

Instagram Car Seat Techs, Local First Responders, or DIY – What is the Best Way to Install Your Child’s Car Seat?



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So often on local and international mom and parenting groups I will see these questions pop up; what is your favorite car seat? How did you get your car seat installed? Is it okay to turn my child around to forward face, they are really tall, heavy, etc.? As I read the hundreds of responses I cringe as the reality sets in. So many of us are not informed on the best car seats for our family and our own children are put in great danger because of it. In April of 2016 a small study, including 291 families, was completed on the ‘Misuse of Car Safety Seats at

Newborn Discharge’. That study determined nearly all (95%) car seats were misused, with 1 or more errors in positioning (86%) and/or installation (77%). Serious car seat safety misuse occurred for 91% of all infants. Frequent misuses included harness and chest clip errors, incorrect recline angle, seat belt and lower anchor use errors. ¹

Now with that information I take pause. When was the last time car seat safety was brought to your attention? Yet 95% of the people in the study were misusing car seats at the very beginning. So, what can be done about this? How do we better protect our children from unintentional injuries in accidents?

Car seat Basics

The first step is to understand the basics of car seat recommendations, as a general rule the CDC recommends the following²:

- Buckle children rear-facing as long as possible. This should include until they max out the car seat weight or height limit (per your car seat manual). Typically, this will be between the ages of 2-4 years old.
- Forward-facing car seats should be used until the child maxes out the weight or height limit of the car seat. This is for a forward-facing 5-point harness system and should be used until at least 5 years old.
- Booster seats can be used once a child has maxed out the forward-facing car seat height or weight. A booster seat should be used to help the vehicle seatbelt to proper lay on the child’s smaller frame. Generally, a child could be the appropriate size to use vehicular seat belts once they are 4’ 9” and at least 9 years old.
- Vehicular seat belts can be used when the child is large enough for the seat belt to fit properly. A properly fitted vehicular seat belt is one that the lap belt lays across the upper and the shoulder belt lays across the chest. NOTE: If the seat belt lays on a child’s stomach or the child’s neck this is NOT a proper fit and could cause major traumas in a vehicular accident.

Table of Contents

Car seat Basics	1
Why Does the Type of Car Seat We Use Really Matter?	2
We’ve Laid the Foundation, Now Cars & Car Seats.....	4
Congrats, Now You Selected a Car Seat	5
Need More Guidance?	5

Additional key notes from the CDC include:

- Children under 12 years old should always sit in the back seat.
- Rear facing car seats should NEVER be used in front of a seat with an active air bag.
- Car seats should only be used in accordance with your specific vehicle manual and your specific car seat manual.
- All car seats are NOT compatible with seat protectors, check your specific car seat manual.

¹ Unsafe from the Start: Serious Misuse of Car Safety Seats at Newborn Discharge (Hoffman MD, Gallardo MA, Carlson PhD) <https://www.sciencedirect.com/science/article/abs/pii/S0022347615014596>

² Protect the Ones You Love: Child Injuries are Preventable https://www.cdc.gov/safekid/road_traffic_injuries/index.html

Why Does the Type of Car Seat We Use Really Matter?

So, we understand the general guidelines from the CDC, but WHY were these guidelines created? WHY should your family follow these guidelines? WHY is it important for those who care for your children to understand these guidelines? Well, lets dive a little deeper.

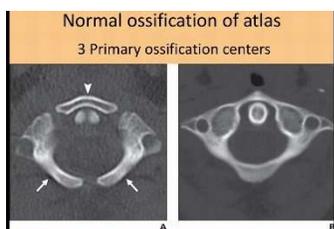
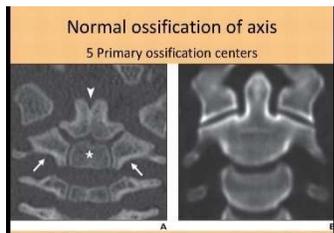
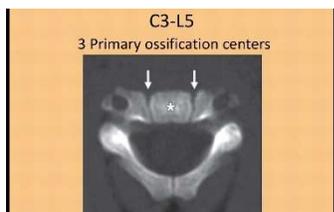
As a first-time mom in 2014, the car seat laws only required a child to be rear-facing until 1 year of age. By the time I was a mom to two children, in 2017, the laws had changed and required rear facing until 2 years of age unless the child reaches 40 lbs. or 40 inches in height before turning 2 years old. I remember being so irritated that my second born would have to be rear-facing for a whole year longer than her older sister. Then I started to research why.

