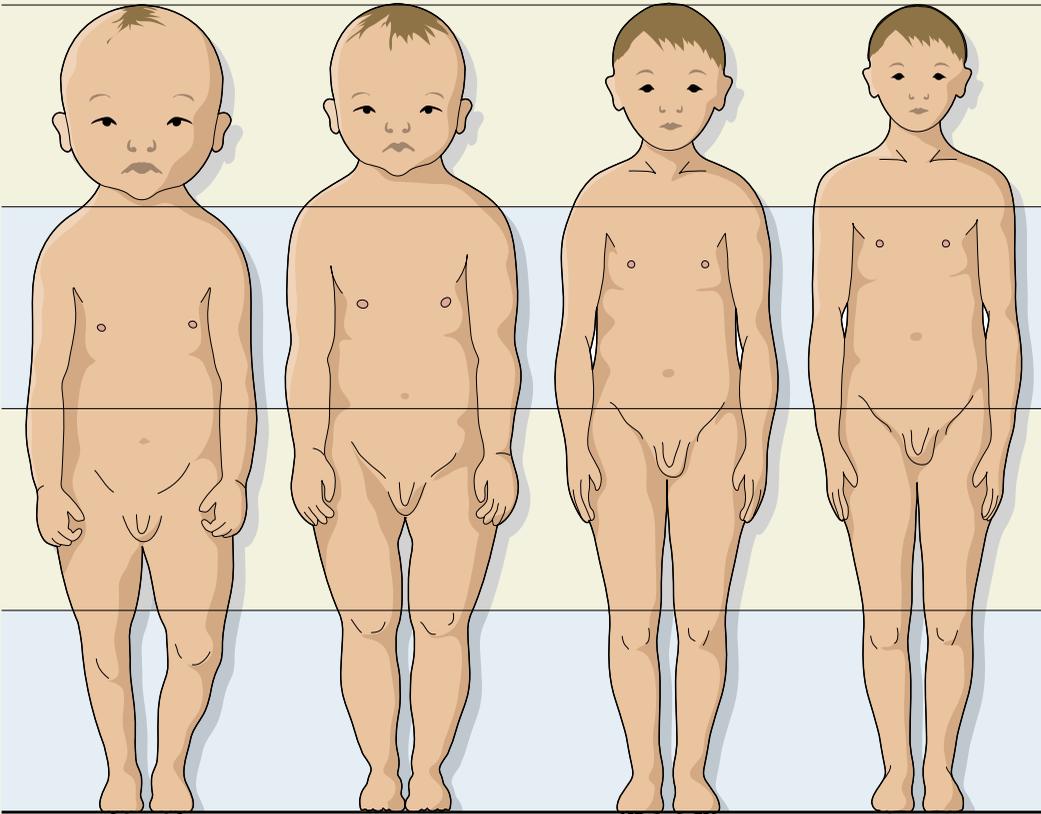
The automotive industry has long been at the forefront of crash dummy development. And safety research is proceeding at an ever-increasing pace.

Those involved in car crashes when travelling in cars made in the late 1990s run a 25 per cent lower risk of death or disablement, when compared with passengers in cars from the early 1980s.

The main reasons for this are the fact that airbags and other safety systems have become standard equipment, and also that car cabins are now stronger and better able to withstand collision forces.

None of this could have come about without research. And crash dummies still have an important role to play in research of this kind.

# Relative proportions, birth to adulthood



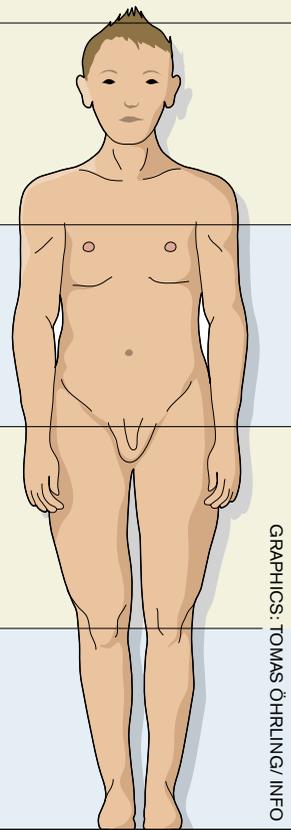
At birth

2 years

6 years

12 years

## FRAGILE PASSENGERS



GRAPHICS: TOMAS ÖHRLING/ INFO

25 years

Babies and children are fragile passengers. Their heads are big and heavy in relation to the rest of their bodies. The head of a nine-month-old baby, for instance, accounts for 25 per cent of its total body weight. The corresponding figure for a male adult is six per cent.

