The Role of Sensory Integration in Learning: When and Why a child might need a sensory-based occupational therapy evaluation

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Author of the Body Activated Learning Handbook

Sensational Achievements

BODY ACTIVATED LEARNING

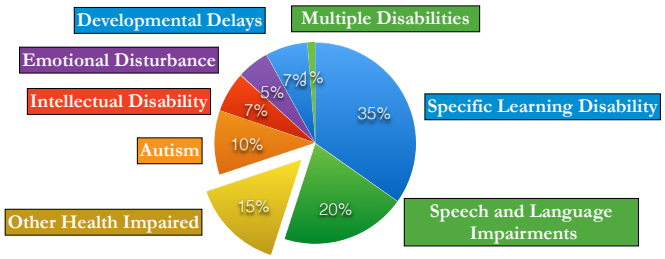
Day 1

1. Understand the different types of sensory processing disorders and impact on learning/behavior in the school setting
2. Understand the changing needs of this generation as it relates to screen time/increased use of technology
3. Get ideas for questions to ask at PPT meetings and how to advocate for a sensory-based OT IEE
4. Expand your understanding of the role of the senses in learning and how you can use that to improve goal specificity and support intervention planning via individual and classroom strategies.

Day 2

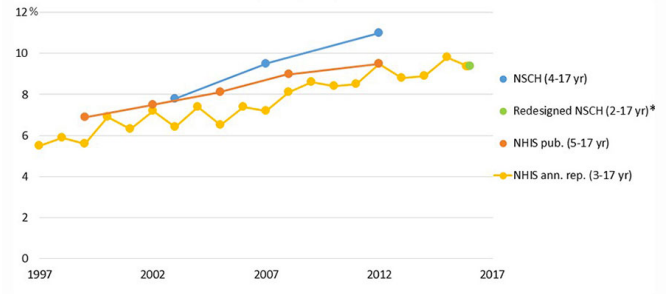
- Strategies to review the scope and limitations of school based testing when requesting an IEE,
- Evaluation of a Sensory Diet Plan and Parent Collaboration under COVID Restrictions
- Experiential learning of possible movement interventions that expand on traditional sensory diets to address the core underlying sensory integration deficits using the Body Activated Learning™ framework.

Types of Disabilities of Children Receiving Special Education



SOURCE: U.S. Department of Education, National Center for Education Statistics. (2019). *Digest of Education Statistics, 2018* (NCES 2020-009), Chapter 2.

Percent of Children with a Parent-Reported ADHD Diagnosis



https://www.cdc.gov/ncbddd/adhd/timeline.html

What has happened with COVID-19

- Smaller general education class sizes
- Scheduling issues with hybrid models and distance learning
- Teletherapy
- Loss of access to flexible seating, shared sensory materials and shared equipment
- More seated work and screen-based learning

Flexible Seating Options

Balance Ball with Inflatable Base by Trideer

UP™ Stool

AlphaBetter Adjustable-Height Stand-Up Desk by Safco

Ergo Seat

School Age Thinking Box

Pinterest: SensationalAOT

The Senses and Learning

Problem-Solving, abstract reasoning, creativity, citizens of the community, volitional behavior (Executive function, ideation)

Integration with cognitive and language concepts (Praxis/Play/Communication/Purpose/

Internal Feedback/Learning/Sensorimotor development

Tactile, Visual, Auditory Exploration of Materials and the world through movement

So What is Sensory Integration?

The way the brain takes in and organizes information from the environment and from our bodies to adapt and respond to everything we experience throughout the day

The Senses We Know

Taste (gustatory)

Hearing (auditory)

Touch (tactile)

Smell (olfactory)

Sight (visual)

The Hidden Senses

Proprioception:
Provides awareness of where body parts are and what they are doing
(receptors in muscles and joints)

Vestibular:
Responsible for sense of balance, space and speed/ direction of movement
(receptors in the inner ear)

