

Current Trends in Occupational Therapy for Children with Autism

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Objectives

At the end of the presentation the participant will be able to:

- understand occupational therapy intervention principles and the theory of sensory integration
- identify sensory processing issues in children with ASD
- describe the evidence supporting the existence of sensory processing issues
- Identify issues in need of occupational therapy utilizing SI

Occupational Therapy: Focus Areas

- Occupation and its components (motor, cognitive, social/emotional, sensory)
- Health and wellbeing
- Purpose
- Daily activities
- Organization of daily activities
- Other: Play, sensory processing, praxis

Therapeutic Interventions with Children with Autism

- Sensory Integration/Sensory Processing
- Family centered interventions
- Early intervention
- Applied Behavioral Analysis and other Behavioral Interventions (ABA)
- Developmental, Individual-Difference, Relationship-Based approach (DIR), Floor time
- other

Sensory Integration as an Intervention Approach

- Addresses sensory processing dysfunctions affecting purposeful interaction with the environment
- Facilitates the adaptive response: social interaction, communication, ideation, motor planning, purposeful interaction, etc.
- Utilizes play / intrinsic motivation and monitoring levels of arousal
- Relationship based

Sensory Integration

Basic Sciences supporting underlying assumptions	Neurosciences, occupational science/therapy
Disciplines prepared to deliver the intervention	Occupational Therapy
Goals of the intervention	Purposeful interaction, motor planning, social communic.
Intensity: Frequency and length of intervention	Once or twice per week
ICF Level it intends to address	Body functions, activity, participation
Context/setting	Clinics, schools, home Importance of intrinsic motiv.

WHY SI?
Aspects to Consider

- Sensory processing dysfunction: the evidence
- Assessment tools
- Intervention strategies

Evidence of Sensory
Processing Dysfunction and
Praxis Difficulties

Evidence of the Existence of
Sensory Processing Dysfunctions

- Psychophysiological Data
- Self reports
- Clinical Studies: Observational, Surveys

70 – 90% of children with Autism present atypical sensory processing (in Schaaf et al, 2006) (Basado en Rogers et al, 2006; Ornitz, 1989; Volkmar et al, 1986)

Psychophysiological

- Blair (1999) – skin conductance measuring response to distress - The children with ASD showed appropriate responses to the distress cues but hypo responsiveness to threatening stimuli.
- Schaaf et al (2006): EDA – 2 groups emerged:
 - Low tonic baseline (low arousal and low variability)
 - High Tonic baseline (high arousal and high variability)
 - Relationship between adaptive behaviors, sensory processing and psychophysiological measures

Autobiographies: Temple Grandin

- Hiposensitivity (*Emergence: Labeled Autistic*, 1986)
- Hug Machine
- Differences in processing visual information, hypersensitivity to artificial light and over focusing on details (*Visual Abilities and Sensory Differences in a Person with Autism*, 2009).

Autobiographies

Chamak, B; Bonniau, B; Jaunay, E; Cohen, D (2008): What Can We Learn about Autism from Autistic Persons? *Psychotherapy and Psychosomatics*. 77:271–279

- 16 autobiographies and 5 interviews
- All of the authors expressed difficulties in perceptual abilities, processing information and regulation of emotions as signs of autism

Clinical

- Baranek (1999) Early signs of sensory processing issues even before diagnosis is made
- Baranek et al (2005) - Sensory Experience Questionnaire, responses to common everyday sensory experiences in children ages 5 months to 6 years
- Autism sample identified as having hypo reactivity to sensory stimuli in both social and nonsocial contexts.