Reason #1 – Motor vehicle crashes are the leading cause of death in children ages 4 and older. Motor vehicle crashes are the third leading cause of death for children from infancy through 4 years old. To help reduce the number of deaths due to vehicular accidents rules have changed. ³

Reason #2 – There is better understanding of how the infant, toddler, child, and adolescent body weight distribution and spinal fusion compares to that of an adult. With more data and information policy has been created to better serve the little ones in our vehicles. ⁴

Reason #3 – Age alone, is not an indicator that your child’s mind or body are ready to handle the responsibilities that come with ‘moving up’ in car seat safety configurations. It is important to note that every transition is associated with some decrease in protection; therefore, parents should be encouraged to delay these transitions for as long as possible. ^{5 6}

The article ‘Why Rear Facing: The Science Junkie’s Guide’ by Car Seats for the Littles (last updated July 27,



*Images from Pseudotrauma of the Spine, the Osseous Variants¹

2021) does a great job explaining the physical changes children go through and when their bodies should be more able to withstand more pressure. Below are a few of the main highlights from that article that helped me decide to rear-face my children as long as possible going forward.

Article Highlight #1 - A toddler’s vertebrae are connected via cartilage rather than ossified bone. Those connections are called synchondroses, which are slowly closing over time. There are three major points of ossification, each with two synchondroses. According to a study published in the Association for the Advancement of Automotive Medicine⁷, the first station to close is the C3, second is the axis, and third is the atlas.

The results of the study show ossification patterns with a 75% probability that:

C3 Vertebra - At 1 year and 5 months there are three synchondroses open and by the age of 3 years and 8 months the child has only one synchondroses remaining open.

Axis – At age 4 years and 6 months there are still three synchondroses open and by 7 years and 3 months a child’s axis has only one synchondroses remaining open.

Atlas - At age 4 years and 3 months there are three synchondroses open and by the age of 8 years and 11 months a child’s atlas has only one synchondroses remaining open.

³ Leading Causes of Death, National Center for Health Statistics, CDC <https://www.cdc.gov/nchs/fastats/child-health.htm>

⁴ Car Seats for the Littles, Why Rear Facing: the Science Junkie’s Guide <https://csftl.org/why-rear-facing-the-science-junkies-guide/>

⁵ Child Passenger Safety, Committee on Injury, Violence, and Poison Prevention, American Academy of Pediatrics <https://pediatrics.aappublications.org/content/127/4/788>

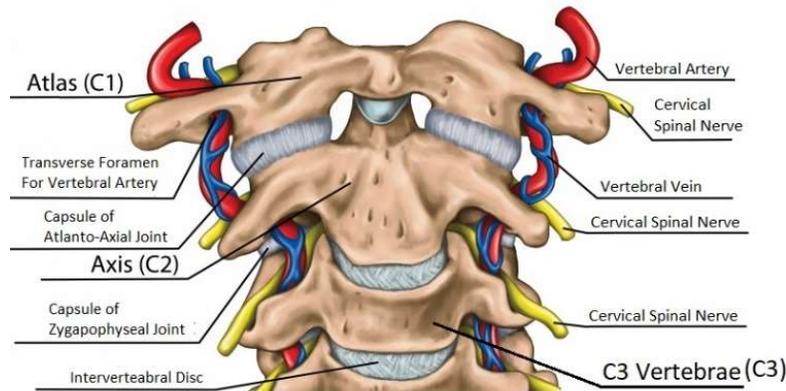
⁶ Car Seat Safety: Where Do We Draw the [Car] Lines? <https://safeintheseat.com/car-seat-safety-where-do-we-draw-the-car-lines/>

⁷ Quantitative Analyses of Pediatric Cervical Spine Ossification Patterns Using Computed Tomography, (Yoganangan PhD, Pintar PhD, Lew MD, Rao MD, Rangarajan PhD) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3256844/>

Note the easily visible synchondroses in each side-by-side photo. As the synchondroses close there is more protection of the spinal cord, spinal nerves, vertebral artery, and vertebral vein. ***These findings show that under the age of 9 years old, it is very likely 1-3 cartilaginous spaces have NOT completed ossification. Those pieces of cartilage have the ability to stretch up to 2", yet only 1/4" stretch is enough to rupture the spinal column, resulting in paralysis or death.***⁸

The photo below shows an adult spine with ossified vertebrae and how it would protect the nerves, veins, and spinal cord. In infants and children without ossified bones these same nerves, veins, and spinal cord would not be protected by structural bone matter and thus the car seat installation is that much more important.

