

Parents' Perception of Effectiveness of Sensory Diets for Children: A Multiple Case Study Analysis

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OBJECTIVE. Multiple case studies and a parent survey were used to analyze parents' perception of effectiveness of sensory diets for children between the ages of 2 and 10.

METHOD. We conducted case-studies on 29 children with symptoms of sensory modulation disorder. Parents received training and assistance in setting up the sensory diet from an occupational therapist. Parents tracked data on one chosen behavior before and during the implementation of a sensory diet using BrainWorks™ and completed an online survey about the sensory diet process.

RESULTS. Twenty-six of the 29 case studies showed significant improvement during the use of the sensory diet, according to data provided by parents. Parent survey showed 100% felt the sensory diet was important to their child's life.

CONCLUSION. Sensory diets designed by occupational therapists and implemented by parents using the BrainWorks™ system have a high likelihood of being perceived as effective in addressing behaviors related to sensory modulation difficulties.

Patricia Wilbarger, M.Ed., FAOTA, OTR is credited with coining the term "sensory diet" to indicate the use of a combination of sensory strategies to keep a person at the optimal level of arousal (Wilbarger, 1984). Occupational therapists often recommend a sensory diet for clients with sensory modulation disorder, a therapeutic diagnosis used to describe the inability to respond appropriately to sensory input and to keep oneself focused on the task at hand. Miller et al. (2007) identified the following three primary types of sensory modulation disorder: sensory over-responsivity, sensory under-responsivity, and sensory seeking. Bar-Shalita, Vatine, and Parush (2008) found that sensory modulation disorder significantly impacts participation in daily life activities.

A sensory diet seeks to address the underlying sensory modulation difficulties in the client that have been identified by the occupational therapist (Biel, 2010). Many times, the therapist creates a list of appropriate activities or makes a schedule detailing which types of activities should be done at what times of day. Alternatively, therapists can use pictures to offer appropriate activity options to children or non-verbal clients. For the purpose of this study, we used the BrainWorks™ system as the tool to offer appropriate sensory activities to the children to select from. BrainWorks™ uses a tachometer to teach levels of modulation and corresponding

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red, yellow, and green arrows on each sensory activity picture card to assist children in selecting activities that will be most beneficial for their sensory systems.

Many activities often included in sensory diets have been researched such as the use of alternative seating options (Schilling, Washington, Billingsley, & Deitz, 2003; Schilling & Schwartz, 2004) wearing a weighted vest (VandenBerg, 2001; Olson & Moulton, 2004), and the impact of movement on learning (Mahar, Murphy, & Rowe, 2006). However, research on the use of an overall sensory diet approach is lacking (Dyer, 2010). Only one research study was found on the topic of sensory diets and that was by Hall and Case-Smith (2007) who found that therapeutic listening combined with a sensory diet resulted in improved behaviors in children with SPD and visual-motor impairments.

Recently the authors of this article conducted multiple case studies in an effort to answer the following broad questions:

1. Does data taken by parents show that sensory diets (designed and implemented using the BrainWorks™ system) work to address the types of behaviors for which OT's typically recommend them?
2. Do parents feel that sensory diets are beneficial and worthwhile?
3. How much training do parents need in order to feel confident in the implementation of sensory diets using the BrainWorks™ tools provided?
4. What types of behaviors respond the best to the use of a sensory diet using the BrianWorks system for children between the ages of 2 and 10?

Method

Research Design

Multiple case studies were implemented and results were analyzed on a case-by-case basis and then results were grouped and analyzed to draw conclusions.

Participant Selection

Research participants were recruited through a bulk email sent to everyone who had at some point voluntarily signed up to receive emails from Sensational Brain, LLC's website: www.sensationalbrain.com. Sensational Brain, LLC is a company owned by Gwen Wild, MOT, OTR/L that offers seminars on the development of sensory diets, consultation, and the BrainWorks™ products. Many who received this email are therapists and forwarded it to families they work with and some posted the email on relevant parent groups. The first 125 people to volunteer who met the requirements were accepted.

The requirements for participation were that the parent or guardian had a child between the ages of 2 and 10 who demonstrated sensory processing difficulties, as determined by parent research on the subject or assessment by an Occupational Therapist or other healthcare provider. For this study, the children were not

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required to have a formal diagnosis nor were any standardized assessments used to determine eligibility.

