

## Sensory Processing: Key Points and Ideas for Application in Music Therapy

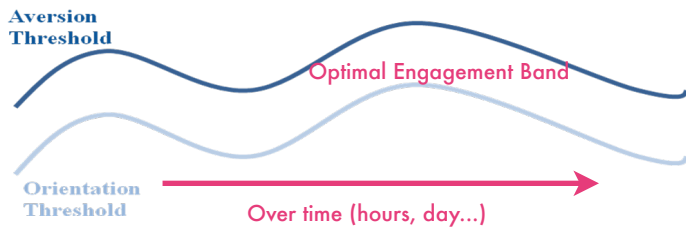
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Attached are some basic strategies to support engagement and participation for children (or adults!) with different patterns of sensory processing problems. General strategies and some specific examples are provided, along with the goal of intervention for each pattern, to help you think about how to provide support for individual clients. But first...

Things we know about sensory processing:

- ▶ Sensory processing refers to the way in which our bodies notice, respond to and use sensory information. Sensory integration is the part of this in which sensory input from our bodies and the environment is put together and sorted out, and then used so that we can make an adaptive or appropriate response in any situation.
- ▶ Types of sensory input:
  - Visual
  - Auditory
  - Tactile (light touch and deep pressure touch, though these are processed differently from one another)
  - Vestibular (movement, particularly of the head)
  - Proprioceptive (traction or compression of joints)
  - Gustatory (taste)
  - Olfactory (smell)
- ▶ The characteristics of sensory input that help determine whether we notice and/or respond to it include:
  - Frequency (how often does it occur?)
  - Durations (how long does it last?)
  - Intensity
  - Rhythm (associated with predictability...)
  - Complexity (are several types being presented at once? If so, what are the qualities of those different inputs?)
  - Novelty (is this familiar or not, and if not, how unfamiliar is it?)
- ▶ Outcomes of sensory processing are sensory modulation (ability of the nervous system to regulate levels of arousal or "alertness" in any given situation) and praxis (the ability to conceive of, plan, and execute new or unpracticed motor patterns)
- ▶ Sensory modulation occurs as the nervous system balances excitation (continuing to pass sensory signals along to be integrated with other information in the brain) and inhibition (the damping down or stopping of sensory signals).
- ▶ All of us have preferences in terms of the types and intensity of sensory input that we like, so any individual may, from time to time, demonstrate behaviors that reflect difficulty processing sensory information.
- ▶ It is only when this difficulty processing sensory information consistently interferes with participation and/or socialization in daily life activities that there is a need for intervention.
- ▶ Often simple accommodations or slightly altered routines can alleviate much of the problem.
- ▶ Responses to sensory input at any given time are affected by a number of factors, such as temperament, fatigue, hunger, sickness, emotional state, what happened just before, anticipated events, etc.
- ▶ The items listed under "Notable Behaviors" for each pattern are not diagnostic criteria, so some children may demonstrate these behaviors for reasons other than sensory processing difficulties.

**Dynamic Model of Sensory Processing**  
 Baranek (1998) adapted from Field (1982)



**Key Concepts**

**Optimal Engagement Band**

- ▶ The range that allows for optimal attention, perception and interpretation of sensory information that can be utilized meaningfully in daily life activities.
- ▶ Width of the band is determined by the distance between two thresholds
  - Aversion threshold is the point at which sensory input becomes overwhelming or at least very difficult to manage – resulting behaviors may include withdrawal, inattention, or seeming anxious
  - Orientation threshold is the point at which we recognize and attend to sensory information – below the orientation threshold, behaviors may include what appears to be lack of interest, inattention, non-responsiveness

**Factors affecting width of the band:**

- ▶ Innate differences in sensory thresholds exist.
- ▶ Genetic endowment contributes to individual differences in sensory thresholds & optimal stimulation band that supports occupation.
- ▶ Temperamental differences may be apparent from birth. (e.g., reactivity to novel situations).