*Image from Cervical Spine Anatomy (Neck), Spine Universe⁹



Article Highlight #2 - According to Thomas Turbell of the Swedish National Road and Transport Research Institute, "A nine-month-old baby's head comprises 25% of its total body weight, while in an adult the head weighs 6% of the total body weight." The difference in proportion of head to body only adds to the need to safeguard the spinal column.¹⁰

Article Highlight #3 - According to NHTSA, roughly 60% of vehicle crashes are frontal impacts and 20% are side impacts. During a crash, occupants will travel towards the point of impact, putting all the stress on the neck and spine. At that moment there are actually three impacts: the vehicle striking whatever it strikes, the body of the occupant being retained by the seat belt or harness, and then the internal organs striking the front of the inside of the body. When someone is rear facing, crashes two and three occur in concert and ***the forces of the crash are more equally diffused along the shell of the seat, holding the neck and spine in line.***

When we consider the structural maturity of the spine in an infant, child, and adolescent in combination with the body weight distribution of the head in proportion to the rest of the body it is easy to see the physical benefits of using the appropriate car seat based on height, weight and age all together.

We've Laid the Foundation, Now Cars & Car Seats...

Now that we know the general guidance, lets talk specifics to look for. When we are car seat shopping there are a few things that should take priority, lets look at them!

1. What car do you drive or would you like to drive with your car seat?
 - o Check out your car seat manual for their specifics on car seats to determine where your child could fit in the vehicle.
 - o Is your seat LATCH compatible, what is the LATCH system weight limit in your car?
 - o If your car seat will be forward facing, does the seat you want to use have a lower anchor system in that space?
 - o Can you borrow LATCH systems and/or borrow the lower anchor system from another seat to satisfy where you want the car seat to be positioned?

⁸ Quantitative Analyses of Pediatric Cervical Spine Ossification Patterns Using Computed Tomography, (Yoganagan PhD, Pintar PhD, Lew MD, Rao MD, Rangarajan PhD) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3256844/>

⁹ Cervical Spine Anatomy (Neck), Spine Universe, <https://www.spineuniverse.com/anatomy/cervical-spine-anatomy-neck>

¹⁰ Review of Child Car Occupant Fatalities in Sweden During Six Decades (Carlsson, Strandroth, Bohman, Stockman, Svensson, Wenall, Gummesson, Turbell, Jakobsson) http://www.ircobi.org/wordpress/downloads/irc13/pdf_files/104.pdf

Once you know your vehicle specifics, begin to narrow down what car seats are best for you. There are great resources like The Car Seat Lady¹¹ and Safe In The Seat¹² that provide detailed information on vehicle specifics and car seat specifics.

1. Set your budget! For your current setup is it best to make a small investment now with an infant seat and plan for a future investment for a convertible seat around 1 year or do you prefer to “go big” early on?
2. Once you have determined how long you want to be able to use the car seat, review the car seat manuals (you can often find PDF versions of this online) for the specific seats you are looking into.
 - o As a Doula I often recommend that clients look at family patterns, if premie or small babies are common in your family you may want to ensure the car seat you purchase can be used for smaller babies. If your family is very tall it would be wise to consider car seats that have extended rear-facing abilities to better accommodate longer bodies.
 - o What is the current height and weight of your child (as in get them barefoot to weigh and measure them now, don't rely on measurements from their last wellness check)? Based on these measurements, what is the safest position they could be secured in? Are they too large for rear-facing based on the car seat maximums? Can they forward face in a 5-point harness car seat? Do they need to go into a booster seat?
3. Do you plan to have other children in the future that could reuse the seat?
 - o Typically car seats are good for up to 10 years from the manufacture date, however this varies based on each car seat and should be reviewed specifically for your seat.
 - o Some seats can even be used after a minor car accident, check that out here based on manufacturer!
 - o If you do plan to have more children this may impact the desire to purchase seats that are meant for shorter-term use.

