**Effectiveness Studies of Ayres SI**

**and also Sensory Strategies that are based in Ayres SI theory**

**(weighted vests, ball chairs, Wilbarger Brushing)**

**PLEASE NOTE: You must review the article to determine whether or not the authors examined fidelity of intervention for ASI, or evaluated the subjects to ensure proper provision of intervention based on child difficulties and ASI theory.**

**2019**

**Park, H., & Kim, K.M. (2019). The effect of Ayres’ sensory integration**

 **intervention on sensory processing ability and motor**

 **development in children with developmental delay. *Korean***

 ***Academy of Sensory Integration, 17*(2), 18–30.**

 **https://doi.org/10.18064/JKASI.2019.17.2.018.**

**Objective:** The purpose of this study was to investigate the effect of Ayres's sensory integration (ASI) intervention on the sensory processing ability and motor development in children with Developmental Delay. **Methods:** 9 children in the experimental group and 8 children in the control group participated in this study for Developmental Delay children aged 3-5 years. For research tools, the Short Sensory Profile (SSP), Peabody Developmental Motor Scale-2 (PDMS-2) are used. In the experimental group, individual sensory integration therapy according to the principle of ASI was performed twice a week, 40 minutes, and 16 times for 8 weeks. Methods for the data analysis included Mann Whitney U test, Chi-square test, Wilcoxon's signed rank test, Cohen's d test of SPSS 24.0.

**Results:** In the ASI Intervention group, the sensory processing ability showed statistically significant difference in total score, movement sensitivity, auditory filtering and low energy/weak compared to the control group without ASI intervention (p<.05). In the ASI Intervention group, the motor development showed statistically significant difference in Gross Motor Quotient, Fine Motor Quotient and Total Motor Quotient compared to the control group without ASI intervention (p<.05). **Conclusions:** In this study, ASI intervention had a positive effect on the sensory processing and motor development in children with Developmental Delay.

**Schoen, S. A., Lane, S. J., Mailloux, Z., May-Benson, T., Parham, L. D.,**

 **Smith Roley, S., & Schaaf, R. C. (2019). A systematic review of**

 **ayres sensory integration intervention for children with autism.**

 ***Autism Research*, *12*(1), 6–19. doi:10.1002/aur.2046.**

Sensory integration is one of the most highly utilized interventions in autism, however, a lack of consensus exists regarding its evidence base. An increasing number of studies are investigating the effectiveness of this approach. This study used the Council for Exceptional Children (CEC) Standards for Evidence-based Practices in Special Education to evaluate the effectiveness research from 2006 to 2017 on Ayres Sensory Integration (ASI) intervention for children with autism. A systematic review was conducted in three stages. Stage 1 involved an extensive database search for relevant studies using search terms related to sensory integration and autism, interventions suggesting a sensory integration approach, and high-quality study designs. Searches yielded 19 studies that were evaluated in Stage 2. Six of these met inclusion criteria of being peer-reviewed, written in English, description of intervention this is consistent with ASI intervention, and comparison group design or single subject method employed. Prior to analysis using CEC standards, three articles were excluded because intervention details were not consistent with the core principles of ASI, or because of major methodological flaws. In Stage 3, the remaining three studies were rated using the CEC quality indicators and standards for an evidence-based practice. Two randomized controlled trials respectively met 100% and 85% of the CEC criteria items. One additional study met more than 50% of the criteria. Based on CEC criteria, ASI can be considered an evidence-based practice for children with autism ages 4-12 years old. Autism Research 2019, 12: 6-19. © 2018 The Authors. Autism Research published by International Society for Autism Research and Wiley Periodicals, Inc. LAY SUMMARY: Ayres Sensory Integration intervention is one of the most frequently requested and highly utilized interventions in autism. This intervention has specific requirements for therapist qualifications and the process of therapy. This systematic review of studies providing Ayres Sensory Integration therapy to children with autism indicates that it is an evidence-based practice according to the criteria of the Council for Exceptional Children.

**Xu, W., Yao, J., & Liu, W. (2019). Intervention effect of sensory**

 **integration training on the behaviors and quality of life of**

 **children with autism. *Psychiatria Danubina*, *31*(3), 340-346.**

**Background:** Autism is a widespread developmental disorder that occurs mostly among children. Children with autism are prone to problematic behaviors due to their deficiencies in language communication and social development. Thus, children with a high degree of autism suffer lower life satisfaction. Moreover, sensory integration dysfunction is closely related to autism. Therefore, the effect of Sensory Integration Training (SIT) on the behaviors and quality of life of children with autism was explored in this study.

**Subjects and methods:** From September 2017 to December 2018, 108 patients from Fuzhou Fourth Hospital and Xiangtan Fifth Hospital were included in the intervention group (group A) and the control group (group B), with 54 members in each group. The 54 members in group B, with an average age of 5.18±2.94, received routine treatment. In addition to the same routine treatment, the members in group B also received sensory integration training and physical exercise intervention, which lasted for three months. The Childhood Autism Rating Scale (CARS) and Autism Behavior Checklist (ABC) were used before and after the intervention experiment to evaluate the curative effect.

**Results:** After the treatment, statistically significant differences were observed in the CARS and ABC scores (P<0.05); the total effective rate was 86.11% in group A and 64.10% in group B. The difference in the CARS score was statistically significant (P<0.05), whereas the difference in the ABC score was also statistically significant (P<0.05). In general, the difference in CARS is statistically significant. Specifically, group A is better than group B, t=3.492, df=73, and bilateral P=0.001<0.01. **Conclusions:** SIT intervention had a certain effect.

**Drobnyk, W., Rocco, K., Davidson, S., Bruce, S., Zhang, F., &**

 **Soumerai, S. B. (2019). Sensory integration and functional**

 **reaching in children with Rett Syndrome/Rett-Related**

 **Disorders. Clinical Medicine Insights. Pediatrics, 13,**

 **1179556519871952. doi:10.1177/1179556519871952.**

**BACKGROUND:**The loss of functional hand skills is a primary characteristic of Rett syndrome. Stereotypies, dyspraxia, and other sensory processing issues severely limit the individual's ability to reach toward and sustain grasp on objects. This loss of functional reach and grasp severely limits their ability to participate in self-help, play, and school-related activities. We proposed that Ayres Sensory Integration (ASI) treatment would improve sensory processing and motor planning, which would lay the sensory-motor groundwork for improving grasp of objects, an important first step in developing functional hand use.

**OBJECTIVE:**We examined the effects of ASI treatment on rate of reaching and grasping for children with Rett syndrome/Rett-related disorders.

**METHODS:**We used an interrupted time series design to measure changes in outcome variables occurring after intervention initiation and cessation. We analyzed daily video observations during baseline, intervention, and post-intervention periods, over a span of 7 months.

**RESULTS:**During baseline, rate of grasping declined moderately. There was a 15% increase in grasping from the end of baseline to end of the post-intervention period. There was no significant change in rate of reaching.

**CONCLUSIONS:**This study provides preliminary data showing very small improvements in hand grasp of children with Rett syndrome following ASI treatment; larger studies in diverse settings are needed to establish the effectiveness of this approach. This study shows that an interrupted time series research design provides a valid template for evaluating interventions for children with rare disorders.

**2018**

### Bodison, S. C., & Parham, L. D. (2017). Specific sensory techniques and sensory environmental modifications for children and youth with sensory integration difficulties: A systematic review. *American Journal of Occupational Therapy,72*(1). doi:10.5014/ajot.2018.029413

This systematic review examined the effectiveness of specific sensory techniques and sensory environmental modifications to improve participation of children with sensory integration (SI) difficulties. Abstracts of 11,436 articles published between January 2007 and May 2015 were examined. Studies were included if designs reflected high levels of evidence, participants demonstrated SI difficulties, and outcome measures addressed function or participation. Eight studies met inclusion criteria. Seven studies evaluated effects of specific sensory techniques for children with autism spectrum disorder (ASD) or attention deficit hyperactivity disorder: Qigong massage, weighted vests, slow swinging, and incorporation of multisensory activities into preschool routines. One study of sensory environmental modifications examined adaptations to a dental clinic for children with ASD. Strong evidence supported Qigong massage, moderate evidence supported sensory modifications to the dental care environment, and limited evidence supported weighted vests. The evidence is insufficient to draw conclusions regarding slow linear swinging and incorporation of multisensory activities into preschool settings.

