A Retrospective
Pre-Test Post-Test Study of OT Intervention for Children with Sensory Challenges

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Need for the Study

Sensory processing problems are a significant impairment that results in difficulties with daily life activities.[1-3] The most commonly used intervention is occupational therapy using a sensory integrative approach. Recent evidence supports the effectiveness of this approach for children with autism spectrum disorder (ASD). [4-5] However, few studies have been conducted on the effectiveness of this approach for children without co-morbid ASD. The following retrospective chart review sought to identify outcomes that were sensitive to change following a short term, intensive, relationship-based course of OT/SI that included a significant parent coaching and education component.

Methods

Study Design:

Retrospective chart review pre-test/post-test design was utilized. Charts were reviewed from a private pediatric clinic in Greenwood Village, Colorado from 2007 -2014.

Participants:

Charts from 179 children, 2-13 years of age, were included in the study. Inclusion was dependent upon having an SPD diagnosis based on the global clinical impression of an occupational therapist following standardized testing, parent report measures, and clinical observations. Children with autism and other known psychiatric, neurological, or physical disorders were excluded. The sample was comprised of 40 females and 139 males, 87% of whom were Caucasian, with a mean age of 6.1 years (SD = 2.3).

Measures:

Three parent report measures were examined: The Adaptive Behavior Assessment System II (ABAS-II), the Behavior Assessment System for Children 2 (BASC-2) and the Sensory Processing 3 Dimensions Inventory (SP3D) (aka Sensory Processing Scale Inventory).

Description of the Intervention:

Intervention was based on the STAR Model[6] which is an amalgamation of occupational therapy approaches including the DIR/ Floortime Model, sensory integration, and Integrated Listening Systems™ (iLs™). In this short term, intensive program with parent coaching, treatment is usually scheduled 3-5 times a week for a total of 20-30 sessions. Each family participates in all treatment sessions as well as 5-6 parent-only, education sessions. Parent education focuses on home strategies using the clinical reasoning model of ASECRET[7].

Data Analysis

Non parametric, paired samples tests were used to assess changes in adaptive behaviors, emotional functioning and sensory processing.
Corrections were made for multiple comparisons dividing alpha (α=.05) by the number of comparisons *a*=.05/14=.003. Correlational analyses were used to evaluate the relation between variables. Threshold levels of significance were adjusted for multiple comparisons (<.001).

Tables and Figures

Changes in Behavior and Adaptive Functioning After Treatment

Table 1. Means, Standard Deviations, and Effect Size for Pre and Post Test

ABAS	Before Treatment Mean	Before Treatment SD	After Treatment Mean	After Treatment SD	Wilcoxon Signed Rank Test	*p*	Effect Size
General Adaptive (n=135)	81.08	15.03	88.79	16.46	-6.43	<.001	0.55
Conceptual (n=141)	85.25	14.50	92.23	15.72	-6.26	<.001	0.53
Social (n=146)	85.84	15.77	91.77	17.29	-5.41	<.001	0.45
Practical (n=143)	79.42	14.60	85.18	17.80	-5.33	<.001	0.45

Figure 1. Improvements in Adaptive Behavior After Treatment

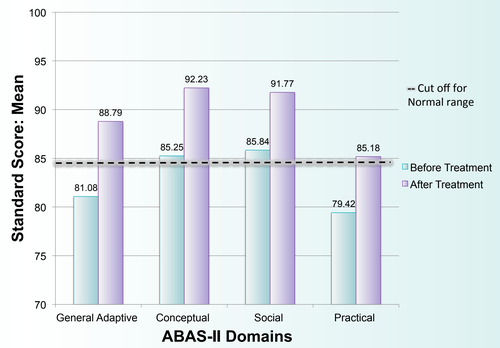


Table 2. Means, Standard Deviations, and Effect Size for Pre and Post Test

BASC	Before Treatment Mean	Before Treatment SD	After Treatment Mean	After Treatment SD	Wilcoxon Signed Rank Test	*p*	Effect Size
Externalizing (n=157)	59.32	13.04	55.06	10.74	-5.15	<.001	0.41
Behavioral (n=157)	62.62	12.67	57.17	10.69	-6.49	<.001	0.52
Internal (n=157)	57.78	13.09	52.65	11.65	-5.88	<.001	0.47
Adaptive (n=156)	40.93	8.74	45.22	8.59	-6.00	<.001	0.48