**BUT WHAT IF...?**



**HYPO – RESPONSIVENESS** (orientation threshold higher, so sensations from external and/or internal [body] environments don't always reach child's orientation threshold)

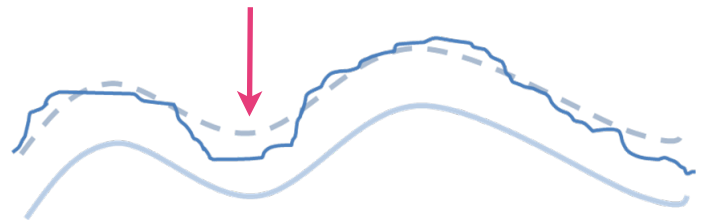
**Notable behaviors:** May seem uninterested, self-absorbed, unemotional, may not notice what is going on around them; may seem overly tired or apathetic. If SENSORY SEEKING to counteract this, may be very active, continuously doing something, may take pleasure in more intense sensory experiences and try to create more of these for themselves (to help themselves reach orientation threshold).

Goal: We want to have child notice and respond to relevant sensory cues in the environment (reach orientation threshold)

▶ **Strategies to Increase Engagement:**

- Enhance task and context features of daily routines (e.g., provide activities to increase intensity, frequency, or duration of sensory experiences)
- For example:
  - ☀ Add stronger visual cues to activities such as bright contrasts or large scale art activities
  - ☀ Add tactile stimuli during social or self-care routines (bear hugs to greet, lotion after handwashing, texture added to fingerpaints)
  - ☀ Increase movement experiences
  - ☀ Add strong smell or taste components to activities

**WHAT IF...?**



**HYPER – RESPONSIVENESS** (aversion threshold lower, so sensations from external and/or internal [body] environments closely approach or exceed aversion threshold)

**Notable behaviors:** Distractible, especially in busy or "complex" settings, may be a "complainer" as they tend to notice and comment on sensory events more than others, may seem anxious or hyper-alert, may seem uncooperative or avoidant, rule-bound, drive by ritual, don't like change, do like structure; If SENSORY SEEKING to counteract this, may persist in seeking deep pressure, heavy work, movement types of activities and may have difficulty participating without this type of sensation

Goal: Support participation by structuring sensory challenges to be predictable (minimize chance the aversion threshold is crossed by unexpected stimuli), minimize generating more arousal, aversion to typical activities, or avoidance

▶ **Strategies to Increase Engagement**

- Help child build coping strategies to use when faced with new sensory challenges
- Provide controlled predictable patterns of sensory experiences in tasks and daily routines
- For example:
  - ☀ Child could always be first or last in line
  - ☀ Toilet or diaper changing routines always the same, with touch predictable

- ☀ Minimize extraneous stimuli in environment, especially during tasks that are difficult for the child already
- Provide separate or structured spaces that prevent the child from experiencing a lot of unpredictable touch (carpet square for each child at circle, etc.)
- Introduce new stimuli systematically into daily routines (honor child's need to have some control or limit input)
- Carefully construct events to introduce a wider range of sensory experiences (one thing at a time)
- For example:
  - ☀ Allow child some control over washing face/brushing teeth
  - ☀ Introduce new foods slowly and gradually and allow time to accommodate
  - ☀ Provide slow predictable movement experiences
  - ☀ Grade/adapt sensory toys and activities (playdoh in plastic bag to start)

- ☀ Watch carefully for subtle cues from child (eye gaze, facial expressions, body language, changes in vocalizations or language, etc.)
- ☀ Prompt, contingent, accepting responses to child
- ☀ Follow child's lead

### References

- Baranek, G.T., Wakeford, C.L., & David, F.J. (2008). Understanding, Assessing, and Treating Sensory-Motor Issues in Young Children with Autism. In K. Chawarska, A. Klin & F. Volkmar (Eds.), *Autism Spectrum Disorders in Infancy and Early Childhood*. New York: Guilford Press.
- Baranek, G.T. (1998). Sensory processing in persons with autism and developmental disabilities: Considerations for research and clinical practice. *Sensory Integration Special Interest Section Newsletter, American Occupational Therapy Association*, June, vol. 21 (2), pp. 1-4.
- Field, T. (1982). Affective Displays of High-Risk Infants During Early Interaction. In T. Field & A. Fogel (Eds.), *Emotion and early interaction* (pp. 101-125). Hillsdale NJ: Erlbaum.