Once accepted into the study, all 125 potential parent participants received emails detailing their next steps, which included paperwork and attending a one-hour training webinar online. Fifty-three of the original 125 parents completed the necessary requirements for participation and received the BrainWorks™ supplies free of charge. Thirty-two participating families actually ended up completing the data-tracking forms and were therefore eligible to be included in our data analysis. Three were disqualified due to incorrect or invalid data-tracking. One participant only returned one week of intervention-phase data but was still included in the data analysis. Therefore the final number of case-studies with data used in the analysis was twenty-nine.

Table 1. Participant Characteristics: Demographics and Conditions Listed by Parents

Participant	Age	Sex	Conditions
1	3	M	High Functioning Autism, Sensory Modulation Disorder
2	9	F	Fetal Alcohol Syndrome, SPD
3	6	M	Asperger Syndrome
4	8	M	Sensory Modulation Concerns
5	9	M	SPD
6	3	M	SPD
7	5	M	SPD, Speech Delay
8	4	F	SPD, Developmental Delay
9	8	F	DCD
10	3	M	ASD, SPD, Pica
11	4	M	SPD
12	8	M	Learning Disability
13	8	M	Low Tone, Lack of Coordination
14	3	M	SPD, Drug and Alcohol Affected
15	7	M	SPD
16	5	F	Dyspraxia, Hypotonia
17	3	M	SPD, Developmental Delay
18	6	F	SPD, ADHD/ADD
19	3	M	ASD
20	7	F	SPD, Developmental Delay
21	5	M	SPD, ADHD
22	4	F	SPD
23	3	M	PDD/NOS
24	6	M	ASD
25	3	M	SPD, Cranial Compression
26	9	F	SPD, Anxiety
27	8	M	Asperger Syndrome, SPD, Anxiety
28	9	M	SPD
29	5	M	None

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Procedures

One parent of each participating child was required to participate in a one-hour webinar hosted by Gwen Wild, MOT, OTR/L. The webinar provided an overview of sensory modulation disorders, introduced data-tracking and provided examples of how to track data on different types of behaviors, guided the parents in selecting an appropriate target behavior on which to track data for the purpose of this study, and introduced parents to the use of the BrainWorks™ sensory diet tools. The parents also received printed information and forms via email to assist them in tracking data appropriately. The parents were given a list of seven examples of behaviors that are often rooted in a sensory processing problem such as difficulty with transitions, resistance to activities of daily living (hair-brushing, dressing, etc.), and over-reactions to certain sensations. Parents were encouraged to choose a behavior from this list but were also given permission to choose any behavior that was impacting their child's life that seemed to be caused by a sensory processing disorder. The only behaviors that were not allowed for inclusion in this study were severe self-injurious behaviors.

The BrainWorks™ system provided to participants included over 130 sensory activity picture cards, instructional materials, a BrainWorks™ File Folder with a tachometer on the front that is designed to help children understand self-modulation and spaces inside for sensory activity cards to be organized and displayed for children to select from. During the webinar and through instructional materials, parents were encouraged to use the BrainWorks™ File Folder sensory diet tool as needed to help their child stay regulated and they were also encouraged to use schedule boards during times of day when the target behavior was the most prevalent. The recommendation was to set up a schedule board with the routine tasks put on by the parents (eat, dress, brush teeth, etc.) while leaving open spaces before and after the routine tasks to allow the child to select and place appropriate sensory activities to assist them in managing the routine more effectively.

Participants who were receiving occupational therapy services during their participation in this study were provided with a letter to give to their OT explaining the purpose of this study and asking them to be involved with the design of the child's sensory diet and to be available to support the parents in carrying out the sensory diet if they were comfortable doing so. Three OT's participated in the webinar along with the parents of the children they treated who were participating in the study. Gwen Wild was also available to families of participants via email and phone to answer any questions about data-tracking or design of the sensory diet as needed.

Data Collection

In order to establish a pre-intervention baseline, parents were required to record data on their chosen target behavior for seven consecutive days before introducing

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BrainWorks™ to their children or beginning the use of any new sensory strategies. Upon completion of the pre-intervention data-tracking period, parents were then asked to implement the use of the sensory diet with the BrainWorks™ tool and continue tracking data for fourteen more days on the chosen target behavior.

