

## Typical Development of the Legs and Feet

Children with flat feet do not have an arch while standing. This is normal in nearly all infants and many young children (**Figure 1**). In infants, the baby fat pad in the foot hides the developing arch. Young children have flat feet because they are loose jointed.

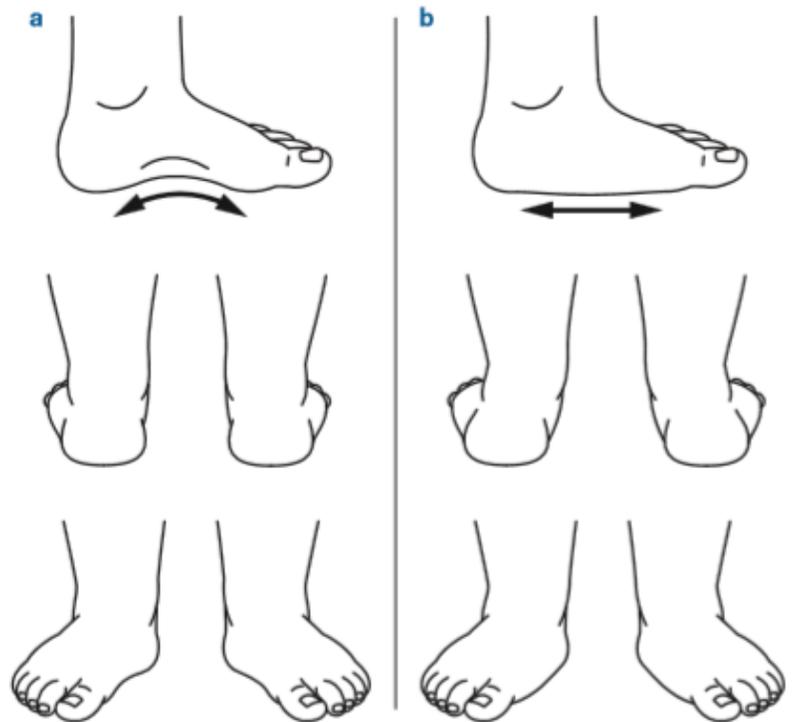
Flat feet are normally flexible. This means that you can see an arch when the feet are off the ground, or when the child stands on tip-toes (**Figure 2**).

Most children develop an arch in standing by around age six. However, about one in five children never develop an arch. Flat feet often occur in more than one member of a family. Most adults with flat feet have no long-term problems or pain.

Flexible flat feet in children do not require treatment. Shoes should be comfortable and fit well. Exercises or shoe inserts (arch supports) will not make an arch develop.

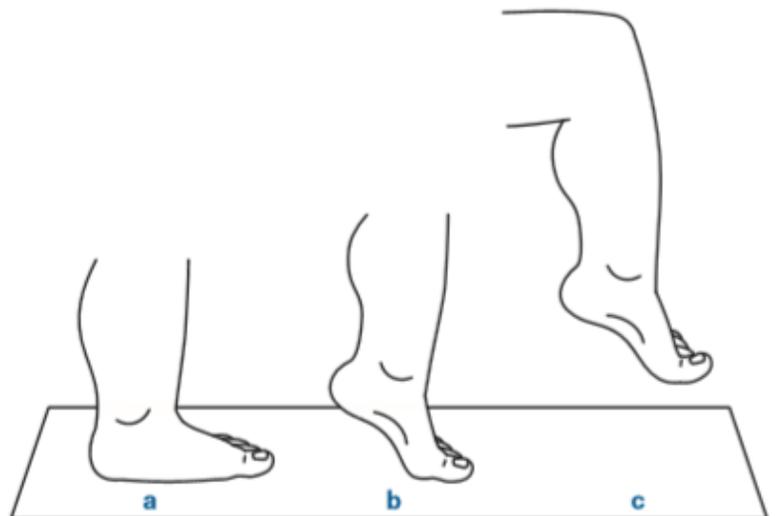
Consult your child's doctor if:

- your child has pain
- activity is limited
- only one foot is affected.



