Baby Ergonomics Report

Ergonomics strives to improve the interaction between users and products, concerning effectivity, efficiency, safety, health and comfort.

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Posture in strollers

Support a good posture to improve comfort and health

Most modern strollers support adjustment of the angles of the back rest and the leg support independently of each other. This allows for many combinations of back rest and leg support positions. Several of the resulting postures are not comfortable for the child and may induce health problems. Strollers increasingly enable such unwanted postures. This does not benefit the child.

In this article, we explain which postures are ergonomic (comfortable and healthy), which postures should be avoided, and how professionals in the baby product industry can engage parents to use their products correctly.

Traditionally, the posture of a child in a stroller was upright, with legs vertical and feet supported by a footrest, see figure 1.

Many modern strollers offer a means of tilting the back support to a reclining position and putting up the leg support to keep the lower legs in a horizontal position. This horizontal posture enables the child to lie down flat to sleep, which is good, because sleeping on a flat surface is more comfortable than doing so sitting upright or semi-reclining. However, such strollers also allow for various other postures to be adopted, some of which are not very comfortable and may induce problems with health and development, for example the posture shown in figure 2.

We estimate that more than half of the current strollers in the Netherlands, France and Germany are forcing children to adopt uncomfortable and/or unhealthy postures.

Most strollers are perfectly capable of supporting a child in a good posture. Therefore, as the products themselves are not at fault, the way in which consumers use them needs to improve. This is easily achieved with just a little effort from professionals in the baby product industry.

What is a good stroller posture?

Babies that cannot yet sit upright by themselves should best lie down flat in a cot, see figure 3.

Children that take the initiative to sit and are able to sit upright by themselves should sit up straight with the lower legs vertical and with sufficient freedom to move. A bumper bar is advised. See figure 1 and figure 7. When children need to sleep, they will be most comfortable lying down flat.

What is the advantage of a good stroller posture?

The upright posture with the lower legs vertical is most comfortable for the child and promotes a healthy development of the child's brain, nerves, skeleton and muscles, reducing the risk of health problems in later life.



Figure 1. Traditional posture in a stroller: sitting upright.



Figure 2. Modern use of strollers: an uncomfortable and unhealthy posture.

Pushchairs, perambulators (prams), buggies and strollers are different terms for transport mechanisms in which children can be pushed along in a sitting posture. In this article, we use the word 'stroller' for all similar products.

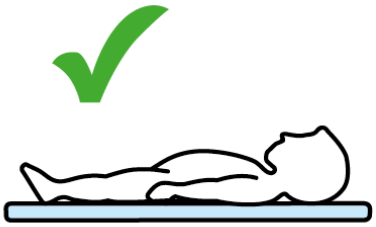


Figure 3. Good posture in a stroller for children who are not able to sit up straight.

Other postures and their effects

An inclined back support (see figure 4) is uncomfortable and unhealthy because it hampers the child's movements. Children love to move and they have a natural drive to do so. Freedom of movement is a necessary condition for a healthy development of brain, nerves, skeleton and muscles. Children should therefore have sufficient room to move their arms, legs and body, and to regularly change posture, even when they are sitting.

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A reclining position significantly limits this freedom of movement. Also, a supine position prevents the child from properly interacting with the world around it. A reclining posture may induce indolence and many other effects, which will be discussed in a future issue of this newsletter.

Combining a reclining or even horizontal back support with the lower legs vertical makes for a very uncomfortable experience. Not only is the posture itself uncomfortable, but with the seat horizontal and the back support at an angle, there will be a tendency for the child to slide down, causing uncomfortable friction between body, clothing and seat.



Figure 4. Inclined back support: not recommended when the child is awake or can not sit independently.

Combining an upright upper body posture with the lower legs supported horizontally (see figure 5) is also very uncomfortable. Try sitting on a floor with your back against a wall and your legs stretched out in front of you. How long before you need to change posture?

Evidence of the discomfort experienced by children in this posture can be seen in figure 6.

The stretched leg posture may also adversely affect the development of the spine and the peripheral nerve system. If the child is kept sitting like this for extended periods, the spine may become deformed and the development of the peripheral nerve system may be hampered, both of which may cause serious back problems in later life. This, too, will be discussed further in a future issue of this newsletter.



Figure 5. Straight back with legs stretched horizontally: not recommended.

The best stroller posture

The best stroller posture is seated more or less upright with the back support and the seat tilted back only a few degrees, and the lower legs vertical with the feet supported, see figure 7. A bumper bar is important because it gives children a support when leaning forward (e.g. when changing posture or interacting with the world around them). Even so it is wise not to let a child sit for too long at a stretch, however optimised its position may be. Sitting for extended periods is unhealthy, and this applies to a child in a stroller as much as to an adult working at a computer ('Sitting is the new smoking').