Case Study Examples

The following participant case studies serve to illustrate the research process and data collection used in this study.

John *

John is an 8 year-old boy with diagnoses of Asperger's Syndrome, anxiety, and sensory processing disorder. At the time of the study, John was being homeschooled but received school-based OT services from 2008-2010 and received OT in an outpatient setting from 2007-2010. John's mother reported that while receiving OT services, John's OT "used the Alert Program to help him learn modulation strategies" and his mom stated that she was taught to use the "Wilbarger brushing protocol to reduce tactile sensitivity."

John's mother chose difficulties with transitions as the target behavior for the purpose of this study. She used the following 5 point rating scale to document the intensity of his reaction to each of 9 transitions throughout his days:

1. Appropriate behavior during transition
2. Mild agitation or mild display of negative emotion during transition
3. Definite display of significant emotion, but responds to attempts to redirect or calm during transition
4. Losing control – unable to be redirected or respond to calming input but not hurting self, others, or being destructive to objects
5. Out of control – acting aggressively toward others, hurting self, destructive to objects in environment

Table 1. Sample Data for John showing days 4 and 9

Transition	Breakfast to 1 st Class	1 st Class to 2 nd Class	2 nd Class to 3 rd Class	3 rd Class to 4 th Class	4 th Class to Lunch	Lunch to Afternoon Activity	Activity to Dinner	Dinner to evening activity	Evening Activity to Bedtime Routine
DAY 4 (Pre-Intervention Phase)	4	5	1	1	1	4	2	2	2
DAY 9 (Intervention Phase)	2	1	1	1	1	1	2	1	3

The average intensity rating during the seven-day pre-intervention phase was 2.75 per transition. The average intensity rating during the fourteen-day intervention phase was 1.71. Overall, John's data demonstrates a 38% reduction in intensity of reaction to transitions.

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Anthony *

Anthony is a 3 year-old little boy with diagnoses of Autism, Pica, and Sensory Processing Disorder. At the time of the study, Anthony was currently receiving occupational therapy services in his school setting as well as private occupational therapy in an outpatient clinic.

Anthony's mother chose to track data on aggressive resistance to activities of daily living (ADL's) for the purpose of this study. The mother defined aggression as hitting, scratching, and kicking. She tracked frequency of this behavior by making tally marks for each act of aggression that occurred during ADL's (hair-brushing and teeth-brushing).

Table 2. Sample Data for Anthony showing days 1 and 9

	7:00 am to 8:00 am	Noon	6:00 pm to 8:00 pm
Day 1 (Pre-Intervention Phase)	1	1	1
Day 9 (Intervention Phase)	0	1	0

The average number of aggressive actions during hair- and teeth-brushing during the seven-day pre-intervention phase was three per day. The average number of aggressive actions during hair- and teeth-brushing for the fourteen-day intervention phase of the study was 1.57 per day. This data shows a 48% reduction in aggressive actions during hair- and teeth-brushing per day.

**** Real names of the children are not being used in this article to protect their privacy.***

Data Analysis

Each case study resulted in seven days of pre-intervention data serving as each subject's control data and the fourteen days of intervention phase data serving as the experimental data. The experimental data were then compared to the control data for each subject to determine effectiveness of the sensory diet intervention for each case study.

Data were analyzed for each participant individually and then component data from all case studies were combined to analyze overall results as well.

Additionally, upon completion of the study, parents of participating children were asked to complete an online survey about the research process, the use of the BrainWorks™ tools, how much OT support they believed was needed to implement

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the sensory diet, and their overall opinions on the use of a sensory diet for their child.

Results

Target behaviors were grouped according to the following categories for the purpose of analyzing overall response to sensory diet intervention:

- Emotional Over-reaction –Included “meltdowns,” aggression, and crying/fussing in response to transitions or certain times of day.
- Attention to Task
- Resistance to Activities of Daily Living (ADL’s) – Included stalling, crying/fussing, refusal, and aggression in response to ADL’s.
- Sleep Issues – Included excess time to fall asleep or frequent awakenings.
- Impulsivity – Included remaining seated at meals and keeping hands to self.