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### Sensory Seeking

Adaptations will depend on the sensory needs the child is trying to meet...

- ▶ If child is **hypo-responsive** and is seeking sensation to raise own arousal level, we want to help child reach orientation threshold in a manner that allows participation to occur with fewer interruptions from sensory seeking behavior
- ▶ If child is **hyper-responsive** and is seeking sensation to lessen effects of aversive sensation, we want to help child counteract those sensations in a manner that allows participation to occur with fewer interruptions from sensory seeking behavior

### General Strategies

- ▶ Cognitive strategies (Useful when cognitive and language skills can be used to mediate in potentially difficult environments or activities)
  - Preparation, priming, planning ahead
  - Contingency Plans
  - Talking through
- ▶ Therapeutic Use of Self by therapist
  - Self-awareness (in order to modulate own behavior to support child participation)
    - ☀ Own sensory preferences
    - ☀ Own sensory processing patterns and the ways in which you get sensory needs met
    - ☀ Levels of affect and animation
    - ☀ Need for structure, routine
    - ☀ Extent to which intervention reflects reciprocity and shared control
    - ☀ Expectations and biases
  - Other awareness



## Sample Analyses of Musical Instruments and Activity From Sensory Processing Perspective:

Instrument	Auditory	Visual	Tactile	Proprioceptive & Vestibular (from positioning and movement of body)
Tambourine	<p>Sound of hand or other body part on head of tambourine, sound of cymbals (may be rhythmic or arrhythmic, and can vary in volume and tempo, i.e., intensity, frequency, duration)</p> <p>Sound varies based on way in which instrument is contacted, such as stroking, patting, scratching the head, flicking finger against head or cymbals, etc.</p>	Roundness, white color and smooth appearance of head, small shiny cymbals positioned along sides and close together	<p>Smoothness of head, ridged texture of sides created by cymbals</p> <p>Holding tambourine may create light or deep pressure touch, depending on how tightly its held</p> <p>Slap of tambourine against body (will vary depending on how loudly or quickly it is played)</p> <p>Tactile input varies based on way in which instrument is contacted, such as stroking, patting, scratching the head, flicking finger against head or cymbals, etc.</p>	Shaking of tambourine, movement of arm to slap it against hand or other body part, weight shift and movement of hips if played against hip or leg, etc.(all will vary with tempo, volume at which it is played, and also the position of the player, for instance standing, sitting on floor or in chair, etc.)
Recorder	Variety of tones, resonance depending on material of which recorder is made	Smoothness of instrument, tapered end, holes, color, length, diameter	Holding recorder in two hands, fingers covering and uncovering holes , instrument in mouth and resting on lips, air flow, mild vibration from resonance of instrument	Posture and stability needed to be still, hold instrument over time to correct position in mouth, expansion and compression of ribcage during respiration
Music activity (from perspective of a child in the group)				
“Sandbox Wiggles” song, accompanied by guitar, in sandbox on playground with a class of preschool children (Kern & Wakeford, 2007)*	<p>Sounds of guitar, adults/ other children singing along, own voice, other children playing elsewhere on playground</p> <p>Tune is rhythmical , moderate tempo; lyrics describe actions for children to make (e.g. wiggle toes in sand, pour sand into hands, clap); names of children can be inserted to individualize</p>	Adult fingers pressing and strumming guitar strings, shape of guitar and spatial arrangement of strings, frets, hole, etc.; watching peers move to music, watching own body movements; color, visual texture of sand; other children running in and out of visual field in background	Palm to palm touch for clapping; Sand on body parts; touching sand, possibly having other children put sand on your hands, toes, etc. or touching you with sandy fingers/hands or bumping up against you as you move to music	Movement of body parts in response to words of song (e.g., clapping, holding scoop and pouring sand from it, toes moving in sand) and includes weight shift and postural control needed to position whole body to make these movements possible

\*Kern, P. & Wakeford, L. (November, 2007). *Playground Favorites: An Interdisciplinary Approach to Outdoor Play for Young Children*. Paper presented at the Annual Conference of the American Music Therapy Association, Louisville, Kentucky.