



# YMCA Awards

Level 3 Applied anatomy and  
physiology  
2018

# Level 3 Applied anatomy and physiology

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## **Posture and core stability**

## Learning outcomes

By the end of this session you will be able to:

- Define optimal posture
- Identify the causes of postural deviations
- Identify the structure and function of the:
  - stabilising ligaments and muscles of the spine
  - core and pelvic floor muscles
- Differentiate between local (deep) and global (superficial) muscles that support posture

## Learning outcomes

By the end of this session you will be able to:

- Explain ‘local’ core muscular changes that can occur due to poor postural awareness/stability
- Identify medical conditions & spinal disorders that can occur as a result of postural deviations
- Describe the impact of core stabilisation exercise on posture and the potential for injury/aggravation of problems
- Clarify when stretching & strengthening protocols should be used to improve postural deviations

## Optimal posture

*'the arrangement of body parts in a state of balance'*

*'the body can carry its weight and that of gravity with minimal muscular effort and limited joint compression and shearing forces through the body'*

# The importance of optimal posture

- A solid foundation for all movements
- Optimal biomechanical efficiency
- Balance between the right and left sides and the front and back of the body
- Reduces the risk of muscle dysfunction
- Reduces the risk of injury
- Reduces the risk of degeneration of muscles and joints

**Static posture** - Alignment when the body is still

**Dynamic posture** - Alignment when the body is moving (walking, running, lifting)

**Neutral spine** - The position of the spine in which impact and forces can be absorbed and transferred most effectively



## **Causes of postural deviations – Birth defects**

- Achondroplasia (Lordosis)
- Congenital kyphosis
- Spina bifida (kyphosis)
- Congenital scoliosis

## **Causes of postural deviations - Environmental/ lifestyle factors:**

- Poor posture
- Poor diet
- Poor/unsuitable footwear
- Uneven carrying of load
- Pregnancy
- Obesity
- Osteoporosis
- Overuse/underuse of muscles leading to imbalance
- Compensatory patterns due to injury/poor technique

## **Medical conditions and spinal disorders which may be caused by postural deviations**

- Herniated disc
- Facet joint problems
- Scoliosis
- Stenosis
- Arthritis/Osteoarthritis
- Ankylosing Spondylitis
- Spondylolisthesis

## Core stability

*‘Ability to prevent unwanted movement from the body’s centre’*

Core stability - provided by three different systems:

- Passive system - Spinal column and spinal ligaments
- Active system - Muscular activity (local and global)
- Neural control - Feedback from the proprioceptors

# The effects of core stabilisation exercise on posture

- Greater coordinated movement – neuromuscular efficiency
- Improved balance – particularly for the elderly

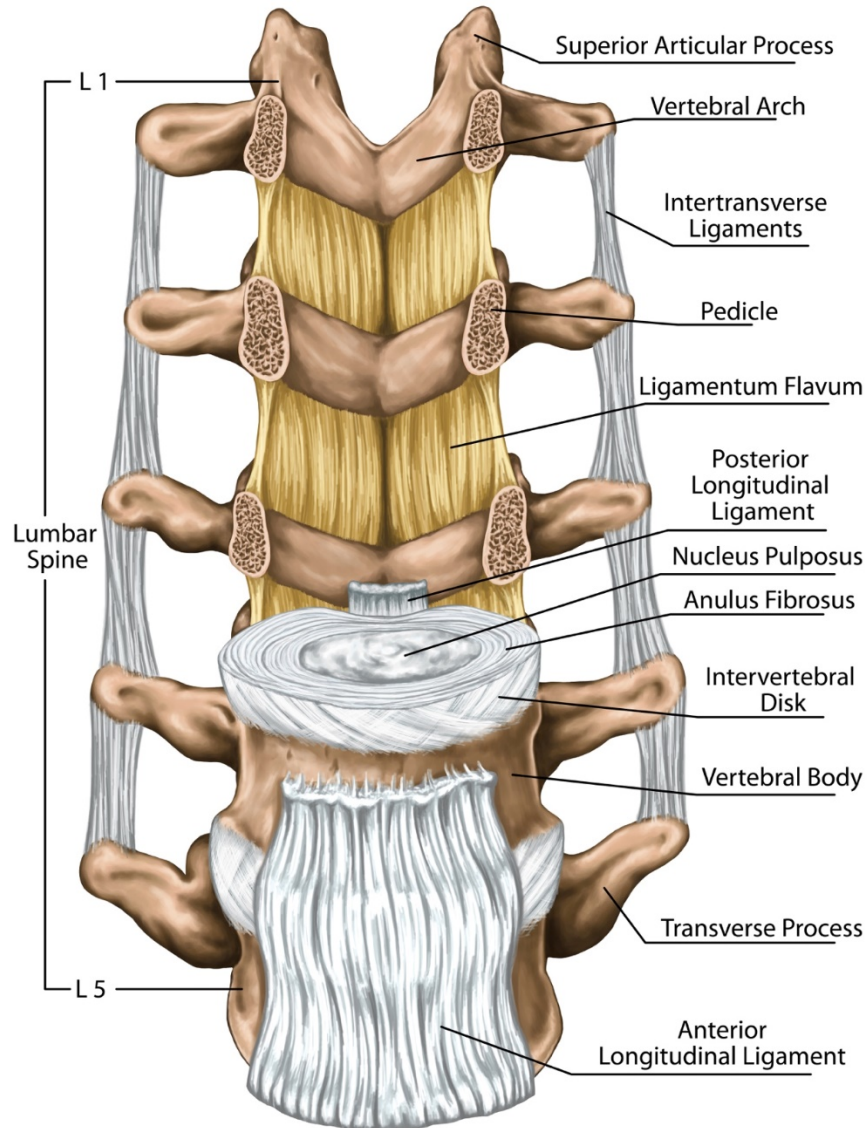
NB. Traditional strength programmes can further develop postural deviations

