INCREASING INDEPENDENCE AND FUNCTION IN SCHOOL AGED CHILDREN WITH DOWN SYNDROME

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Enable children to engage in & perform the *occupations* that are important & meaningful to them

- **Occupations**: activities that a child *wants* & *needs* to do within their day

Develop a child’s independence in the areas of:

- **Self-care** – toileting, dressing, hygiene, eating
- **Productivity** – academic tasks at school, employment
- **Leisure** – participation in recreational or social activities, hobbies
**Optimal Performance**

*Optimal Performance* occurs when:

- A child is motivated to perform a task
- The task demands are at the *‘just right challenge’*
- The environment is adapted to facilitate success

A child performs at their best when there is a balance between:

- **Person**
  - Internal factors & motivation
- **Occupation**
  - The task & it’s demands
- **Environment**
  - External factors in the environment
PERSON FACTORS

*Internal* factors of a child with Down syndrome

- **Motivation & interests**
  - Preferred toys & favourite activities

- **Cognitive skills**
  - Difficulty taking in, organizing & remembering information
  - Difficulty with planning, reasoning & problem solving

- **Learning style**
  - Visual memory is stronger than auditory memory
  - Preference for repetition & sameness
PERSON FACTORS

**Physical** Factors of children with DS

- Hypotonia
- Decreased Strength
- Short limbs
- Hypermobility
- Sensory processing challenges
- Medical conditions
**Occupation Factors**

The task & its demands

**What is involved in the task?**
- What are the steps of this task?
- What are the skills that are necessary to complete this task?

**What are the child’s skills?**
- What tasks can they do?
- How can we adapt this to be *the just right challenge*?
ENVIRONMENT FACTORS

- Important to determine the environmental factors that may be impeding learning & engagement in a specific setting

- The physical environment, along with the availability of supports, have an impact on the child’s optimal performance in a setting

- Adapt the environment to suit the needs of the child
Life Skills

Self Care Skills
- toileting, grooming, dressing

Fine Motor Skills
- bilateral coordination, dexterity

Gross Motor Skills
- postural control/ stability, muscle tone, strength

Sensory Systems
- Visual, auditory, tactile, gustatory, olfactory, proprioception, vestibular
Life Skills
Self Care Skills
toileting, grooming, dressing
Fine Motor Skills
bilateral coordination, dexterity
Gross Motor Skills
postural control/stability, muscle tone, strength
Sensory Systems
Visual, auditory, tactile, gustatory, olfactory, proprioception, vestibular
SENSORY SYSTEMS

Visual *(sight)*

Auditory *(sound)*

Tactile *(touch)*

Gustatory *(taste)*

Olfactory *(smell)*

**Proprioception** *(body awareness)*: tells us where our bodies are in space & how different muscles & joints are moving

**Vestibular** *(movement)*: maintain our balance and posture & understand where & how fast our bodies are moving
SENSORY PROCESSING

Ability to take in, organize & make sense of the sensory information received by the brain from the sensory systems, & respond appropriately
IMPORTANCE OF SENSORY PROCESSING

Children with sensory processing challenges may experience:

- Reduced participation in activities of daily living
- Impaired self-esteem & increased levels of anxiety
- Increased levels of frustration
- Difficulties with **self-regulation**
- Reduced participation in sensory experiences can limit a child's learning opportunities – children learn about their world through active exploration & experimentation with their environments
SENSORY PROCESSING CHALLENGES

- **Sensory processing** - ability to take in, organize & make sense of the sensory information received by the brain from the sensory systems, & respond appropriately

- Research suggests that approximately **49%** of individuals with DS experience sensory processing challenges compared to approx. **5 - 16%** of the general population

- Children with DS can experience differences in the way they process & respond to sensory information
SENSITIVITY VS SEEKING

**Sensory Sensitivity**
Children can be *over* sensitive to specific sensory input
- These children may be *fearful* or *avoid* certain sensations

*E.g.* *Unexpected loud noises* – *School announcements/School bell*

**Sensory Seeking**
Children are *under* sensitive to specific sensory input
- These children *seek* out greater than average amounts of sensory input
- Require more intense sensory input to be regulated

*E.g.* *Intentionally falling or bumping into objects*

Children can fall into either categories for each of the sensory systems
SENSITIVITIES

Common sensory processing challenges in DS:

• **Visual** – dislikes bright lights, overwhelmed or distracted by too much visual information

• **Auditory** – reacts strongly to unexpected or loud noises, or distracted by background noises