Sensorial Assumptions

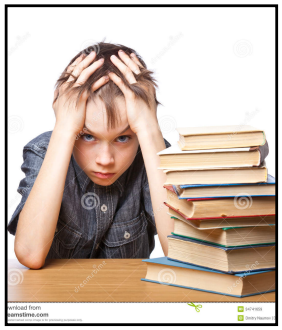
- Adequate orientation to and processing of sound
- Good body awareness and body
- Stable posture and adequate coordination
- Good auditory processing
- Adapts and responds appropriately to sensory
- Uses vision to guide body, direct actions, and sustain attention to task
- Adequate spatial perception and movement

Sensorial Assumptions

- Emotional
- Disruptive
- Disconnected
- Rigid
- Inattentive
- Behavior issues
- Clumsy
- Off-Task
- Poor transitions

You expect me to…

- *Learn*
- *Behave*
- *Be nice to my friends*
- *Listen*
- *Communicate*
- *Sit*
- *Get my work done*



Development: Piaget's 4 Cognitive Stages

0-2 Years	Sensorimotor stage: sensory experiences and physical action
2-7 Years	Preoperational stage: words, images, symbolic thinking
7-11 Years	Concrete operational stage: logical reasoning and classification of object/
11-15 Years	Formal operational stage: abstract reason, idealism, complex logic

Dr. Ayers Believed….

- Most children have the desire/Inner drive for participation in sensorimotor and learning activities
- Learning is a multisensory process dependent on the integrity of sensory structures and sensorimotor experience
- Senses interact and link with higher-order centers of the brain to promote learning and development (Ayers - "Sensory Integration")
- Abstract reasoning, perception, language, and learning evolves from these experiences

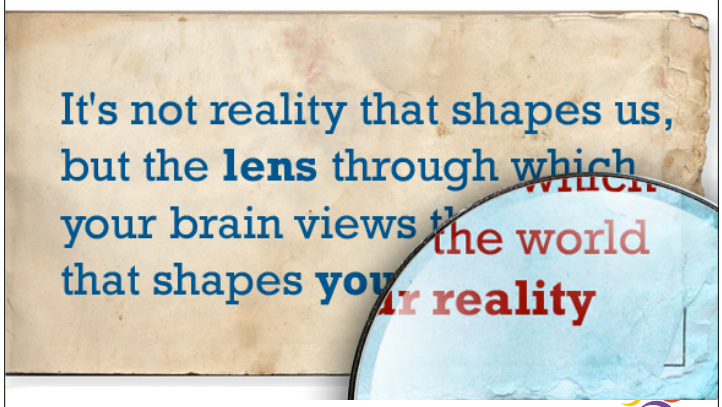
What about Children with SPD/ SID?

- Ayer's research showed that children with sensory integrative dysfunction showed little inner drive to be active participants, try new experiences, or meet new challenges
- Individuals who have a decreased ability to process sensation may also have difficulty producing appropriate actions, which, in turn, may interfere with learning and behavior.

Improving Sensory Processing



- Enhanced sensation, as a part of meaningful activity yields an adaptive interaction and improves the ability to process sensation.
- Supporting development of the sensory foundations along with motor skills leads to a stronger inner drive to seek out growth-promoting opportunities that further enhance sensory integration.



What We See in this Generation

- Health: More children with food allergies, sensitivity, and compromised immune systems
- Neurological Development: More children with underdeveloped nervous systems and non-specified learning difficulties
- Vision: Eyes don't guide the body, visual skills aren't developing impacting reading and writing skills.
- Increase in children with limited attention spans and poor self regulation
- Limited play skills and independent exploration, especially involving motor skills
- Decreased exploration, initiation, and problem-solving skills