**Miller-Kuhaneck, H., & Watling, R. (2017). Parental or teacher education and coaching to support function and participation of children and youth with sensory processing and sensory integration challenges: A systematic review. *American Journal of Occupational Therapy,72*(1). doi:10.5014/ajot.2018.029017**

**This systematic review examines the literature published from 2007 through May 2015 related to the effectiveness of occupational therapy interventions using parental or teacher education and coaching with children with challenges in sensory processing and sensory integration (SP-SI). Of more than 11,000 abstracts and 86 articles that were considered, only 4 met the criteria and were included in this review. Studies of parental training and coaching for children with challenges in SP-SI and comorbid autism spectrum disorder have suggested that educational or coaching programs could result in positive outcomes for both parents and children, often in a relatively short time period. Recommendations include a greater focus on providing educational interventions for parents and teachers and including specific assessment of SP-SI before implementing interventions meant to address those issues. Specific recommendations for future research are provided.**

### Pfeiffer, B., Clark, G. F., & Arbesman, M. (2017). Effectiveness of cognitive and occupation-based interventions for children with challenges in sensory processing and integration: A systematic review. *American Journal of Occupational Therapy,72*(1). doi:10.5014/ajot.2018.028233

**This systematic review examines the evidence for the effectiveness of cognitive and occupation-based interventions to improve self-regulation in children and youth who have challenges in processing and integrating sensory information. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis guided the methodology. Five studies identified through a comprehensive database search met the inclusion criteria and were separated into categories of cognitive and occupation-based interventions. Articles that did not specifically measure sensory integration (SI) or processing challenges were omitted. Synthesis of the articles suggests that self-regulation (e.g., sensory processing, emotional regulation, executive functioning, social function) improved with cognitive and occupation-based interventions. Because the number of studies that measured sensory processing or SI challenges was limited, researchers are encouraged to include these measures in future research to understand the impact of a broader range of cognitive and occupation-based interventions.**

### Schaaf, R. C., Dumont, R. L., Arbesman, M., & May-Benson, T. A. (2017). Efficacy of occupational therapy using Ayres Sensory Integration®: A systematic review. *American Journal of Occupational Therapy,72*(1). doi:10.5014/ajot.2018.028431

**This systematic review addresses the question "What is the efficacy of occupational therapy using Ayres Sensory Integration® (ASI) to support functioning and participation as defined by the International Classification of Functioning, Disability and Health for persons with challenges in processing and integrating sensory information that interfere with everyday life participation?" Three randomized controlled trials, 1 retroactive analysis, and 1 single-subject ABA design published from 2007 to 2015, all of which happened to study children with autism, met inclusion criteria. The evidence is strong that ASI intervention demonstrates positive outcomes for improving individually generated goals of functioning and participation as measured by Goal Attainment Scaling for children with autism. Moderate evidence supported improvements in impairment-level outcomes of improvement in autistic behaviors and skills-based outcomes of reduction in caregiver assistance with self-care activities. Child outcomes in play, sensory-motor, and language skills and reduced caregiver assistance with social skills had emerging but insufficient evidence.**

### Pfeiffer, B., May-Benson, T. A., & Bodison, S. C. (2017). State of the science of sensory integration research with children and youth. *American Journal of Occupational Therapy,72*(1). doi:10.5014/ajot.2018.721003

**Many children and youth with and without disabilities are affected by challenges in processing and integrating sensations. Occupational therapy practitioners serve a pivotal role in the evaluation and treatment of this population. This special section of the American Journal of Occupational Therapy includes articles that elucidate the relationship between sensory processing and participation in valued occupations as well as articles that guide best practice, including systematic reviews on common occupational therapy interventions for children and youth with challenges in processing and integrating sensation. This editorial elaborates on key issues for future research.**

**2017**

**Lecuona, E., Jaarsveld, A. V., Raubenheimer, J., & Heerden, R. V. (2017). Sensory integration intervention and the development of the premature infant: A controlled trial. *South African Medical Journal,* *107*(11), 976. doi:10.7196/samj.2017.v107i11.12393**

**Background:** Premature infants are at risk of sensory processing difficulties and developmental delays due to an immature central nervous system and possible episodes of medical instability, discomfort, pain and stress during the first weeks or months after birth.

**Objective**: To investigate the effect of Ayres Sensory Integration (ASI) on the development of premature infants in the first 12 months of life. **Methods**: A pre-/post-test experimental design was used to randomly divide 24 premature infants from a low socioeconomic setting in Bloemfontein, South Africa, into experimental and control groups after being matched by corrected age and gender. Developmental status was determined with the Bayley III Scales of Infant and Toddler Development, the Test of Sensory Functions in Infants and the Infant/ Toddler Sensory Profile. The experimental group received 10 weeks of ASI intervention. Results. ASI intervention had a positive effect on the sensory processing and development of premature infants, especially in terms of cognitive, language and motor development.

**Conclusions:** ASI intervention at an early age enhances the developmental progress of premature infants.

**Gorman, M. E., & Kashani, N. H. (2017). A. Jean Ayres and the development of sensory integration: a case study in the development and fragmentation of a scientific therapy network. *Social Epistemology,* *31*(2), 107-129. doi:10.1080/02691728.2016.1241322**

Jean Ayres invented Sensory Integration (SI) for children experiencing learning and social difficulties because, according to Ayres, they could not adequately integrate information from multiple sensory modalities. She established a scientific basis for her identification of children with sensory integrative difficulties, using statistical techniques to identify symptoms and neuroscience to determine a cause. She was an unusually reflective practitioner who catalyzed a community of practice around SI without becoming a guru—indeed, she encouraged her students to come up with their own ideas and test them empirically. She felt isolated from the growing field of Occupational Therapy (OT) yet is viewed as one of its greatest pioneers. After her death in 1988, the SI community gradually began to argue about fundamental issues like what should constitute an appropriate diagnosis and set of tests for SI. At present, the network is fragmented to the point where some of the opposing positions may be incommensurable with each other, which would require a trading zone.

**Hunt, J., Hooydonk, E. V., Faller, P., Mailloux, Z., & Schaaf, R. (2017). Manualization of occupational therapy using Ayres Sensory Integration® for autism. *OTJR: Occupation, Participation and Health,* *37*(3), 141-148. doi:10.1177/1539449217697044**

This article reports on the development of a Stage 3 manual (following pilot effectiveness study) for implementing occupational therapy using Ayres Sensory Integration® (OT/ASI) for children with autism spectrum disorders to enhance participation in daily occupations. Three stakeholder groups were surveyed to aid in translation of manual from research to practice (i.e., Stage 3 manual) and an expert consensus meeting was held to finalize recommendations. Data indicated that the manuals usability could be improved by including a section on frequently encountered problems and solutions, and by including video case examples. Also recommended were greater chapter uniformity, improved clarity of forms and charts, and inclusion of a glossary. Changes were made and subject to expert review and consensus using modified Delphi process. The Stage 3 manual has been rigorously vetted and is ready for practice and research replication.

**2016**

**Pekçetin, S., Akı, E., Üstünyurt, Z., & Kayıhan, H. (2016). The efficiency of sensory integration interventions in preterm infants. *Perceptual and Motor Skills*, *123*(2), 411-423.**

This study aimed to explore the effects of individualized sensory integration interventions on the sensory processing functions of preterm infants. Thirty-four preterm infants (intervention group) at a corrected age of seven months and 34 term infants (control group) were included. The preterm infants underwent an eight-week sensory integration intervention. Before and after the intervention, the preterm infants' sensory processing functions were evaluated using the Test of Sensory Functions in Infants and compared with those of term infants. Preterm infants had significantly poorer sensory processing function pre-intervention when compared with term infants. There was a significant improvement in preterm infants' sensory processing functions after the sensory integration intervention. In conclusion, preterm infants should be evaluated for sensory processing disorders and individualized sensory integration interventions should be implemented.