• **Tactile** – dislikes messy play or touching certain textures, or tags in clothing
SEEKING

- **Proprioception** (body awareness) – Enjoys jumping & crashing, bumping into others, enjoys being squeezed/squished

- **Vestibular** (movement) – needs to move constantly, can’t sit still, rocks or fidgets in chair

- **Tactile** – seeks out opportunities to feel textures on hands/feet or other body parts
SENSORY STRATEGIES

Sensitivities

- **Visual** – decrease visual stimulation & minimize clutter
- **Auditory** - remove unpredictable noises
- **Tactile** – Encourage exploration of new textures at child’s own pace

*Light diffusers*  
*Noise cancelling headphones*  
*Sensory Bins*
SENSORY STRATEGIES

Seeking

• Proprioception /Vestibular – incorporate functional heavy work breaks into the day

• Tactile - Incorporate fidget toys into daily routine
Life Skills

Self Care Skills
toileting, grooming, dressing

Fine Motor Skills
bilateral coordination, dexterity

Gross Motor Skills
postural control / stability, muscle tone, strength

Sensory Systems
Visual, auditory, tactile, gustatory, olfactory, proprioception, vestibular
GROSS MOTOR SKILLS

• Performing functional activities through large movements involving the entire body.
  o Running
  o Jumping
  o Skipping
  o Throwing
  o Climbing
GROSS MOTOR DEVELOPMENT

Foundations for gross motor development

- Muscle tone
- Strength (*upper limbs, trunk, arms*)
- Postural control & Stability
**Muscle Tone**

- Children with DS exhibit *low muscle tone*, where muscles have less tension & feel “floppy”
- Muscle *tone* is what enables us to keep our bodies in a certain position
- A child with *low muscle tone* may need to exert more effort when doing an activity to activate their muscles
- As a result may have difficulty maintaining their *postural stability* & may fatigue more quickly due to the extra effort required.
STRENGTH

Children with *low muscle tone* often display:

- Decreased muscle strength
- Decreased activity tolerance & endurance
- Rounded shoulder posture

All these physical factors contribute to reduced ability to sustain a *proper posture* to meet the demands of an activity

A *stable* base of support is necessary to facilitate hand function for fine motor tasks
HYPERMOBILITY

• The ligaments that hold the joints together are slack & easily stretched, which allows excessive flexibility & range of movement

• Flexibility in the joints limits a child’s control over their movements

• This can make it difficult to support themselves, as hyper flexible joints are harder to stabilize
POSTURAL CONTROL

• Large muscles of the body working together to stabilize the arms so hands/fingers are free to move

• The muscles of the shoulders, neck and trunk keep us in an upright position for sitting and standing

• Low muscle tone, decreased strength, and hypermobility contribute to reduced postural control

• These physical factors make it more difficult for children with DS to stabilize themselves to meet the demands of an activity
GROSS MOTOR ACTIVITIES

Increase *muscle tone*

- 10 star jumps
- Jumping jacks
- Running on the spot, stomping, jump rope
- Ball games – catching, throwing, bouncing

Improve *strength & postural control*

- Animal walks
- Wheelbarrow races
- Scooter board races
- Playground equipment – climbing, swings, monkey bars
- Yoga
POSITIONING
POSTURAL CONTROL & STABILITY

Proper Chair Size
- Feet flat on floor
- Ankles, knees, hips bent at 90 degrees

Proper Chair Position
- Seated comfortably, bend forward at the waist leaving a small space
- Arm should be 30 degrees angle from the body
**POSITIONING**

**POSTURAL CONTROL & STABILITY**

**Proper Desk Size**

- The height of the top of the desk should be approx. 90 degrees
- Arms should rest comfortably on desk top
- Clearance for your knees, thighs and feet
Life Skills
Self Care Skills
toileting, grooming, dressing
Fine Motor Skills
bilateral coordination, dexterity
Gross Motor Skills
postural control/ stability, muscle tone, strength
Sensory Systems
Visual, auditory, tactile, gustatory, olfactory, proprioception, vestibular
FINE MOTOR DEVELOPMENT

Performing functional tasks through small movements of the hands, wrists & fingers

- Drawing & Printing
- Cutting
- Fasteners *(buttons and/or zippers etc.)*
- Eating with utensils
FINE MOTOR DEVELOPMENT

• Foundational skills are important for FM development

• Children build on previously learned skills as they progress towards more complicated tasks

• Children will best learn skills through meaningful activities

Building blocks of optimal fine motor development:
  ◦ Tactile perception
  ◦ Postural control
  ◦ Bilateral coordination
  ◦ Dexterity
Tactile Perception

- **Tactile perception** involves sensory receptors sending information to the brain about what the fingers and hands are touching.
- Touch sensation enables us to feel things, and to understand what we feel making it an important component for developing FM skills.
- Helps the child learn to guide their finger movements so that fine motor skills can be more automatic.

