Determining Sensory-Based Interventions Used By Occupational Therapists

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This research, submitted by Zena Lia Toyama, has been approved and accepted in partial fulfillment of the requirements for the degree of Master of Science in Occupational Therapy from the University of Puget Sound.

Committee Chairperson: Marge Luthman, MS, OT/L

Reader: Yvonne Swinth, PhD, OTR/L, FAOTA

Director, Occupational Therapy Program: Yvonne Swinth, PhD, OTR/L, FAOTA

Dean of Graduate Studies: Sunil Kukreja, PhD

Abstract

Objective: The purpose of this descriptive study was to determine what types of sensory-based interventions, other than Ayres Sensory Integration®, pediatric occupational therapists are using, how frequently they are being used, and the clinical rationale for choosing these interventions for children with a sensory processing dysfunction.

Method: A survey was sent to 250 primary members of the American Occupational Therapy Association Sensory Integration Special Interest Section (SISIS). The survey was piloted by the SISIS committee members and their feedback was used in guiding the survey contents.

Results: Out of 250 surveys sent, 87 surveys were returned for a response rate of 35.2%. The findings revealed the primary reason for using sensory-based interventions is to provide a comprehensive treatment approach. The most frequently used sensory-based interventions in practice were The Alert Program for Self-Regulation and the Wilbarger Protocol. Duration of use was stated to be dependent on the "unique needs of the child." For clinical rationale, the primary sensory systems addressed in the sensory-based intervention chosen corresponded to the intent of that chosen sensory-based intervention. The three most frequently reported anticipated outcomes for each sensory-based intervention related to the role of the primary sensation being addressed in therapy.

Conclusion: Therapists need to be vigilant in choosing and explicit in articulating the sensory-based interventions they practice. Using evidence, staying true to an intervention, and receiving continuing education is key to clinical reasoning. Sound clinical reasoning is important in validating treatment approaches to others important to the child's care.

Determining Sensory-Based Interventions Used by Occupational Therapists

The ability to process sensory stimuli is vital to a person's engagement in activities and ability to function on a daily basis. Difficulty with sensory processing can disrupt family life and result in various behavioral, motor, and social impairments for a child. Dr. A. Jean Ayres (1972) studied problems with tactile, vestibular, and proprioceptive senses in children with learning disabilities. She introduced the theory of sensory integration, where she identified the importance of being able to process sensory information and produce adaptive responses appropriate for the demand of the activity or environment. Children need different amounts and types of sensory stimulation in order to self-regulate and improve their function in daily life, especially children with sensory processing dysfunction (Ayres, 1972; Smith Roley & Jacobs, 2009). In addition to using Ayres' Sensory Integration® (ASI®) as an intervention strategy for sensory processing dysfunction, many pediatric therapists also use other sensory-based interventions (Polatajko & Cantin, 2010).

Occupational therapists frequently work with children with sensory processing issues including children with autism. Since all children are unique in their sensory needs, an ASI® treatment approach alone may not be sufficient, thus a sensory-based intervention may be needed to complement ASI® treatment or used independently (Nwora & Gee, 2009). While there is extensive research on ASI®, and it is used widely in practice (Watling, Koenig, Schaaf, & Davies, 2011) more research is needed on alternative types of sensory-based interventions used in practice. Occupational therapists need to be able to distinguish between ASI® and other sensory-based interventions because they use different methods and seek to achieve different outcomes.

Background

History of ASI® theory. When children are developing, integrating sensory input is important for function of daily occupations. There are seven types of sensations that provide input to one's brain and body: tactile, visual, auditory, gustatory, olfactory, vestibular, and proprioceptive. Dr. A. Jean Ayres (1972) developed the sensory integration theory which is based on neurologic research. Her theory suggested that children with learning disabilities would have better behavioral and occupational outcomes if their brains were able to better organize sensory information from their environment. She claimed that this can be accomplished by forming a foundation for the brain to have the ability to change and adapt to environmental demands versus teaching the child specific skills (Ayres, 1972). Many children experience sensory integrative dysfunction in which their brains present difficulty integrating sensory input. Some symptoms seen in children are distractibility, hyperactivity, speech and language delays, low muscle tone, and poor motor coordination (Ayres, 1979). Other behaviors observed may be one's body leaning on objects, bumping into objects or people, and challenges with writing (Ayres, 1979).

Adherence to Dr. Ayres' principles is important in helping organize a child's nervous system and integrating sensory input from the environment. In order to promote adherence to those principles, the Fidelity Measure was developed. Ten criteria were established: provide sensory opportunities, provide just-right challenges, collaborate on activity choice, guide self-organization, support optimal arousal, create play context, maximize child's success, ensure physical safety, arrange room to engage child, and foster therapeutic alliance (Parham et al., 2007).

Ayres believed that sensory integrative dysfunction is a broad category encompassing sensory modulation disorders, vestibular disorders, developmental dyspraxia, problems with visual perception, challenges with speech development, and difficulty with auditory processing (Ayres, 1979). Sensory modulation issues involve difficulties with over-responsiveness or under-responsiveness to sensory stimuli (Ayres, 1972). For instance, over-responsiveness can appear as avoidance to stimuli such as the feel of shirt tags and seams of socks on the skin. Under-responsiveness can appear as if a child does not register the sensory input. For example, a child with tactile under-responsiveness may not discriminate the tactile input in the hands causing poor hand skills, difficulty using utensils or writing implements, and oral motor problems as seen with drooling (Ayres, 1979).

Inefficient vestibular processing can result in gravitational insecurity in which the child fears moving, falling, or having their feet leave the ground. Vestibular disorders can also appear as postural problems, including difficulty balancing and performing bilateral motor tasks (Ayres, 1979). Developmental dyspraxia or motor planning issues are defined as difficulty processing tactile-proprioceptive input which prevents a child from planning and executing desired movements (Ayres 1979).

Sensory integrative dysfunction can lead to learning problems in school; especially if there are visual perceptual and auditory processing issues present (Ayres, 1979). A child may have difficulty reading, writing, and following instructions. Children may have impairments with social skills as seen with forming relationships, reading cues, and responding appropriately during conversations (Ayres, 1979). In ASI®, the belief is that changing the underlying issues is imperative so the child is able to appropriately organize tactile, proprioceptive, and vestibular inputs at the central nervous system level, with hopes to produce adaptive responses that meet

the environmental demands. ASI® theory is based on neuroplasticity, which claims that the brain can change, develop, and be altered. Therefore, ASI® can be more effective with younger children because their brains have greater plasticity to change (Ayres, 1979).

Although ASI® is widely accepted, there has been controversy over ASI® since it was introduced in the 1970s. Ayres' theory was revolutionary for her time and the validity of the intervention was difficult to demonstrate (Smith Roley, Blanche, & Schaaf, 2001). However, results from some studies have shown ASI® to be just as effective as other intervention methods (Polatajko, Law, Miller, Schaffer, & Macnab, 1991; Vargas & Camilli, 1999; Wilson, Kaplan, Fellowes, Gruchy, & Faris, 1992). Thus, using an ASI® intervention must be intentional and wherein requires an occupational therapist to be certified in ASI® treatment (Parham et al., 2011; Watling et al., 2011). In spite of the controversy over ASI®, research has provided evidence for neuroplasticity in relation to using ASI®. One research study revealed that a child produced adaptive responses to multiple sensory inputs with improvement noted in activities of daily living, instrumental activities of daily living, and social participation (Arbesman & Lieberman, 2010). Another study by Miller, Coll, and Schoen (2007) found attention, social participation, and goal attainment significantly improved in a group of children who received an ASI® intervention twice a week for 10 weeks.