**Gaston, A., Moore, S., & Butler, L. (2016). Sitting on a stability ball improves attention span and reduces anxious/depressive symptomatology among grade 2 students: A prospective case-control field experiment. *International Journal of Educational Research*, *77*, 136-142.**

This study used a prospective matched case-control design to examine the effects of sitting on a stability ball on inattention, hyperactivity, oppositional defiant behaviours, and anxious/depressive symptomatology among 23 experimental and 18 control grade 2 students. Classroom teachers completed the NICHQ Vanderbilt Assessment Scale at baseline and 8-weeks (T2) and 5-months (T3) after the experimental group switched to stability balls. Social validity was assessed at year-end. ANCOVAs controlling for baseline scores demonstrated that students in the experimental condition had improved attention at T2 and T3 and reduced anxious/depressive symptoms at T2. All students and the classroom teacher preferred the balls. In conclusion, sitting on stability balls is well received and may represent an effective classroom management strategy for improving attention.

**Matin Sadr, N., Haghgoo, H. A., Samadi, S. A., Rassafiani, M., & Bakhshi, E. (2016). Impact of air seat cushions and ball chairs on classroom behavior of students with Autism Spectrum Disorder. *Journal of Rehabilitation*, *17*(2), 136-147.**

**Objective:** Children with Autism Spectrum Disorder (ASD) have a lot of sensory integration problems, which severely interfere with their learning process in the classroom; therefore, they confront with difficult problems in academic achievements. As a result, they need environmental modification to resolve sensory seeking behaviors and improve their educational success. Considering the effects of sensory stimulation and integration in children with ASD, this study aimed to examine the impacts of sitting on a ball, cushion, and or common chair on classroom behavior of 4 students with ASD. Because alternative seating like therapy balls and air cushions instead of regular chairs can exert various sensory stimuli on student’s sensory organs, this study aimed to examine the effects of three alternative classroom-seating devices; i.e. regular classroom chairs, therapy balls, and air cushions on students’ classroom behaviors. These behaviors include on-seat behavior, on-task behavior, and autistic behavior.
**Materials & Methods:** In this study, 4 male students with ASD in Tabasom Primary School, Mashhad, Iran were investigated in a single-subject study. Their classroom behaviors were recorded and monitored by video recording in an A-B-A-C single-subject design for 4 weeks. Their classroom behaviors were video recorded in 3 phases: Students sat on a normal chair in baseline phases (A), on a cushions in second phase (B), and on a therapy ball in third phase (C). The students’ behaviors (including sitting times; in-seat and on-task/ off-task behaviors) were observed and recorded every other day, a session per day, and 10 minutes each session (in total 12 sessions equal to 120 minutes). Sitting times and on-task/off-task behaviors were quantified by momentary time sampling and compared during different phases for important changes. Social validity was taken by the teacher at the end of the research as well. Additionally, the Gilliam Autism Rating Scale - Second Edition test was used to examine stereotyped movements, social and communication skills of the students before and after the research. Social and communication skills of the subjects were evaluated before and after the intervention using The Vineland Social Maturity Scale. Statistical software SPSS version 19 and Excel software were used to analyze the descriptive statistics and drawing diagrams, respectively.
**Results:**The findings of this research demonstrated increases in on-task and in-seat behaviors in 4 students when seated on air sit cushioned chairs and therapy balls when compared to seating on regular chairs. But, despite increase in on-task behaviors for all students, only two of the students showed improved in-seat behaviors when seated on therapy balls. An increase of 11.7% in on-task behaviors was observed during sitting on a therapy ball, when compared to regular chairs. Furthermore, a 25% increase was observed in on-task behavior of students when they were seated on air sit cushioned chairs in comparison with regular chairs. The in-seat behaviors were increased by 31.7% and 23.3% when sitting on the therapy ball and cushioned air chairs, respectively, when compared with regular chairs. Social validity findings indicated that the teacher preferred the use of the balls and air-cushioned chairs for her students.
**Conclusion:**In the present study, therapy balls and or cushioned chairs for ASD students facilitated in-seat and on-task behaviors and improved classroom performance. It seems that using these alternative seating chairs can satisfy the subjects’ needs to sensory stimuli, and therefore, decreases their sensory seeking behaviors which interferes with their academic achievements. While, using therapy ball chairs for these students may facilitate in-seat behavior and decrease autistic behavior in class, the student’s response to dynamic seating is different individually. Therefore, chair selection must be based on vestibular reaction of the students.

**Losinski, M., Sanders, S. A., & Wiseman, N. M. (2016). Examining the use of deep touch pressure to improve the educational performance of students with disabilities: a meta-analysis. *Research and Practice for Persons with Severe Disabilities*, *41*(1), 3-18.**

The current meta-analysis examined the use of deep touch pressure (DTP; e.g., weighted vests) with students with disabilities. DTP is a form of sensory integration therapy that is currently used extensively in schools with students with autism and other disabilities. Each study in the analysis was evaluated using the Council for Exceptional Children’s guidelines for evidence-based practices. In addition, noting the debate regarding appropriate single-case effect sizes, the current study calculated omnibus effect sizes utilizing a variety of single-case design effect sizes. Results of the current study suggest that DTP interventions are of generally poor quality and demonstrate effects that do not validate their current use for students with disabilities.

**Lancaster, S., Zachry, A., Duck, A., Harris, A., Page, E., & Sanders, J. (2016). Delivery of the Wilbarger Protocol: A survey of pediatric occupational therapy practitioners. *Journal of Occupational Therapy, Schools, & Early Intervention*, *9*(3), 281-289**.

The Wilbarger Therapressure Program is a commonly used treatment approach utilized by occupational therapy professionals for the treatment of sensory defensiveness. The purpose of the current study was to investigate occupational therapy practitioners’ sources of training in the administration of Wilbarger Therapressure Program, the uniformity of administration in practice, and the diagnoses for which therapists recommend this treatment approach. Occupational therapists from across the United States participated in an online survey investigating specifics related to training and implementation of the brushing protocol. A total of 153 respondents reported using the Wilbarger Therapressure Program in practice. Almost half of the respondents received their education on the Therapressure program by attending the workshop offered by the Wilbargers. Forty eight percent of survey participants reported learning how to administer the Therapressure program by participating in hands-on training provided by another occupational therapy practitioner, 39% by attending the course taught by the Wilbargers, 7% by information obtained through word of mouth from another occupational therapy practitioner, 3% by information obtained through online research, and 3% by other means. The results of this study reveal that a variety of approaches exist related to the training and implementation of the protocol. It is the responsibility of all occupational therapy practitioners to obtain the proper training prior to recommending and implementing the Therapressure program. Because a standardized protocol for implementation of the protocol has not been published, the optimal means of training is for practitioners to attend the Wilbarger workshop.

**2015**

**Haghgoo, H. A., Samadi, S. A., Rassafiani, M., & Bakhshi, E. (2015). Can air seat cushions and ball chairs improve classroom behaviors of students with Autism Spectrum Disorder: A single subject study. *Journal of Rehabilitation Sciences and Research*, *2*(2), 31-36.**

**Background:** Classroom behaviors are disturbed in autistic students because of their repetitive, restlessness, and disruptive behaviors. is study aimed to examine the impacts of sitting on a ball, cushion, and/or common chair on classroom behavior of four students with Autism Spectrum Disorder (ASD). **Methods:** Four children with Autism participated in this single-subject study. Students’ behaviors were video recorded in three phases: Sitting on their common chairs during phase A, air-sit cushioned in phase B, and ball chairs in phase C. Sitting times and on-task/o -task behaviors were quantified by momentary time sampling (every 10 seconds) and compared during different phases for important changes. Social validity was taken by the teacher at the end of the research as well. **Results:** Findings demonstrated increases in on-task and in-seat behaviors in four students when seated on air sit cushioned chairs. Despite rises of on- task behaviors for all students, only two of the students showed enhanced in- seat behaviors when seated on therapy balls. Social validity findings indicated that the teacher preferred the use of the balls and air-cushioned chairs for her students. **Conclusion: Th**erapy balls/cushioned chairs for students with ASD may facilitate in-seat and on-task behavior.

