Sensory Processing and FASD

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Objectives

- Describe how sensory processing differences influence development, behavior, and daily function in children with FASD.
- Describe current approaches and emerging evidence-based practices used to identify and treat sensory processing disorders.
- Discuss strategies to address sensory processing challenges in home, school and community environments.

Sensory processing and integration

“Sensory integration is the process of organizing sensory inputs so that the brain produces a useful body response and also useful perceptions, emotions and thoughts. Sensory integration sorts, orders, and eventually puts all of the individual sensory inputs together into a whole brain function. When the functions of the brain are whole and balanced, body movements are highly adaptive, learning is easy, and good behavior is a natural outcome.”

Ayres, 1979, p. 28
Sensory processing:
A neurobehavioral process

The brain’s ability to efficiently receive, organize, interpret, and use information from the sensory systems and generate/maintain an adaptive behavioral response.

Sensory integration:
A neurobehavioral theory

- Model for understanding the relationship between sensation, brain function, and observable behavior
- Framework for therapeutic techniques and approaches that support arousal, emotion, sensorimotor development and daily function (Spitzer & Smith-Roley, 2001)

Sensory processing and occupational therapy

- One framework used by OTs to understand behavior and function and guide intervention
  - Child factors
  - Task demands
  - Physical environment
  - Social/developmental expectations
Sensory processing and development

Supports capacity to attend to meaningful stimuli and filter what is irrelevant for
- Behavioral organization
- Exploration of objects and surroundings
- Regulation of emotions and behavior
- Successful interaction with physical and social environment

Sensory modulation and arousal

Continuum of sensory responsivity (Royeen & Lane, 1991)

Optimal Arousal

Hypo-responsivity (underarousal, not noticing sensation)
Hyper-responsivity (overarousal, sensation threatening or painful)

Sensory processing and arousal

Classic arousal curve (Kimball, 1999)
Children with FASD

• Children across the fetal alcohol spectrum demonstrate high rates of sensory processing differences (61-81%).
• Frequent, persistent differences in auditory filtering and under responsive/sensation domains

(Abele-Webster, Magill-Evans, & Pei, 2012; Carr, Agnihotri, & Keightley, 2010; Franklin, L, Deitz, L, Jirikowic, T, & Astley, S, 2008; Jirikowic, Olson & Kartin, 2008; Wengel, Hanlon-Dearman, & Fjeldsted, 2011)

Sensory processing: Animal models

• Link between PAE and sensory processing differences
• Tactile defensive behaviors in alcohol-exposed primate models
• PAE linked with behavioral aversion (withdrawl) to repetitive tactile stimulation
• Reduced habituation to stimuli compared to non-exposed monkeys (Schneider et al., 2004, 2009)

Sensory processing and daily function

• Sensory processing differences correlated with
  • ↓ Adaptive behavior (Carr et al., 2010; Jirikowic et al., 2008)
  • ↑ Problem behaviors (Franklin et al., 2008)
  • ↑ Sleep problems (Wengel et al., 2011)
• Also associated with increased caregiver stress (Jirikowic et al., 2012)
Sensory processing and behavior challenges
- Sensory processing differences highly correlated with problem behaviors (Child Behavior Checklist; $r = .72$) (Franklin et al., 2008)
- Clinical behavior problems associated with significant differences in auditory filtering and under responsive/sensation seeking behaviors.
- Clinical sensory processing problems associated with significant behavior problems in *attention*, social, rule-breaking behaviors and thought problems.

Sensory processing and sleep
- Moderate relationships ($r = .52$-.74) between sensory processing (Sensory Profile) behaviors
  - Sleep items on Children’s Sleep Habits Questionnaire (CSHQ)
    - e.g., sleep duration (CSHQ) and sensory sensitivity ($r = .639$)
    - Sleep behaviors as measured by actigraphy
      - e.g., sleep efficiency and auditory processing ($r = -.631$)
  (Wengel et al., 2011)

Impact on caregiving and parenting stress
- Higher levels of child-related parenting stress moderately correlated with more parent-reported sensory processing problems ($r = -.60$).
- Child behavior regulation and sensory processing strongest predictors of child-related parenting stress (in 5-12 year old children).
  (Jirikowic, Olson & Astley, 2012)
85th percentile = clinically elevated levels of stress

Jirikovic et al., 2012

Evidence suggests that....

Sensory processing problems are important to identify and treat in children with FASD

Identifying sensory needs

• Questionnaires and interviews
  • Sensory Profile (Dunn, 1999)
    • Infant Toddler Sensory Profile
    • Adolescent-Adult Sensory Profile
    • School Companion
  • Sensory Processing Measure
    • Home Form (Parham & Ecker, 2004)
    • Main Classroom and School Environments Forms
      (Miller Kuhaneck, Henry, & Glennon, 2004)
Identifying sensory needs

- Clinical observations of play, behavior and movement
- Observations in natural settings
  - Classroom (structured and unstructured)
  - Playground
  - Lunch
  - Transitions
- Context matters!