**Figure 1.** Children's feet may have an arch (**a**)

Flat feet appear flat with no arch (**b**)



**Figure 2.** In flexible flat feet (**a**) an arch is seen when standing on tip-toes (**b**) and when the feet are off the ground (**c**)

(Source: Department of Orthopaedics and Physiotherapy, The Royal Children's Hospital, Melbourne.)

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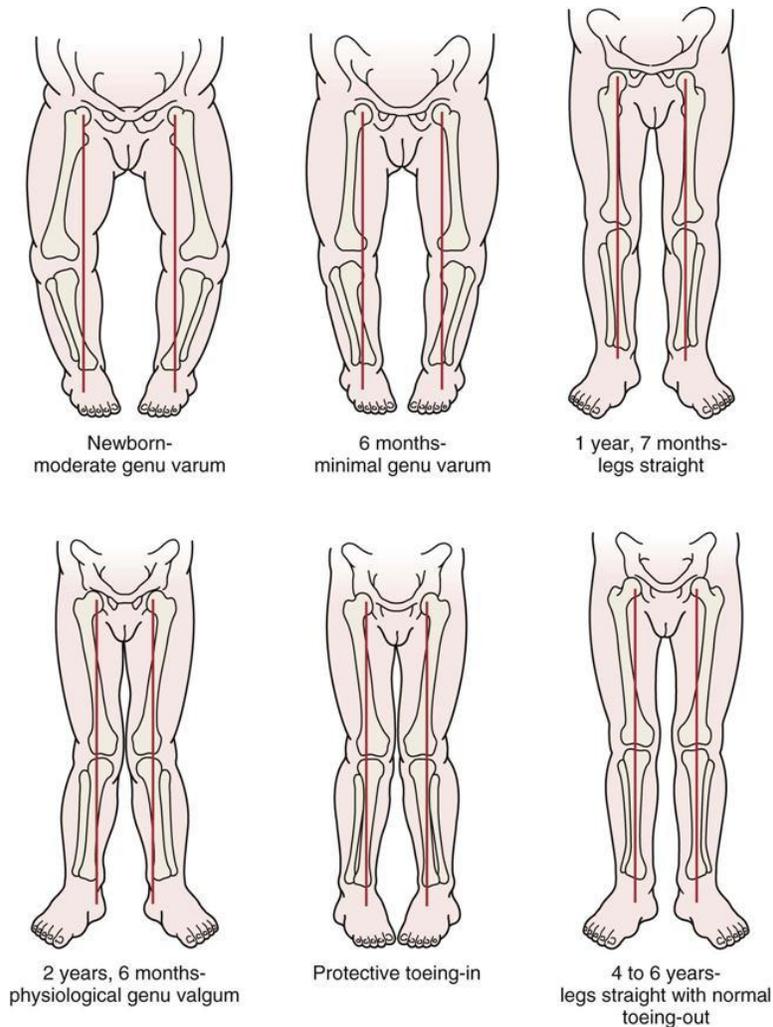
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(Source: <https://www.boundlessbracing.com>.)

Children's hips and knees alignment also varies as they develop, going from 'bow legs' and 'in-toeing' to 'knock knees' and 'out-toeing' and then 'straightening out' any time between 4 to 10 years of age.



(Source: S.K. Campbell et al., *Physical Therapy for Children*, 4<sup>th</sup> Ed., 2012.)

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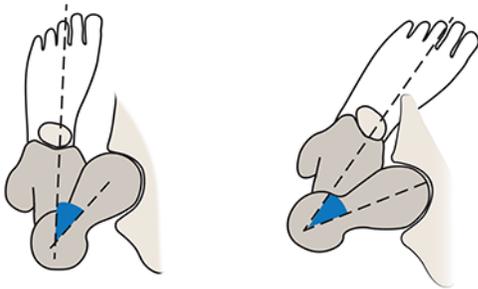
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A common reason for differences in alignment is:

- 1. Femoral anteversion:** Inwards twisting of the thigh bone (femur) causing the knees and feet to turn in, as a mean to better position the femoral head in its socket. The knees and feet remain in relative alignment though.
- 2. Femoral retroversion:** The exact opposite of anteversion where the thigh bone (femur) twists outwards.