A baby's head has quite different proportions too. Its face is relatively small compared with the rest of its head and brain. If a baby or child suffers head injuries, this often means brain damage, which is generally much more serious than facial injuries. Head injuries in babies are frequently more severe because their skulls are thinner than an adult's.

### **VULNERABLE NECK**

Other factors which make a child more vulnerable are its disproportionately slender and undeveloped neck, and its undeveloped pelvis.

One key difference between an adult's pelvis and a child's is that the child's pelvis does not have the distinctive structure known as the iliac crest. This is a bone formation which, in an adult, prevents the seat belt from slipping upwards and damaging the internal organs in a car collision. Until the child is eight or ten years old, its pelvis has a very rounded shape. Only at puberty does the pelvis gain its adult shape, with a fully-developed iliac crest.

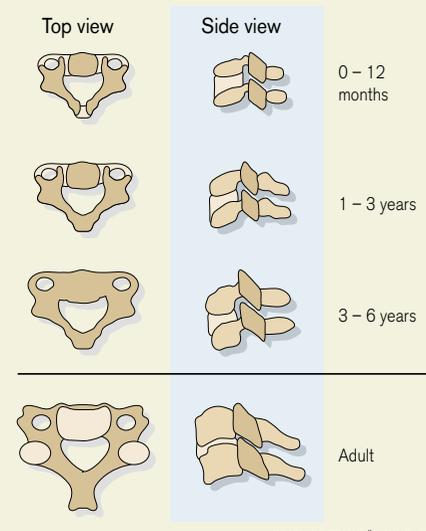


# FRAGILE PASSENGERS

## SOFT SKELETON

The neck vertebrae of a new-born baby are composed of separate portions of bone joined by cartilage, in other words, the baby's skeleton is still soft.

### Development of human vertebrae



— GRAPHICS: TOMAS ÖHRLING/ INFO

This cartilage turns into bone over the first three years of the baby's life. The ossification process continues right up until puberty. There is a similar gradual development of the muscles and ligaments in the neck.

Human neck vertebrae also change shape progressively throughout the years when a person is growing, from the flat vertebrae of the small child to the saddle-shaped ones of the adult. Being saddle-shaped also means that the vertebrae will hold together and support one another if the head is thrown forward. The young child lacks this extra protection.

## BACKWARDS SAFER FOR EVERYONE

The safest way of travelling in a car is backwards. It would actually be better for all of us to travel backwards, but, given the existing designs of our cars, this is not feasible for adults. But young children can and should travel facing the back of the car for as long as possible.

In a front-end collision, the head of a forward-facing car occupant will be thrown forward with considerable force. Its momentum propels it downwards onto the breastbone and then back up again. An adult neck can withstand this strain relatively well, but a small child's neck cannot.





## **CRASH DUMMIES IN BRIEF**

CRASH DUMMIES COME IN MANY SIZES AND TYPES THESE DAYS. MOST OF THEM ARE USED IN FRONTAL CRASH TESTS, BUT SOME HAVE BEEN DEVELOPED FOR TESTING IN SIDE-ON AND REAR-END COLLISIONS.



The commonest dummy represents an average American male. There is also an extra tall and heavy variant of the male dummy, but the female dummy is remarkably small and dainty. So dainty that she is also used to represent a normal twelve-year-old.

Besides this combination woman/twelve-year-old, there are other child dummies representing children aged ten, six and three years, then eighteen, twelve, nine, six and zero months.



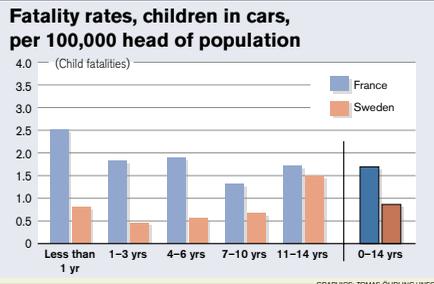
# FACING FORWARDS OR TOWARDS THE BACK?

The idea of carrying baby and child passengers facing backwards in cars was a Swedish one, from the 1960s. It was the brainchild of Professor Bertil Aldman of Chalmers University in Gothenburg.

Professor Aldman took his inspiration from the seats the Gemini mission astronauts used for take-off and landing, specially moulded to distribute the forces over the whole back. The principle behind rearward-facing child car seats is exactly the same. In the event of a front-end collision, the whole of the child's back takes the strain of the impact, not its much more vulnerable neck.