**Yunus, F. W., Liu, K. P., Bissett, M., & Penkala, S. (2015). Sensory-based intervention for children with behavioral problems: A systematic review. *Journal of Autism and Developmental Disorders*, *45*(11), 3565-3579.**

Sensory-based intervention is a common approach used to address behavioral problems in children. Types of sensory-based intervention for children and details of the intervention effectiveness have not been systematically examined. This review examined the effectiveness and ideal types of sensory-based interventions for children with behavioral problems. Searching seven databases, a total of 132 studies were identified; 14 met the selection criteria and were reviewed. Seven of the studies were tactile-based interventions, four were proprioceptive-based intervention and three were vestibular-based interventions. Tactile-based interventions such as massage therapy were the most promising intervention in reducing behavioral problems. However, evidence concerning the effectiveness of sensory-based interventions remains unclear. More research is required for determining the appropriate intervention for children with behavioral problems.

**Moore, K. M., Cividini‐Motta, C., Clark, K. M., & Ahearn, W. H. (2015). Sensory integration as a treatment for automatically maintained stereotypy. *Behavioral Interventions*, *30*(2), 95-111.**

According to sensory integration (SI) theory, many symptoms of autism are caused by an inability to integrate and adaptively respond to sensory input. Despite little evidence supporting SI, this form of therapy is a popular treatment for children with autism. Should these treatments work, they should be most effective for behavior maintained by sensory consequences (automatically maintained). SI activities may make these sensory consequences less reinforcing. The purpose of this study was to determine whether SI treatments could reduce automatically-maintained stereotypy. Five individuals with autism participated. An occupational therapist prescribed sensory activities that competed with stereotypy for SI treatments. Two types of SI treatments were tested: sensory diets and brushing with deep-pressure therapy. The effect of these treatments on stereotypy was evaluated in an ABAB design. Neither the sensory diet alone, brushing and deep pressure alone, nor both treatments combined were effective interventions for stereotypy. These results do not support the use of SI as a treatment for stereotypy. Copyright © 2015 John Wiley & Sons, Ltd.

**Leong, H. M., Carter, M., & Stephenson, J. R. (2015). Meta-analysis of research on sensory integration therapy for individuals with developmental and learning disabilities. *Journal of Developmental and Physical Disabilities*, *27*(2), 183-206.**

Sensory integration therapy (SIT) is a widely used intervention for people with disabilities to address educationally related outcomes and has been subject to ongoing controversy. The outcomes from 30 comparison group studies on sensory integration therapy for people with, or at-risk of, a developmental or learning disability, disorder, or delay were reviewed and analyzed. Studies comparing SIT to no treatment yielded a statistically significant but small effect. However, when SIT was compared to alternative interventions, differences were non-significant. Numerous methodological flaws were identified, such as issues in clearly defining treatment and evaluating integrity, poor quality of research, and diversity of outcome measures. There was little evidence that SIT was an effective intervention for any diagnostic group, particularly when functional blinded outcome measures were examined. Minimum methodological requirements for any future research studies are discussed.

**Leong, H. M., Carter, M., & Stephenson, J. (2015). Systematic review of sensory integration therapy for individuals with disabilities: Single case design studies. *Research in developmental disabilities*, *47*, 334-351.**

Sensory integration therapy (SIT) is a controversial intervention that is widely used for people with disabilities. Systematic analysis was conducted on the outcomes of 17 single case design studies on sensory integration therapy for people with, or at-risk of, a developmental or learning disability, disorder or delay. An assessment of the quality of methodology of the studies found most used weak designs and poor methodology, with a tendency for higher quality studies to produce negative results. Based on limited comparative evidence, functional analysis-based interventions for challenging behavior were more effective that SIT. Overall the studies do not provide convincing evidence for the efficacy of sensory integration therapy. Given the findings of the present review and other recent analyses it is advised that the use of SIT be limited to experimental contexts. Issues with the studies and possible improvements for future research are discussed including the need to employ designs that allow for adequate demonstration of experimental control.

**Watling, R., & Hauer, S. (2015). Effectiveness of Ayres Sensory Integration® and sensory-based interventions for people with autism spectrum disorder: A systematic review. *American Journal of Occupational Therapy*, *69*(5), 6905180030p1-6905180030p12.**

This systematic review examines the literature published from January 2006 through April 2013 related to the effectiveness of Ayres Sensory Integration® (ASI) and sensory-based interventions (SBIs) within the scope of occupational therapy for people with autism spectrum disorder to improve performance in daily life activities and occupations. Of the 368 abstracts screened, 23 met the inclusion criteria and were reviewed. Moderate evidence was found to support the use of ASI. The results for sensory-based methods were mixed. Recommendations include performing higher level studies with larger samples, using the Fidelity Measure in studies of ASI, and using carefully operationalized definitions and systematic methods in examination of SBIs.

**Barton, E. E., Reichow, B., Schnitz, A., Smith, I. C., & Sherlock, D. (2015). A systematic review of sensory-based treatments for children with disabilities. *Research in developmental disabilities*, *37*, 64-80.**

Sensory-based therapies are designed to address sensory processing difficulties by helping to organize and control the regulation of environmental sensory inputs. These treatments are increasingly popular, particularly with children with behavioral and developmental disabilities. However, empirical support for sensory-based treatments is limited. The purpose of this review was to conduct a comprehensive and methodologically sound evaluation of the efficacy of sensory-based treatments for children with disabilities. Methods for this review were registered with PROSPERO (CRD42012003243). Thirty studies involving 856 participants met our inclusion criteria and were included in this review. Considerable heterogeneity was noted across studies in implementation, measurement, and study rigor. The research on sensory-based treatments is limited due to insubstantial treatment outcomes, weak experimental designs, or high risk of bias. Although many people use and advocate for the use of sensory-based treatments and there is a substantial empirical literature on sensory-based treatments for children with disabilities, insufficient evidence exists to support their use.

**2014**

**Case-Smith, J., Weaver, L. L., & Fristad, M. A. (2014). A systematic review of sensory processing interventions for children with autism spectrum disorders. *Autism*, 1362361313517762.**

Children with autism spectrum disorders often exhibit co-occurring sensory processing problems and receive interventions that target self-regulation. In current practice, sensory interventions apply different theoretic constructs, focus on different goals, use a variety of sensory modalities, and involve markedly disparate procedures. Previous reviews examined the effects of sensory interventions without acknowledging these inconsistencies. This systematic review examined the research evidence (2000-2012) of two forms of sensory interventions, sensory integration therapy and sensory-based intervention, for children with autism spectrum disorders and concurrent sensory processing problems. A total of 19 studies were reviewed: 5 examined the effects of sensory integration therapy and 14 sensory-based intervention. The studies defined sensory integration therapies as clinic-based interventions that use sensory-rich, child-directed activities to improve a child's adaptive responses to sensory experiences. Two randomized controlled trials found positive effects for sensory integration therapy on child performance using Goal Attainment Scaling (effect sizes ranging from .72 to 1.62); other studies (Levels III-IV) found positive effects on reducing behaviors linked to sensory problems. Sensory-based interventions are characterized as classroom-based interventions that use single-sensory strategies, for example, weighted vests or therapy balls, to influence a child's state of arousal. Few positive effects were found in sensory-based intervention studies. Studies of sensory-based interventions suggest that they may not be effective; however, they did not follow recommended protocols or target sensory processing problems. Although small randomized controlled trials resulted in positive effects for sensory integration therapies, additional rigorous trials using manualized protocols for sensory integration therapy are needed to evaluate effects for children with autism spectrum disorders and sensory processing problems.

# **Preis, J., & McKenna, M. (2014).The effects of sensory integration therapy on verbal expression and engagement in children with autism. *International Journal of Therapy and Rehabilitation, 21*(10). doi http://dx.doi.org/10.12968/ijtr.2014.21.10.476.**

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| **Background/Aim** |

Sensory-based interventions, including sensory integration therapy (SIT), are one of the most highly requested and provided services for children with autism spectrum disorders (ASDs). Although SIT is predominantly provided by occupational therapists, other service providers, including speech-language pathologists, are expected to understand and, on occasion, are requested to integrate SIT into their treatment. The purpose of this study was to determine whether: (a) SIT improved the communication skills of children with autism, specifically spontaneity, complexity of utterance, and engagement; (b) effects continued following the provision of SIT; and (c) effects were consistent across young children with autism with different learning profiles.