Clinical: Parent Questionnaires

- Using Sensory Profile - Sensory processing dysfunction in autism appears to be global in nature (Kern et al, 2007)
- Using a parent questionnaire, this study showed that over 90% of children with autism had sensory abnormalities and sensory symptoms in multiple sensory domains (spec. vision, smell/taste, touch). (Leekam et al, 2006)

Parent Questionnaires

- 144 subjects in an expanded version of the Sensory Profile
- 10% showed a pattern of overfocused sensation and attention, including overreactivity, perseveration, overfocused attention and exceptional memory. This cluster of children was the highest functioning, but also the most socially impaired (Liss et al, 2006)

Parent Questionnaires

- Sensory Profile – 40 parents of 40 children with ASD and 40 children without autism ages 3-6
- Performance of children with autism was significantly different than their peers on 8 out of 10 factors including sensory seeking, emotional reactivity, low endurance/tone, oral sensitivity, inattention/distractibility, poor registration, fine motor/gross motor (Watling et al, 2006)

Type of dysfunction	Characteristics	Evidence
Hypo reactive	Lack of response or decreased intensity	pain and novel sounds (Baranek, 2006)
Hyper reactive	Increased response High arousal and low habituation	Touch and sounds (Miyasaki, 2007; Miller et al., 2001; Baranek et al. 2006; Volkmar, Chawarska, & Klin, 2005)
Hypo and hyper	combination	Greenspan and Wieder, 1997; Hirstein et a., 2001
Praxis	Conceptualization, motor planning, organization and execution	Imitation of gestures, praxis on verbal command, use of tools (Mostofsky et al., 2006)

Blanche and Reinoso, 2007

Evidence of Tactile Defensiveness

- Children evaluated with the Stereotyped Behavior Checklist (SBC) Questionnaire and on 4 measures of TD
- Children with higher levels of TD were more likely to evidence rigid or inflexible behaviors, repetitive verbalizations, visual stereotypes, & abnormal focused affections.
- Baranek, Foster & Berksohn (1996)

Meta-analysis

- 14 studies based on parents' reports
- 2 groups: Children with Autism and typical
- Biggest difference:
 - hyporesponsiveness,
 - followed by hyper response and sensory seeking
- Ben-Sasson, A; Hen, L; Fluss, R; Cermak S.A; Engel-Yeger, B; Gal, B. (2009): A Meta-Analysis of Sensory Modulation Symptoms in Individuals with Autism Spectrum Disorders. *Journal of Autism and Developmental Disorders*. 39 (1–11)

Postural Control

- Variability
- Postural control is poor but improves between 5 and 12 years of age – will never have adult level of postural control
- Difficulties in conditions related to processing somatosensory information
- Deficits in anticipatory postural control
- Over use of visual input (over somatosensory in balance tests)
- Ambulation pattern characterized by shorter steps and is not guided by an objective (executive function)
- Molloy, C.A., Dietrich, K.N., & Bhattacharya, A. (2003). Postural stability in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 33(6), 643-652.
- Minshew, N.J., Sung, K., Jones, B.L. & Furman, J.M. (2004). Underdevelopment of postural control in autism. *Neurology*, 63, 2056-2061.
- Vernazza-Martin, S., Martin, N., Vernazza, A., Lepelle-Muller, A., Rufo, M., Massion, J. et al. (2005). Goal Directed Locomotion and Balance Control in Autistic Children. *Journal of Autism and Developmental Disorders*, 3(1), 91-10

Praxis

- Ideation
- Motor planning - Imitation
- Execution

Ideation

- Having a purpose in smaller and larger spatio-temporal horizons → organization of behavior
- Flexibility

Motor Planning and Imitation

- Children with autism have difficulties in imitation of gestures ([\[Aldridge et al., 2000\]](#), [\[Bennetto, 1999\]](#), [\[Bernabei et al., 2003\]](#), [\[Bernier et al., 2007\]](#), [\[Dawson et al., 1998\]](#), [\[DeMyer et al., 1972\]](#), [\[Ohta, 1987\]](#), [\[Rogers et al., 1996\]](#), [\[Rogers et al., 2003\]](#) and [\[Smith and Bryson, 1996\]](#)).
- Imitation with objects is less impaired than imitation of meaningful and meaningless gestures ([\[Dawson et al., 1998\]](#), [\[Hammes and Langdell, 1981\]](#), [\[Hobson and Lee, 1999\]](#), [\[McDonough et al., 1997\]](#) and [\[Rogers et al., 2003\]](#), [\[Williams et al., 2004\]](#)).

