



## Down Syndrome and Physiotherapy

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# Who am I?

Chartered Physio  
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# Introduction

- Children with DS generally walk between 18 months to 5 years old (unless there are very significant other disabilities)
  - The discrepancy can be due to their physical development, learning difficulty, personality, family dynamics and their environment but **THEY WILL GET THERE!**
  - Our job is to give them the building blocks in their early development to allow them the best opportunities for the future. Walking too early can lead to problems, its about quality of movement.
1. Main difficulties that can influence development:
    1. Hypotonia and hypermobility –
    2. Learning Difficulties
    3. Difficulties with Sensory Integration

## What is Hypotonia (Low Tone)

- Tone refers to the tension of a muscle when moved passively.
- Hypotonia (low tone) is when a limb moves too easily, showing little tension or resistance.
- The child with DS can feel floppy when handled especially when still an infant.
- Tone is controlled by the brain.
- Muscle strength is not the same as muscle tone. Muscle strength is the active contraction of the muscle.
- Muscle strength is not affected in children with DS but the child may be weak though lack of movement caused by the low tone.
- Each child with DS will have a varying degree of hypotonia
- Children with DS generally have a more extended posture when they are born due to their lower than normal tone.
  - This puts them at an immediate postural disadvantage as they have to work harder to fulfil the first milestones (hands to hands, holding their heads in the middle).
  - Causes poor core stability.
  - Tone tends to increase with age in DS, possibly as muscle strength improves and over comes low tone.

# Effects of Low Tone

## **Tone varies hour to hour and person to person**

- Gross motor
  - Harder to initiate an activity - need to bring their tone to normal and then to active, twice as hard as other children
  - Less likely to be active so reduced underlying strength
  - Poor rotation (twice as difficult) and weight shift – 2D movements. (e.g. prone to sit).
  - Poor balance – not getting strength in muscles due to poor core stability
  - More difficult to achieve milestones.
- Fine motor
  - Distal actions are dependent on good central control. If core or shoulder stability is not good then fine motor activities will be harder for child.
- Body awareness and Sensory Integration - Decreased proprioception (where you are in space). Feel less therefore less sense of self in space
- Communication
  - Low tone affects mouth , tongue and swallow.
- Concentration and attention
- Behaviour
  - Passive child/ bossy child
  - 'Laziness'!
- Sight/hearing
- Oromotor function, wake up mouth with electric toothbrush, gentle and controlled by child. Eye muscles also work best at the end of range so child might turn head to one side to see more easily.

# What affects tone?

- Tone dependant on what you are doing
- Position
- Antigravity (sit vs. stand)
  - Supportive  
(a little more challenging will increase tone)
- Environment
  - Sound
  - Sight
  - Supporting surfaces
- Movement - Vestibular system
- Mood
- Challenges of task
- Illness
- Touch



# Hypermobility/ Flexible Joints

## What is it?

- Ligaments hold bones together at joints
- Ligaments are lax/ loose

## What are the implications?

- Overuse muscles to stabilise joints
- Use end of range of movement – locking out joints
- Typical lumber spine lordosis (arching of back), knee hyperextension, externally rotated hips, hyperextended neck, hyperextended elbows and fingers, flat feet.

## Longer term implications

- Want to avoid compensations.
- Potential for arthritis in joints

1 in 10 of UK are hypermobile/flexible



## Specific difficulties resulting from Hypermobility

- Unstable neck – Atlanto-axial instability - only now considered a concern if there is a direct fall on the head
- Lumbar hyperextension
  - leads to reduced recruitment of abdominal muscles = poor core (sit up from supine vs. from sofa).
- Instability of joints in hands
  - causes poor handwriting / fine motor skills.
- Hyperextending knees
  - Waddling gait
  - Poor grading of movement for higher level activities (stairs / climbing / jumping)
- Flat feet - 1 in 6 of population have flat feet, usually considered a normal postural variation.
  - Mobile flat foot
  - Causes unstable base so difficulty with balancing.



# Hypermobility and Hypotonia.

The 4 main difficulties due to low tone and hypermobility are;

1. Poor core stability with a lack of rotation
2. Poor shoulder stability
3. Poor pelvic stability
4. Lack of mid range of motion control

These areas have an influence on every other part of the body. Where there is instability, precision is much more difficult to achieve.

e.g. poor fine motor skills, poor balance.

Therefore you should try and find every day activities to improve these 4 areas

# What can you do about Hypotonia and Hypermobility (1)

- Improve tone while doing activities
  - Reduce support - take your hands off when possible, use less support, maybe use fingers not a whole hand to help them work harder. “a poke not a hold”
  - Ensure activity is interesting
  - Challenge child (not too hard and not too easy)
  - Change environment/ voice/ support
  - Change positions –
    - antigravity positions (preferably not lying down)
    - Standing frame/ gaiters
  - Use movement breaks throughout day when concentration is necessary
- Improve underlying strength
  - Prevent compensations – work on rotation, mid range positions/ activities
  - Keeping strong throughout range of motion – swimming, gymnastics, ballet, football
  - Discourage unhelpful positions, e.g. W-sitting.