ASI® intervention. In an effort to provide a more clear understanding of Ayres' concepts and maintain fidelity to her intervention, ASI® became a registered trademark in 2007 (Mailloux & Smith Roley, 2012) and the Fidelity Measure was created which ensures adherence to ASI® by therapists during treatment (Parham et al., 2007). Primary criteria to fidelity of ASI® is having a large, safe therapy space in which suspended items such as swings, rope, ladders, and bars afford opportunities to explore the sensory environment with hope of making adaptive responses via

motor planning, balancing, and problem solving (Parham et al., 2011; Watling et al., 2011). Another criterion is the collaboration between the therapist and child to accomplish a just-right challenge. Other criteria are making intervention active, in the context of play, with the therapist vigilant about obtaining an adaptive response. Other ASI® intervention essentials include encouraging the child to maintain an appropriate level of arousal, challenging motor control, and helping to improve praxis (Parham et al., 2007; Parham et al., 2011) Overall, the therapist's role is to guide the child in selecting tools and equipment to use and to create motivating games in order to facilitate the child's inner drive, which leads to organization within and an adaptive response appropriate to the situation (Ayres, 1979).

ASI® interventions help with sensory modulation of behavior and social participation through playful activities (Case-Smith & Arbesman, 2008). A study implemented a 30 session ASI® intervention over 10 weeks on a child with autism that resulted in improved flexibility when deviating from routines and the ability to participate in family and peer games like bowling while using appropriate verbal communication (Schaaf, Hunt, & Benevides, 2012). Due to ASI® intervention, the child no longer needed an aide in school, since attention in the classroom improved (Schaaf et al., 2012). By having child-directed therapy, the child sought stimulation specific to the child's need which helped with increasing attention in school and with secondary side effects of improving reading, writing, and math.

May-Benson and Koomar's (2010) systematic review of descriptive, outcome, and qualitative studies has shown that using an ASI® intervention results in better sensory processing abilities in children. Their findings revealed that children were able to attend better, present less maladaptive behaviors, and improve social skills. In an 11 week single subject design study using an ASI® intervention three times per week, Roberts, King-Thomas, and Boccia (2007)

found that behavioral regulation improved as noted with a reduced intensity in teacher's direction and decreased aggression from the child. The child also displayed increased engagement in classroom activities (Roberts et al., 2007). A randomized controlled trial implemented 18 ASI® interventions for 45 minutes each over six weeks to children with autism and found increased self-regulation skills and decreased autistic mannerisms, impacting social acceptance (Pfeiffer, Koenig, Kinnealey, Sheppard, & Henderson, 2011). Overall, these outcomes are specific to ASI® and allow for an adaptive foundation that children can use to participate more fully in daily tasks (May-Benson & Koomar, 2010).

Sensory-based interventions. In contrast to ASI® interventions, sensory-based interventions may focus on one sensory system or on changing the environment with the intervention more passive and implemented by the therapist with or without the child's collaboration. Sensory-based interventions do not have a Fidelity Measure; therefore, they can be used to complement ASI® intervention or used alone. Sensory-based interventions may incorporate elements of the Fidelity Measure, which may be helpful in determining which to use in treatment. Sensory-based interventions do not always provide the opportunity to organize tactile, proprioceptive, and vestibular senses together, but rather use a specific type of sensory stimulation such as deep touch pressure, sound therapy, massage, etc. to change inefficient sensory processing of one or two sensory systems (Polatajko & Cantin, 2010).

Research has shown positive outcomes with sensory-based interventions in improving social interaction, sensorimotor skills, and behaviors (Case-Smith & Arbesman, 2008; Smith Roley et al., 2001). Some examples of sensory-based interventions are Astronaut Training, Wilbarger Protocol, Therapeutic Listening Program, The Alert Program for Self-Regulation (The Alert Program), Developmental, Individual-Difference, Relationship-Based model

(DIR)/Floortime approach, and Craniosacral/Myofascial Release therapy. These sensory-based interventions are specific to a sensory system (Astronaut Training, Wilbarger Protocol, Therapeutic Listening Program) or integrated approaches (The Alert Program, DIR/Floortime, Craniosacral/Myofascial Release). A brief description of each follows.

Sensory systems focused. Some sensory-based interventions focus on one or more specific sensory systems. They target specific sensations while attempting to create an optimal arousal level for a child.

Astronaut Training. In children with visual problems, the Vestibular-Oculomotor Protocol, Astronaut Training, (Kawar, 2005) can be used to stimulate the vestibular, visual, and auditory systems to facilitate postural and oculomotor control. Astronaut Training is not child-directed because specific activities are required via the protocol, such as spinning on the astronaut board then eliciting saccadic eye movements. (Kawar, 2005). Astronaut Training appears to meet six of the ten criteria of the Fidelity Measure which includes providing sensory opportunities, guiding self-organization, supporting optimal arousal, maximizing a child's success, ensuring physical safety, and fostering a therapeutic alliance.

Wilbarger Protocol. For children with sensory modulation disorders, the Wilbarger Protocol is used to provide deep touch pressure. The therapist provides tactile and proprioceptive stimuli to the child via deep touch pressure with a special brush and joint compressions. Kimball, Lynch, Stewart, Williams, Thomas, and Atwood (2007) found in a small convenience sample that using a Wilbarger Protocol-Based procedure improved an optimal level of arousal in children. The study found deep touch pressure influenced the sympathetic nervous system whether over or under aroused, thus eliciting appropriate behaviors. The Wilbarger Protocol appears to meet four of the ten criteria of the Fidelity Measure which includes providing sensory

opportunities, guiding self-organization, supporting optimal arousal, and ensuring physical safety. Although it is a protocol, variations of it are being used widely to meet the needs of children and family schedules (Kimball et al., 2007).

Therapeutic Listening Program. Therapeutic listening aims to help a child with self-regulation. The child listens to altered music that stimulates the auditory system with two sides of the brain which is speculated to help calm the child before attending to a task (Hall & Case-Smith, 2007). Research has shown positive outcomes in school for children using a Therapeutic Listening Program in conjunction with a sensory diet (Hall & Case-Smith, 2007). Therapeutic Listening Program appears to meet five of the ten criteria of the Fidelity Measure which includes providing sensory opportunities, guiding self-organization, supporting optimal arousal, maximizing child's success, and ensuring physical safety.

Integrative approaches. Some sensory-based interventions utilize an integrative approach involving multiple strategies to facilitate self-regulation and create an optimal arousal level for a child.

The Alert Program. A sensory-based intervention focused on obtaining an optimal level of arousal is The Alert Program, which teaches children to recognize their current arousal levels and to use the most appropriate self-regulation strategy that works for them to help in various situations (Williams & Shellenberger, 1996). Research has supported the use of The Alert Program with children to improve participation in the classroom (Barnes, Vogel, Beck, Schoenfeld, & Owen, 2008). The Alert Program appears to meet seven of the ten criteria of the Fidelity Measure which includes providing sensory opportunities, providing just-right challenges, guiding self-organization, creating a context of play, supporting optimal arousal, maximizing child's success, and ensuring physical safety (Parham et al., 2007).

DIR/Floortime Approach. A play-based sensory-based intervention is the Developmental, Individual-Difference, Relationship-Based model (DIR)/Floortime approach. It focuses on the child's developmental needs by challenging behavior through play with a parent (Ryan, Hughes, Katsiyannis, McDaniel, & Sprinkle, 2011). Studies have supported DIR/Floortime to improve function and engagement (Parajeya & Nopmaneejumruslers, 2011; Solomon, Necheles, Ferch, & Bruckman, 2007). DIR/Floortime appears to meet seven of the ten criteria of the Fidelity Measure which includes providing just-right challenges, collaborating on activity choice, guiding self-organization, creating a context of play, ensuring physical safety, arranging the room to engage the child, and fostering a therapeutic alliance.