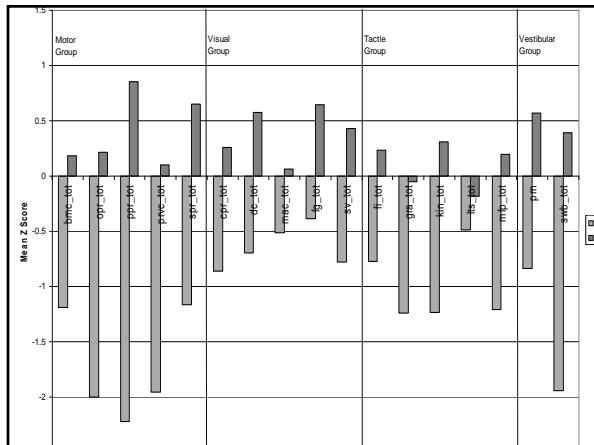
Imitation

- Daniel Stern (1985): Important in the development of interpersonal relations, sharing, language, intention and empathy (Rogers)
- Gestural, oral, object, emotional

SIPT Performance

(Parham, Mailloux, & Roley, 2000)

- 20 children with high functioning autism
- 20 typically developing, matched for age, gender, & ethnicity



Results

- All SIPT scores were significantly different between groups except Localization of Tactile Stimuli (LTS)
- Conditional logistic regression identified Oral Praxis test as the best predictor of being in the autism group

Conclusions

Weaknesses:

- Ideation
- Imitation of body and facial positions & sequences of movements
- Complex tactile perception and proprioception

Conclusions

Strengths:

- Praxis involving object manipulation to replicate designs
- Motor-free visual perception
- Simple tactile localization

Assessment Tools

Assessment Tools: Methods Utilized to Obtain Information

- Parent sensory questionnaires: Sensory Profile and Sensory Processing Measure
- Observations
 - Free play, choice, attention, organization of behavior, socialization, motor control, motor planning, responses to sensory input, etc
- Standardized Tests
 - Sensory Integration and Praxis Test, Sensory Over Responsivity (SOR) (Shoen, Miller, & Green, 2008).

Intervention Strategies

Basic Principles of SI Intervention

SI	Sensory	Challenge/highest
=	+	Level of the
Intervention	Experience	Adaptative Response

Context of play and the social relationship

Core Elements of SI Intervention Process (Parham et al, 2007)

- Evaluating and modifying the sensory environment
- Focus is on integrating tactile, proprioceptive, and vestibular sensations
- The context of play
- Active participation by the child
- Child-directed interactions
- "Artful Vigilance" on the part of the therapist
- "Just Right Challenge"
- Eliciting an adaptive response
- Tapping the inner drive of the child
- The child's engagement is its own reward

The Adaptive Response In SI

- Recommendations
 - Ideation, attention, organization
 - Imitation and copy
 - Social Interactions
 - Use of tools
 - Use of language
- Careful with
 - Motor difficulties can be secondary problems
 - Repetitions and lack of flexibility
 - Reinforcing negative behaviors

Ideation/Organization

- Capture and maintain attention
- Purpose in different spatio-temporal horizons
- Increase repertoire of activities
- Increase participation in symbolic play
- Increase flexibility

Imitation/Copy

- Start with simple gestures: manual and facial
- Constructional Praxis in two and three dimensions
- Reinforce appropriate responses

Social Interaction and Language

- Visual Contact – use of sensory experience
- Use and reinforce appropriate communication
- Receptive Language – following simple instructions
- Expressive Language
 - Use of gestures
 - Use of words

Sensory Experience

- Recommendations
 - Evaluate sensory processing (hyper, hypo, fluctuating)
 - Provide input that maintains the optimal level of arousal and facilitates the AR
 - Decrease mal adaptive responses
 - use proprioception
 - CAREFUL WITH providing non purposeful sensory input (no AR) and reinforcing negative behaviors

Sensory Experience

- Pressure
- Proprioception
- Vestibular
- Auditive
- Visual

Relationship Based

- Recommendations
 - Optimal level of arousal
 - Social Interaction requires attention
 - Purposeful Visual Contact (language)
 - Increase the level of the AR
- CAREFUL WITH
 - Non purposeful social relations

