Incorporating Sensory Processing in Early Intervention Programs

The HELP Group Summit

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Objectives

- Apply ideas of practice based evidence and patient centered research to data collection and analysis in clinical practice

- Present retrospective study of data obtained in an intervention program for children identified with developmental delays
  - The effect of early intervention utilizing a sensory based approach
  - Sensory processing patterns in children with ASD versus children with children identified with developmental delays and typically developing children
  - The relationship between sensory processing and development

Practice Based Evidence (PBE)

(Horn et al, 2012)

- PBE: evidence obtained from observational methods during routine practice
- Differs from EBP in that in EBP, the evidence is obtained from experimental studies
- Different from everyday practice outcome measurements
- Has been used with large samples of in-patients across several settings

Practice Based Evidence (Horn et al, 2012)

- Requires clinician involvement from the beginning stages
- Takes into consideration individual patient characteristics (diversity)
- Uses of detailed standardized documentation
- Easily translated into clinical practice
- REQUIRES PREPARATION

TWISPP: Early Intervention Sensory and Play Program

- Enriched environment: Provided in a specialized setting with support from occupational therapists, physical therapists, and speech and language therapists

- Unstructured parental involvement and through in-service sessions with other parents

Program Characteristics

- Play and intrinsic motivation as a context to facilitate autonomy, learning and exploration
- Sensory rich environment as a context for sensory-motor development, social interaction, and problem solving
- Interdisciplinary collaborations: occupational, physical and speech and language therapy

Program Characteristics

- Age: 18 to 36 months identified as presenting a developmental delay in the areas of language, motor and cognitive development
  - Includes children who are typically developing
- Group ratio: 1 adult :3 children
- Frequency: two or three days per week/3 hours per day
- Children spend 30 to 45 minutes per day in specialized sensory rich environment that requires interacting with sensory input and praxis
- Ongoing focus is on vestibular, tactile, and proprioceptive experiences

Intake and Outcome Measures

- Intake (first 2 months):
  - Bayley Scales of Infant and Toddler Development®, Third Edition (Bayley-III®)(Bayley, 2005)
  - Infant Toddler Sensory Profile (ITSP) (Dunn & Daniels, 2002)

- Outcome measures every 3 to 6 months:
  - Bayley Scales of Infant and Toddler Development®, Third Edition (Bayley-III®)(Bayley, 2005)

- Other assessment as needed

The Tools:

Bayley Scales of Infant and Toddler Development®, Third Edition (Bayley-III®)(Bayley, 2005)

Scores Provided:

- Raw scores:
  - cognitive, receptive, expressive fine motor, and gross motor from direct administration.
  - social emotional and adaptive behaviors from a parent questionnaire.
- Scaled scores (raw and age) with a mean (SD): 10 (3)
- Composite scores: Language, Motor, and GAC
- Percentiles

Infant Sensory Profile (ITSP)

- Parent questionnaire focusing on sensory processing, primarily modulation

ITSP: Scoring System

- Parents report using a Lykert scale about the occurrence of a specific behavior (almost always (1), frequently, occasionally, seldom, and almost never (5)

- Categorizes the child in 4 patterns of overall response (Low Registration, Sensation Seeking, Sensory Sensitivity, and Sensory Avoiding) and 5 sensory categories (vestibular, tactile, visual, auditory, and oral)

ITSP: Analysis

In each category the child is classified as:

- Significantly less than others (definite difference)
- Less than others (probable difference)
- Typical
- ***More than others (probably difference)***
- ***Significantly more than others (definite difference)***

3 Retrospective Studies

- Sensory processing patterns in children with ASD versus children with children identified with developmental delays and typically developing children

- The effect of early intervention utilizing a sensory based approach

- The relationship between sensory processing and development

Background

- The SP has been used in several studies to identify sensory processing patterns in children with ASD older than 3 years (Baker, et al. 2008; Ben-Sasson, et al., 2009; Dunn, Myles, & Orr, 2002; Ermer & Dunn, 1998; Hilton et al. 2010; Kientz,. & Dunn,1997; Rogers, Helpbum, & Wehner, 2003; Watling, Deitz, & White, 2001)

- The IFSP and SP has been used in studies with children with ASD under 3 years with results suggesting higher incidence of low registration, auditory processing difficulties, higher incidence of increased sensitivity, and lower frequency of sensory seeking (Ben-Sasson et al, 2007; Dunn, 2002; Wiggins et al, 2009).