**Difficulties with tactile perception:**
- Appear clumsy and drop objects
- Hold pencils very tightly
- Increased pencil pressure
DEVELOP TACTILE PERCEPTION

Providing children with a variety of sensory experiences where they can feel and do with their hands

- Better able to anticipate, discriminate and adjust their hand and arm muscles in response to sensory input

Activities can include:

- Hand and finger massages prior to fine motor activities
- Tactile adventure bins – sand, cornmeal, lentils
- Treasure hunt – hide small objects in playdoh
- Finger painting – paint, foam soap, shaving cream
- Kitchen time – mixing, kneading, washing dishes
**POSTURAL CONTROL**

- Ability to stabilize the body by integrating sensory input about body position with the motor output to coordinate the action of the body’s muscles

Important for:

1. Effective writing, drawing and cutting skills
2. Sit up in a chair without slouching
3. Sit cross-legged on the floor
4. Using the right amount of pencil pressure and pressing down on the paper
**BILATERAL COORDINATION**

Use of both sides of the body together in a coordinated manner to perform a functional task

Developmental Progression

- **Gross symmetric bilateral skills**
  - Holding objects with 2 hands, clapping, banging objects together
  - Stabilize object with one hand while manipulating with other
    - Holding a container while putting an object in it
- **Complementary two hand use**
  - Manipulating objects with both hands simultaneously
DEVELOPMENT OF BILATERAL COORDINATION

Gross symmetric bilateral skills
- Playing with toy instruments; banging drums, triangle, cymbals
- Playing catch / throw games to encourage coordinating both hands

Stabilize object with one hand while manipulating with other
- Stringing uncooked pasta on yarn or beads on pipe cleaners/ string

Complementary two hand use
- Pinching, pulling, squeezing, play-doh (*finding hidden objects, etc.*); as well as using the play-doh “tools”
- Snipping/ cutting with scissors- yarn, string licorice, play-doh, construction paper (*thicker*), coupons, etc.
Video
Dexterity

Skillful, precise and efficient hand movements

- Grasp (*pencil, utensil use etc.*)
- Finger Control and Coordination
- Hand and wrist movements

Importance of dexterity

Accomplish functional tasks such as dressing, feeding, and school related activities (*printing, coloring, cutting*)
DEVELOPING DEXTERITY

Puzzles

Wind Up Toys

Toys with buttons / switches

Patty Cake
Embedded beads/marbles

Finger Rhymes

Action Songs
FINE MOTOR SKILLS

Pencil Grasp / Dominance
Pre-printing Skills
Printing Skills
Drawing & Coloring
Cutting Skills
GRASP DEVELOPMENT

Development Of Functional Tripod Grasp
DEVELOPING TRIPOD GRASP

• Play with puzzles that have pegs for the children to grasp
• Build with Legos
• Playing games like *Operation* with tweezers to manipulate items
• Crafts
  o Tearing paper to make a collage
• Squirt toys
**Hand Dominance**

- Refers to the consistent favouring of one hand over the other for the skilled part of an activity.
- Typically begins to emerge in pre-school years and established by Kindergarten.

**What is Crossing Midline?**

- One hand spontaneously moves over to the opposite side of the body.
- Before this develops, children use the left hand on the left side of the body and the right hand on the right side of the body.
- Crossing the midline needs to be established so the dominant hand receives the practice it needs to become skilled.
DEVELOPMENT OF HAND DOMINANCE

Adapt the environment to facilitate crossing the midline of the body:

- For example
  1. Wiping down large tables
  2. Draw/trace large Figure 8’s
  3. Ball Passing games
  4. Worksheets or drawings
PRE-PRINTING DEVELOPMENT

Children begin experimenting with colors and strokes on paper – working on directing their hands

Developmental Sequence

• Scribbling & random marks on paper
• Separate strokes: *vertical*, *horizontal lines*
• Diagonal lines: X and +
• Simple shapes: square, triangle
• First letters: capital letters of name
PRINTING – TEACHING SEQUENCE