Craniosacral/Myofascial Release. Stimulating deep tactile senses through manual therapies, such as craniosacral therapy and myofascial release, which is not child-directed, are used by some therapists. Craniosacral therapy emphasizes self-correction after the therapist releases restrictions by pushing on the bones and fascia of the cranium and sacrum to improve central nervous system function (Giaquinto-Wahl, 2009). In myofascial release, the goal is for the therapist to release tension in the fascia in order to decrease pain and improve range of motion in joints through massage (Barnes, 2009). Research has supported Craniosacral/Myofascial Release to improve function and alertness in children with cerebral palsy (Whisler et al., 2012). These manual therapies appear to meet two of the ten criteria of the Fidelity Measure which includes supporting optimal arousal and ensuring physical safety.

Terminology. One problem in the realm of sensory related therapy is that terminology between ASI® intervention and sensory-based interventions has become intermixed and used incorrectly. A master's thesis study looked at terminology use of sensory integration theory and practice before the Fidelity Measure was created (Foss, 2003). The results suggested that

inconsistent terminology among pediatric occupational therapists may be due to differences in treatment settings and training in intervention application (Foss, 2003). Therapists often say they are using an ASI® treatment without fulfilling all 10 criteria of the Fidelity Measure (Parham et al., 2007). If an intervention does not meet all 10 requirements, such treatments should instead be called sensory-based interventions in order to maintain fidelity to ASI® (May-Benson & Koomar, 2010; Parham et al., 2007). This distinction is important in evidenced-based practice. It is also crucial for therapists to know the differences for reasons of explaining it to doctors, teachers, family members, third-party payers, or in their writing what type of intervention was selected (Arbesman & Lieberman, 2010; Parham et al., 2011). Understanding the differences between ASI® and sensory-based interventions supports clinical reasoning and allows for better validity in treatment selection in occupational therapy. Intentionally choosing between an ASI® and a sensory-based intervention shows that the therapist is mindful of the differences in treatment approaches and the outcomes that may result (Arbesman & Lieberman, 2010; Case-Smith & Arbesman, 2008; Parham et al., 2007).

Polatajko and Cantin (2010) found that more research is needed to determine the effectiveness of sensory-based interventions because they vary widely for purpose and rationale for use. Due to this variation, frequency and duration of use for effectiveness remains a puzzle. Therefore, the purpose of this study is to determine what types of sensory-based interventions, other than ASI®, pediatric occupational therapists are using, how frequently they are being used, and the clinical rationale for choosing these interventions for children of all ages with a sensory processing dysfunction.

Method

Research Design

This descriptive study used a survey research design to collect data. A survey captures the same information from all participants in order to maintain validity. Doing a survey by mail allowed for gathering information from a large number of participants, increasing the confidence in the findings (Salant & Dillman, 1994). It also eliminated possible interviewer bias that can lower validity. The data were analyzed in order to discover trends in the variables of sensory-based intervention choices, frequency and duration of the interventions, and clinical rationale for using sensory-based interventions.

Participants

The ideal population for this study was all U.S. pediatric occupational therapists who use sensory-based interventions. The accessible population was members of the American Occupational Therapy Association (AOTA) who listed the Sensory Integration Special Interest Section (SISIS) as their primary interest, from which a systematic random sample was drawn. Members of the SISIS include therapists who have interest in sensory interventions, not limited to strictly ASI®. Inclusion criteria for participants were at least one year of experience in clinical practice, and currently working with children 0-21 years old. The sample size was 250. Mailing the survey to 250 random members of the 5000 total members of the SISIS group provided a representative sample of the entire group and captured variability in responses. Since the population of interest is not varied, consisting of only pediatric occupational therapists, a sample of at least 234 of the total 5000 is needed for a ±5% sampling error at a 95% confidence level (Salant & Dillman, 1994).

Procedures

The faculty research committee members along with the practitioner committee of SISIS provided expert opinion to guide the content and refinement of the survey. Both faculty committee members are Sensory Integration and Praxis Test (SIPT) certified and the faculty committee chair also teaches a section of the SIPT certification and sits on the SISIS committee. Since there are a myriad of sensory-based interventions, Astronaut Training, Wilbarger Protocol, and Therapeutic Listening Program were first selected because they address primary sensory systems. With input from the SISIS committee, Craniosacral/Myofascial Release was added to the survey as an integrative approach. A draft was piloted by the other three SISIS committee members. They reviewed the draft to ensure that the questions were coherent, complete, and accurate with regard to terminology. The survey was revised according to the pilot feedback and The Alert Program and DIR/Floortime were added to the survey because they are familiar integrative approaches used by therapists. After approval by the University's Institutional Review Board, the survey was mailed out.

A systematic random sample of 250 SISIS members from AOTA was mailed a packet which included a cover letter, the survey, and a business return envelope. Following strategies of Salant and Dillman (1994), the survey envelopes were coded in order to protect the confidentiality of respondents, but still enabled a second round of surveys to be sent only to non-respondents. Upon receiving completed surveys, responses were separated from envelopes to maintain respondent confidentiality. The unused reminder mailing labels were destroyed. Data were entered into the Statistical Package for Social Sciences for statistical analysis. Responses from the second wave of surveys received were kept separate to compare data with the first wave

of completed surveys. Since the responses were visually similar, the data were pooled together for analysis.

Instrumentation

The survey was designed to gather data about the background and demographics on the therapist: type of practice setting, years of pediatric experience, and level of education received (see Appendix). The survey also consisted of questions pertaining to the types of sensory-based interventions, other than ASI®, that are being used, based on the specific list of interventions provided by the SISIS committee. Frequency and duration of use of these sensory-based interventions and the clinical rationale for their use was asked. The survey contained mostly multiple choice questions. This method was selected to decrease confusion in answers; however, respondents were able to write in other interventions to elicit a wider range of answers. These specific strategies according to Salant and Dillman (1994) were used to develop the survey questions (see Appendix).

Data Analysis

Descriptive statistics were calculated on survey questions. Frequencies were used to portray types of interventions used, frequency, duration, and clinical rationale questions. Central tendency and variability were calculated for demographic and practice content. Comments written by respondents were recorded as qualitative data and used to interpret quantitative analysis. This was done by sorting comments into groups to find commonalities in the responses.

Results

Response Rate

The initial sample size was 250 and two surveys were returned undeliverable. One respondent did not meet the inclusion criteria of having at least one year of experience as a

practicing therapist. The new sample size was 247. There were 87 surveys returned for a response rate of 35.2%. The first wave included 67 surveys and the second wave included 20 surveys. Through visual analysis, it appeared that responses between waves were similar. Respondents did not follow directions to some questions, resulting in different sample sizes for various tables. Although these responses were omitted, there were an adequate amount of responses for data analysis to occur for each question.

Demographics

The respondents' mean number of years practicing occupational therapy was 22.9 years with a wide range from 1.8- 47 years. The respondents practice in 37 different states. The three most frequently represented states were CA (12.6%), NY (9.2%), and PA (6.9%). In response to education, the most common highest level of education received was a Bachelor's (37.9%), followed by an Entry Level Master's (27.6%), Advanced Master's (25.3%), Post Professional Doctorate (5.7%), and Clinical Doctorate (1.1%). Two respondents did not include their educational information. Many therapists currently work in more than one pediatric setting. Forty-one (47.1%) work in school-based practices, 42 (48.3%) work in private practices, 20 (23.0%) work in early intervention programs, 14 (16.1%) work in outpatient clinics, 12 (13.8%) work in pediatric rehabilitation facilities, 12 (13.8%) work in a free-standing outpatient clinics, and eight (9.2%) work in other settings.

Children Receiving Sensory-Based Interventions

Therapists provide intervention using a sensory integration frame of reference for a wide range of diagnoses (see Table 1). Table 2 shows that the majority of a pediatric therapist's caseload consists of younger children. The 4-6 year old group had the largest mean (36.6%) per therapist caseload followed by the 7-10 year old group (28.4%). Older age groups made up a

small population of therapists' caseloads or were not being seen by therapists. Responses from nine respondents relating to age groups of therapist's caseload were omitted because they did not total 100%.

