

CALM FOR KIDS

PHYSICAL DEVELOPMENT
EARLY YEARS

Yoga and the Skeletal System

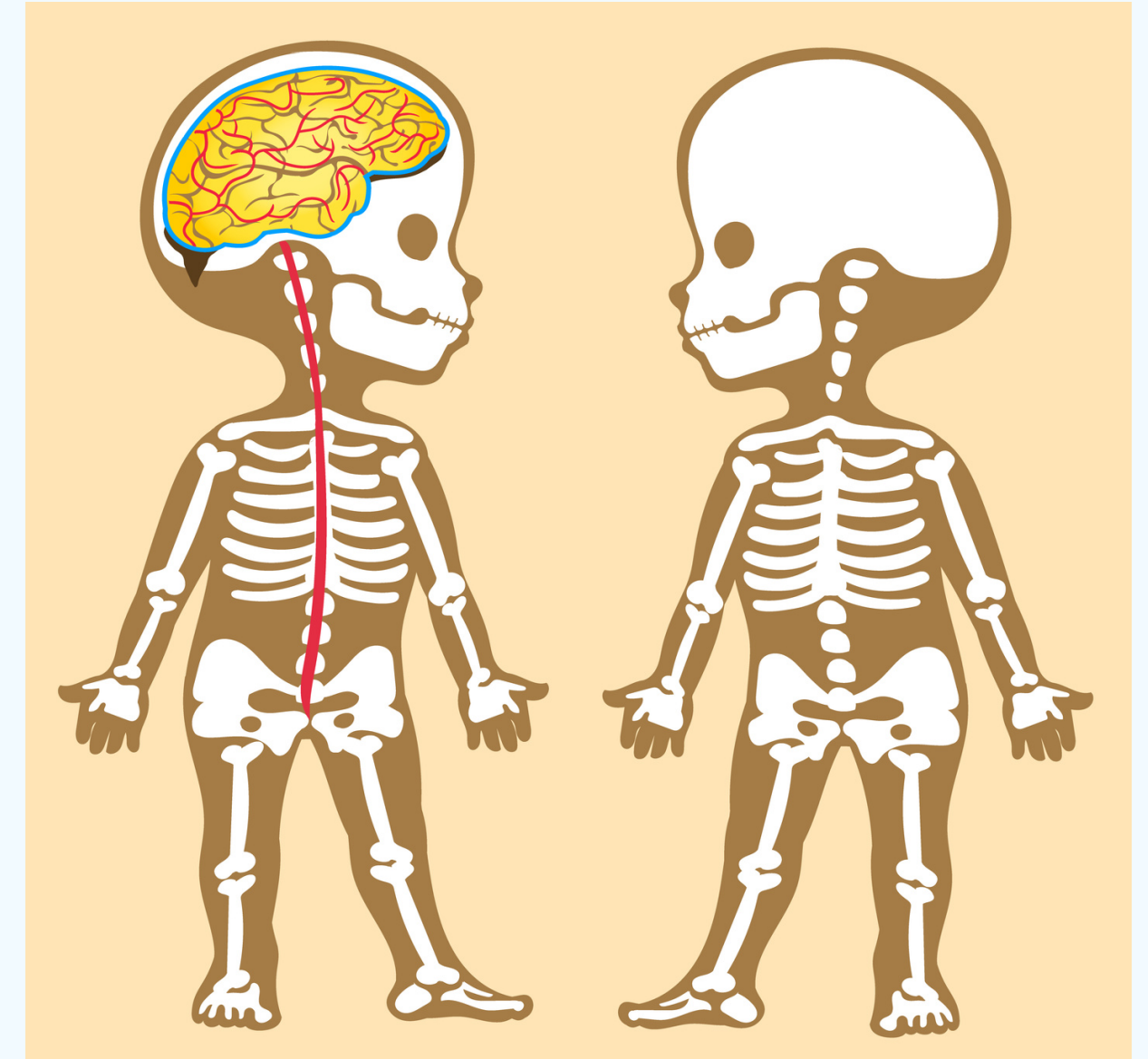
Yoga can help healthy bone development in children and adolescents.

- With very young children it is important to avoid putting too much weight and pressure on the bones as they are still forming.
- The main function of the skeleton is to support our weight and protect our vital organs. It supports our muscles and allows them to move at the joints.
- White and red blood cells are produced in our bone marrow.
- When children are born they have over 300 bones some of which partially fuse as they become adults.



Types of Bones

- Flat bones such as in our skull, ribs and shoulder girdle protect our organs.
- Long bones such as the humerus and femur in our arms and legs are where the muscles used for big movement are attached.
- The irregular bones in our face and our spine give shape and structure to our bodies.
- The short bones, mostly in our hands and feet are used for the fine movements of the body.
- Most joints in the body are synovial joints which move to varying degrees. These can be divided into several types.



Types of Synovial Joints - Pivot

- Pivot joints are a type of synovial joint that allow for rotation.
- A projection from one bone rotates in the ring shape of another, like a ring on a peg.
- An example of this is the joint of the first and second vertebrae of the neck which allows the head to move from side to side. Another example is the wrist joint that allows you to turn your palm upwards and downwards.



Types of Synovial Joints - Hinge

- Hinge joints are a type of synovial joint that allows for flexion and extension and sometimes limited rotation, such as in the elbow and knee. They are more stable than a ball and socket joint but offer less mobility.
- A spool shaped projection from one bone fits into the concave surface of another bone.
- Examples of hinge joint are the knee, elbow and the tibiotalar joint of the ankle.