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| **Methods** |

A single-subject applied behaviour analysis design was implemented to assess the effectiveness of SIT on verbal spontaneity, grammatical complexity (measured through mean length of utterance) and engagement in four young children with ASD, measuring each area before, during and after SIT. The effects of sensory integration intervention were measured by comparing each participant's expressive language and engagement in a no-treatment phase (A phase) to those same skills in the treatment phase (B phase).

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| **Findings** |

All of the participants performed best in the occupational therapy or post-occupational therapy conditions for spontaneity, complexity of utterance, and engagement, and the worst in the pre-occupational therapy condition. Specifically, the greatest percentage of spontaneity was noted post-SIT, with the longest measured length of utterance during SIT, and the greatest engagement found both during and post-SIT. The pre-SIT condition consistently ranked as the lowest for all dependent measures.

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| **Conclusions** |

Results from this small study indicate that the SIT condition (occupational therapy) yielded better communication and engagement than the condition immediately prior (pre-occupational therapy); therefore, specific components of SIT need to be examined, particularly issues of motivation and momentum.

[**Iwanaga, R**](http://www.ncbi.nlm.nih.gov/pubmed/?term=Iwanaga%20R%5BAuthor%5D&cauthor=true&cauthor_uid=23893373)**.,** [**Honda, S**](http://www.ncbi.nlm.nih.gov/pubmed/?term=Honda%20S%5BAuthor%5D&cauthor=true&cauthor_uid=23893373)**.,** [**Nakane, H**](http://www.ncbi.nlm.nih.gov/pubmed/?term=Nakane%20H%5BAuthor%5D&cauthor=true&cauthor_uid=23893373)**.,** [**Tanaka, K**](http://www.ncbi.nlm.nih.gov/pubmed/?term=Tanaka%20K%5BAuthor%5D&cauthor=true&cauthor_uid=23893373)**.,** [**Toeda, H**](http://www.ncbi.nlm.nih.gov/pubmed/?term=Toeda%20H%5BAuthor%5D&cauthor=true&cauthor_uid=23893373)**., &** [**Tanaka, G**](http://www.ncbi.nlm.nih.gov/pubmed/?term=Tanaka%20G%5BAuthor%5D&cauthor=true&cauthor_uid=23893373)**. (2014). Pilot study: efficacy of sensory integration therapy for Japanese children with high-functioning autism spectrum disorder. *Occupational Therapy International 21*(1), 4-11. doi: 10.1002/oti.1357.**

This study's objective was to investigate the efficacy of sensory integration therapy (SIT) for children with high-functioning autism spectrum disorder (HFASD). The subjects were 20 HFASD children with IQs above 70 selected from previously collected data. Eight participated in individual SIT sessions, and 12 participated in group therapy (GT) including social skill training, communication training, kinetic activities, and child-parent play for 8-10 months. Changes in Total score and five Index scores on the Japanese version of the Miller Assessment for Preschoolers before and after therapy between children in the SIT and GT groups were compared. The results showed that Total score and all Index scores except for Verbal Index increased significantly in the SIT group, while only Total score increased in the GT group. Furthermore, the SIT group showed more improvement compared with the GT group in Total score and on Coordination, Non-verbal, and Complex Index scores. SIT might have a more positive effect on motor coordination abilities, non-verbal cognitive abilities, and combined abilities of sensory motor and cognition in children with HFASD when compared with GT. This study has limitations such as being an analysis of previously collected data. Further study should be conducted with a randomized control trial.

**Sniezvk, C.J., & Zane, T.L. (2014).Investigating the effects of sensory integration therapy in decreasing stereotypy. *Focus on Autism and Other Developmental Disabilities*. doi: 10.1177/1088357614525663**

Sensory Integration Therapy (SIT) is a popular treatment for Pervasive Developmental Disorders that involves therapists using various strategies and manipulanda to provide sensory stimulation to improve behavioral dysfunctions. Although SIT is popular, the research literature demonstrates little experimental proof of effectiveness. Many published studies find little to no causal relationship between SIT and improvements in target behaviors. There are numerous internal and external validity threats that preclude confidence in a functional relationship for those studies that report positive changes. The current study attempted to evaluate the impact of different SIT techniques on the behavioral excesses of children diagnosed with autism, while using research designs that adhered to commonly accepted standards for internal and external validity controls. The results showed that there was no causal relationship between the sensory procedures and improvements in the targeted dependent variables. Thus, SIT remains an unproven treatment for autism.

**Case-Smith, J., Weaver, L.L., & Fristad, M.A. (2014). A systematic review of sensory processing interventions for children with autism spectrum disorders. *Autism.* doi: 10.1177/1362361313517762.**

Children with autism spectrum disorders often exhibit co-occurring sensory processing problems and receive interventions that target self-regulation. In current practice, sensory interventions apply different theoretic constructs, focus on different goals, use a variety of sensory modalities, and involve markedly disparate procedures. Previous reviews examined the effects of sensory interventions without acknowledging these inconsistencies. This systematic review examined the research evidence (2000–2012) of two forms of sensory interventions, sensory integration therapy and sensory-based intervention, for children with autism spectrum disorders and concurrent sensory processing problems. A total of 19 studies were reviewed: 5 examined the effects of sensory integration therapy and 14 sensory-based intervention. The studies defined sensory integration therapies as clinic-based interventions that use sensory-rich, child-directed activities to improve a child’s adaptive responses to sensory experiences. Two randomized controlled trials found positive effects for sensory integration therapy on child performance using Goal Attainment Scaling (effect sizes ranging from .72 to 1.62); other studies (Levels III–IV) found positive effects on reducing behaviors linked to sensory problems. Sensory-based interventions are characterized as classroom-based interventions that use single-sensory strategies, for example, weighted vests or therapy balls, to influence a child’s state of arousal. Few positive effects were found in sensory-based intervention studies. Studies of sensory-based interventions suggest that they may not be effective; however, they did not follow recommended protocols or target sensory processing problems. Although small randomized controlled trials resulted in positive effects for sensory integration therapies, additional rigorous trials using manualized protocols for sensory integration therapy are needed to evaluate effects for children with autism spectrum disorders and sensory processing problems.

# **Leong, H.M., Carter, M., & Stephenson, J.R. (2014). Meta-analysis of research on sensory integration therapy for individuals with developmental and learning disabilities. *Journal of Developmental and Physical Disabilities*. doi: 10.1007/s10882-014-9408-y**

Sensory integration therapy (SIT) is a widely used intervention for people with disabilities to address educationally related outcomes and has been subject to ongoing controversy. The outcomes from 30 comparison group studies on sensory integration therapy for people with, or at-risk of, a developmental or learning disability, disorder, or delay were reviewed and analyzed. Studies comparing SIT to no treatment yielded a statistically significant but small effect. However, when SIT was compared to alternative interventions, differences were non-significant. Numerous methodological flaws were identified, such as issues in clearly defining treatment and evaluating integrity, poor quality of research, and diversity of outcome measures. There was little evidence that SIT was an effective intervention for any diagnostic group, particularly when functional blinded outcome measures were examined. Minimum methodological requirements for any future research studies are discussed.

**Reinert SS., Jackson K., Bigelow K. (2014). Using posturography to examine the immediate effects of vestibular therapy for children with Autism Spectrum Disorders: A feasibility study. *Physical and Occupational Therapy in Pediatrics.* doi:10.3109/01942638.2014.975313.**

**Aims:** The primary objective of this study was to determine the feasibility of using posturography to monitor acute changes in postural control induced by a Sensory Integration (SI) therapy intervention. A secondary objective was to identify which posturography outcome parameters, tests conditions and data analysis methods might be most useful in identifying post-intervention changes.