Categories of Sensory Processing

Sensory Modulation

- ability to regulate and determine the importance of sensory input

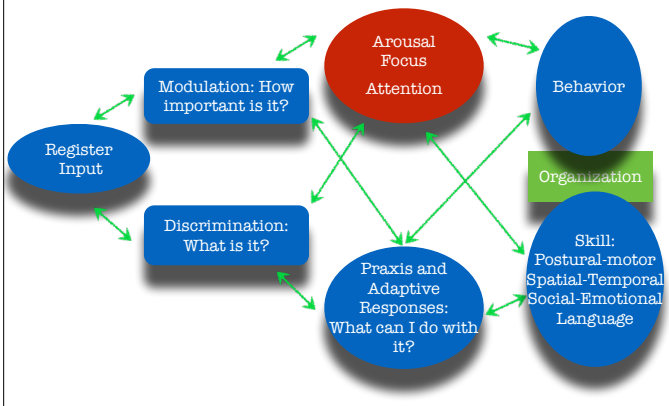
Sensory Discrimination

- ability to understand and differentiate between sensory stimuli

Sensory-Motor Based Skills

- Postural control and coordination
- Praxis skills (developing ideas, planning, and

Sensory Modulation Disorder	Sensory Discrimination Disorder	Postural-Ocular Disorder	Dyspraxia
• Easily distracted • hyper aware of touch and/or sounds in the environment • Rigid/Controlling behaviors • Defensive reactions to food and/or clothing textures • Easily distracted by sensory stimuli • Lack of response to sensory stimuli • Disconnected/Disengaged	• Poor force grading • Easily disoriented with movement • May/may not have anxiety with movement • May seek sensation via movement, bumping into peers, or putting objects in their mouth • May have poor balance and body control	• Does not use vision to guide his/her body • May be unsafe or overly cautious • May avoid unpredictable environments • Falls/loses balances easily • Trips/Is Clumsy • Difficulty sitting still for long periods • May fidget/move around a lot • May seek sedentary play versus gross motor activities	• Difficulty completing daily activities • Difficulty following multi-step directions requiring motor skills • Often takes an awkward approach to novel motor tasks • Takes a long time to learn new skills • May have poor handwriting and/or fine motor skills • May avoid team sports or coordinated activities
What is it?	**What is it?**	**What is it?**	**What is it?**
Over or under-responsivity to various types of sensory inputs that can worsen in times of stress. It is often observed as emotional outbursts, withdrawal, and negative responses to situations that don't seem to bother others.	Difficulty understanding the details of sensory information resulting in limited or inaccurate body feedback. It can result in disorientation, confusion, and clumsiness or trigger sensory-seeking behaviors to get more feedback.	Presents as poor postural control, tensing, and use of compensatory strategies such as relying on arm strength due to lack of dynamic body control. Inadequate use of vision to guide body movements impacts safety.	Presents as difficulty developing ideas about what to do with one's body and objects as well as difficulty planning/organizing and following through with activities. It is typically most obvious with new learning tasks, novel activities, or activities done infrequently.



Teresa May-Benson's Model of Sensory Integration
Revised from Koomar, Szklut, Raredon, Trecker and OTA Staff, 1996 in 2007

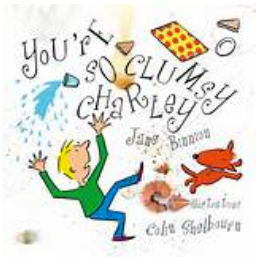
Praxis and Learning

- **Ideational Praxis:** The ability to recognize object/ environmental affordances (-ables) to generate a goal for a purposeful action and some idea how to accomplish the goal.
- **Sequencing Praxis:** Being able to combine a series of motor actions into a purposeful plan (up to 3 steps)
- **Execution:** Relies on feedforward (motor preparation to execute the plan) and internal feedback to improve performance

How are Praxis and Executive Function Different?

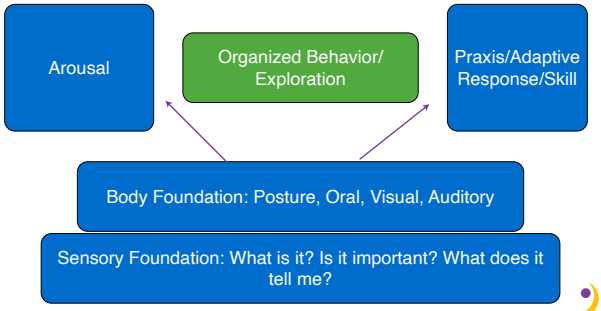
- **Executive function involves the orchestration of information from many parts of the brain to plan activities over space and time**
- **Planning and organization is an outgrowth of the ability to conceive long-term goals and form a plan of action**