Table 3 shows that younger children are more likely to receive sensory-based interventions more frequently than older children. Therapists use sensory-based interventions for "all", "most", or "many" of their children that are between 0-10 years old, but responses varied more across categories for children 11-21 years old. Although there were discrepancies in age groups on caseloads and percentage of age groups that sensory-based interventions are used with, responses were entered as written.

Sensory-Based Interventions

Nearly all therapists (98.9%) reported using sensory-based interventions in practice. Only one therapist reported not using other sensory-based interventions beyond ASI® in treatment. Eighty-five respondents have been using sensory-based interventions for a mean of 18.3 years. Providing a comprehensive treatment program was the most frequent (58.4%) response of therapists' reason for using sensory-based interventions in conjunction with ASI®. Less frequent reasons for choosing sensory-based interventions were to target a specific outcome (16.9%), not being certified in ASI® (13%), and to target a specific sensory system (10.4%). Responses from 10 were omitted because respondents selected more than one reason for using sensory-based interventions in conjunction with ASI® in treatment.

Education and training. The type of training received varied among the respondents. Of the specific training or certification on the survey, the most frequent source of training was from coursework/continuing education for all choices except for "advanced mentoring on treatment technique." The next highest category was "on the job training" then "at work in-service." For

the specific interventions listed, respondents received different types of education and training, shown by the differences in the frequency of responses between categories (see Table 4).

Table 4 shows that amount of training or education received for each intervention or certification listed in the survey greatly varied between respondents. Many respondents stated it was difficult to determine the estimated total hours of training and omitted the question. One day was calculated as six hours, thirty minutes continuing education hours for responses that were reported by respondents in days instead of hours.

Frequency and duration. The Alert Program was the most frequently used sensory-based intervention used by 69 therapists (79.3%), followed by the Wilbarger Protocol used by 67 therapists (77.0%), DIR/Floortime used by 48 therapists (55.2%), Therapeutic Listening Program used by 45 therapists (51.7%), Astronaut Training used by 35 therapists (40.2%), and Craniosacral/Myofascial Release used by 19 therapists (21.8%) (see Table 5.) Many of the interventions are used "frequently" or "occasionally," except Craniosacral/Myofascial Release, which is used "seldom" as shown in Table 5. Few therapists reported using the listed interventions "all" the time in treatment. The 11 other sensory-based interventions reported by 18 respondents (20.7%) were not frequently reported by most therapists (see Table 5).

Duration of intervention use varies with each sensory-based intervention. Table 6 shows that most of the interventions on the survey are used less than one year, except for The Alert Program and DIR/Floortime, which were more frequently used for more than 13 months per child. For therapists who use Astronaut Training, the most frequent response was 0-3 months reported by 17 therapists (51.5%). For those who use the Wilbarger Protocol, 0-3 months and 4-6 months were the two most frequent responses indicated by 22 therapists (33.8%). For those who use Craniosacral/Myofascial Release, 0-3 months was the most frequent response reported by

four therapists (43.8%). For those who use the Therapeutic Listening Program, 4-6 months was the most frequent response reported by 16 respondents (37.2%). For those who use DIR/Floortime, 13 or more months was the most frequent response reported by 20 therapists (50.0%). For those who use The Alert Program, 4-6 months was the most frequent response indicated by 23 therapists (37.1%). Overall, there was not high consensus among respondents for duration of use for each intervention.

Clinical rationale. Interventions that were reported from four respondents without clinical reasoning or anticipated outcomes were not included to maintain the purpose of this study.

Of the therapists using Astronaut Training (see Table 7), the two most frequently targeted sensory systems were the vestibular system reported by 34 respondents (97.1%) and the visual system reported by 32 respondents (91.4%). The three most frequent anticipated outcomes for areas of improvement had lower frequencies. Postular-ocular control was indicated by 24 therapists (63.2%), oculomotor control was indicated by 22 therapists (57.9%), and balance skills was indicated by 18 therapists (46.4%).

Table 8 shows the clinical rationale of therapists who use the Wilbarger Protocol. The two most frequently addressed sensory systems were the tactile system reported by 67 respondents (97.1%) and the proprioceptive system reported by 48 respondents (69.6%). The three most frequent anticipated outcomes for areas of improvement had lower frequencies. Tolerance to being touched was reported by 49 respondents (75.4%), ability to self-soothe/calm was reported by 32 respondents (49.2%), and body sense was reported by 31 respondents (47.7%).

Table 9 shows the clinical rationale of the therapists who use the Therapeutic Listening Program. The two most frequently addressed sensory systems were the auditory system reported by 44 therapists (95.7%) and the vestibular system reported by 32 therapists (69.6%). The three most frequent anticipated outcomes for areas of improvement had lower frequencies. Emotional regulation was reported by 22 therapists (48.9%), attention was reported by 20 therapists (44.4%), and balancing alertness or arousal level was reported by 18 therapists (40%).

Table 10 shows the clinical rationale of the therapists who use The Alert Program. The two most frequently addressed sensory systems were the proprioceptive system reported by 39 therapists (67.2%) and the vestibular system reported by 38 therapists (65.5%). The three most frequent anticipated outcomes for areas of improvement had similar frequencies. Ability to self-soothe or calm was reported by 37 therapists (60.7%), balancing alertness or arousal levels was reported by 35 therapists (57.4%), and attention was reported by 34 therapists (55.7%).

The clinical rationale of therapists who use DIR/Floortime is shown in Table 11. The two most frequently addressed sensory systems were the visual system indicated by 22 respondents (59.5%) and the proprioceptive system indicated by 16 respondents (43.2%). The three most frequent anticipated outcomes for areas of improvement had similar frequencies. Play skills with peers or others was indicated by 25 respondents (59.5%), engagement was indicated by 25 respondents (59.5%), and play skills with objects was indicated by 18 respondents (42.9%).

The clinical rationale of therapists using Craniosacral/Myofascial Release is shown in Table 12. The two most frequently addressed sensory systems were the proprioceptive system indicated by 16 respondents (80.0%) and the vestibular system indicated by six respondents (30.0%). The three most frequent anticipated outcomes for areas of improvement were the ability

to self-soothe or calm, emotional regulation, and balancing alertness or arousal levels. Each had low frequencies and was reported by six therapists (31.6%).

Discussion

The purpose of this study was to determine what types of sensory-based interventions pediatric occupational therapists are using, how frequently they are being used, and the clinical rationale for choosing these interventions to use in treatment. The findings suggest that because sensory-based interventions lack uniform terminology, there is inconsistency among therapists describing their use. Although most therapists received training via coursework and continuing education, those that reported learning through in-services and on the job training may demonstrate how some terminology may be used incorrectly. This study supports Foss's (2003) findings that different settings and work environments may teach therapists slightly different techniques and terminology associated with all sensory intervention approaches. Differences in the number of respondents for frequency, duration, and clinical rationale for using sensory-based interventions show complexity surrounding the realm of sensory related therapy, which is consistent with the literature (Polatajko & Cantin, 2010).

Types

When selecting which of the sensory-based interventions to use, for which children on a caseload, and for what length of time for each child, the key is clinical reasoning. For example, if a child has auditory processing issues, the therapist needs to know that ASI® may not be sufficient and thus the Therapeutic Listening Program may be needed to complement treatment. Therapists need to be conscientious in selecting and using strategies instead of reporting they use all strategies in practice.

Therapists need to be able to articulate all aspects of clinical reasoning in terms of frequency, duration, and rationale when choosing a type of sensory-based intervention. This study supports Polatajko and Cantin's (2010) findings that sensory-based interventions vary widely, are less known, and require more research. Although treatment needs to be tailored to a child's individual needs and protocols or programs may not be adhered to, it makes errors for research, which is important in evidenced-based practice. For example, a respondent stated using "elements of sensory programs as they seem appropriate" indicating that the therapist deviates from protocol, which can cause the type of sensory-based intervention to appear unclear. Some therapists expressed that they need more training in certain interventions, and therefore do not use them in practice. This qualitative data indicate some therapists are vigilant in only using interventions they can explain and validate to others important to the child's care (Arbesman & Lieberman, 2010).