**Methods:** Five children with Autism Spectrum Disorder (ASD) and five children with typical development (TD) participated in a 10 min vestibular swing activity and had their postural stability evaluated pre- and post-intervention under four different sensory testing conditions. Sway ranges, mean sway velocity, sway root mean square (RMS), and sample entropy were calculated from center of pressure (COP) data. **Results:** All five children with ASD demonstrated decreased mean sway velocity in the eyes open/flat plate condition post-intervention with an average decrease of 5.87 ± 2.69 mm/s. Four of the five children with ASD demonstrated an increase in RMS and a decrease in anterior/posterior sample entropy post-intervention in the eyes closed, foam pad condition and eyes open, flat plate condition respectively.

**Conclusion**: Posturography may be useful for assessing acute physiologic responses to an SI therapy intervention and warrants further investigation.

**Murdock, L.C., Dantzler, J.A., Walker, A.N., & Wood, L.B. (2014). The effect of a platform swing on the independent work behaviors of children with Autism Spectrum Disorders.** ***Focus Autism Other Dev Disabl, 29*(1), 50-61. doi: 10.1177/1088357613509838.**

A randomized pretest–posttest control group design was utilized to measure the effects of a platform swing on independent work behaviors of 30 children with Autism Spectrum Disorders (ASD). Participants engaged in two 5-min intervals of independent work. Between the intervals, participants in the treatment group received 5 min of vestibular stimulation using a platform swing and children in the control group watched a video. No significant differences were evidenced between the treatment and control groups on engagement, on-task behavior, stereotyped/repetitive behavior, or out-of-seat behavior. Changes noted for individual participants could not be linked to age, diagnosis, or sensory profile patterns.

# **Gee, B.M., Thompson, K., & St John, H. (2014). Efficacy of a sound-based intervention with a child with an Autism Spectrum Disorder and auditory sensory over-responsivity. *Occupational Therapy International, 21*(1), 12-20. doi: 10.1002/oti.1359.**

Sound-based interventions (SBIs) are being used by paediatric occupational therapists to help children with autism spectrum disorders and co-morbid sensory processing disorders. A limited yet growing body of evidence is emerging related to the efficacy of SBIs in reducing sensory processing deficits among paediatric clients with co-morbid conditions. The current study employed an ABA single-subject case-controlled design, implementing The Listening Program® with a 7-year-old child diagnosed with autism spectrum disorder who demonstrated auditory sensory over-responsivity (SOR). The intervention consisted of 10 weeks of psycho-acoustically modified classical music that was delivered using specialized headphones and amplifier and a standard CD player. Repeated measures were conducted during the A(1), B and A(2) phases of the study using the Sensory Processing Measure, a subjective caregiver questionnaire, and the Sensory Over-Responsivity Scales, an examiner-based assessment measure to track changes of the participant's auditory SOR-related behaviours. The results indicated that the participant exhibited a decrease in the number of negative (avoidant, verbal and physical negative) and self-stimulatory behaviours. The decreases in negative and self-stimulatory behaviour may have been due to the therapeutic effect of the repeated exposure to the Sensory Over-Responsivity Scales or The Listening Program SBI. Copyright © 2013 John Wiley & Sons, Ltd.

**Barton, E.E., Reichow, B., Schnitz, A., Smith, I.C., & Sherlock, D. (2014). A systematic review of sensory-based treatments for children with disabilities. *Research in Developmental Disabilities, 37,* 65-80.** **doi:10.1016/j.ridd.2014.11.006.**

Sensory-based therapies are designed to address sensory processing difficulties by helping to organize and control the regulation of environmental sensory inputs. These treatments are increasingly popular, particularly with children with behavioral and developmental disabilities. However, empirical support for sensory-based treatments is limited. The purpose of this review was to conduct a comprehensive and methodologically sound evaluation of the efficacy of sensory-based treatments for children with disabilities. Methods for this review were registered with PROSPERO (CRD42012003243). Thirty studies involving 856 participants met our inclusion criteria and were included in this review. Considerable heterogeneity was noted across studies in implementation, measurement, and study rigor. The research on sensory-based treatments is limited due to insubstantial treatment outcomes, weak experimental designs, or high risk of bias. Although many people use and advocate for the use of sensory-based treatments and there is a substantial empirical literature on sensory-based treatments for children with disabilities, insufficient evidence exists to support their use.

**Watkins N. & Sparling E. (2014). The effectiveness of the snug vest on stereotypic behaviors in children diagnosed with an Autism Spectrum Disorder. *Behavior Modification, 38*(3), 412-427.** [**http://www.ncbi.nlm.nih.gov/pubmed/24778434**](http://www.ncbi.nlm.nih.gov/pubmed/24778434)

Various reviews of the effects of sensory integration therapy (SIT) have concluded that such interventions fail to reduce stereotypy. However, a new, and as yet untested, SIT iteration, an inflatable wearable vest known as the Snug Vest purports to decrease such repetitive behavior. In the current study, three children who emitted different forms of stereotypy participated in an alternating treatments design in which each participant wore a fully inflated vest and either a fully deflated vest or no vest. The results of the study show that the Snug Vest failed to reduce any participants’ stereotypy. We highlight our findings in the context of professional practice and discuss several potential limitations.

**Cobb,S.M., Fitzgerald,B., & Lanigan-O’Keeffe,C. (2014). The Alert Program for self-management of behaviour in second level schools: results of phase 1 of a pilot study. *Emotional and Behavioural Difficulties, 19*(4), 410-425. doi: 10.1080/13632752.2014.903593.**

This article reports on Phase 1 of a pilot programme on self-management of behaviour with challenging class groups of students as part of the evidence-informed practice of the National Behaviour Support Service. The Alert Program is a structured active learning programme using an engine analogy. The person’s engine runs on high, low or just right for the task in hand. The focus of this first phase of the pilot was on the appropriateness of module content, teaching approaches, resource materials and classroom management strategies. Eighty-five first year students (aged 12–13 years) and four teachers in four second level partner schools in areas of social disadvantage were involved. Trial 1 offered five class sessions and Trial 2 offered eight. Phase 1 was occupational therapist led with class teacher support. Perceptions from teachers and students were gathered by questionnaires. Teachers reported that the content and class management strategies were appropriate. Students gained an understanding of their behaviour and identified self-management strategies for use in the class. They recommended that all teachers working with the class group should be familiar with the language and techniques of the programme to reinforce learning. Feedback from 85% (72) of students confirmed that the learning tasks were considered by the majority to be enjoyable and relevant. The group of students perceived to be the most challenging gave the most positive scores, and 100% of these indicated their intention to use their new self-management strategies in class. The positive results led to Phase 2 of the pilot in which teachers took the lead role with occupational therapist support in a national pilot in 16 schools in areas of social disadvantage.

**Kalantari, M., Mohammadjani, Z., Pashazadeh Azar Z., & Tabatabaeei, S.M. (2014). Effects of using weighted vest on attention and motor skills of 7-11 year old children with learning disorders. *The Scientific Journal of Rehabilitative Medicine, 2*(3).** [**http://www.journals.sbmu.ac.ir/rm/article/view/5695**](http://www.journals.sbmu.ac.ir/rm/article/view/5695)**.**

**Background and Aim:** learning disorders is one of the most common disorders in school children. These children usually have problems in various areas such as attention and motor skills, cognition. The purpose of this study was to investigate the effects of weighted vest on continuous attention (by using continuous performance test) and motor skills (by using Bruininks osetotsky motor Proficiency Test) in children with Learning Disabilities (LD).

 **Materials and Method**: A quasi experimental method was designed for the study. A sample of 16 children with L.D were selected and observed during 3 stages. stage 1 and 3 the participants received 12 school-based occupational therapy (OT) sessions. During phase 2, participants received occupational therapy sessions and wore a weighted vest (OT/WV) during sessions. Finally, the data were compared with each other.

**Results**: this study demonstrated:

-Significant differences between attention scores during stage 2were indicated) p= 0,001 t=6, 443(

-Significant differences between motor skills scores during stage 2were indicated (t=- 11,212, p=0,001).

No significant differences between attention and motor skills scores during phases 1 and 3 results were indicated.