Types of Synovial Joints - Ball & Socket

- Ball and socket joints offer the widest range of movement with flexion, extension, abduction, adduction and rotation.
- The ball shaped end of one bone fits into the cup shaped end of another.
- Examples of ball and socket joints are the shoulder and hip joints.



Types of Synovial Joints - Planar

- Planar joints offer a small degree of movement in all directions which is restricted by strong ligaments.
- The surfaces of both bones are almost flat and allow for gliding movements which is why they are sometime referred to as "gliding joints".
- Examples of planar joints are the carpal bones in the hands, the tarsal bone of the foot and the bones inbetween vertebrae of the spine.



Types of Synovial Joints - Saddle

- Saddle joints are bones with concave and convex areas that fit together.
- Saddle joints provide stability to the bones while providing more flexibility than a hinge or planar joint. They can move back and forward and from side to side.
- Examples of a saddle joint are the thumb and the planar joints of the foot.



Types of Synovial Joints - Condyloid

- Condyloid joints allow for flexion and extension and sideways movement. Similar to a saddle joint but with a lesser range of motion.
- The rounded end of one bone fits into the hollow part of another.
- Examples of a condyloid joint are the wrist and the metacarpophalangeal joints in the fingers.



The Spine - Cervical

- The spine consists of 33 vertebrae which are divided into 5 sections: the cervical, thoracic and lumbar spine sections and the sacrum and coccyx bones.
- There are 7 cervical vertebrae and the top cervical vertebrae, which attaches to the skull, is called the atlas. This rotates on the second cervical vertebrae, the axis.
- The cervical vertebrae are vulnerable in children and more mobile than in adults. Children have big heads in relation to the size of their bodies and the cervical vertebrae have to support this disproportionate weight.



The Spine - Cervical

- Due to the weight of the head, it is recommended to avoid asanas that extend a child's cervical spine. The muscles are not strong enough to support the weight. Poses such as camel should be modified so that the head is supported by a wall or you can lengthen the arms back to the wall as you keep the chin tucked forward.
- Although many kids of this age will have practised shoulder stand in gym class, start with a candle pose/half shoulder stand or legs up the wall shoulder stand. This age does not have the strength or stability for full shoulder stand so in a class setting, offer an alternative pose.

The Spine - Thoracic

- There are 12 thoracic vertebrae which support the ribcage. They have limited movement allowing flexion and extension, side to side movement and slight rotation.
- Twists with the under eights should be soft and gentle as this age group does not have the necessary muscle strength to support the spine. When teaching twists to the under eights ensure that they can lengthen and support the spine before twisting.
- Gentle supine twists are a good place to start with this age group.



The Spine - Lumbar

- The 5 lumbar vertebrae are the largest of all the vertebrae and have the maximum capacity for extension.
- It is important to avoid hyperextension in the lumbar spine as it can cause problems in later life.
- Avoid back bends from standing as although many children will do this quite naturally others will not have the strength in the front of the body to support the back bend, and it can result in overextension.
- When teaching prone back arches, encourage a sense of length through the whole spine, and if necessary, encourage your students to keep their belly button or lower ribs on the ground.



The Spine - Sacrum & Coccyx

- The remaining nine vertebrae are fused or partially fused and consist of :
- Five sacral vertebrae which are attached to the pelvic girdle and make a strong base to support the weight of the body.
- Four Coccyx which form the tail bones of the spine and are much smaller than the other vertebrae.



The Lower Limbs

- Due to the fold position in the uterus, children are normally born bow legged and this increases until the age of 18 months. The legs then begin to straighten on their own.
- By 3 or 4 years of age a knock-kneed configuration, where the knees angle inwards, develops.
- This usually straightens by the age of 6, leaving a slightly knock-kneed alignment that is within the normal range for adults.



The Lower Limbs

- Due to the alignment of their legs, children often have flat feet until the age of 6 as feet pronate inwards.
- The opposite of this is supination of the foot, where the lower leg bows out. Often caused by a weak arch.
- Yoga can help develop strength and stability in the feet which can not only help with balance but also avoid problems in later life.
- As yoga teachers we are often fixated on alignment but it is important to accommodate the development of our youngest students and keep the practice soft, playful and safe.



The Upper Limbs

- Our upper body is not designed for weight bearing but can take weight in an all fours position. The shoulder joint is shallow in comparison to the hip.
- Shoulder instability can be an issue for all children and with the very young, full weight bearing on the hands and arms should be avoided. Even for older children and into adolescence, extension and full weight bearing should be approached with extreme caution.
- Supported handstand is a great way to give the youngest children a taste of being upside down but make sure you support yourself as a teacher.



Bone Development

- The process of **ossification, where cartilage becomes bone**, begins in utero around 6 weeks old and carries on through puberty and often up to the age of 25.
- Between the the head of the bone, which is called the **epiphysis**, and the bone shaft, which is called the **diaphysis**, is a growth plate. As the bones increase in length, the cartilage in the growth plate turns into bone.
- "Bone age" is more important than actual age and even when our bones are fully grown, they can be kept strong by regular weight bearing exercise and a healthy, balanced diet.
- Bone development depends on a good supply of blood to the growth areas. As yoga improves circulation, it can have a beneficial effect on the skeletal system.
- It is worth noting that in children, "hard" tissue - developing bone - can be weaker than "soft" tissue such as ligaments and tendons.