- **Praxis always involves motor actions/ interactions**
- **It is NOT imagination and creativity**
- **Often precedes development of higher level executive function skills.**



Most children with dyspraxia can and do try harder than other children to be successful in school. However, If you are dyspraxic, "trying harder" can only be effective when parents, teachers, and support staff understand the problem and can employ the appropriate strategies that can be used to facilitate a child's learning

The Balancing Act



Adapted from Foundational Supports for Function

Sensory Processing Disorders and Social Participation

- Patterns of sensory avoiding and sensory sensitivity on the Sensory Profile displayed the strongest correlations between social performance and sensory processing (Hilton, Graver, & LaVesser, 2007)
- Sensory processing deficits often have an impact on social performance which can alter the experiences during peer interactions
- Children with Developmental Coordination Disorder spent more time alone and were often on-lookers in social, motor-based play (Smyth & Anderson, 2000)
- Children who self-select out of social opportunities due to motor deficits narrow their experiences around which to form language

Self Regulation Foundations

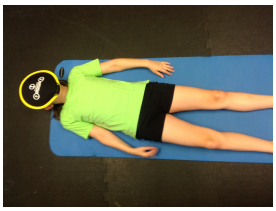
How Do You Improve Modulation?

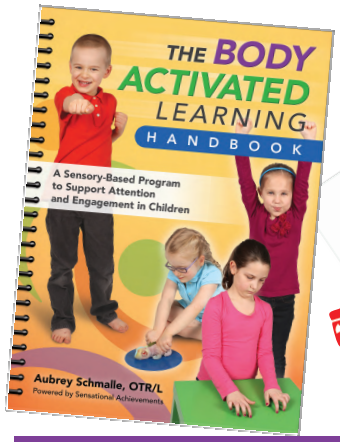
arousal/Organization and use of Body Activated Learning

- OT and Caregiver: Input to Improve Body Awareness for skill
- School and Private OT: Sensory Stimulation Protocols: Wilbarger Brushing Program, Spinning Protocol, Listening Programs
- Private OT with Caregiver: Progressive Desensitization techniques to improve tolerance of sensation

Supporting Self Regulation

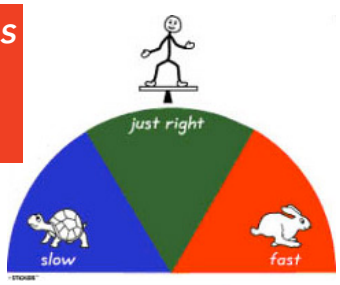
- Sensory Snacks (quick supports)
- Sensory Breaks (3-4 longer movement breaks)
- Supportive Leisure (Daily/Weekly)
- Environmental Modifications: Time, tolerance, safe spaces, toolbox





Tools for Success

Common Programs for Regulation



Classroom Thinking Box

Thinking Box: Adolescents

How Do We Improve Discrimination and Motor Skills?

- Sensory Integrative Treatment
- Listening Programs/Forbrain
- Body Activated Learning
- Specific treatment exercises that train sensory systems to work together