Two children in the study had the following target behaviors that did not fit the definition for any of the above categories:

- Pressure-seeking (hand to jaw and hand-clenching)
- Mouth open while eating

Comparison of the seven days of pre-intervention data on the chosen target behavior to the fourteen days of intervention phase data showed positive change in 26 of 29 participants (see Table 3). Overall average improvement occurring during Intervention Week 1 was 26% and average change during Intervention Week 2 showed a 37.3% positive change over the pre-intervention data.

TABLE 3 Change in behaviors based on comparison of pre-intervention phase data to intervention-phase data collected by parents.

Category of Targeted Behavior	Case Studies	Positive Change in Behavior	Average Percent of Change
Emotional Over-responsiveness	11	11	41.84%
Resistance to ADL's	7	7	40.92%
Sleep Issues	4	3	29.00%
Impulsivity	3	2	20.01%
Attention to Task	2	2	10.78%
Mouth Open While Eating	1	0	-0.01%
Pressure-Seeking to Jaw/Hands	1	1	45.13%

After turning in all data, parents were emailed a link to participate in an online survey about the sensory diet process. Twenty-two parents participated in the survey. When asked about their comfort level in using the BrainWorks system to implement the sensory diet, 10 responded that the training received in the webinar

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was sufficient, 11 needed direct communication with Gwen Wild or their own occupational therapist in addition to the webinar, and one responded that she felt only somewhat comfortable implementing the sensory diet in spite of the assistance available. Of those currently receiving occupational therapy, four respondents received up to one hour of support from their therapist that was directly related to the implementation of the sensory diet and three respondents received up to three hours of support during the study.

Survey participants were asked about the importance of the sensory diet in their children's lives. One participant skipped this question. Zero participants agreed with the statement, "A sensory diet does not make a difference in my child's life." Seven rated the sensory diet as "somewhat important," and fourteen rated the sensory diet as "very important in my child's life."

Participants were asked, "Not including the target behavior that you tracked data on, did you notice positive changes in your child that you attribute to the sensory diet used during this study?" Fifteen responded "yes," six responded "no," and one person skipped the question.

LIMITATIONS OF STUDY

According to Salminen, Harra, and Lautamo (2006), case study research has been criticized for "subjectivity of the method and biased data collection, analysis and conclusions, and for a lack of representativeness." Therefore we recognize the limitations of case study research. This includes the fact that parents' bias toward seeing improvement may have affected the data gathering process but believe that does not necessarily invalidate the results since the goal was to ascertain parents' *perception* of effectiveness. Furthermore, although this project was looking at the effectiveness of sensory diets, results may be limited to sensory diets using the BrainWorks™ system combined with the specific training received by the case study participants.

By nature, case study research "aims to investigate a particular topic in its context from multiple viewpoints and it uses multiple methods and multiple data sources for its data collection" (Salminen et al., 2006). Therefore, standardized testing was not used to determine eligibility or progress nor were controls placed on variables that could be affecting outcomes. This should be viewed as an exploratory study from which hypotheses can be generated for future controlled studies.

Conclusion

In spite of the admitted limitations of this study, we believe this study effectively provided the following answers to our questions:

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1. Does data taken by parents show that sensory diets (designed and implemented using BrainWorks™ system) work to address the types of behaviors for which OT's typically recommend them?

Yes, 26 of the 29 case studies provided by this study showed significant positive change through data-tracking of the target behavior chosen by the parent. Seventy-one percent of parents stated that aside from the target behavior used for data-tracking, they noticed other positive changes in their child that they attribute to the sensory diet used during the study.

2. Do parents feel that sensory diets are beneficial and worthwhile?

Yes. Of the 21 parents who participated in the post-study survey, 100% agreed that the sensory diet used during this study was either "very important" or "somewhat important" to their child's life.

3. How much training do parents need in order to implement the sensory diet using the BrainWorks™ system provided?

For 10 of the 22 survey participants, the one hour training webinar was sufficient for them to feel comfortable implementing the sensory diet using BrainWorks. The remaining 12 participants required up to three additional hours of support from Gwen Wild or their own occupational therapist.

4. What types of behaviors respond the best to the use of a sensory diet approach using the BrainWorks™ system for children between the ages of 2 and 10?

Our research indicates a sensory diet approach using the BrainWorks™ system has a high likelihood of success for the following behaviors: emotional over-responsiveness, resistance to ADL's, sleep issues, impulsivity, and pressure-seeking behaviors. Please see Tables A and B for statistics.

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