Frequency

The responses to frequency of these specific sensory-based interventions suggest that therapists are selectively choosing which interventions to use. Since few therapists selected "all" for frequency of use of these interventions, this indicates intentional use of the sensory-based interventions with their clients. The high frequency of use among these sensory-based interventions suggests that ASI® is not being used alone and sensory-based interventions are being used either independently or in conjunction with ASI® in treatment.

Duration

Some therapists stated difficulty determining duration due to individual client differences and omitted parts of the question or the entire question. However, differences in duration within each sensory-based intervention may be contributing to the difficulty in researching these types

frequently reported sensory systems addressed corresponded to the targeted sensory systems of each sensory-based intervention. Multiple respondents could not describe their clinical rationale for The Alert Program and DIR/Floortime due to the limited answer choices. Implications point towards these interventions not being understood as sensory specific by some therapists. Instead, they are considered integrative approaches that incorporate many sensations throughout the treatment session. Without a definition or explicit criteria for sensory-based interventions, it appears to be difficult for therapists to articulate their clinical reasoning for using sensory-based interventions. The findings show there is more variability in the use of sensory-based interventions because for ASI®, the tactile, vestibular, and proprioceptive systems are usually the primary sensory systems addressed (Ayres, 1972).

The anticipated outcomes show improvement in areas that correspond with the addressed sensory systems for each intervention. This is vital in demonstrating sound clinical reasoning skills in order to validate the treatment a child receives. The three primary outcomes for areas of improvement related to the two primary sensory systems addressed for each sensory-based intervention, which suggests that many therapists are appropriately choosing interventions.

However, some respondents wrote in other interventions used in practice that were activities and equipment such as “therapeutic ball”, “swing based”, or “postural control.” A few respondents included intervention approaches outside the scope of this study. For example, NDT was reported which is a different frame of reference compared to the focus on the sensory integration frame of reference in this study. These discrepancies confirms confusion in terminology, understanding of sensory related therapy, and lack of sound clinical reasoning still exists and reflects previous literature findings (Foss, 2003). Respondents that added other interventions beyond the ones in the survey may have included techniques either not believed to

be sensory-based, not used for treating sensory processing disorders by other therapists, or not available to therapists indicated by the low frequency of use. Since only a small number of therapists reported using the other interventions, the practice of sound clinical reasoning cannot be determined. From the findings of this study, it is evident that there needs to be a clearer understanding of therapists' clinical reasoning in determining why a certain sensory-based intervention is being used.

Implications for Occupational Therapy

Vigilance in selecting an appropriate sensory-based intervention to be used either independently or in conjunction with ASI® in treatment is important if this is the path that the therapist is taking. Therapists need to seek out continuing education instead of learning through on the job training, in-services, or books about a new technique. Interventions that have protocols need to be learned through proper training and followed if certain outcomes are desired and if therapists are reporting using them. Otherwise, therapists should articulate that they are using a similar type of intervention for a specific outcome and clearly describe deviations from the standard protocol.

Therapists need to be aware of evidence available to know when to use certain interventions and why they are using them. For example, if treating a child that has difficulty with the ability to self-soothe, balancing arousal levels, and attending to tasks, the therapist should use clinical reasoning to determine if The Alert Program would be beneficial to the treatment of that child. The therapist should refer to relevant evidence available.

Understanding the differences between frames of references is important for therapists to be able to use sound clinical reasoning in determining how to treat a child. Different types of frames of references can be used in conjunction if the therapist is vigilant and able to validate its

use during treatment. If therapists do not know what frames of reference they are using, they may not obtain the outcomes they are seeking or may not be using the most appropriate interventions with the child. Therapists should know that utilizing a sensory integration frame of reference includes ASI®, which is a reason for the Fidelity Measure, and other sensory-based interventions. Other interventions can be used as long as therapists articulate and understand that they are then shifting their frame of reference. Treatment should be comprehensive as long as therapists are intentional and can validate the interventions they use in practice.

Limitations

A higher response rate may have provided more information about the types of sensory-based interventions used, the duration of use, along with clinical rationale. It appeared to be difficult to answer questions about sensory-based interventions using a quantitative method because of the need to limit responses. Due to the nature of the topic, therapists seemed to have challenges with quantifying and categorizing their answers. Inability to limit answers to directions in the survey suggests that the topic of sensory strategies continues to be challenging to understand and clearly describe.

Having only certain sensory-based interventions may have limited the findings of this study because therapists may not have included other sensory-based interventions they use in practice. The differences in what interventions therapists consider to be sensory-based also influenced the results. The additional sensory-based interventions that respondents included were each used by very few therapists that individual analysis of each intervention could not be conducted on those interventions.

Future Research

The findings of this study will help to distinguish terminology in the realm of sensory related occupational therapy and guide research for further studies on sensory-based interventions. Developing criteria to define a sensory-based intervention would help to decrease confusion in terminology and may help future research and clinicians be able to more accurately explain their treatment. Geographical and practice setting differences in training and intervention use could be an area of further interest. Future research should focus on determining the effectiveness of sensory-based intervention outcomes once terminology becomes clarified (Polatajko & Cantin, 2010).

Future research should examine therapists' understanding of the differences between ASI® and sensory-based interventions. Other sensory-based interventions being practiced should be researched. It was shown that there are more sensory-based interventions being used beyond the six that were the focus of this study.

Conclusion

The most frequently reported sensory-based interventions used by pediatric occupational therapists are The Alert Program, Wilbarger Protocol, and DIR/Floortime. Of therapists using these sensory-based interventions, most use them 75% of the time in treatment. There is not high agreement among therapists for the length of time each sensory-based intervention is used. There is more agreement among therapists for the sensory systems addressed for the six sensory-based interventions of this study than for the anticipated outcomes for areas of improvement. The findings indicate that therapists need to be vigilant when choosing a sensory-based intervention to use. Better understanding and consistent terminology of sensory-based interventions are

needed for therapists to practice sound clinical reasoning in order to articulate their rationale and provide children with the most suitable intervention to meet their individual goals and needs.

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Appendix

Determining Sensory-Based Interventions Used by Occupational Therapists

Please return your completed questionnaire
In the enclosed envelope to:

University of Puget Sound
School of Occupational Therapy and Physical Therapy
1500 N. Warner St. #1070
Tacoma, WA 98416-1070
(253) 879-3514

Disclaimer: For the purpose of this study, Ayres' Sensory Integration® (ASI®) is defined as having 10 criteria: provide sensory opportunities, provide just-right challenges, collaborate on activity choice, guide self-organization, support optimal level of arousal, create play in context, maximize child's success, ensure physical safety, arrange room to engage child, and foster therapeutic alliance (Parham et al., 2007). This study is addressing sensory-based interventions that may be used to complement ASI®. There are other intervention approaches such as dynamic seating, while important and used by many pediatric therapists, are not part of this study.