Activate


Move, Learn,Connect

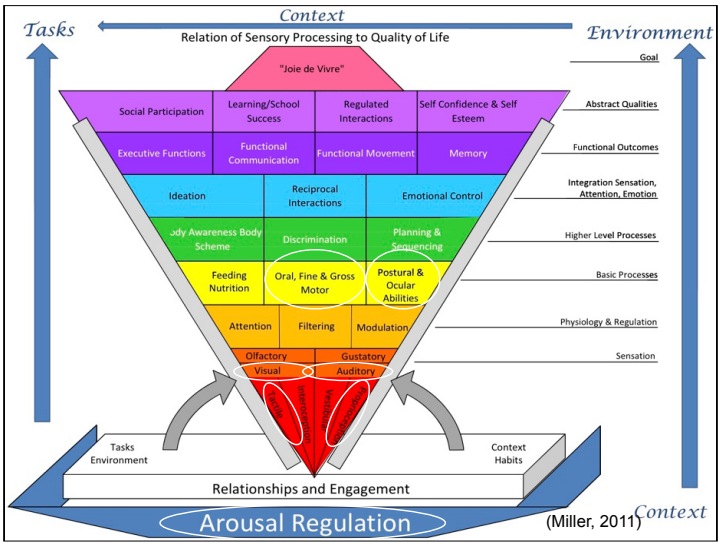

Sit Up,Draw,Create


Get Ready,Get Set,Go


Sit Up, Listen,Engage

Get Ready, Get Set, Go

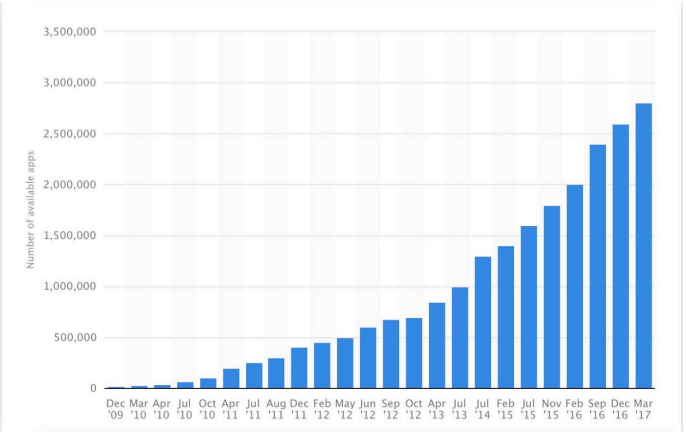
Windmills



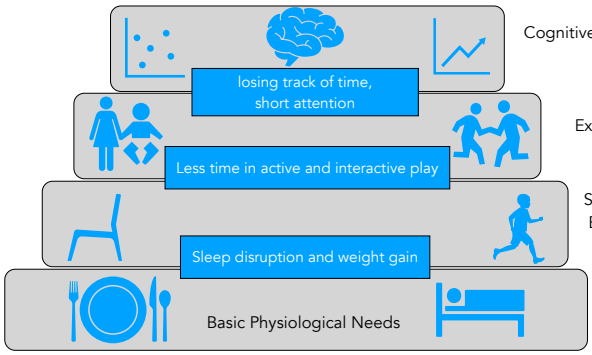
How Has the World Changed?

Chromebooks, iPads, Phones, and Gaming

App Store Analytics: Number of available apps from December 2009 to January 2017



Behavior Changes



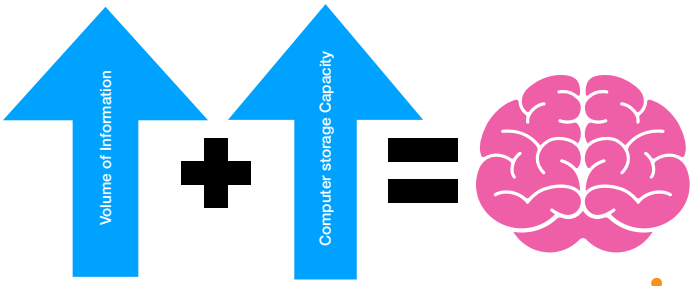
Effects of Technology on Children

Pros	Cons
Individualized learning	Increasing obesity, anxiety, behavior
Accessibility of information	Decreased parent interaction, play/ social/ communication skills, self esteem, and attention
Adaptable	Delayed motor milestones
Increased communication options for non-verbal children	Nearsightedness, decreasing functional visual skills, focus

"School screen time couples with at-home smart device usage can on an average expose a student age 8-18 to media for more than 10 hours/day"

- Dr. Rahul Bhola, Pediatric ophthalmologist at CHOC Children's Hospital

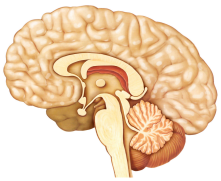
Digital Dementia



So What Happens to Learning?