## **Benefits of core stability**

- Decreased injury risk
- Improved application of force
- Improved appearance
- Improved balance and motor skills
- Reduced low back pain
- Improved lung efficiency
- Decreased risk of falls in the elderly and frail

# Stabilising ligaments of the spine

- Ligamentum flavum
- Anterior longitudinal ligament (ALL)
- Posterior longitudinal ligament (PLL)
- Interspinous ligament
- Supraspinous ligament
- Thoracolumbar fascia (TLF)





## Stabilising muscles of the spine and core

- Quadratus lumborum
- Multifidus
- Erector spinae
- Transverse abdominis
- Pelvic floor
- Internal and external obliques
- Diaphragm



## Function of core muscles

- Contain and protects the internal organs
- Ensure greater mobility of the spine and trunk
- Stabilise the spine
- Promote optimal posture
- Stabilise the top part of the body over the bottom part
- Control the pelvic-lumbar relationship

## Structure of the pelvic floor muscles

- The pelvic floor is a double-layered (deep and part-superficial layer) broad sling of muscle from the pubic bone at the front to the base of the spine at the back of the pelvis
- Comprising the coccygeus and the levator ani.
- It consists of both fast and slow- twitch muscle tissue

## Function of the pelvic floor muscles

- Stability of the pelvic girdle
- Support for the organs of the pelvis and abdominal contents
- Support for the foetus when pregnant
- Continence control of urine and faeces
- Reflex activity to counteract changes in abdominal pressure (i.e. coughing, sneezing, nose blowing, vomiting and forced expiration)

## **Muscles that support posture**

- Local (deep) muscles are located close to the spine and are recruited prior to gross movement to prevent unwanted movement
- Global (superficial) muscles either prevent or produce a specific joint action

- Local core muscular changes can occur due to poor postural awareness and stability
- Muscle weakness leading to over compensation of other muscles – synergistic dominance
- Permanent shortening of overactive muscles

