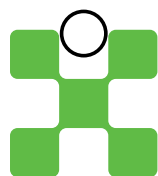


EDUCATION

HELP FOR PEOPLE WITH DOWN'S SYNDROME



**DOWN'S
SYNDROME
ASSOCIATION**
A Registered Charity

Fine Motor Skills in children with Down's syndrome – Information Sheet.

By Sandy Alton

DSA UK Education Consortium 2005

What are Fine Motor Skills?

Fine motor skills involve manipulation of the hands and fingers. Examples include picking up small objects, using scissors, writing, drawing, threading and tying shoelaces. They develop in a continuous process from birth to adulthood.

How do fine motor skills develop in children with Down's syndrome?

Children with Down's syndrome usually develop fine motor skills in the same pattern as typically developing children but with some delay, reaching milestones later than their typically developing peers. They also tend to perform skills less well than their peers, although there is a wide range of variability. Difficulties are especially noticeable in the early years and primary age range. They tend to decrease over time and, as they grow older, most children are able to achieve a perfectly adequate level of dexterity to enable them to participate in everyday life.

However, all motor skills improve with practice. Every time we perform a particular motor sequence or movement, the neural pathway (the connections made between the brain and the muscles involved) is reinforced again and again and we get better at performing the movement. Also, the more we use our muscles the stronger they become. It is vital therefore that children are given additional and appropriate practice and encouragement, from an early age, to develop their skills as much as possible.

There are several reasons why children with Down's syndrome may have delayed motor development.

Possible causes of delay 1: Cognitive skills

Research suggests that children with Down's syndrome have difficulties processing the information they receive from their senses and then co-ordinating their movements. This process takes longer than in typically developing children. Their motor-neuro pathways are relatively inefficient and take longer to become established. They may, therefore, need more practice than their peers to develop and establish these pathways. In addition, the more complex the task, the more difficulty the child has translating it into action. Tasks which require faster perceptual and cognitive judgments, are particularly hard, as they demand a greater level of co-ordination and planning.

Studies also show slower reaction times, with difficulties in adapting movements: asking children to tap **faster** resulted in them tapping with more pressure rather than increasing the speed (Frith & Frith, 1974).

As a result of the above factors, although the muscles themselves can perform the movements, they are often performed in a slower, more clumsy or un-coordinated manner.

Possible causes of delay 2: Hypotonia

Children with Down's syndrome commonly have hypotonia, although this tends to decrease with age. Hypotonia means low muscle tone and affects both gross and fine motor skills. However, the precise effects on the development of motor skills are not clear and more research is needed to investigate this further.

Possible causes of delay 3: Loose joints and ligaments

Ligaments are attached to joints and connect bones together. In children with Down's syndrome, the ligaments are looser and stretchier, enabling a wider range of movement and flexibility. An example of this is often seen in the hip joints of children who can sit cross-legged with both knees flat on the floor and their feet resting on their knees. The thumb joint can also be particularly lax causing additional difficulties when manipulating small objects and developing pencil control. Again, more research is needed to clarify the affect of this additional flexibility on the development of motor skills.

Possible causes of delay 4: Hand formation

The hands of children with Down's syndrome are often smaller and the fingers shorter and stubbier. The thumb is often set lower down. Some children may not have all of the usual wrist bones. These factors will inevitably affect the ability to hold and manipulate objects.

The following factors should be considered when working on improving the fine motor skills of children with Down's syndrome:

Improving skills 1: Stability

Good seating and positioning are critical in providing the stability needed to keep one part of the body still while moving another e.g. writing, tying laces.

- The chair and desk should be the right size. Knees should be in line with hips and feet flat on the floor, directly under the knees. If necessary, place a footrest under the feet. Elbows should rest comfortably on the desk.
- Working on a slanted surface or writing board can help children sit up straight for longer.
- A variety of different working positions and techniques (e.g., short periods working at the computer, desk, on carpet) may help the child work for longer.
- Allow short breaks to compensate for tiring more quickly than their peers.

Improving skills 2: Hand exercises

Before, during and after activities, encourage the child to do a variety of exercises to increase awareness of their hands and fingers, stimulate or relax them and restore blood flow, e.g.

- Open/close hands slowly and rapidly
- Shake hands and rub them together
- Tap thumbs to each fingertip in turn

Improving skills 3: Strengthening activities for wrists and hands

Make available some specific items to help strengthen the child's wrists, hands and fingers. Offer them when he/she finishes an activity early or needs a change. They could be: -

- A stress ball or small squashy ball – the child can count the seconds before it regains its shape.
- Tearing paper for collages or papier-mâché.
- Finger puppets.
- Wind up and squeaky squeeze toys.
- Pop-together beads, Lego and Multi-link.
- small items such as macaroni to pick up and put into bowls or small cups.
- Bulldog clips and coloured clothes pegs; the child can clip them onto the side of a box or tin.
- sponges or cloths to wring out.
- Tiddlywinks.
- Hammering pegs.
- Stacking cups, Russian dolls.
- small bits off plasticine/play dough to roll into balls or snakes.

Improving skills 4: Activities to develop perceptual skills & hand-eye co-ordination.