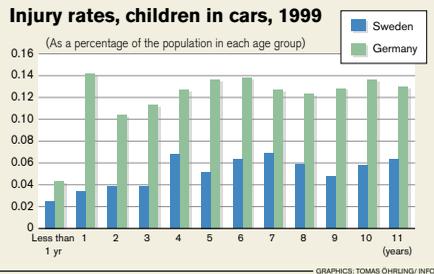
## SWEDEN LED

Thanks to Professor Aldman, rearward-facing child seats came into widespread use in Sweden much earlier than in other countries. The result is reflected in accident statistics. Research by the insurance company Folksam, for instance, shows that the risk of young children being killed or seriously injured is five times greater in forward-facing seats than in rearward-facing ones. If you compare the Swedish accident statistics with those from countries where most children travel facing forwards, the differences are striking. One example is France:



The risk of a child dying in a car accident in France is twice as high as in Sweden.

The German statistics reveal a similar pattern:



Note in particular the differences from the age of one onwards. That is the age when most German children start using forward-facing child seats, whereas most Swedish children travel in rearward-facing seats until at least their third birthday.





## JUST HOW SAFE?



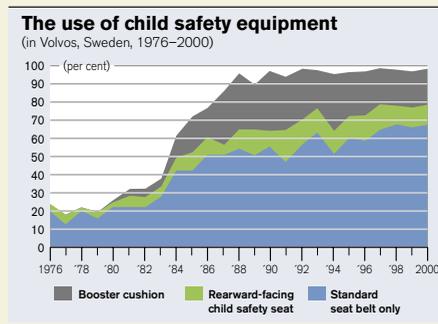
Volvo has worked with Professor Aldman ever since he became involved with child safety. One of the results of this collaboration was the rearward-facing seat which Volvo launched in 1972, a first in the car industry. Since the mid-1970s, Volvo's Traffic Accident Research Team has investigated Swedish road accidents involving the newer models of Volvo. The results have all been documented in a permanent database, which now encompasses over 30,000 accidents, involving a total of over 50,000 people.

A unique resource for researchers wanting to learn more about child car seat safety.

### STATISTICS ON THOUSANDS OF CHILDREN

Between 1976 and 2000 4,448 children aged 0–15 were involved in the accidents investigated by the team. Over the same period, the use of seat belts and child seats increased dramatically, from about 25 per cent in 1976 to almost 100 per cent in 2000.

The effects of this increase are clearly apparent in the injury statistics.



# JUST HOW SAFE?

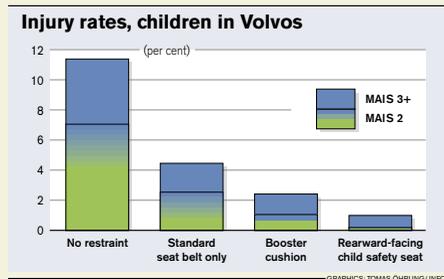
Injuries are classified according to severity on a scale (1–6) known as MAIS – the Maximal Abbreviated Injury Scale. MAIS 1 covers trivial injuries such as bruising. MAIS 2 means minor injuries, MAIS 3 covers serious injuries, and MAIS 4 is more serious still, such as serious loss of blood. MAIS 5 means the patient has critical injuries, and in MAIS 6 the injuries have proven fatal.

The risk of a child suffering injuries of MAIS 2 severity or higher is only one fifth of what it was twenty years ago. And the risk of injuries of MAIS 3 or more is only a third of what it once was.

## HEIGHTENED PROTECTION

The type of safety protection actually used by children in accidents obviously makes a big difference.

Using a standard seat belt provides 60 per cent better protection than no restraint at all. Using a forward-facing child seat or booster cushion



provides 80 per cent better protection, and a rearward-facing child seat is 90 per cent better. One very significant fact is that out of all the accidents recorded in the Volvo database there was only one fatality (the result of exceptional circumstances) amongst all the children who were travelling in rearward-facing seats.

It is also important for children to be given the most suitable type of protection for their particular age, height and weight.





## FAQS ON REARWARD-FACING CHILD SEATS

### **How long should children continue to use rearward-facing seats?**

Young children should continue to use rearward-facing seats for as long as possible. A child should only switch to a forward-facing seat when it reaches the weight limit for the seat type or when its head extends beyond the top of the seat. It is recommended that children go on using rearward-facing seats until they are three, and preferably longer. Not being able to sit with their legs fully stretched out does not affect their safety.

### **Why is this so important?**

Because the necks of young children are not strong enough to withstand the stresses of having the head thrown sharply back and then forward in a front-end collision. The neck is subjected to severe forces if the child is travelling in a forward-facing seat. In a rearward-facing seat the child's back bears the brunt of these forces, and the head is not thrown sharply forward. The forces involved in rear-end collisions are usually lower.