Detective work

- Responses to sensation vary and highly individualized
  - Context matters
  - Impact on function

A sensory perspective on behavior challenges.....

- My child....
  - won’t get dressed
  - can’t sit still during circle time in school
  - has meltdowns in the store
  - has trouble settling down to go to bed
Sensation and Arousal (Wilbarger, 1991)

Sensory-based interventions

Sensory-based approaches have been used for children with FASD

- Anecdotal and clinical support
- Empirical evidence limited
- Sensory-based interventions vary in focus, frequency and intensity
- Research interventions incorporating sensory-based principles/strategies embedded into larger interventions, so hard to tease out added effects

Sensory-based approaches ...more than just sensation

- Therapeutic use of sensation
- Use of activities rich in tactile, vestibular and proprioception qualities to affect arousal modulation
- Goodness of fit – artful vigilance
- Scaffolding: “just right challenge”
- Child-environment fit; modifying environment
- Education
- Reframing behavior challenges
The big picture....

- Child thresholds
- Task demands and characteristics
- Physical environment
- Social/developmental expectations

Examples

- Two example of sensory-based approaches for children with FASD in empirically tested intervention models
- Families Moving Forward
- Neurocognitive Habilitation Therapy (Wells)

Families Moving Forward Intervention

- Caregiver focused behavior consultation
- Delivered in-home by intensively trained FASD specialists
- Provide caregiver education and support
- “Brainstorm” challenging behaviors
- Intervention outcomes
  - Positive changes in parenting attitudes and knowledge
  - Reductions in perceived disruptive behavior
  - Increased parental self-care

(Olson et al 2004; Olson et al 2005)
OT Consultation in FMF Model

Goal: Help caregivers recognize sensory processing differences and understand the relationship to behavior within the context of a caregiver focused behavioral intervention for children with FASD.

Use of sensory processing knowledge to understand challenging behaviors

- Training of FMF intervention specialists
- Sensory Conversation Module (optional)
  - Parent education materials
  - Collaborative problem solving with caregiver
  - Environmental modifications and accommodations

Education and reframing

- Reframing behavioral difficulties/functional challenges in light of sensory processing problems (e.g., aggression provoked by unexpected touch, poor boundaries due to poor body awareness)

- Understanding child’s general responsivity to sensation/s and cues related to difficulty coping (e.g., signs of increasing irritation/escalation)
Accommodations and environmental modifications

- Change physical structure of the environment (e.g., organization, increase/reduce stimuli).
- Change sequence/timing of activities and routines (e.g., order of events in the day).
- Change expectation or participation demands (“must do” vs. “don’t have to do” vs. “don’t have to do right now”).

Routine-based Interventions (e.g., sensory diets)

- Concept of providing sensory activities that “nourish”
- Embedded into daily routines
- Built around child’s identified sensory needs, environment and task.

Neurocognitive Habilitation Therapy

- 12 week group therapy intervention aimed at improving executive function/self-regulatory behaviors
  - Included sensory-based self-regulatory techniques based on Alert program™
  - Instructional components addressing memory, planning, and behavior, social skills, emotion awareness
- Concurrent parent training (including sensory education)
- Outcomes
  - Children learned self-regulatory techniques
  - Parent reported improvements in executive function (BRIEF—Organization of Materials, Monitor) and (RATC emotional problem solving )

(Wells et al., 2012)
How Does Your Engine Run?

• The Alert Program for Self-regulation
  • Teaches children, parents and teachers how to recognize arousal states related to attention, learning and behavior.
  • Helps children recognize and expand sensory-motor based self-regulation strategies.
  • Provides a framework (vocabulary, activities) to help children recognize and regulate their own arousal state.

(Williams & Shellenberger, 1996)

Kid’s Club:
Friendship group for school-aged children

Key components
• Social skill instruction and practice
• Activity-based curriculum
• Sensory motor activities to support self-regulation
• Carefully structured environment
• Parent education

Sensory-based strategies

• Used to “set-up” positive learning environment & promote self-regulation
• Environmental modifications and accommodations
  • e.g., quiet space, simple room structure, external structure/cues
• Sensory-motor activities and/or strategies that help modulate arousal
  • e.g., fidget toys, movement and “heavy-work” activities, yoga
• What does this mean for assessment and intervention practices in “the last frontier?”

3-Tiered Approach & Examples

- Tier 1
  - Universal
  - Screening
  - Education/training
  - Sensory-friendly environments
  - Movement breaks

- Tier 2
  - Targeted
  - Parent/teacher consultation
  - Sensory diet
  - Routine/environment changes
  - Accommodations
  - Group intervention (ALERT)

- Tier 3
  - Intensive
  - 1:1 intervention - OT/SI
  - Group intervention (ALERT)
  - Sensory diet
  - Parent/teacher consultation

References


References


References