First, I would like to ask you some background information.
Q1. Number of years working as an occupational therapist: _____

Q2. State in which you practice: _____

Q3. Your highest level of education received:
☐ Bachelors ☐ Entry Level Masters ☐ Advanced Masters ☐ Clinical Doctorate ☐ Post-Professional Doctorate

Q4. Setting in which you currently work (check all that apply):
☐ School-based practice ☐ Outpatient clinic in medical setting ☐ Pediatric rehabilitation facility ☐ Private practice
☐ Early intervention (birth-to-three) program ☐ Free-standing outpatient clinic ☐ Other: _____

Q5. Primary diagnoses of populations for whom you are providing intervention using a sensory-integration frame of reference (check all that apply):
☐ PDD/ Autism/ Asperger's ☐ Neuromuscular Conditions ☐ Developmentally Delayed ☐ ADHD/ ADD

☐ Failure to thrive ☐ Learning disabled ☐ Behavioral disorders ☐ SPD/SMD ☐ Drug affected
☐ Fetal Alcohol Syndrome ☐ Environmentally impoverished ☐ Dyspraxia/ Developmental Coordination Disorder ☐ Mental health diagnosis (anxiety, depression, bipolar) ☐ Other: _____

Q6. Age groups of populations for whom you are providing treatment using sensory-based intervention (fill-in %):
0-3 years____%, 4-6____%, 7-10 years____%, 11-13 years____%, 14-18 years____%, 19-21 years____% = 100%

Q7. Education and training you have received related to assessment and intervention for individuals with sensory integration/ sensory processing deficits:

	At Work In-service	On the job training (observation and/or hands-on experience at the job)	Coursework/ Continuing Education	Estimated Total Hours
Astronaut Training	☐	☐	☐	
Craniosacral/Myofascial Release	☐	☐	☐	
SIPT Certification	☐	☐	☐	
Advanced Mentoring on Treatment Technique	☐	☐	☐	
Therapeutic Listening	☐	☐	☐	
Wilbarger/Brushing Protocol	☐	☐	☐	
Other:_____	☐	☐	☐	

The following are questions about your use of sensory-based interventions.
Q8. Beyond ASI®, do you use other sensory-based strategies to complement your treatments?
☐ Yes ☐ No

If you selected no, you may stop here. Please return your survey in the enclosed envelope.

Q9. How many years in your career as an occupational therapist have you used sensory-based interventions to treat your clients? _____
Q10. With what *percentage* of your caseload do you use sensory-based intervention? (check age group(s) you work with)

Age Group ↓	All (100%)	Most (99-75%)	Many (74-50%)	Some (49%-25%)	Few (24%-1%)	None (0%)
0-3 years	☐	☐	☐	☐	☐	☐
4-6 years	☐	☐	☐	☐	☐	☐
7-10 years	☐	☐	☐	☐	☐	☐
11-13 years	☐	☐	☐	☐	☐	☐
14-18 years	☐	☐	☐	☐	☐	☐
19-21 years	☐	☐	☐	☐	☐	☐

Finally, here are questions about specific types of sensory-based interventions.
Q11. Please fill in the table below regarding the sensory-based interventions you use in practice.

	Frequency: 0= never, 1= seldom (25%)	Total **number of months** used per client:

	2= occasionally (50%), 3 = frequently (75%), 4= always (100%)	
Astronaut Training	0 1 2 3 4	☐ 0-3 ☐ 4-6 ☐ 7-9 ☐ 10-12 ☐ 13+
Wilbarger/Brushing Protocol	0 1 2 3 4	☐ 0-3 ☐ 4-6 ☐ 7-9 ☐ 10-12 ☐ 13+
Craniosacral/Myofascial Release	0 1 2 3 4	☐ 0-3 ☐ 4-6 ☐ 7-9 ☐ 10-12 ☐ 13+
Therapeutic Listening	0 1 2 3 4	☐ 0-3 ☐ 4-6 ☐ 7-9 ☐ 10-12 ☐ 13+
DIR/Floortime	0 1 2 3 4	☐ 0-3 ☐ 4-6 ☐ 7-9 ☐ 10-12 ☐ 13+
Alert Program	0 1 2 3 4	☐ 0-3 ☐ 4-6 ☐ 7-9 ☐ 10-12 ☐ 13+
Other:_____	0 1 2 3 4	☐ 0-3 ☐ 4-6 ☐ 7-9 ☐ 10-12 ☐ 13+
Other:_____	0 1 2 3 4	☐ 0-3 ☐ 4-6 ☐ 7-9 ☐ 10-12 ☐ 13+

Q12. For each sensory-based strategy you use, please fill in the table below.

	Your **clinical rationale** for choosing this intervention (**check no more than 2**):	Your **anticipated outcomes** when using this intervention show **improvement** in (prioritize with **no more than 3**):
Astronaut Training	☐ to address visual system ☐ to address auditory system ☐ to address tactile system ☐ to address gustatory system ☐ to address olfactory system ☐ to address proprioceptive system ☐ to address vestibular system	☐ balance skills ☐ reciprocal movement patterns ☐ postular-ocular control ☐ oculomotor control ☐ hand-eye coordination skills ☐ in-hand manipulation ☐ body sense ☐ spatial awareness ☐ ability to self-soothe/calm ☐ emotional regulation ☐ tolerance to being touched environments ☐ tolerance to busy ☐ play skills with objects ☐ play skills with peers/others ☐ attention ☐ balance alertness/arousal levels ☐ functional communication ☐ engagement
Wilbarger/ Brushing Protocol	☐ to address visual system ☐ to address auditory system ☐ to address tactile system ☐ to address gustatory system ☐ to address olfactory system ☐ to address proprioceptive system ☐ to address vestibular system	☐ balance skills ☐ reciprocal movement patterns ☐ postular-ocular control ☐ oculomotor control ☐ hand-eye coordination skills ☐ in-hand manipulation ☐ body sense ☐ spatial awareness ☐ ability to self-soothe/calm ☐ emotional regulation ☐ tolerance to being touched environments ☐ tolerance to busy ☐ play skills with objects ☐ play skills with peers/others ☐ attention ☐ balance alertness/arousal levels

		☐ functional communication ☐ engagement
Craniosacral/ Myofascial Release	<u>Your clinical rationale for choosing this intervention (**check no more than 2**):</u> ☐ to address visual system ☐ to address auditory system ☐ to address tactile system ☐ to address gustatory system ☐ to address olfactory system ☐ to address proprioceptive system ☐ to address vestibular system	<u>Your anticipated outcomes when using this intervention show **improvement** in (prioritize with **no more than 3**):</u> ☐ balance skills ☐ reciprocal movement patterns ☐ postular-ocular control ☐ oculomotor control ☐ hand-eye coordination skills ☐ in-hand manipulation ☐ body sense ☐ spatial awareness ☐ ability to self-soothe/calm ☐ emotional regulation ☐ tolerance to being touched environments ☐ tolerance to busy ☐ play skills with objects ☐ play skills with peers/others ☐ attention alertness/arousal levels ☐ balance ☐ functional communication ☐ engagement

Therapeutic Listening Program	<u>Your clinical rationale for choosing this intervention (**check no more than 2**):</u> ☐ to address visual system ☐ to address auditory system ☐ to address tactile system ☐ to address gustatory system ☐ to address olfactory system ☐ to address proprioceptive system ☐ to address vestibular system	<u>Your anticipated outcomes when using this intervention show **improvement** in (prioritize with **no more than 3**):</u> ☐ balance skills ☐ reciprocal movement patterns ☐ postular-ocular control ☐ oculomotor control ☐ hand-eye coordination skills ☐ in-hand manipulation ☐ body sense ☐ spatial awareness ☐ ability to self-soothe/calm ☐ emotional regulation ☐ tolerance to being touched environments ☐ tolerance to busy ☐ play skills with objects ☐ play skills with peers/others ☐ attention alertness/arousal levels ☐ balance ☐ functional communication ☐ engagement
DIR/ Floortime	<u>Your clinical rationale for choosing this intervention (**check no more than 2**):</u> ☐ to address visual system ☐ to address auditory system ☐ to address tactile system ☐ to address gustatory system ☐ to address olfactory system ☐ to address proprioceptive system ☐ to address vestibular system	<u>Your anticipated outcomes when using this intervention show **improvement** in (prioritize with **no more than 3**):</u> ☐ balance skills ☐ reciprocal movement patterns ☐ postular-ocular control ☐ oculomotor control ☐ hand-eye coordination skills ☐ in-hand manipulation ☐ body sense ☐ spatial awareness ☐ ability to self-soothe/calm ☐ emotional regulation ☐ tolerance to being touched environments ☐ tolerance to busy ☐ play skills with objects ☐ play skills with peers/others ☐ attention alertness/arousal levels ☐ balance ☐ functional communication ☐ engagement