### **What should I look for when choosing a child car seat?**

Firstly, the seat must be right for your car. There should be a list of car models specified on the seat. Secondly, the seat must bear the right mark to show it complies with the relevant safety standards.

### **How do I go about fitting a child seat?**

Be sure to follow the instructions for the seat you have. Seats using the Isofix anchorage system are the easiest to install, but many Volvos have other seat anchorages built into the floor. If in doubt, ask the retailer.

### **Where in the car should the child seat be installed?**

Many prefer to have the child within easy reach of the driver's seat, i.e. on the front passenger seat. But the child seat must definitely not be put there if there is a passenger airbag which has not been disabled. If the airbag were to inflate, the child could be seriously injured or even killed. If there is an airbag in the front, then the child seat must go into the back. However, some cars are equipped with an airbag cut off switch that allows you to temporarily disable the airbag. Please check the owners manual for guidance. The alternative is to

have the passenger airbag permanently disabled. This task should only be entrusted to an authorised dealership for your brand of car. Be sure to get a written guarantee that the airbag has been disabled.

### **Can you be absolutely sure that the airbag has, in fact, been disabled?**

Yes, the Volvo Passenger Airbag Cut Off Switch (PACOF) is very reliable. However, you must always be absolutely sure that the switch is in the correct mode. An airbag permanently disabled at an authorised dealership for your car brand, is also safe. If you are in any doubt, ask at your dealership.

### **Do side airbags pose any risk to child passengers?**

No. At least, not in a Volvo.

### **What if my child doesn't want to use the child seat?**

Stop and take a break. Take the car seat indoors when it's new, to let your child use it and get accustomed to it at home first.

### **What if a child falls asleep with its head at an angle?**

If it doesn't seem to bother the child, it probably looks worse than it is. If it worries you, stop and prop the child's head up with a pillow.



## TIME TO LOOK FORWARD

Sooner or later the time comes when the child grows out of his or her rearward-facing child seat. This is generally at the age of three to four. Now it's time for the child to travel facing forwards, seated on a booster cushion with or without a special backrest section. Make sure that the cushion has horn like projections in order to fix the lap belt across the hips and above the tops of the thighs.

There are several advantages to using a booster cushion with a backrest. The backrest provides a degree of extra protection in the event of a side-on collision. If the child goes to sleep, it will stay sitting up better, especially if the backrest has side projections to lean against. These will also help prevent the child's head tilting sideways at an alarming angle when it falls asleep. Because this does happen, from time to time.

### **NOT TOO FAR OUT ON SHOULDER**

Having the backrest section also helps the belt stay in place better, near the neck and over the shoulder. When a child, sitting on a booster cushion with or without a backrest section, is buckled in using a standard three-point seat belt, it is important for the belt to be positioned correctly. The main reason for using a booster cushion is not to help the child to see more, but rather to achieve the right belt geometry.

The diagonal belt needs to go over the shoulder and across the chest with the minimum of slack. Remove any slack when you buckle the child's belt.

The less play there is, the better the belt can protect its wearer.

It doesn't matter if the belt comes close to the child's neck. It may look uncomfortable, but it certainly won't strangle the child if there is an accident. It is important that the belt is not too far out on the shoulder as if the car stop abruptly, the child's head would move forward and the belt would move further out onto the shoulder, which decreases the belts protection level.

### **NEVER UNDER THE ARM**

The child's safety is posed at risk if the belt is worn too close to the edge of the shoulder. It can then slip downwards in a crash and the child could be thrown forward over the top of it.

Under no circumstances should the child sit with the belt under its arm. This would mean that there is little to stop the child from flying forward, at worst right through the windscreen.

The lap belt needs to be worn across the hips, above the tops of the thighs. Make sure that it is always strapped firmly in front of the two horn-like projections on either side of the booster cushion. If it's not, it could slide up onto the child's stomach in an accident, with the risk of internal injuries. A lap belt can't restrain a child across the pelvis, because a child's pelvis is undeveloped compared with an adult's. An ordinary pillow is totally unsuitable as it is too soft and misses the important hornlike projections. In the case of an accident it can be compressed or slip away. The child then risk to slide under the belt.



# FAQS ON FORWARD-FACING CHILD RESTRAINTS

## **When can you move to a forward-facing child restraint system?**

When the child has grown out of its rearward-facing seat, i.e. when the top of its head is no longer within the child seat, or is touching the overhang, depending on the type of seat you have. The child should be at least three, and preferably older.