Learning impact

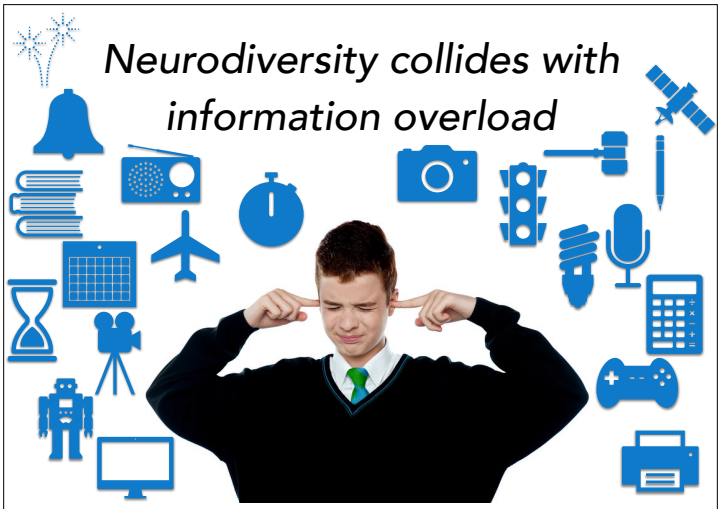
7+ Hours of screen time



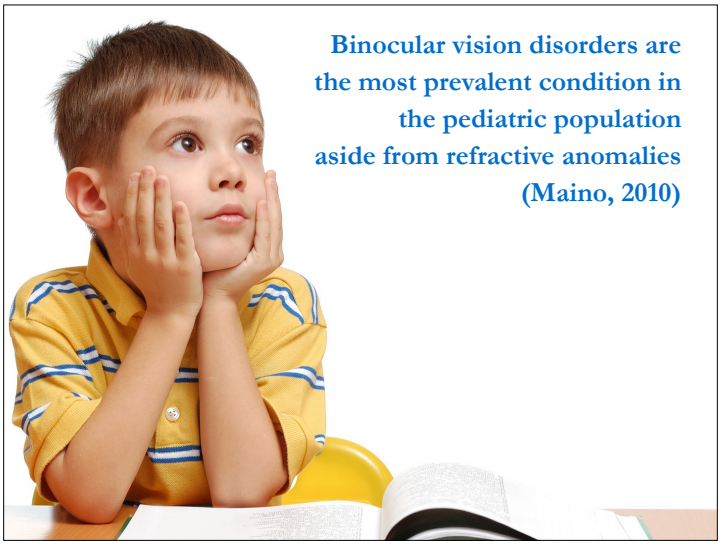
Channel Capacity

Miller, G. A. (1956). "The magical number seven, plus or minus two: Some limits on our capacity for processing information". Psychological Review. 63 (2): 81-97.

Neurodiversity collides with information overload



Vision Deficits



Binocular vision disorders are the most prevalent condition in the pediatric population aside from refractive anomalies (Maino, 2010)

Blue Light

Pros	Cons
Helps regulate circadian rhythm	Passes through the lens and cornea more easily than UV rays, causing damage over time
Boosts energy and mood	Blue light is scattered and harder to focus on, contributing to digital eye strain
Boosts alertness and cognitive function	If exposure is high at night, can disrupt the circadian rhythm and block melatonin production

Retrieved from: www.allaboutvision.com

Impact of Technology on Vision

- Nearsightedness
- Decreased visual perception
- Poor functional vision
- Computer Vision Syndrome
- Retinal Damage