1. Imitating
2. Tracing
3. Copying
4. Printing Independently
FINE MOTOR WARM UPS

Activities to increase muscle tone

Arm and hand warm ups:

- *Playdough, plasticine or theraputty* – roll, pinch, squeeze, pound and make sausages, balls and pinch
- *Spray bottles* – water plants or make pictures by squirting water on the concrete
- Dig a small patch in the garden
PRINTING STRATEGIES

Handwriting Without Tears
• Build letters
  o Wooden letter pieces
  o Roll a dough letters (Playdoh)
• Stamp and see screen
• Big line, little lines, big curve, little curve

Wet dry try
• Slate chalk board
• Sponge cubes
• Little chalk pieces
  ◦ Imitate, trace, print
Video
**Drawing Development**

Developmental progression in drawing

- **Scribbles, traces of movement, and linear strokes**
  1. **Intentional figures**
      - Generic circle for face; lines for arms & legs
  2. **Recognizable figures**
      - More parts, accuracy in placing parts, may resemble subject
  3. **Figure in Scene**
      - Dimensional figure with familiar objects

2-year-old: scribbles, traces of movement, circular and linear strokes

3-year-old: intentional figure—generic circle for face, lines for arms/legs

4-year-old: recognizable figure—more parts, accuracy in placing parts, may resemble subject

5-year-old: figure in scene—dimensional figure with familiar objects at base of paper
COLORING DEVELOPMENT

Ability to color a picture
- Covering large paper with color
- Coloring medium sized area
- Coloring small design with attention to detail

Ability to use color
- Using color randomly / 1 per picture
- Using some colors appropriately
- Using colors appropriately

Ability to control stroke
- Coloring with random lines
- Accommodating paper to fit stroke direction
- Adjusting stroke to fit area
DEVELOPING DRAWING & COLORING

**Drawing**
- Introduce shapes and strokes in developmental order
- Build Mat man (*HWT*)
- Sing along CD (*HWT*)
- Step by step drawing

**Coloring**
- Use *wiki stix* or *bold outlines* to teach coloring inside the lines
- Provide coloring opportunities in different mediums
  - Paints, pencil crayons, markers, different colored chalk
  - Use large barrel crayons / markers for smaller hands
- Use vertical surfaces
  - Slant boards, easels or taping a picture to a wall
ADAPTIVE EQUIPMENT
PRINTING, COLORING, DRAWING

- Pencil grips
- Triangle Pencils
- Twist n’ Write Pencils
- iPad Stylus
- Wiki Stix
- Easel
- Slant Board
- Easel
CUTTING DEVELOPMENT

Developmental sequence
Interest
Holding
Opening & Closing
Snipping
Cutting Forward
Cutting a Line
Cutting Straight-Edged Shapes
Cutting Rounded Shapes
Cutting Complex Designs
Cutting Other Materials
DEVELOP CUTTING SKILLS

Tweezer games

Squeeze Games

Ripping Paper
ADAPTED EQUIPMENT

Choice of Scissors
• For small hands use scissors that don't require a lot of movement to open/close
• Metal blades work better than plastic (with rounded tips for safety)

Paper
• Paper with slightly heavier weight and stiffness is easier to cut when in the learning stage
Self Care Skills
Daily activities to maintain our personal hygiene, general health & wellbeing

Toileting

Dressing

Hygiene skills
  tooth brushing
  handwashing
  bathing

Utensil use
Life Skills

Self Care Skills
toileting, grooming, dressing

Fine Motor Skills
bilateral coordination, dexterity

Gross Motor Skills
postural control/ stability, muscle tone, strength

Sensory Systems
Visual, auditory, tactile, gustatory, olfactory, proprioception, vestibular
TEACHING SELF CARE STRATEGIES

- Positioning
- Task analysis
- Backwards chaining
- Social Modeling
- Visuals and visual schedules
- Rewards and Reinforcement
- Environmental adaptations (sensory preferences)
- Adaptive Equipment
POSITIONING

• Ensure child is in a stable position that provides adequate **postural stability** to carry out the task
• This alleviates the challenge of balancing and reduces fatigue

Sit down for Self-care tasks:
- Sit on a chair to don a shirt
- Sit and lean against the wall to don socks/shoes
- Sit on the step/stool to tie laces
Task Analysis

Step By Step
• Break down the task into small steps
• Determine which step the child is having trouble with and begin support there
• Use sufficient supports at first, then slowly fade to promote independence (maximal to minimal support)