## What can you do? (2)

### Specific problems

- Atlantoaxial instability
  - If your child has a fall to the head Look out for symptoms of cord compression and seek urgent medical care if they develop.
    - Neck pain, restricted neck movements, unsteadiness in walking, deterioration in bladder/ bowel control.
  - No indication to suggest restricting activities and sports with neck flexion will reduce the risk of dislocation.
- Fingers and hands
  - Finger strengthening exercises – putty/ resistive fiddle toy/ salt dough
- Flat feet
  - Orthotics/ supportive shoes – won't improve feet but give more stable surface. Try and get a boot that covers the bony parts on the sides of the ankle to provide good support. They may tend to curl their toes as you put a boot on so try and get boots that open all the way to the toe so you can open it up and ensure their toes are flat.
  - Work with shoes on and off

# Positions/ movements which help

## **Babies**

- On their tummy – use rolled up towel to bring elbows onto the floor or small wedge cushion
- Lying in a cocooned position using towels so they can get their hands to hands and hands to feet. And feet to feet for good proprioception
- Pull to sit to strengthen core
- Strengthen the “front chain” /flexion muscles/ front of the body muscles (neck and tummy mostly)
- Rubbing hands and fingers, pulling and pushing limbs. Vibrations to help wake up the body

## **Sitting**

- Only sit when they can get to sitting. Avoid putting them in sitting but encourage lying to sitting.
- Practice lie to sit going over 1 arm to push up (loads of rotation)
- When they are sitting – use a move ‘n’ sit cushion to keep them active. Try to have 1 leg bent so not fixing with straight legs
- Sat astride your leg to challenge their trunk while they have bent knees

## **Tummy time and hand and knees**

- Masses of tummy time to encourage to push up on hands
- Hands and knees over your leg so they get used to putting weight through hands.
- Sat back on heels makes this easier
- Keep them moving in hands and knees so they don't lock out their joints too much.
- Move ‘N’ Sit cushion and Wobble Cushions available easily on line (Amazon)

## Crawling

- Crawling is the ultimate gross motor skill which children with DS should be encouraged to use.
- Helps with hypotonia, hypermobility (midrange activities), core, pelvic and shoulder stability as well as rotation and balance and coordination.
- Better to hold back from independent sitting to ensure crawling.
- Longer in prone, more likely to crawl. Longer in sitting, more likely to bottom shuffle.
- Use wheelbarrow as soon as they can do it for shoulder stability.
- **CRAWLING IS KING**

## Standing

- Keep knees soft by pushing on backs of knees
- Stand with 1 foot on a step
- Stand on a wobble cushion

## Walking

- On uneven surfaces,
- Along a line
- Do steps as early as possible – up and down

See details on our '[Our Home](#)' page for children with mild physical difficulties.

You can find the page for [Core Stability](#), [leg coordination and balance](#) or [Shoulder stability and strength](#) for many ideas.

If your child moves on from here check the section on [Learning Difficulties](#) which is for children who are mobile.

# Sensory Difficulties

## Poor sensory integration

- Loose joints can lead to difficulty in awareness of movement of one joint against another so making it harder to know where their limbs are in space or where they have moved a limb. This makes movement and learning new tasks more challenging.
- Lack of vestibular input (Rocking, twisting, bouncing) and poor processing can lead to further low tone.
- Problems with auditory processing means linking conversation with gross motor skills may make the action more difficult \*\*
- Low tone can lead to vision difficulties – if tone is higher, visual skills will be higher.

\*\*Makaton useful to go along with learning to speak\*\*

Better Communication Bristol has a good Facebook group

“Out of Sync Child” by Carol Stock Kranowitz Excellent book on Sensory Integration.

## What can we do?

- Tactile and proprioceptive input throughout day.
  - Deep squeeze and rubbing, vibration – prepare for activities.
  - Tight clothes Lycra suits are used by OTs but you can also use tight sports tops (base layers, a rash vest used under wetsuits or sunsuits)
  - Heavy rucksack
  - Heavy work – e.g. (i.e. Carrying heavy objects/ pulling/ pushing activities.)
  - Carry box for teacher.
  - Fiddle toy / chewy toy
  - Electric toothbrush on lips before feeding
  - Linked with tactile and vestibular inputs.
- Vestibular input
  - Rocking – calming
  - Rotation/ bouncing – excitatory
  - Start/ stop
  - Lots of repetition

# Learning difficulty

## **What are the impacts for development?**

- It can take more practice to secure a skill for a child with DS.
- Learn by repetition – if stop doing a task they can forget again.
- Lack of curiosity and interest in surroundings.
- Learning will need to be tailored to their specific personalities and motivations.
- Poor persistence with a task. This can be due to indiscriminate praise for little effort when a baby is young. This confuses the link between effort and praise. Praise effort rather than result
- Same social understanding as anyone - can be as good at manipulating parents as any child!
- Visual learners – Makaton and PECS really useful verbal learning may be also difficult due to a hearing loss/ glue ear
- May stop progressing a skill – may be working on something else.



# Tips on how to play and work with your child



- Important to give praise when effort has been put in. i.e. Not indiscriminately praising every task as child gets confused. Will lead to better persistence in a task.
- Limit complexity of instructions and allow more time for processing the instruction when teaching a motor skill.
- Learning needs to be through self-directed activities for best carry over
- Putting too much pressure on a child to 'catch up' in his skills has been shown to make him perform worse as he becomes disheartened and gives up more easily.
- Only do as much as you are happy with knowing the restraints of your family and abilities of your child. The development of self esteem is as important as developing new skills
- Read your child's signs. If he is becoming resistant to exercises and he is made to continue, he may develop negative behaviours to avoid the therapy. Better to have a break and both come back recharged and with renewed enthusiasm.



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