Study #1

- Sensory processing patterns in children with ASD versus children identified with developmental delays and typically developing children

- Significance
  - Contributes to the understanding of sensory processing in children with ASD as compared to other children with developmental delays (Most studies have compared ASD with typically developing children and focused on children older than 3 years of age)

Methods

- Children between 19 and 36 months attending the early intervention program

- Three groups matched by age and gender:
  - Children diagnosed with ASD after they left the program (28)
  - Children not exhibiting signs of ASD and not diagnosed with ASD after they left the program (28)
  - Typically developing children attending the program (28)

Analysis

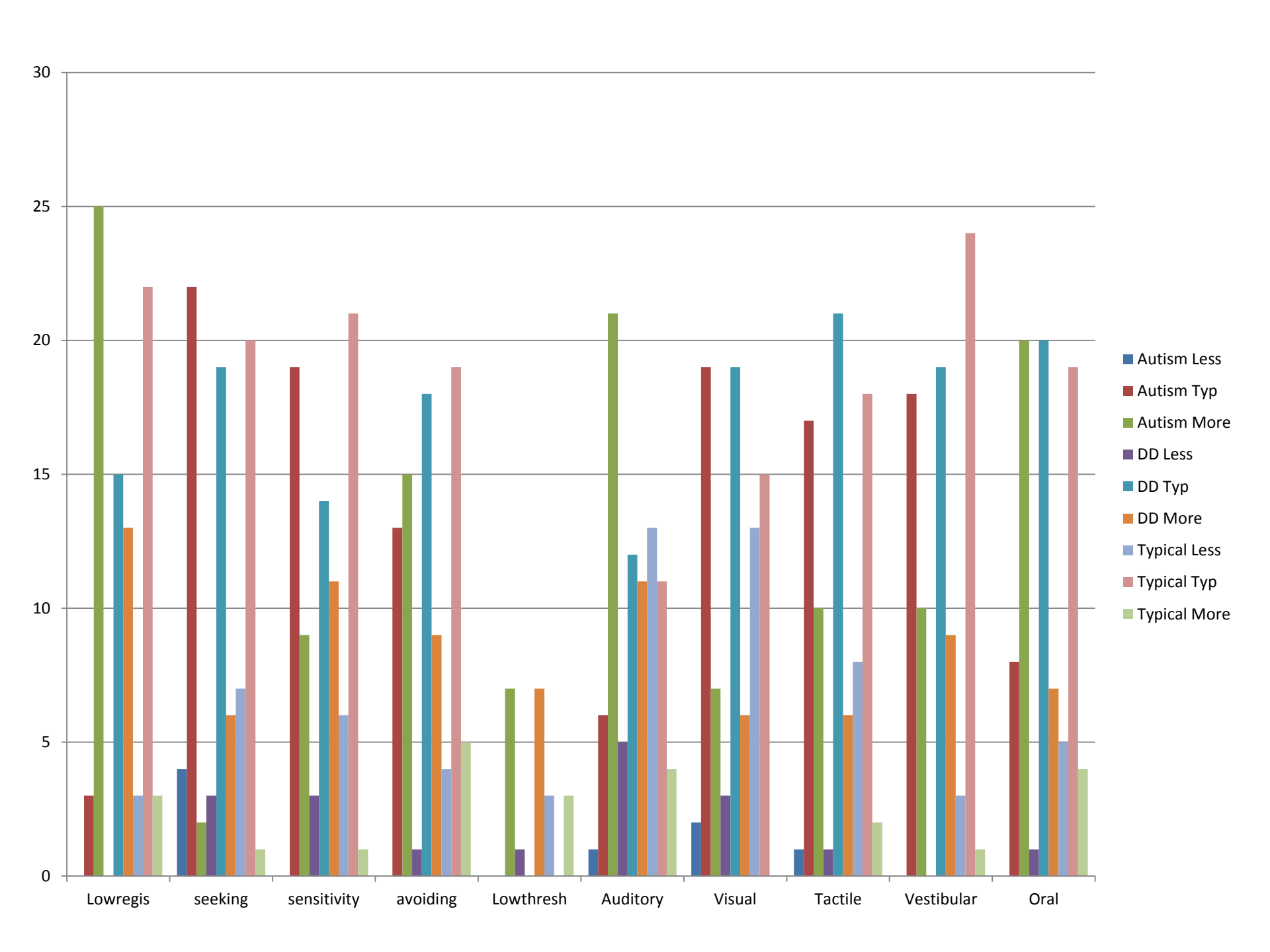
- Five groups: Much more than others, more than others, typical, less than others, and much less than others

- Three groups: Definite difference and probable different were grouped into more than others (3), less than others (1) and same as others (2)

- Poisson Regression

Three Groups

ASD=28	DD=28	Typ=28								
Diagnosis	**Pattern**	**Lowreg**	**seekin**	**sensiti**	**avoid**	**Audit**	**Visua**	**Tact**	**Vestib**	**Oral**
Autism	Less	0	4	0	0	1	2	1	0	0
Autism	Typ	3	22	19	13	6	19	17	18	8
Autism	More	25	2	9	15	21	7	10	10	20
DD	Less	0	3	3	1	5	3	1	0	1
DD	Typ	15	19	14	18	12	19	21	19	20
DD	More	13	6	11	9	11	6	6	9	7
Typical	Less	3	7	6	4	13	13	8	3	5
Typical	Typ	22	20	21	19	11	15	18	24	19
Typical	More	3	1	1	5	4	0	2	1	4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Autism Less
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Autism More
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DD Typ
DD More
Typical Less
Typical Typ
Typical More