## **What should I look for when choosing a booster cushion with or without backrest?**

That it is suitable for your type of car, comfortable, and of an approved type.

## **Is a booster cushion as good as a booster cushion plus backrest?**

No, the booster cushion/backrest combination provides better protection for smaller children.

## **Where should the belt go?**

The diagonal belt needs to go down across the shoulder, near to the child's neck. It doesn't matter if it seems very close to the neck. Wearing the belt too close to the edge of the shoulder is much more risky. In an accident, the child could even be

thrown forward over the belt. For the same reason, the child must never wear the belt under its arm. The lap belt needs to be worn across the hips, above the tops of the thighs. It must always be positioned correctly in front of the two projections on either side of the booster cushion. Otherwise it could slide up in front of the stomach and cause internal injuries in an accident. Both sections of the belt must have a minimum of slack. Remove any slack after you fasten the child's belt.

## **Can a child ever use an ordinary cushion instead of a booster cushion?**

No. An ordinary cushion is too soft. In an accident it could slip forwards or be flattened, and the child could slide out below the belt.

## **Is it all right for the child to sit in an adult's lap instead?**

No. Children should never be allowed to travel on laps. Each child needs a seat of its own, and a suitable form of safety restraint.

## **Which seat in the car is safest?**

In a Volvo all seats are equally safe for children, provided they have an adequate safety

restraint. The only exception is when the front passenger seat has an airbag. A child must never be allowed to travel in this seat, unless the airbag has been disabled by a professional.

## **In Volvo estate models, how can children travel safely in the load space?**

If you install the rearward-facing extra seat which is made for Volvo estate cars. This is supplied complete with seat belts and head restraints. It is designed for children who have grown out of child seats, but only until they are 140 cm (4 ft 7 in) tall.

This extra seat is good if you often need to carry more than five in the car, but is not intended as a permanent solution for those who need a seven-seater.

## **How tall does a child have to be to sit in a seat with a functioning airbag?**

140 centimetres (4 ft 7 in).

## **What if my child won't sit on the booster cushion?**

You must persuade him or her.

## **When can a child be seated without a booster cushion?**

At 150 cm length.



# THE ELEPHANT IN THE BACK SEAT

Of course, there are always some people who don't belt up, some of the time. Perhaps neglecting to put on their own seat belts, or to clip their kids in before they drive off. Maybe it doesn't seem a long journey at all. Perhaps the child is fractious and it's impossible to make it stay in the seat long enough to fasten the straps. Or perhaps... it's only around town, and we really won't be driving fast...

But... A child weighing 30 kg in reality, travelling in a car at 40 km/h, will weigh a tonne in a front-end collision with an object as unyielding as a rock face.

A tonne!

## ENOUGH TO CRUSH THE DRIVER

If a weight of that size hits you in the back, all your ribs are likely to break, and then they puncture your lungs. You're dead within 60 seconds. Or the child may go straight through the car windscreen and hit the same object that stopped the car dead in its tracks. A scenario every bit as nightmarish as the first.

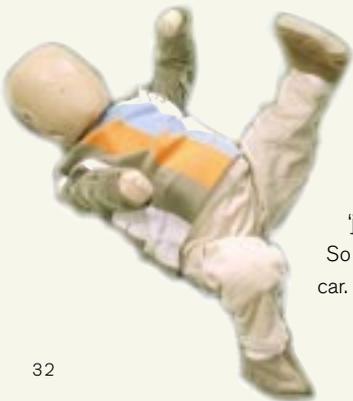
A few more figures:

If you were to climb onto an ordinary dining chair and let yourself fall flat on your face on the floor from that height, the effect would be the same as if you were in a car, not wearing a seat belt, and it crashed at 15 km/h. For the equivalent of 20 km/h you'd have to stack four chairs up before you fell. To approximate a crash at 30 km/h, you'd

have to go eight chairs high.

Eight chairs stacked one on top of another make quite a tower. And 30 km/hour (18.6 mph) is not very fast at all. It's less than the new lower 20 mph limit in some residential areas in the UK, for instance. We generally drive faster than that, even 'just around town'.

So – do use those seat belts. Always. For everyone in the car.







## **WHAT IS REQUIRED BY LAW?**

You will need to check the legal requirements which apply in your country. Most countries require baby and child seats to comply with national standards, and to be labelled to show they conform to these.

You can also ask your nearest Volvo dealer, or contact Volvo Car Corporation, either in your own country or at company headquarters in Sweden:  
[info@volvocars.com](mailto:info@volvocars.com)



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