



Sensory Impairments in Children with Cerebral Palsy

Until recent years, intervention for children with cerebral palsy focused primarily upon motor performance. Current theories of motor behavior support the notion that movement and sensation are intimately related and that intervention cannot address them separately.

Many children with CP exhibit sensory processing and praxis disorders that often impose greater functional limitations for these children than their actual movement disorders. Let's briefly examine what is known about the sensory processing challenges in this population:

1. Tactile Processing Deficits:

How do we know what a tactile processing deficit is?

The following questions may help:

Does the child:

- a) object to being handled when not wearing clothing
- b) struggle against being held?
- c) Avoid being messy (feeding as well)
- d) Object to light touch
- e) Startle easily when being touch unexpectedly
- f) Push the therapist's hand away from his body
- g) Rub or scratch a part of the body that has been touched?

If any of these behaviors are observable, then this child may experience hypersensitivity to touch.

Or Does the child:

- a) fail to localize or respond when touched?
- b) Excessively mouth objects?
- c) Fail to notice when clothing is twisted on his body?
- d) Seek out to touch everything around his body?
- e) Fail to recognize when hands or face are messy?
- f) Like the feeling of vibration.

If any of these behaviors are observable, then this child may be hyposensitive to touch.

Tactile processing deficits in children with CP might be the direct result of injury to an area in the central nervous system. Studies focusing on somatosensory deficits in children with CP conclude that tactile deficits in the hands are more common in children with spasticity than in children with athetosis (Yekutiel, et al, 1994). Tactile processing deficits are common in children with hemiplegia and can affect both sides (Cooper, et al 1995).

2. Processing of Proprioceptive Input:

Does the child:

- a) bite or chew on nonfood objects?
- b) Pinch and hit others or self?
- c) Lean into the therapist's hands during therapeutic handling techniques?
- d) Fail to adjust the body in response to changes in position?



- e) Exhibit decreased, increased, or fluctuating postural tone?
- f) Grind his or her teeth?

Proprioceptive/kinesthetic deficits that CP children present are difficult to diagnose because of accompanying tactile perception and motor control deficits.

3. Processing of Vestibular Input

- a) Object to being moved backward in space even when the trunk and head are supported?
- b) Express fear/anxiety when placed on the large therapy ball?
- c) Object to having his feet leave the supporting surface or the ground?
- d) Overreact when moved in space?
- e) Become fearful of bouncing or swinging?
- f) Dislike sudden or quick movement?

If these behaviors are presented it is likely that the child is hyper-sensitive to movement.

Or:

- a) Does the child need to be moved and rocked passively to soothe?
- b) Does the child fail to increase extensor tone when linear movement is provided?
- c) Does the child seek opportunities to fall without regard to his or her own safety?
- d) Fear to notice or react when moved in space?
- e) Not seem to get dizzy when others usually do?
- f) Like to be roughoused or moved with more intensity than other children?
- g) Enjoy being upside down during play, even for short periods of time?
- h) Does the child like to twirl and spin?

If these behaviors are presented then the child is likely hypo-sensitive to movement.

Researchers have done little or no investigation on other sensory processing deficits, such as sensory modulation deficits or vestibular processing disorders, most likely because it is difficult to differentiate the symptoms of these disorders from the neuromotor deficit.

Motor Planning Disorders:

Motor planning is the ability of the brain to conceive of, organize and carry out a sequence of unfamiliar actions as necessary when learning new skills. Evaluation of motor planning skills in children with CP is complex. Differentiating motor planning deficits from signs of a neuromotor disorder depends on discerning whether the motor control deficits that a child presents are due to the absence of movement components or the inability to use these movement components in a variety of novel situations. For example, a child who is unable to figure out how to get off of a piece of equipment, even when he is able to climb onto it may have a motor planning deficit. On the other hand, a child with spastic diplegia who is able to describe what his body needs to do to get off but cannot actually get on or off a piece of equipment independently is more likely to have specific motor execution challenges.

Motor planning correlates to sensory processing in that it requires the ability to use feedback and feedforward loops when performing a novel motor act. Individuals use feedback to correct their motor actions and feedforward mechanisms prior to an action. Feedforward mechanisms rely on sensorimotor maps of previous interactions with the environment in order to anticipate how to perform an action correctly. Sensory processing deficits decrease the child's ability to use the sensory input to create and develop accurate motor programs that the child can later use as representations for their actions. When a child is learning a new movement, therapists who understand sensory integrative principles can identify the child's sensory needs and provide meaningful sensory feedback.