The Context of Play

- Recommendations
 - Intrinsic motivation – how to use with children with ASD
 - Following the child's lead
 - Modify the tendency to explore
 - Use symbolic play and constructional play
- Careful with
 - Intrinsic motivation and stereotyped and repetitive behaviors

Intervention

- Systematic review of sensory motor interventions
- There is evidence that children with autism exhibit sensory motor difficulties
- Results obtained from studies focusing on the effectiveness of sensory processing were mixed
- Studies in the area of SI, sensory stimulation, auditory integration training, prism lenses, and physical exercise yielded some positive but modest outcomes
- Methodological constraints limit conclusive statements
- Educational programs for young children with autism may need to include structured physical and sensory environments (Baranek, 2002)

Effect of Deep Pressure

- Hug machine
- Children who received deep pressure from hug machine showed a significant reduction in tension ($p < .01$) and near-significant reduction in anxiety ($p < .10$) as compared to children who did not receive deep pressure.

Edelson et al (1998)

Effect of Tactile Input

- 22 preschoolers with autism randomly assigned to massage or play
- After 15 minutes of massage per day, 2 days per week for four weeks, the groups showed:
 - Decrease in touch aversion in both groups
 - Off task behaviors decreased in both groups but more in massaged group
 - Orientation to irrelevant sounds and stereotypic behaviors decreased in both groups but significantly more in touch therapy group

• Field, Lasko, Mundy, Henteleff, Kabat, Talpins, Dowling (1997)

Relationship to Vestibular Processing

- Presence of postural control issues and decreased response to vestibular input

Impact of Vestibular input

- On REM sleep (Ornitz et al, 1973)
- On eye contact (Slavik et al, 1984)
- On vocalizations (Ray, King, & Grandin, 1988)

Sensory Integration and Self Stimulation and Self Injurious Behaviors

- Smith et al (2005)
- Demonstrated no significant difference immediately following tx, but one hour after tx, participants had significantly fewer self-stimulating & self-injurious behaviors compared to control

Sensory Integration and Mastery Play

- 5 preschool children with autism (single system design)
- Intervention: OT with an SI emphasis
- Gains were made in mastery play, but no effects were seen for interaction.

Case-Smith, J. & Bryan, T. (1999).

Ayres and Tickle (1980)

- Children were divided into hypo and hyper reactive to sensory stimulation based on 12 measures
- Children's sensory processing were evaluated prior to tx; after one year of SI tx,
- Results showed that children who were *hyper*-reactive to sensory input were more likely to have a better response to tx than those who were *hypo*-reactive.

Sensory Integration

- Single system design with 2 boys
- Measures of functional behaviors (social interaction, approach to new activities, response to holding or hugging, functional communication during meal time, and response to movement) at home
- Gains in measures of functional behaviors at home except functional communication during meals

Linderman, T. & Stewart, K., (1999). *American Journal of Occupational Therapy*, 53, 207-213.

Summary: Intervention

- Benefits of SI intervention: play behaviors, engagement, minimal changes in adult/peer interactions, approach to new activities, response to holding or hugging, response to movement and decreases in frequency and duration of disruptive behaviors and increases in functional behaviors.
- Vestibular input appears to increase vocalizations, word production, and eye contact. Vestibular input appears to decrease self-stimulatory behaviors. Vocalizations and word production may increase during the administration of vestibular input and not necessarily after.
- Vestibular input is provided in the form of swings, oscillators or jogging.

Intervention Needs – Family Centered

- Studies suggest that parent training leads to improved child communicative behavior, increased maternal knowledge of autism, enhanced maternal communication style and parent-child interaction and reduced maternal depression (Review by McConachie & Diggle, 2007)

Conclusions

- Subgroups of children respond differently to intervention approaches – we need interventions that take into consideration the individual characteristics of the child rather than the diagnosis
- Our experience: Systematic evaluations of children's progress in early intervention programs leads to understanding their progress