Alert Program	Your clinical rationale for choosing this intervention (**check no more than 2**): ☐ to address visual system ☐ to address auditory system ☐ to address tactile system ☐ to address gustatory system ☐ to address olfactory system ☐ to address proprioceptive system ☐ to address vestibular system	Your anticipated outcomes when using this intervention show **improvement** in (prioritize with **no more than 3**): ☐ balance skills ☐ reciprocal movement patterns ☐ postular-ocular control ☐ oculomotor control ☐ hand-eye coordination skills ☐ in-hand manipulation ☐ body sense ☐ spatial awareness ☐ ability to self-soothe/calm ☐ emotional regulation ☐ tolerance to being touched environments ☐ tolerance to busy ☐ play skills with objects ☐ play skills with peers/others ☐ attention ☐ balance alertness/arousal levels ☐ functional communication ☐ engagement
Other: _____ _____	Your clinical rationale for choosing this intervention (**check no more than 2**): ☐ to address visual system ☐ to address auditory system ☐ to address tactile system ☐ to address gustatory system ☐ to address olfactory system ☐ to address proprioceptive system ☐ to address vestibular system	Your anticipated outcomes when using this intervention show **improvement** in (prioritize with **no more than 3**): ☐ balance skills ☐ reciprocal movement patterns ☐ postular-ocular control ☐ oculomotor control ☐ hand-eye coordination skills ☐ in-hand manipulation ☐ body sense ☐ spatial awareness ☐ ability to self-soothe/calm ☐ emotional regulation ☐ tolerance to being touched environments ☐ tolerance to busy ☐ play skills with objects ☐ play skills with peers/others ☐ attention ☐ balance alertness/arousal levels ☐ functional communication ☐ engagement

Q13. What is your **primary** reason when using a sensory-based intervention in conjunction with ASI®? (check one)

☐ Less time required ☐ Fewer criteria required ☐ Target a specific sensory system ☐ Not certified in ASI®

☐ Target a specific outcome ☐ To provide a comprehensive treatment program

Thank you for your time. Please feel free to add any additional comments in the space below.

Table 1

Primary Diagnoses of Populations Provided Sensory Integration Frame of Reference

Diagnosis	Number of Respondents (%)
PDD/Autism/Asperger's	83 (95.4)
ADHD/ADD	74 (85.1)
Developmentally Delayed	68 (78.2)
Dyspraxia/Developmental Coordination Disorder	63 (72.4)
SPD/SMD	59 (67.8)
Learning Disabled	53 (60.9)
Behavioral Disorders	44 (50.6)
Neuromuscular Conditions	36 (41.4)
Mental Health Diagnosis	32 (36.8)
Failure to Thrive	22 (25.3)
Drug Affected	16 (18.4)
Fetal Alcohol Syndrome	16 (18.4)
Environmentally Impoverished	12 (13.8)
Other	9 (9.9)

Note. N = 87; Other = Down Syndrome, Seizure disorder, Brachial Plexus Injury, Torticollis, Cardiac issues, Low vision, Hearing impaired, Brain Injury/TBI, and Selective Mutism

Table 2

Percentage of Age Groups in Each Therapist's Caseload

Age groups	Mean %	SD
0-3 years	23.7	30.5
4-6 years	36.6	23.2
7-10 years	28.4	24.6
11-13 years	6.9	11.4
14-18 years	3.3	11.1
19-21 years	0.5	2.2

Note. N = 78; Nine responses omitted because age group percentages did not total 100%.

Table 3

Frequency of Children Receiving Sensory-Based Interventions

Age groups	All (100%)	Most (99-75%)	Many (74-50%)	Some (49-25%)	Few (24-1%)	None (0%)	Total n
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
0-3 years	25 (41.0)	16 (26.2)	10 (16.4)	6 (9.8)	3 (4.9)	1 (1.6)	61
4-6 years	23 (30.7)	25 (33.3)	19 (25.3)	5 (6.7)	3 (4.0)	0 (0)	75
7-10 years	19 (28.8)	18 (27.3)	16 (24.2)	11 (16.7)	2 (3.0)	0 (0)	66
11-13 years	13 (25.5)	6 (11.8)	12 (23.5)	10 (19.6)	8 (15.7)	2 (3.9)	51
14-18 years	7 (24.1)	5 (17.2)	3 (10.3)	9 (31.0)	4 (13.8)	1 (3.4)	29
19-21 years	4 (28.6)	1 (7.1)	0 (0)	1 (7.1)	7 (50.0)	1 (7.1)	14

Table 4

Assessment and Intervention Education and Training

Type of Training	Coursework/ Continuing Education	On the Job Training	At Work In-service	Estimated Total Hours	
		Number of respondents (%) (N= 87)		N	Mean (SD)
Wilbarger Protocol	57 (65.6)	31 (35.6)	21 (24.1)	51	23.0 (7.8)
SIPT Certification	46 (52.9)	8 (9.2)	6 (6.9)	29	95.8 (92.7)
Therapeutic Listening Program	44 (50.6)	11 (12.6)	11 (12.6)	38	34.8 (38.5)
Craniosacral/ Myofascial Release	28 (32.2)	7 (8.9)	7 (8.0)	25	67.7 (198.1)
Astronaut Training	27 (31.0)	14 (16.1)	6 (6.9)	26	12.5 (6.5)
Advanced Mentoring on Treatment Technique	22 (25.3)	25 (28.7)	15 (17.2)	21	135.0 (163.4)
The Alert Program	6 (6.9)	3 (3.4)	0 (0)	6	9.9 (6.5)
DIR/Floortime	3 (3.4)	0 (0)	0 (0)	2	55.5 (27.6)
Other	16 (18.4)	8 (9.2)	5 (5.7)		

Note. Other = Interactive Metronome, Integrated Listening Systems (iLs), Yoga, Feeding Techniques, The Listening Program (TLP), Masgutova Neuro-Sensory-Motor Reflex Integration (MNRI), R2K Research and SPD Symposiums, Autism Specialty Certification, Brain Gym, Sensory Processing Measure (SPM), and Feldenkrais

Table 5

Frequency of Use in Practice

Intervention	Never= 0% (%)	Seldom= 25% (%)	Occasionally= 50% (%)	Frequently= 75% (%)	Always= 100% (%)	Total (%)
The Alert Program	18 (20.7)	8 (9.2)	25 (28.7)	29 (33.3)	7 (8.0)	69 (79.3)
Wilbarger Protocol	20 (23.0)	15 (17.2%)	19 (21.8)	32 (36.8)	1 (1.1)	67 (77.0)
DIR/Floortime	39 (44.8)	6 (6.9)	17 (19.5)	19 (21.8)	6 (6.9)	48 (55.2)
Therapeutic Listening Program	42 (48.3)	13 (14.9)	13 (14.9)	18 (20.7)	1 (1.1)	45 (51.7)
Astronaut Training	52 (59.8)	6 (6.9)	14 (16.1)	15 (16.1)	0 (0)	35 (40.2)
Craniosacral/ Myofascial Release	68 (78.2)	11 (12.6)	5 (5.7)	2 (2.3)	1 (1.1)	19 (21.8)
Other						18 (20.7)

Note. N = 87; Other = Interactive Metronome, iLs, yoga, TLP, MNRI, Zones of Regulation, Brain Gym, ALS Synactive Therapy, Touch Massage, Integrative Manual Therapy, Feldenkrais

Table 6

Duration of Use Per Client

Intervention	0-3 months	4-6 months	7-9 months	10-12 months	13+ months	n
			Number of Respondents (%)			
Wilbarger Protocol	22 (33.8)	22 (33.8)	14 (21.5)	4 (6.2)	3 (4.6)	65
The Alert Program	9 (14.5)	23 (37.1)	8 (12.9)	10 (16.1)	12 (19.4)	62
Therapeutic Listening Program	7 (16.3)	16 (37.2)	13 (30.2)	4 (9.3)	3 (7.0)	43
DIR/Floortime	5 (12.5)	17 (17.5)	4 (10.0)	4 (10.0)	20 (50.0)	40
Astronaut Training	17 (51.5)	7 (21.2)	3 (9.1)	5 (15.2)	1 (3.0)	33
Craniosacral/Myofascial Release	7 (43.8)	4 (25.0)	3 (18.8)	0 (0)	2 (12.5)	16