Congrats, Now You Selected a Car Seat

Once you have picked your seat it's important to realize car seats have different requirements based on the size of your child and that manufacturer. However some more universal guidelines for installing the car seat into your vehicle are:

- o When installing the car seat in your vehicle, EITHER the Lower Anchor Connectors OR the vehicle seat belt must be used through the rear-facing seatbelt path area. Typically, this rear-facing belt path will be near the leg area of the car seat.
- o If installing car seat using the seat belt method and your seat begins leaning due to the shoulder belt height, review your car seat manual for recommendations on using a locking clip, sliding latch plate, and ELR (emergency locking retractor).
- o Lower Anchor Connector systems have weight limits per car seat and car manual. Be sure to review both! My Graco car seats LATCH system maxes out at 40lbs.
- o Car seats also have a guide to show the car seat is at the proper incline in the vehicle, often times this will be on the side of the car seat but sometimes the guide is in the printed manual too. This guide or indicator should be reviewed throughout the installation process to ensure proper install.
- o Many infant car seats should be used in the vehicle with the carrying handle in an upright position. Check your car seat manual to determine appropriate use for your specific seat.
- o Most car seats require a top tether (or lower anchor connector) be used on a forward-facing harnessed car seat and sometimes on the booster seat with a back. Check your vehicle manual to determine where lower anchor connectors are located to ensure you aren't strapped into a cargo hook by accident.

¹¹ The Car Seat Lady <https://thecarseatlady.com/>

¹² Safe in the Seat <https://safeintheseat.com/>

- When a car seat is tightly installed and the top tether anchor is in proper use, it limits a forward-facing car seat from tipping forward by 4-6+ inches in a car crash. These inches could keep your child's head from hitting the vehicle seat in front of it, the door or console, or a fellow passenger.

Tips for safely buckling your child into the properly installed car seat are:

- Regardless of installation method being used to install the car seat, the seat belt or lower anchor connector belt must have flat, tight, untwisted straps. A properly installed seat should not shift more than 1" to the left, right, forward or back.
- Always ensure your child's harness is tight and fully buckled with the chest clip at arm pit level. Strap crotch buckles first, checking for the lower belt path to be flat and smooth across your child's hip and upper thigh area, then buckle the chest strap last for a snug and proper fit.
- Use the pinch test or reverse pinch test to ensure the harness is tight enough to be safe and to calm your mind about the harness being too tight.
- Your car seat manual will detail the crotch buckle positions permitted for use on your seat. The GENERAL rule is that your child's body should not be sitting on top of the crotch buckle (body not diaper); and there should not be gapping between the child's body and the crotch buckle position.

Every trip matters! If you are starting to sweat, don't. Unless you're buckling your seat in, sweating as you install is normally a clue you're doing it right. You've got this. Control what is controllable! ¹³

Need More Guidance?

Often times, parents are encouraged to install their car seat for a newborn and then head down to the CHP, fire station, or other designated first responder site to get a double-check on the car seat installation. It is easy to assume employees at these locations would know how to keep a child safe in a car seat. However, it is NOT SAFE to assume all first responders are properly trained as Car Seat Technicians.

When searching through the National Child Passenger Safety Certification program¹⁴ in July 2021 there were 15 registered technicians in Santa Barbara County and 12 in San Luis Obispo County. The lists I generated in July 2021 showed **some of these** technicians are employed by SB City Fire, Children's Resource and Referral, SB Cottage Hospital, Marian Medical Center, Carpinteria Summerland Fire, Lompoc City Fire, CHP, SLO Police Department, Pregnancy and Parenting Support, Community Action Partnership, Car seat 101, Kinship Center, County of SLO Dept of Public Health, The LINK Family Resource Center, and CHP.

To wrap this all up, car seat installation, proper car seat fit, and buckling up every single time is so important! Just as I would advise a client preparing for birth, I want to encourage you to continue educating and empowering yourself to know the proper uses of your vehicle and car seat. Don't rely on someone else to keep your children safe when it comes to the vehicle you use all the time. Read those manuals, connect with The Car Seat Lady, connect with Safe in the Seat, and with Certified Car Seat Technicians through the National Child Passenger Safety Certification program.

¹³ How to Buckle Up a Child in a Car Seat <https://thecarseatlady.com/buckling-up-rfo/>

¹⁴ National Child Passenger Safety Certification

<https://portalskcms.cyzap.net/dzapps/dbzap.bin/apps/assess/webmembers/secure/manage?webid=SKCMS&pToolCode=CERT-SEARCH&pAdd=Yes>