**Conclusion**: This study provides evidence that use of weighted vests for students with LD may increase continuous attention and improve motor skills. All children benefited from the weighted vests; the effects were strong and consistent. Weighted vest may be a component of intervention for children with LD, and the results do not support the use of weighted vests in isolation to improve continuous attention or motor skills.

**Barrett, E., Ayyash, H., Waltz, M., Waltz, M., & Banerjee S. (2014). G356 Teachers’ experiences of working with children with autism and sensory processing needs. *Arch Dis Child, 99*(1). doi:10.1136/archdischild-2014-306237.339.**

 **Aims** The purpose of this project was to investigate teachers’ perceptions of their experiences of the Sensory Processing Pathway for children with a diagnosis of autism, identifying strengths and limitations and outcomes to guide service development.

**Methods** Four teachers of children with a diagnosis of autism who had received input through the sensory processing care pathway completed questionnaires. One participant also completed a semi-structured qualitative interview. Numerical data analysis was completed of descriptive and comparative data, and key messages were highlighted in qualitative data.

**Results** Results showed there to be a decrease in undesirable behaviours which could be perceived to impact negatively upon the child’s ability to engage in school activities, and also an increase in desirable behaviours following the application of sensory processing principles in practice.



**Abstract G356 Figure 1**

A bar chart to show the presence of observed behaviours in children prior to and following involvement.



View larger version:

**Abstract G356 Figure 2**

Perceived frequency of impacts of ongoing sensory processing difficulties upon the children’s ability to engage in school activities prior to and following input.

Negative impacts of ongoing sensory processing needs upon the children’s ability to engage in school activities were indicated by teachers to reduce in frequency following the application of sensory processing principles in practice.

**Conclusion** This study, when considered alongside existing studies investigating the impacts of applying sensory processing principles to practice on functional performance of daily activities in children with a diagnosis of autism, strengthens the belief that it is beneficial to apply sensory integration principles to practice when working with children with a diagnosis of autism who may be experiencing difficulties with functional performance of daily activities in mainstream school.

 **2011**

**Pfeiffer, B.A., Koenig, K., Kinnealey, M., Sheppard, M., &** [**Henderson**](http://ajot.aotapress.net/search?author1=Lorrie+Henderson&sortspec=date&submit=Submit)**, L. (2011). Effectiveness of sensory integration interventions in children with Autism Spectrum Disorders: A Pilot Study. *American Journal of Occupational Therapy,* 65(1), 76-85.**

The purpose of this pilot study was to establish a model for randomized controlled trial research, identify appropriate outcome measures, and address the effectiveness of sensory integration (SI) interventions in children with autism spectrum disorders (ASD). Children ages 6–12 with ASD were randomly assigned to a fine motor or SI treatment group. Pretests and posttests measured social responsiveness, sensory processing, functional motor skills, and social–emotional factors. Results identified significant positive changes in Goal Attainment Scaling scores for both groups; more significant changes occurred in the SI group, and a significant decrease in autistic mannerisms occurred in the SI group. No other results were significant. The study discusses considerations for designing future outcome studies for children with ASD.

**Baysinger, M. D. (2011). The effects of sensory integration intervention on the reduction of maladaptive behaviors in high school students with autism. Thesis: Wichita State University, College of Education.** [**http://hdl.handle.net/10057/2438**](http://hdl.handle.net/10057/2438)

A single-case experimental design with multiple baseline reversal was conducted to determine the effects of sensory integration intervention on the reduction of maladaptive behaviors in high school students with autism. Four participants with a diagnosis of autism coupled with sensory integration dysfunction ranging in ages from 16 to 17 participated in this study. Individually designed sensory integration intervention (SII) was administered three times per week during the two week intervention phases of the study (B) and (B2). Following administration of individualized SII, participants engaged in an independent pre-vocational task. The use of SII produced improvements in level of engagement for each of the participants with significant decreases in performance upon removal of treatment. A decrease in level of maladaptive behavior occurred during the intervention phases for each participant. The findings of this study may provide support for the use of SII for increasing level of engagement in task work and functional performance while reducing maladaptive behaviors in high school students with autism.

**Collins, A. & Dworkin, R.J. (2011). Pilot study of the effectiveness of weighted vests. *American Journal of Occupational Therapy, 65*, 688-694.**

**OBJECTIVE:** In this pilot study, we determined the effectiveness of a weighted vest on attention to task for second-grade general education students with difficulty attending.

**METHOD:** We used an intervention and a control group and an ABA design to compare participants’ percentage of time on task with and without a vest. Ten participants from nine elementary schools in a suburban Texas school district were randomly assigned to an intervention or a control group. Control group participants wore a nonweighted vest. Participants, classroom teachers, and research assistants who coded the data were blind as to the group to which the participants were assigned.

**RESULTS:** A repeated measures analysis of variance indicated no significant differences between groups or between baseline, intervention, and withdrawal conditions.

**CONCLUSION:** Our results indicated that the weighted vests were not effective in increasing time on task. These results should be generalized cautiously owing to the small sample size and participant selection process.

**Sandra Hodgetts,** [**Joyce Magill-Evans**](http://www.springerlink.com/content/?Author=Joyce+Magill-Evans) **&** [**John E. Misiaszek**](http://www.springerlink.com/content/?Author=John+E.+Misiaszek) **(2011). Weighted vests, stereotyped behaviors and arousal in children with autism.**[***Jo***](http://www.springerlink.com/content/0162-3257/)***urnal of Autism and Develop***[***mental Disorders***](http://www.springerlink.com/content/0162-3257/), [**41,**](http://www.springerlink.com/content/0162-3257/41/6/)**805-814, DOI: 10.1007/s10803-010-1104-x**

The homeostatic theory of stereotyped behaviors assumes that these behaviors modulate arousal. Weighted vests are used to decrease stereotyped behaviors in persons with autism because the input they provide is thought to serve the same homeostatic function. This small-n, randomized and blinded study measured the effects of wearing a weighted vest on stereotyped behaviors and heart rate for six children with autism in the classroom. Weighted vests did not decrease motoric stereotyped behaviors in any participant. Verbal stereotyped behaviors decreased in one participant. Weighted vests did not decrease heart rate. Heart rate increased in one participant. Based on this protocol, the use of weighted vests to decrease stereotyped behaviors or arousal in children with autism in the classroom was not supported.

**Shawn P. Quigley, Lloyd Peterson, Jessica E. Frieder, & Stephanie Peterson (2011). Effects of a weighted vest on problem behaviors during functional analyses in children with Pervasive Developmental Disorders, *Research in Autism Spectrum Disorders, 5,* 529-538. http://www.sciencedirect.com/science/article/pii/S1750946710001066)**

Weighted vests are a specific form of Sensory Integration Therapy (SIT) ([Honaker, 2005a](http://www.sciencedirect.com/science/article/pii/S1750946710001066#bib11)) that are intended to help individuals resolve sensory related issues thereby decreasing the symptoms (e.g., hyperness, lack of attention, etc.) of the sensory issue and are also often recommended as an intervention for problem behaviors exhibited by children with Pervasive Developmental Disorders (PDD). The effects of 5% and 10% total body weight vests on problem behaviors in children with PDD were investigated during functional analysis conditions ([Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994](http://www.sciencedirect.com/science/article/pii/S1750946710001066#bib14)). Though results indicated there was no functional relationship between the SIT of 5% or 10% weighted vests and participants’ problem behaviors, a further analysis indicated there was a functional relationship between the problem behavior and the operant-based intervention of functional communication training. Thus, though the problem behaviors appeared to be unresponsive to SIT (i.e., weighted vests) these same problem behaviors could be altered with interventions that have been grounded in rigorous, empirical scientific research findings.

**Tonya N. Davis, Shannon Durand, & Jeffrey M. Chan, (2011). The effects of a brushing procedure on stereotypical behavior, *Research in Autism Spectrum Disorders, 5,* 1053-1058, ISSN 1750-9467, 10.1016/j.rasd.2010.11.011.**

In this study we analyzed the effects of a brushing protocol on stereotyped behavior of a young boy with autism. First, a functional analysis was conducted which showed that the participant's stereotypy was maintained by automatic reinforcement. Next, the Wilbarger Protocol, a brushing intervention, was implemented. An ABA design was implemented in which the participant was observed during four phases: (a) baseline, prior to the administration of the brushing protocol; (b) week 3 of implementation of the brushing protocol; (c) week 5 of implementation; and (d) 6 months after the discontinuation of the brushing protocol. Findings suggest that the brushing protocol had no marked affect on levels of stereotypy.