Table 7

Clinical Rationale for Using Astronaut Training

Sensory System Addressed	Number of Respondents (n = 35[a])	%	Anticipated Outcomes of Improvement (n = 38)	Number of Respondents	%
Vestibular	34	97.1	Postular-ocular control	24	63.2
Visual	32	91.4	Oculomotor control	22	57.9
Proprioceptive	3	8.6	Balance skills	18	47.4
Auditory	1	2.9	Body sense	10	26.3
Tactile	0	0	Balance alertness/arousal levels	10	26.3
Gustatory	0	0	Hand-eye coordination	6	15.8
Olfactory	0	0	Spatial awareness	5	13.2
			Attention	4	10.5
			Ability to self-soothe/calm	3	3
			Reciprocal movement patterns	2	5.3
			Emotional regulation	1	2.6
			Tolerance to busy environments	1	2.6
			Engagement	1	2.6
			Tolerance to being touched	0	0
			Play skills with objects	0	0
			Functional communication	0	0
			In-hand manipulation skills	0	0
			Play skills with peers/others	0	0

Note. Respondents could select up to two sensory systems and up to three outcomes.
[a]Three responses omitted because more than two sensory systems selected.

Table 8

Clinical Rationale for Using Wilbarger Protocol

Sensory System Addressed	Number of Respondents (n = 69[a])	%	Anticipated Outcomes of Improvement (n = 65[b])	Number of Respondents	%
Tactile	67	97.1	Tolerance to being touched	49	75.4
Proprioceptive	48	69.6	Ability to self-soothe/calm	32	49.2
Auditory	4	5.8	Body sense	31	47.7
Vestibular	2	2.9	Emotional regulation	29	44.6
Gustatory	1	1.4	Balance alertness/arousal levels	16	24.6
Visual	0	0	Attention	10	15.4
			Tolerance to busy environments	5	7.7
			Engagement	5	7.7
			Play skills with peers/others	4	6.2
			Play skills with objects	2	3.1
			In-hand manipulation skills	2	3.1
			Spatial awareness	2	3.1
			Functional communication	1	1.5
			Balance skills	0	0
			Postular-ocular control	0	0
			Hand-eye coordination	0	0
			Reciprocal movement patterns	0	0
			Oculomotor control	0	0

Note. Respondents could select up to two sensory systems and up to three outcomes.
[a]Six responses omitted because more than two sensory systems selected. [b]Ten responses omitted because more than three anticipated outcome selected.

Table 9

Clinical Rationale for Using Therapeutic Listening Program

Sensory System Addressed	Number of Respondents (n = 46[a])	%	Anticipated Outcomes of Improvement (n = 45[b])	Number of Respondents	%
Auditory	44	95.7	Emotional regulation	22	48.9
Vestibular	32	69.6	Attention	20	44.4
Proprioceptive	8	17.4	Balance alertness/arousal levels	18	40
Visual	4	8.7	Ability to self-soothe/calm	17	37.8
Tactile	1	2.2	Engagement	12	26.7
Gustatory	0	0	Tolerance to busy environments	10	22.2
Olfactory	0	0	Functional communication	9	20
			Body sense	7	15.6
			Spatial awareness	6	13.3
			Postular-ocular control	3	6.7
			Hand-eye coordination	2	4.4
			Play skills with peers/others	2	4.4
			Play skills with objects	1	2.2
			Balance skills	0	0
			Tolerance to being touched	0	0
			Reciprocal movement patterns	0	0
			Oculomotor control	0	0
			In-hand manipulation skills	0	0

Note. Respondents could select up to two sensory systems and up to three outcomes.
[a]Six responses omitted because respondents selected more than two sensory systems. [b]Six responses omitted because respondents selected more than three anticipated outcomes.

Table 10

Clinical Rationale for Using The Alert Program

Sensory System Addressed	Number of Respondents (n = 58[a])	%	Anticipated Outcomes of Improvement (n = 61[b])	Number of Respondents	%
Proprioceptive	39	67.2	Ability to self-soothe/calm	37	60.7
Vestibular	38	65.5	Balance alertness/arousal levels	35	57.4
Auditory	14	24.1	Attention	34	55.7
Tactile	10	17.2	Emotional regulation	24	39.3
Visual	5	8.6	Body sense	10	16.4
Gustatory	0	0	Engagement	10	16.4
Olfactory	0	0	Tolerance to busy environments	8	13.1
			Functional communication	4	6.6
			Spatial awareness	4	6.6
			Play skills with peers/others	3	4.9
			Tolerance to being touched	2	3.3
			Postular-ocular control	1	1.6
			Hand-eye coordination	1	1.6
			Oculomotor control	1	1.6
			Balance skills	0	0
			Play skills with objects	0	0
			Reciprocal movement patterns	0	0
			In-hand manipulation skills	0	0

Note. Respondents could select up to two sensory systems and up to three outcomes.
[a]13 responses omitted because respondents selected more than two sensory systems. [b]11 responses omitted because respondents selected more than three anticipated outcomes.

Table 11

Clinical Rationale for Using DIR/Floortime

Sensory System Addressed	Number of Respondents (n = 37[a])	%	Anticipated Outcomes of Improvement (n = 42[b])	Number of Respondents	%
Visual	22	59.5	Play skills with peers/others	25	59.5
Proprioceptive	16	43.2	Engagement	25	59.5
Auditory	11	29.7	Play skills with objects	18	42.9
Vestibular	8	21.6	Functional communication	16	38.1
Tactile	3	8.1	Attention	12	28.6
Gustatory	0	0	Emotional regulation	11	26.2
Olfactory	0	0	Body sense	4	9.5
			Hand-eye coordination	3	7.1
			Ability to self-soothe/calm	2	4.8
			In-hand manipulation skills	2	4.8
			Balance skills	1	2.4
			Tolerance to being touched	1	2.4
			Oculomotor control	1	2.4
			Postular-ocular control	0	0
			Reciprocal movement patterns	0	0
			Spatial awareness	0	0
			Tolerance to busy environments	0	0
			Balance alertness/arousal levels	0	0

Note. Respondents could select up to two sensory systems and up to three outcomes.
[a]Nine responses omitted because respondents selected more than two sensory systems. [b]Five responses omitted because respondents selected more than three anticipated outcomes.

Table 12

Clinical Rationale for Using Craniosacral/Myofascial Release

Sensory System Addressed	Number of Respondents (n = 20)	%	Anticipated Outcomes of Improvement (n = 19[a])	Number of Respondents	%
Proprioceptive	16	80	Ability to self-soothe/calm	6	31.6
Vestibular	6	30	Emotional regulation	6	31.6
Tactile	5	25	Balance alertness/arousal levels	6	31.6
Visual	1	5	Postular-ocular control	5	26.3
Auditory	1	5	Body sense	5	26.3
Gustatory	0	0	Tolerance to being touched	5	26.3
Olfactory	0	0	Engagement	5	26.3
			Reciprocal movement patterns	4	21.1
			Balance skills	3	1.8
			Attention	3	15.8
			Hand-eye coordination	2	10.5
			Play skills with objects	1	5.3
			In-hand manipulation skills	1	5.3
			Spatial awareness	1	5.3
			Tolerance to busy environments	1	5.3
			Functional communication	0	0
			Oculomotor control	0	0
			Play skills with peers/others	0	0

Note. Respondents could select up to two sensory systems and up to three outcomes.
[a]One response omitted because more than three anticipated outcomes selected.

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