Small children

For small children with short upper legs the stroller seat may be too deep to sit comfortably in a good posture. In that case, they can be given the freedom to change between sitting with their legs on the seat and knees facing outside (rather than stretched in front of them), or leaning forward against the bumper bar with their feet down.



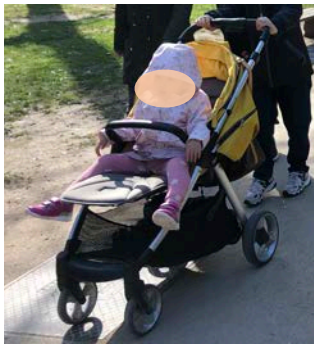




Figure 6. In strollers with horizontally raised leg supports children still manage to find ways to sit with their feet down. This is not very comfortable either.



Figure 7. Good posture in a stroller for children who are able to sit up straight by themselves.

Why use uncomfortable postures?

As there is no real reason to use uncomfortable postures, the current trend is suspected to be down to fashion. The best advice is to steer things into a more ergonomic direction.

Improving stroller comfort

To ensure that children are comfortable and healthy in a stroller:

Inform consumers and retailers to put the stroller seat back upright and the footrest down for children that have learned to sit (when they are awake). Include this information in the instructions.

In all visual communications, show strollers compatible with an upright posture: backrest up and footrest down. This includes shops and showrooms, fairs and any pictures used in marketing such as leaflets, brochures, websites and other digital media.

If necessary, adapt the design of the stroller.

Conclusion

For the benefit of children's health, good stroller postures need to be promoted. Sitting up straight with feet down must once again become the normal posture for a child in a stroller. ✳

Solid food? First sit up straight!

Sitting devices affect ability to eat solid food

We don't often think about it when we are enjoying a meal, but eating solid food is a complicated business. Swallowing is one of the most complex coordinated actions that a person can make. All the muscles involved must be controlled exactly at the right time, and the procedure has to be perfect every time as a single mistake may result in choking.

Since babies are unable to understand instructions on how to chew and swallow solid food, they have to learn how to eat solid food all by themselves. Usually this goes well, and parents can provide some support during the process, as I learned from speech therapist Caroline Arts.

Choking on food

Caroline is a preverbal speech therapist for children from 0 to 4 years old. She helps them if they have problems with chewing and swallowing food. At her surgery, she regularly sees babies who habitually gag and sometimes seriously choke when they are being fed. Their parents come to the preverbal speech therapist for tips on how to improve their child's ability to process solid food.

The first thing Caroline looks at when a child keeps choking is the posture it is in when eating. A person needs to sit up straight to be able to eat solid food, and there are two reasons for this.

Firstly, when eating in a (semi) reclining posture, gravity can easily cause a mouthful to go down the wrong way, resulting in choking. This happens more easily with babies, as their tongue and jaw muscle coordination has not yet sufficiently developed.

Secondly, the actions of opening the mouth and chewing will both go well only if the head is moved a little forward. If you are sitting upright, you do this automatically when eating. If you are (semi) reclining, this becomes a different matter altogether. Try eating with your head slightly pulled backwards and you will find that the movement of the lower jaw becomes limited, restricting the opening of the mouth, and makes chewing and swallowing almost impossible.

To make a baby eat well, let it reach for the spoon with its mouth. If the baby pulls its head back, as when you try to force it to take food, eating becomes very difficult or even impossible

Muscle tension for swallowing

Moreover, a baby may only receive solid food when it is able to sit upright on its own. Being able to chew and swallow requires muscle tension from the trunk, and the trunk will only have enough muscle tension if the child manages to sit of its own accord. It is useless to hold a child upright when it has insufficient muscle tension, because chewing and swallowing will still be a major problem. If the child has only just learned to sit, a good supporting chair can help the child during meal times. This is a time-limited solution however, since a child that cannot sit up by itself should not be kept in an upright posture for too long.

If a child can sit independently on its own initiative, it is certainly ready for solid food. If it cannot yet sit independently it needs to be seen if the child is really ready for solid food, as it needs to be able to make the necessary chewing movements. The age at which children manage all this varies. Some children can sit by themselves at 6½ months, others take 8 months. The general advice is to start a child on solid food before it reaches ten months.

Baby bouncer? No food!

There is a greater choking risk for children if they get fed in a baby bouncer, both with solid and pureed or liquid food.

One advertisement for a baby bouncer claimed that a baby could 'play, sleep and eat' in it. In other words, there was no need at all to get the child out of its chair, as it could stay in the bouncer all day. This is of course not a very good idea, because restricted movement impedes both motor and brain development. The use of a bouncer during feeding, for however limited a time, is to be discouraged due to the risk of choking. It is much better to keep the child well supported on your lap during feeding.

Facilitating eating and reducing choking hazards

Designers and manufacturers of high chairs can make their products to allow children to lean forward for feeding, even if they are constrained by a safety belt.

Manufacturers and retailers of bouncers can explicitly inform parents: "Do not feed children solid food in a rocking chair. This can lead to choking and suffocation. Give solid food only to children who can sit upright on their own."