Figure 2. Reduction in Behavioral Problems After Treatment

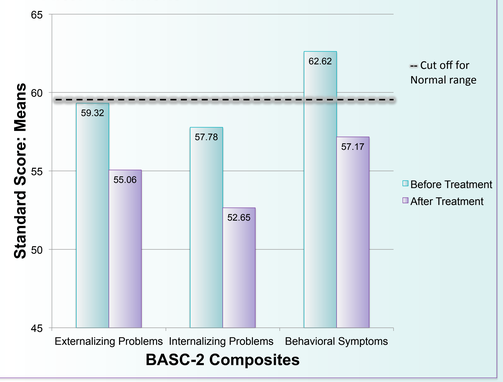
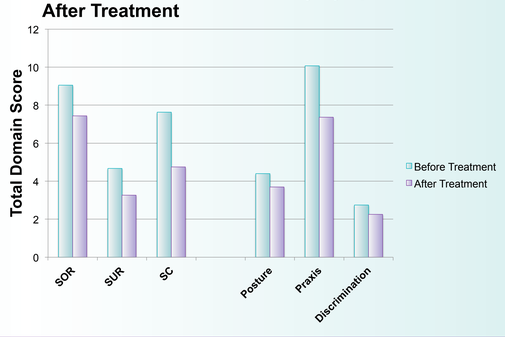


Table 3. Means, Standard Deviations, and Effect Size for Pre and Post Test

SPD3	Before Treatment Mean	Before Treatment SD	After Treatment Mean	After Treatment SD	Wilcoxon Signed Rank Test	*p*	Effect Size
SUR (n=91)	4.67	3.71	3.26	3.12	-4.19	<.001	0.44
SOR (n=119)	9.05	5.16	7.44	5.13	-3.57	<.001	0.33
Sensory Craving (n=116)	7.63	6.40	4.75	5.10	-5.62	<.001	0.52
Posture (n=118)	4.40	4.60	3.69	3.62	-2.10	*p*=.036	0.19
Praxis (n=118)	10.07	7.56	7.36	6.01	-4.80	<.001	0.44
Discrimination (n=118)	2.75	2.48	2.25	2.33	-1.94	*p*=.053	0.18

Figure 3. Reduction in Sensory Symptoms After Treatment



Results

- **Characterizing sensory modulation subtypes:**
  - Sensory Craving (SC) pre-test was associated with the Externalizing Problems (*r* =0.447; *p*=.000) and Behavioral Symptoms Index composites of the BASC-2 (*r* =.405; *p*=.000) and Social Domain of the ABAS-II (*r*=-0.283, *p*=.004)
  - Sensory Underresponsivity (SUR) pre-test was associated with the Conceptual Domain (*r* =-0.338; *p*=.002) and Practical Domain (*r*=-0.280, *p*=.010)] of the ABAS-II
  - Sensory Overresponsivity (SOR) pre-test was associated with the Internalizing Problems composite of the BASC-2 (*r* =0.337; *p*=.000)
- Participants had between 11 and 68 treatment sessions (Mean=26.10, Std. Deviation=7.739)
  - Mean # of treatment sessions negatively correlated with change on Externalizing Problems composite (*r*=-0.262, *p*=.001)
  - More treatment sessions were associated with decreased behavioral problems
- Significant improvements reported after treatment on:
  - all composites scores of the ABAS-II (Table 1),
  - all composites of the BASC-2 (Table 2),
  - all subtests of the SP3D, except for Posture (*p*=.036) and Discrimination (*p*=.053) (Table 3).
- Largest effects sizes:
  - the General Adaptive Composite (*r* =.55) and Conceptual Domain (*r* = .53) of the ABAS-II, reflecting ADL and IADL,
  - Behavioral Symptoms Index composite (*r* = .52) of the BASC-2,
  - and Sensory Craving (*r* = .52).

Discussion

This study provides preliminary support for the effectiveness of a novel treatment approach that combines short-term intensive occupational therapy using sensory integration, DIR/Floortime Model and iLs™. All children improved on standardized measures of adaptive behavior, emotional functioning and sensory processing, thus suggesting that these measures are sensitive to change and hold promise for use in prospective studies that use more scientifically rigorous designs. This study also suggests that sensory modulation subtypes are associated with different adaptive behavior and emotional functioning impairments. Limitations of this study include the lack of a control group and non-randomization.

Implications for Practice

- This study contributes important information to guide evidence-based practice for children with sensory processing challenges and highlights a shift in current clinical practice to embrace extensive parent education and coaching as an integral part of intervention.

The following may be valuable components of this intervention:
- Short-term program (20-30 sessions)
- Intensive treatment occurring 3-5 times per week
- Frequent parent-only education and parent coaching within the sessions
- A combination of sensory-based treatment with a focus on engagement/relationship

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