# Stretching /strengthening postural deviations



## **Excessive (hyper) Kyphosis**

- Stretching of the pectoralis major
- Stretching of the upper trapezius
  
- Strengthening of the lower trapezius



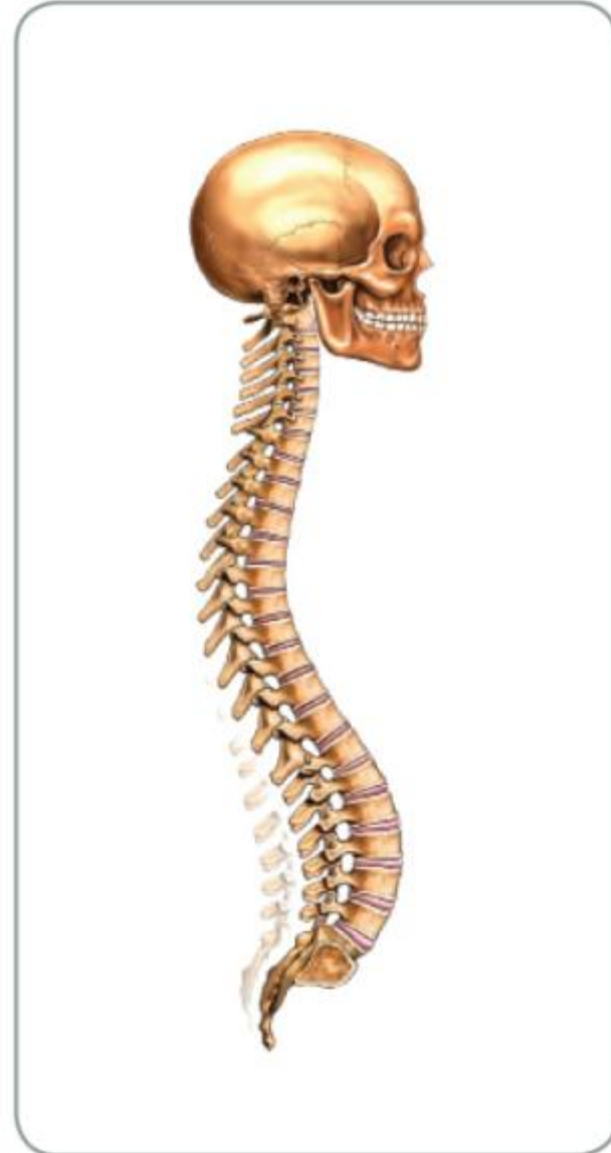
# Kyphosis



## **Excessive (hyper) Lordosis**

- Stretching of the hip flexor muscles
- Stretching the erector spinae
- Stretching the quadratus lumborum
- Strengthening the hamstrings
- Strengthening the gluteus maximus (in isolation where possible)
- Strengthening the core stabilisers (TVA in particular) and rectus abdominus

# Lordosis



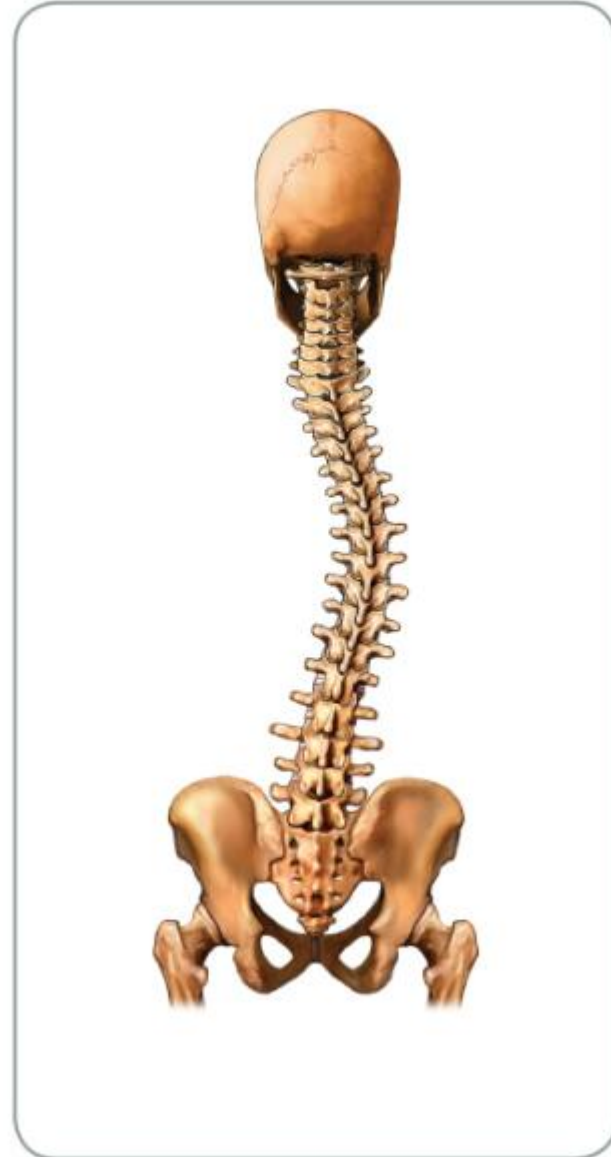
## **Scoliosis**

- Unilateral training and stretching
- Do not strengthen one side more than another

## **Swayback**

- Shorten hip flexors
- Encourage 'plumb line' posture bringing hips back to midline.
- This posture tends to be habitual with little muscular imbalance

# Scoliosis



## Flat-back

- Strengthen lumbar spine through full range extension
- Potentially strengthen hip flexors if there is posterior pelvic tilt present
- Encourage 'plumb-line' posture
- Associated with incorrect movement patterns – particularly in bending or lifting
- Can occur after disc injuries