**Typical development:** All babies are born with a lot of anteversion of the hips, and this usually straightens out by the age of 8 to 10. Even though these conditions are not believed to increase the risk of osteoarthritis in the future, Physiotherapists do want to ensure that all muscles and joints have the best alignment possible for optimal function.

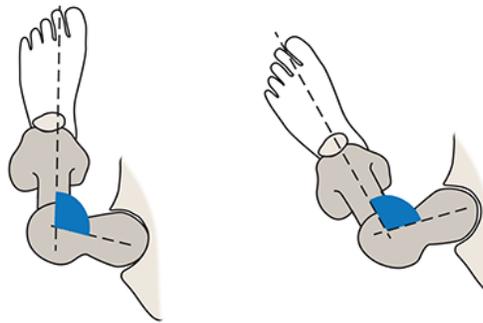
## Excessive Femoral Anteversion



Position of the femoral head with the foot straight.

Most patients with excessive femoral anteversion "in-toe" to better position the femoral head.

## Excessive Femoral Retroversion



Position of the femoral head with the foot straight.

Most patients with excessive femoral retroversion "out-toe" to better position the femoral head.

## Intervention

It is recommended that you consult with your pediatric Physiotherapist (PT) if your child has:

- **excessive** in-toeing (pigeon-toed more than 50% of the time) or out-toeing (duck walking more than 50% of the time)
- **pain** or **asymmetrical alignment** (one side is different)
- if your child's flat foot is **not** flexible (no arch ever)
- delays or **difficulties with learning new gross motor skills**, balance, coordination, and muscle tone/endurance/strength
- **W-sitting** the majority of the time (it's their go-to sitting preference).

Your child's PT will assess their joints' range of motion, muscles' strength, and gross motor development, to determine if they fall within normal limits or if there is a reason for any difference in alignment. Bracing/orthotics, special shoe modifications, and stretches are not *typically* necessary for these conditions, but your PT may recommend some. More importantly, your PT will recommend that

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your child avoids certain postures or activities, and they will provide you with strengthening and balance activities to do with your child.

In the very rare case that your child's leg alignment is measured to excessively be outside of normal age-range, if it is fixed (un-correctable with muscle action), or if it is constantly painful, affects functional, or it is very asymmetrical, your Physiotherapist will help refer your child to the appropriate medical services.

## **Some general advice regarding W-sitting**

### "W"-sitting Solutions

#### 1: Alternative ways to sit



- Tailor Sitting, or "Criss-Cross" Sitting: sitting with hips in flexion, abduction, and external rotation
- Long Sit: sitting with knees extended and hip flexion, with or without trunk support
- Side-Sitting: sitting with both feet to one side, with one hip in internal rotation and one hip in external rotation

- Squatting: encourages lower extremity and core strengthening
- Prone: laying on belly, supporting self on forearms
- Sitting on a Chair or Low Stool

#### 2: Core Strengthening

- If the underlying cause of "W"-sitting is core weakness, a home exercise program aimed at strengthening the child's core will help the child feel stable in other sitting options

#### 3: Hip Stretching



- Prolonged "W"-sitting can result in shortening of the hip abductors, solei, and hamstring muscles, making it difficult to achieve or maintain alternative sitting postures
- Exercises aimed at stretching muscles that have been shortened will help a child achieve alternative sitting postures

#### 4: Repetition and Verbal Cues

- Consistency with a verbal cue will help a child associate a specific phrase with changing their sitting posture, such as "Fix your legs" or "Criss-cross- applesauce"

#### 5: Seek Help

- Have your child see a licensed Physical or Occupational Therapist
- An experienced therapist will help your child work on strategies to decrease "W"-sitting and increase proper postural positions

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