ASD/DD/TD Distribution

	Patterns in More/Typ/Less than
Auditory	0.07
Visual	<.001
Oral	<.001
Tactile	<.001
Vestibular	<.001
Sensory Seeking	<.001
Sensory Avoiding	<.001
Sensory Sensitivity	<.001
Low Registration	<.001

ASD/DD Distribution

Autism/DD	28-28-28
	Patterns in More/Typ/Less thar
Auditory	<.001
Visual	<.001
Oral	<.001
Tactile	<.001
Vestibular	<.001
Sensory Seeking	<.001
Sensory Avoiding	<.001
Sensory Sensitivity	<.001
Low Registration	<.001

Results

- Children with ASD exhibit a distinct sensory processing pattern as compared to children with DD and typically developing children

- Differences in the following areas need further consideration:
  - Low Registration
  - Tactile Processing
  - Vestibular Processing
  - Sensory Seeking

Sample Items

- Low Registration
- Tactile Processing
- Vestibular Processing
- Sensory Seeking

Conclusion

- Need to consider sensory processing in children under 3 years as sensory processing may be related to behavioral manifestations and have a predictive value

- Need for observational tools that focus on sensory processing

Study # 2: Effects of Early Intervention Enriched Environment - Background

- Principles of early intervention that are widely accepted (Ramey & Ramey, 1998)
  - Interventions that begin earlier are more effective
  - More intense programs are more effective
  - Direct more beneficial than indirect
  - More comprehensive services more effective than narrow focus
  - Individual differences
  - Effects are lessened over time

Study # 2: Effects of Early Intervention Enriched Environment

- Populations:
  - ***Cognitive, expressive, receptive, and fine motor subtests were completed on 72 children***
  - ***Gross motor subtest was completed on 64 children***
  - Social emotional subtest was completed on 15 children and adaptive subtest was completed on 14 children
- Age: 19 to 35 months at time of testing
- Follow up testing: 3.1 to 9.1 months later
- Number of sessions: Three hour group sessions 1 to 3 times per week

Scaled Scores

	Pre	Post
Cognition	7.85	9.29
Receptive Language	7.39	9.47
Expressive Language	6.71	8.91
Fine Motor	9.18	10.04
Gross Motor	7.51	8.41

Analysis: Paired t-test

	NUMBER OF PAIRS	P value
COGNITION	71	<.0001
RECEPTIVE LANGUAGE	71	<.0001
EXPRESSIVE LANGUAGE	71	<.0001
FINE MOTOR	71	0.013
GROSS MOTOR	64	<.0001
SOCIAL EMOTIONAL	15	0.307
ADAPTIVE SCALE	14	0.7

Results

- No significant differences in fine motor area, probably due to performance at entry

- Significant performance differences in four areas:
  - Cognition
  - Expressive Language
  - Receptive Language
  - Gross motor

Sample Items

- Cognition items include:
  - Imitation
  - Imaginary use and pretend play

- Gross motor items primarily focus on developmental milestones, postural control and balance

Conclusions

- Supports the existing literature on the importance of early intervention with children with developmental delays
- Supports the use of the Bayley III as an outcome measure
- Need for a control group in non-enriched environment

Study #3:

- How do scores in sensory processing as measured by the ITSP correlate with development as measured by the Bayley Scales of Infant and Toddler Development®, Third Edition (Bayley-III®)(Bayley, 2005)?

- 138 children referred for group services for developmental delays

Analysis

- Five groups: Probable difference and definite difference not combined
- Three groups: Probable difference and definite difference combined
- Spearman Correlation Coefficients

Results

Significant correlations

- Lower scores in Cognition correlate with difficulties in Oral Sensory Processing (more than others) and Sensory Sensitivity (more than others)

- Lower scores in expressive and receptive language correlate with Low Registration (more than others) and Visual Processing (more than others)

Sample Items

- Visual Processing
- Sensory Sensitivity
- Oral Sensory Processing

Conclusions

- Sensory processing relates to functional performance and needs to be assessed

- The relationship between sensory processing and motor performance requires observational tools of sensory processing

Limitations

- Retrospective study
- Sample size
- Restricted by existing assessment tools:
  - Use of a parent report (ITSP) to measure sensory processing
  - The ITSP focuses on modulation of sensory input and not on discrimination

Lessons Learned for Clinical Practice

- Plan the data collection strategies
  - Choose the data collection tools with caution
    - Need for observational measures of sensory processing in children under 36 months of age
  - Monitor record keeping and documentation
  - Structure the data collection (electronic)
  - Avoid collapsing data too early in the process

- Thank you!

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