Children may need help with perceptual concepts. e.g. the ability to place a mark with finger or pencil on a selected point, move from left to right and top to bottom, beginning in the top left corner etc. Practice large movements involving the whole arms before trying smaller, finer movements and introduce a range of activities, which use a multi-sensory approach as developing sensory awareness will aid development of motor skills:

- Finger painting – use paint, flour, powder, sand, spray foam etc.
- Matching or tracking: connecting two identical pictures or shapes together with a pencil line.
- Touch screen activities.
- Finger rhymes.
- Building and stacking bricks, rings etc.
- Chalking on blackboard.
- Threading beads and lacing activities – The Lacing Shoe.
- Drawing vertical and horizontal lines beginning on a green dot & ending on red.
- Dot to dot activities, mazes and stencils.
- Making shapes with play dough
- Magna doodle and Magnetic fish games.
- Peg boards, inset puzzles.

Improving skills 5: Cutting

Cutting is a higher-level fine motor skill and often popular: Blunt ended metal scissors work best. Spring-loaded or self-opening scissors position the hand automatically in the thumb-up position and only need squeezing to close. Double-handed scissors enable adult hands to use the scissors behind the child's hands, to guide with the squeeze/release movements. Cutting straws and paper strips are good early cutting activities and card and heavy paper are easier to cut than normal paper.

Improving writing skills

Writing is a highly complex task including many skills in addition to hand-eye co-ordination, and is a result of motor, sensory, perceptual and cognitive processes working together. Multi-sensory, visual and perceptual motor activities will all contribute towards developing handwriting skills.

Improving writing skills 1: Pencil grip development

Initially children hold the pencil in their palm - "palmar grasp". Gradually the fingers extend out and the pencil is held between the thumb and fingers in a rather clumsy grasp but most of the movement comes from the wrist and arm. This is a "static tripod", or "immature tripod" grasp. Finally children develop a mature grasp holding the pencil between the tips of the thumb and first two fingers, and use small hand movements to control it - the "dynamic tripod grasp". The ideal finger position is between $\frac{3}{4}$ - 1 inch from the pencil tip.

Children with Down's syndrome often persist in using the immature tripod, anchoring the pencil against the base of the thumb and the side of the hand rather than using the tip of the thumb. They may need additional encouragement and activities to develop the correct grip.

- Use pegboards, which encourage the thumb and fingers to pick up in a tripod grasp.
- Use short stubs of crayons or chalk that won't fit into the palm.
- Use triangular pencils/crayons/thick markers or pencil grips to help cue the child to use a tripod grasp.

Children may not establish a dominant hand until later. Once the dominant hand is clear, encourage the use of that hand in all activities.

Improving writing skills 2: Pencil pressure

Pressure can be affected by position, type of grasp used and type of pencil. Most children use too little pressure resulting in lines that are faint and wobbly and writing that is slow and laboured. Felt tip markers may help as can a pencil grip to hold the pencil more firmly and also a sloped writing board, or to be less conspicuous, resting on a ring binder or lever arch file.

Improving writing skills 3: Letter formation and writing on lines

- Make letters with play dough. (Initially, make the letter on top of a large printed letter).
- Trace over or draw in between the outlines of large printed letters.
- Squared paper – the boxes help with consistency of letter size, writing horizontally and word spacing and can be gradually phased out as skills develop.
- Garden writing – a visual activity using 3 coloured lines, representing the sky, grass and soil to help children understand instructions for positioning and forming letters. See www.speechteach.co.uk.
- Cursive (joined-up) writing can improve writing. The child doesn't see each letter as an individual unit but as part of a whole and writing becomes more fluent.
- Draw the shape of a letter/number in the air before writing it on paper.
- Graded pre-writing activity sheets.
- Initially use widely spaced lines to allow for the child's larger printing.
- Paper with very dark lines can also help with orientation.
- Use *Rol'n'Write* (NesArnold) - a steel ball slowly traces the letter / numeral in correct sequence. The child can also follow the groove with their finger.
- Developmental / multi-sensory handwriting programmes such as *Write from the Start*, *Speed Up*, (LDA), and *Handwriting without Tears* (J.Olsen).

Finally remember: all motor skills improve with hard work and practice and children with DS will need more practice than their typically developing peers, to process, consolidate and improve their skills. Encourage independence in daily living skills, such as dressing and feeding, as early as possible and do not over-support. In addition, as strong visual learners, demonstration and visual instructions and strategies will tend to work much better than verbal instructions.

Further Reading

Bruni, M. (1998) *Fine Motor Skills in Children with Down Syndrome*. Woodbine House.

Frith, U. & Frith, C.D. (1974). *Specific Motor Disabilities in Down syndrome*. *Journal of Child Psychology and Psychiatry*, 15, 283-301.

Kerr, R & Blais, C. (1985) *Motor Skill Acquisition in Individuals with Down syndrome*. *American Journal of Mental Deficiency*. Vol 90. 3. 313-318.

Newton, R. (2004) *The Down's Syndrome Handbook, New Edition*, Vermillion.

Portwood, M. (1999) (2000) *Developmental Dyspraxia & Understanding Developmental Dyspraxia*. D. Fulton.

Sacks, B & Buckley, S. (2003) *Motor Development for individuals with Down Syndrome – An overview*. DownsEd.

National Office: Langdon Down Centre, 2A Langdon Park, Teddington, Middlesex TW11 9PS

Tel: 0845 230 0372 Fax: 0845 230 0373

e-mail: info@downs-syndrome.org.uk web site: www.downs-syndrome.org.uk

A charitable company limited by guarantee

Registered Charity No. 1061474 Registered Company No. 3310024 (England and Wales)

Registered Office Langdon Down Centre, 2A Langdon Park, Teddington, Middlesex TW11 9PS