Yes, eliminating choking hazards can be that easy. ✳

Sources of information

C. Arts, Slok speech therapy, www.slok-logopedie.nl

Handleiding Poster Best lastig. A. Boersen et al., Amsterdam UMC en GGD Kennemerland, november 2020.

Foot support width

To support the feet of a child in a high chair or stroller, a foot support needs to be provided. One of the requirements for a good foot support is that it should be wide enough.

The width of a foot support depends on three factors: the width of the child's feet, the width of its shoes, and the necessary moving space. For the width of feet and shoes, the largest size (i.e. of the oldest children) should be allowed for. For children 2.0 to 3.0 years old, the 97th percentile foot width is 6.9 cm. For each shoe, 2.5 cm must be added. Two feet in shoes therefore add up to 18.8 cm, which is rounded to 19 cm. Given a foot support width of 19 cm, nearly all children can put both feet on the support, but the children with the largest feet (and shoes) will not be able to move their feet or change position. As it is more comfortable and healthy for children to be able to move, the advice is to make the foot support as wide as possible, with at least 10 cm extra space for movement. Thus the minimum width for children up to 3 years old is 29 cm, but the wider the foot support, the better. ✳

New AAP guidelines to prevent cot death

Simple measures to reduce cot deaths do work

The Working Group on Sudden Infant Death Syndrome) of the American Association of Pediatricians (AAP) has improved its recommendations to prevent cot death. So what has changed?

Fewer cot deaths, but more other problems

Fortunately, the number of baby cot deaths has gone down dramatically, with Dutch figures down from 200 in 1986 to the current annual average of 25. Still, every cot death is one too many. And although strict advice to let babies sleep on their back has prevented a lot of cot deaths, other problems have surfaced, including cranial deformation, impaired motor development and posture problems at a later age.

These problems are addressed in the new AAP guidelines. The basic rules remain the same: always let the child sleep on its back, always on a flat, firm, horizontal surface, never in a (baby) chair, keep the sleeping environment clear of everything but a fitted sheet, breastfeed the child, do not smoke, and so on. The background of the rules is extensively explained in the 16-page article.

Tummy time

The new recommendations pay more attention to 'tummy time'. Tummy time promotes motor development and prevents a flattened skull and future problems with posture. For the first time a guideline with time indication is given: parents are encouraged to position their children on their tummy shortly after leaving the hospital (where all deliveries take place in the U.S.A.) regularly for a short time and under supervision when they are awake. The recommendation is to slowly increase the time to at least 15 to 30 minutes of belly position per day when the children are 7 weeks old.

Don't let a baby sleep in a seat

It has been recommended for some time not to let babies sleep in devices such as car seats, strollers, baby swings, baby carriers and slings, and this applies especially to children younger than 4 months. A new recommendation is to remove a baby from such a device if it falls asleep, and to move it to a crib or some other appropriate flat surface

Recommendations for industry

The following recommendations are included in the new guidelines. These provide designers, manufacturers, marketeers and retailers of baby goods with the instruments, and therefore the responsibility, to further reduce the number of cot deaths and improve infant health.

Product design

Do not produce unhealthy products that fail to meet the recommendations for safe sleep, including all products in which a child is not on a flat, firm, horizontal surface and all soft products such as pillows and head protectors for the cradle. Advice to consumers is to avoid their use, but it is of course much better not to put such products on the market at all.

Promotion and product placement

Do not promote unhealthy situations. Obstruction of breathing due to soft products or loose bedding is the most common cause of suffocation in babies. These products should never be used in the sleeping environment or together with a sleeping baby, and certainly not in advertisements, images and store displays. This means no advertising for a cradle with a soft head protector around the edge, no promotion video of a baby nest with a thick soft surround, no store display of a playpen with pillows and soft toys. In this way, consumers learn automatically and unconsciously what a safe sleeping environment looks like. This is an important contribution to the prevention of suffocation and cot death. ✳

Literature

Moon, R.Y., Carlin, R.F. and Hand I., AAP Task Force On Sudden Infant Death Syndrome, AAP Committee on Fetus and Newborn, 2022. Sleep-Related Infant Deaths: updated 2022 Recommendations for Reducing Infant Deaths in the Sleep Environment. *Pediatrics*, 150 (1): E2022057990. https://doi.org/10.1542/peds.2022-057990

Preventing cot deaths

"Avoid the use of commercial devices that are inconsistent with safe sleep recommendations."

"It is advised that media and manufacturers follow safe sleep guidelines in their messaging, advertising, production, and sales to promote safe sleep practices as the social norm. Media exposures (including movie, television, magazines, newspapers, websites, and social media), manufacturer advertisements, and store displays affect individual behavior by influencing beliefs, attitudes, and social norms."

(Moon et al., 2022)

This article appeared earlier in *BabyWereld,* Dutch trade magazine for the baby industry.

Colophon

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