Postural Deficits

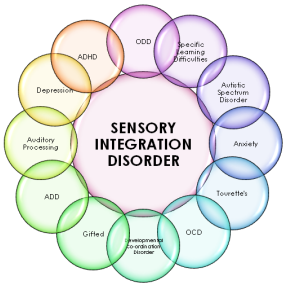
Dysregulation

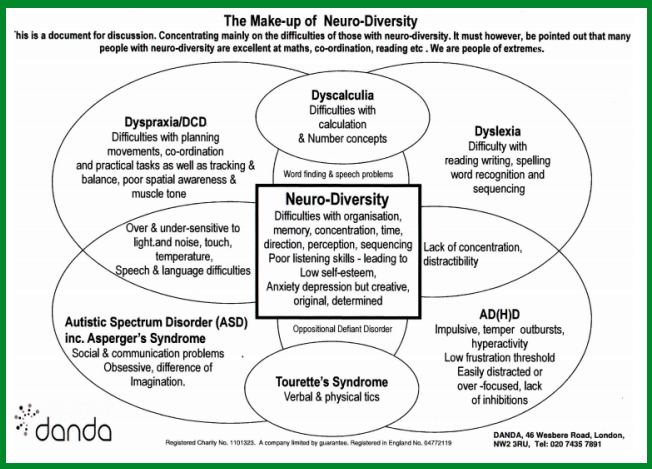
Postural Deficits

- In a study of 207 children and adolescents, 180 with non-specific neck pain reported flawed extension in their neck and back while studying and using smartphones and tablets. (Fares, Fares, &Fares, 2017)
- 21% also had eye symptoms
- 82% reported a change in psychological and social behavior

Special Populations

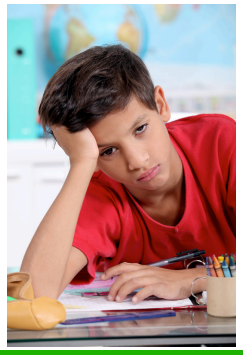
- Sensory Modulation Disorder
- Sensory Integration Disorders
- Auditory Deficits
- Visual Deficits
- Dyspraxia
- Dysgraphia





ADHD, Vision, and Posture

- Children with ADHD often show difficulty supressing saccadic eye movements (Munoz, 2003)
- Vestibular brainstem reflexes are altered in a subset of children with ADHD and points to this as a cause of decrease postural control. (Isaac, et al, 2017)



Autism

- Atypical EDR - low/under-responsive
- Behaviorally often over-responsive to input (taste, smell, visual, movement)
- May seek or avoid movement
- Poor eye contact and visual attention
- Emotional dysregulation
- Praxis and motor deficits

"Dyslexic children often show impairments in steady fixation, inefficient saccade patterns, and possible motion-processing disorders."

–Leigh and Zee, 2006

Types of Dysgraphia

Spatial Dysgraphia:	Motor Dysgraphia:	Dyslexic Dysgraphia:
Oral spelling and finger-tapping are normal, yet students with spatial dysgraphia have a problem with illegible writing or drawing because of a lack of understanding of space, due to their internal processing of the information.	Difficulty in writing and copying words along with problems in drawing and finger-tapping speed.	Difficulty in writing or spelling words that is not associated with a lack of fine motor coordination, or a physical medical condition.

"Children with low scores on visuomotor skills and developmental tests are rarely tested for vestibular function or gaze stability deficits."

–Hardman, 2001

In Summary

- Sensory processing is the foundation for self regulation, motor skill development, and learning.
- Neurodiversity combined with excessive screen time for school and leisure exacerbates pre-exisiting deficits.
- Vision/Ocularmotor skills are rarely evaluated during school-based testing and little/no supports are in place to address the issues that arise from deficits in this "medical" area.
- Many diagnoses have overlapping deficits in sensory processing impacting self-regulation, task completion, and development of executive functions.

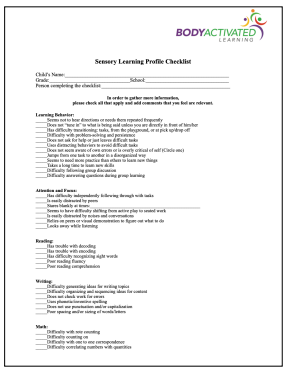
Medical or Educational?

1. Sensory processing and integration impacts more than just self-regulation
2. Sensory Diets are only one type of support
3. Many sensory diets do not take into account vision-related issues

Medical or Educational?