Grading
• Progressively increasing or decreasing the difficulty, duration or frequency of a task/activity
Task Analysis - Example

Putting on a jacket

1. Orient the jacket
2. Put right arm in
3. Put left arm in
4. Pull to shoulders
5. Grasp zipper
6. Hook zipper
7. Grasp jacket
8. Zip up zipper
BACKWARDS CHAINING

Breaking down the steps of a task and teaching them in reverse order – *motivates and facilitates success*

*Putting on Jacket*

1. Orient the jacket
2. Put right arm in
3. Put left arm in
4. Pull to shoulders
5. Grasp zipper
6. Hook zipper
7. Grasp jacket
8. Zip up zipper

Help your child perform **steps 1 through 7** and then let them complete the task by performing **step 8**
Video
MODELING

• Model self care skills with family members, siblings and peers

• Practice the task analysis sequence within play

*Example*: Demonstrate getting dressed on a preferred toy or doll
VISUALS

Read **books** about the self-care skills

Sing **songs**

Watch **videos** about self-care skills

Create **social stories** - Pictello App
Demo
VISUALS

Visual Sequence
• Pre-teach steps using visual sequences

Visual Schedule
• Incorporate new skill into a daily routine
REWARDS & REINFORCEMENT

Rewards
• Provide feedback and assist with motivation
• Choose low cost activity based incentives
  o *i.e. time with a preferred toy or stickers*
• When child completes self care task, provide the reward immediately

Social Reinforcement
• Praise & positive feedback
• Specific i.e. “Great! You got dressed!”
• Rewards will eventually be faded out as child masters the self-care skill
Video
ENVIRONMENTAL ADAPTIONS

• Adapt the environment to suit the needs of the child
• Think accessibility!
• Ensure equipment is set up to facilitate independence
• Recognize child’s sensory preferences
Adaptive Equipment  Toileting

Supported seating

Small Potty  Ring Reducer  Foot stool

Equipment is set up to facilitate independence
ADAPTATIONS & EQUIPMENT

DRESSING

Clothing
- Recognize sensory preferences
- Choose loose, comfortable and preferred fabrics
- Pull over shirts to begin instead of button ups
- Elastic waist bands instead of button/zip pants
- Jackets with contrasting colors inside/outside

Socks
- Ankle socks
- Socks with colored heels
- Stripe across the toe
ADAPTATIONS & EQUIPMENT

Fasteners

- **Buttons**
  - Large buttons
  - Vertical button holes
  - Magnetic closures

- **Zippers**
  - Sturdy zipper
  - Small key ring or large bead
  - Easy to grab zipper charms
Shoe Laces
- Slip on or Velcro shoes
- No tie elastic laces
- Hickies
- Shoe lace clamps
- Lock or Snap laces
- Memory Ties
- Wide, flat laces
- Two different colored laces
Adaptations & Equipment

Dressing

- Dress up
- Dolls
- Dressing boards
- Dressing vests
- Dress up Dragon

Steps:
- Complete on the table in front of them
- Complete in their lap
- Complete on a doll
- Complete on another person (sibling or parent)
- Complete on themselves
**Grooming**

- Hair brushing
  - Built up handles
  - Detangling brushes

- Tooth brushing
  - Electric tooth brush

**Bathing**

- Long handled sponge
- Hand held shower head
Adaptations & Equipment

Utensils
- Child sized spoons with easy grip handles
- Built up handles or foam tubing assist with grasp
- Spoons that curve inwards
- Spoons with flat shallow bowls
- Stickers on handles

Dishes
- Raised sides to scoop against the sides
- Flat shallow bowls
- Non stick dishes and placemats

Utensils
- Built Up Handles
- Curved utensil
- Scooper Plates
- EZPZ Happy Mat
ADAPTIVE EQUIPMENT

CUPS

- Recessed Lid Cup
- Munchkin Silicone Lid Cup
- Cut-out Cup
- Honey Bear
- Take and Toss
- Camelbak Bottle with Bite Valve
Life Skills

Self Care Skills
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Questions
EQUIPMENT RESOURCES

School Specialty Canada
  ◦ www.schoolspecialty.ca

Wintergreen Learning Materials
  ◦ www.wintergreen.ca

Flaghouse
  ◦ www.flaghouse.ca

Odin Books
  ◦ www.odin.com
REFERENCES


Continence Society of Australia (2010). One step at a time: A parent’s guide to toilet skills for children with special needs. Victoria, Australia: Commerce Press.

REFERENCES


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