1. Educationally-based OT supports ACCESS to the curriculum and school environment - With COVID and distance learning, this includes the home environment now.
2. Ocularmotor issues and visual-motor issues are within an OT's scope of practice and directly Impacts self-regulation, navigation of the environment, and visual motor/graphomotor skills

Sensory Learning Profile Checklist



BODYACTIVATED LEARNING

Sensory Learning Profile Checklist

Child's Name:_____
Grade:_____School:_____
Person completing the checklist:_____

In order to gather more information, please check all that apply and add comments that you feel are relevant.

Learning Behavior
____Seems not to hear directions or needs them repeated frequently
____Does not "tune in" to what is being said unless you are directly in front of him/her
____Has difficulty transitioning; tasks, from the playground, or on pick up/drop off
____Difficulty with problem-solving and persistence
____Gives up easily when tasks are difficult or frustrating
____Uses distracting behaviors to avoid difficult tasks
____Does not seem aware of own errors or is overly critical of self (Circle one)
____Needs to be told how to do something more than once
____Seems to need more practice than others to learn new things
____Takes a long time to learn new skills
____Difficulty following group discussion
____Difficulty answering questions during group learning

Attention and Focus
____Has difficulty independently following through with tasks
____Is easily distracted by peers
____Stares blankly at times
____Has difficulty smoothly shifting from active play to seated work
____Is easily distracted by noises and conversations
____Relies on peers or visual demonstrates to figure out what to do
____Looks away while listening

Reading
____Has trouble with decoding
____Has trouble with encoding
____Has difficulty recognizing sight words
____Poor reading fluency
____Poor reading comprehension

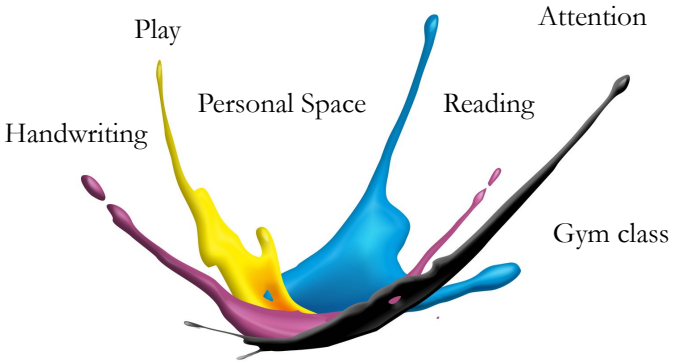
Writing
____Difficulty generating ideas for writing topics
____Difficulty organizing and sequencing ideas for content
____Poor spelling for age and grade
____Uses phonetics/creative spelling
____Does not use punctuation and/or capitalization
____Poor spacing and/or sizing of words/letters

Math
____Difficulty with rote counting
____Difficulty with skip counting
____Difficulty with one-to-one correspondence
____Difficulty correlating numbers with quantities

Writing Sensory-Learning Specific Goals In an IEP

- **S** SPECIFIC
- **M** MEASURABLE
- **A** ATTAINABLE
- **R** RELEVANT
- **T** TIME-BOUND

We CAN have an Impact



Day 2 Goals

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- Experiential learning of possible movement interventions that expand on traditional sensory diets to address the core underlying sensory integration deficits using the Body Activated Learning™ framework.
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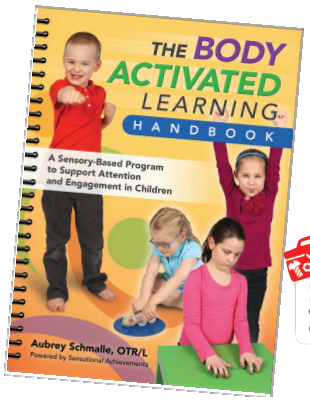
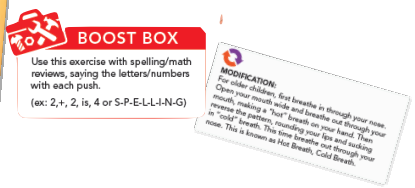


Next Week:
Understanding the Body Activated Learning Framework



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thespiralfoundation.org/spdtoolkits.html