[**Jeryl D. Benson,**](http://www.tandfonline.com/action/doSearch?action=runSearch&type=advanced&result=true&prevSearch=%2Bauthorsfield%3A(Benson%2C+Jeryl+D.)) [**Emily Beeman,**](http://www.tandfonline.com/action/doSearch?action=runSearch&type=advanced&result=true&prevSearch=%2Bauthorsfield%3A(Beeman%2C+Emily)) [**Debbie Smitsky,**](http://www.tandfonline.com/action/doSearch?action=runSearch&type=advanced&result=true&prevSearch=%2Bauthorsfield%3A(Smitsky%2C+Debbie))  **&** [**Ingrid Provident,**](http://www.tandfonline.com/action/doSearch?action=runSearch&type=advanced&result=true&prevSearch=%2Bauthorsfield%3A(Provident%2C+Ingrid)) **(2011). The Deep Pressure and Proprioceptive Technique (DPPT) Versus Nonspecific Child-Guided Brushing: A Case Study. Journal of Occupational Therapy, Schools, & Early Intervention,** [**4**](http://www.tandfonline.com/loi/wjot20?open=4#vol_4)**, 204-214**

Therapeutic interventions with a somatosensory component, such as deep pressure brushing or joint compressions, have been suggested for use with children with sensory modulation disorders This case study describes the use of brushing as an intervention technique with two children with autism. One participant was administered the deep pressure proprioceptive technique, and the other participant utilized a nonspecific brushing program with the frequency guided by indicators from the child. Both children demonstrated improvements as indicated by school function assessment pre and post scores. The outcomes support the use of brushing in general as an intervention strategy to promote the development, participation, and occupational performance of a child with autism spectrum disorder and sensory defensiveness.

[**Caroline Umeda**](http://ajot.aotapress.net/search?author1=Caroline+Umeda&sortspec=date&submit=Submit) **&** [**Jean Deitz**](http://ajot.aotapress.net/search?author1=Jean+Deitz&sortspec=date&submit=Submit) **(2011). Effects of Therapy Cushions on Classroom Behaviors of Children With Autism Spectrum Disorder. *American Journal of Occupational Therapy, 65* 152-159.**

**OBJECTIVE.** We investigated the effects of therapy cushions on the in-seat and on-task behaviors of 2 kindergarten students with autism spectrum disorder during math activities.

**METHOD.** We used a single-subject A–B–A–B–C design across 2 male participants who used chairs during baseline phases (A) and cushions during intervention phases (B). We included a choice phase (C) to determine participant seating preferences. Social validity was addressed by assessing teacher and participant seating preferences. Data were graphed and visually analyzed for functionally relevant changes between phases.

**RESULTS.** No clinically relevant changes in the in-seat or on-task behaviors of either participant were observed with cushion use.

**CONCLUSION.** Therapy cushions may not impose sufficient postural demands or provide adequate sensory input to produce behavioral changes. Continued research in this area is needed.

**2010**

[**May-Benson TA**](http://www.ncbi.nlm.nih.gov/pubmed?term=%22May-Benson%20TA%22%5BAuthor%5D)**, &** [**Koomar JA**](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Koomar%20JA%22%5BAuthor%5D)**. (2010).** [**Systematic review of the research evidence examining the effectiveness of interventions using a sensory integrative approach for children.**](http://www.ncbi.nlm.nih.gov/pubmed/20608272)**Am J Occup Ther,** **64(3):403-14.**

Twenty-seven studies were systematically reviewed to identify, evaluate, and synthesize the research literature on the effectiveness of sensory integration (SI) intervention on the ability of children with difficulty processing and integrating sensory information to engage in desired occupations and to apply these findings to occupational therapy practice. Results suggest the SI approach may result in positive outcomes in sensorimotor skills and motor planning; socialization, attention, and behavioral regulation; reading-related skills; participation in active play; and achievement of individualized goals. Gross motor skills, self-esteem, and reading gains may be sustained from 3 mo to 2 yr. Findings may be limited by Type II error because of small sample sizes, variable intervention dosage, lack of fidelity to intervention, and selection of outcomes that may not be meaningful to clients and families or may not change with amount of treatment provided. Replication of findings with methodologically and theoretically sound studies is needed to support current findings.

**Penelope Wong Bonggat & Laura J. Hall (2010). Evaluation of the Effects of Sensory Integration-Based Intervention by a Preschool Special Education Teacher. *Education and Training in Autism and Developmental Disabilities, 45*(2), 294–302.**

This study addresses the call for increased research on common public school practices and progress monitoring by public school teachers. An alternating treatment design was implemented by a preschool teacher to evaluate the effect of sensory-integration based activities compared with an attention control on the on task behavior of three participants with disabilities. The preschool participants were observed during one-to-one teaching sessions and completing maintenance tasks in an independent workstation during the second half of a school year. The results revealed no differences in the estimated percentages of time on-task when either

condition was used for all three participants. More time on task occurred when the participants were working in one-to-one activities. The design used in this study serves as a model that can be used by teachers and occupational therapists working in a public school.

[**Ferreira AM**](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Ferreira%20AM%22%5BAuthor%5D)**, &** [**Bergamasco NH**](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Bergamasco%20NH%22%5BAuthor%5D)**. (2010).** [**Behavioral analysis of preterm neonates included in a tactile and kinesthetic stimulation program during hospitalization.**](http://www.ncbi.nlm.nih.gov/pubmed/20464169)**Rev Bras Fisioter,** **14(2):141-8.**

**OBJECTIVE:** To evaluate the effect of tactile and kinesthetic stimulation on behavioral and clinical development in preterm neonates while still in the hospital.

**METHODS:** Thirty-two clinically stable preterm infants weighing <2.500 grams, with no significant perinatal asphyxia, were allocated to two groups: a control group (CG) in which no intervention was made (n=16) and a study group (SG) in which the newborn infants received tactile and kinesthetic stimulation (n=16). Data on the infants' clinical progress were collected from medical charts and behavioral evaluations by means of a series of weekly, eight-minute films recorded from the time of inclusion into the study until hospital discharge.

**RESULTS:** There was a trend towards a shorter duration of hospital stay, increased daily weight gain and a predominance of self-regulated behavior (regular breathing, state of alertness, balanced tonus, a range of postures, coordinated movements, hand-to-face movement control, suction, grip, support) in infants in the SG. With respect to motor control, comparative analysis of postconceptional ages according to age-bracket (I - 31-33 weeks 6/7; II - 34-36 weeks 6/7; and III - 37-39 weeks 6/7) revealed balanced tonus and coordinated voluntary movements in all three periods, a longer time spent in a range of postures (age bracket I) or in flexion (age bracket II) and more regular breathing in age bracket I in the SG.

**CONCLUSION:** In the hospital, tactile and kinesthetic stimulation was shown to have a positive effect, contributing towards adjustment and self-regulation of behavior in the preterm newborn infant. Article registered in the Australian New Zealand Clinical Trials Registry (ANZCTR) under the number ACTRN12610000133033.

[**Jennifer Stephenson**](http://www.springerlink.com/content/?Author=Jennifer+Stephenson) **&** [**Mark Carter**](http://www.springerlink.com/content/?Author=Mark+Carter) **(2010). The Use of Weighted Vests with Children with Autism Spectrum Disorders and Other Disabilities**

Therapists who use sensory integration therapy may recommend that children wear weighted vests as an intervention strategy that they claim may assist in remediating

problems such as inattentiveness, hyperactivity, stereotypic behaviors and clumsiness. Seven studies examining weighted vests are reviewed. While there is only a limited body of research and a number of methodological weaknesses, on balance, indications are that weighted vests are ineffective. There may be an arguable case for continued research on this intervention but weighted vests cannot be recommended for clinical application at this point. Suggestions are offered for future research with regard to addressing methodological problems.

**Brian Reichow,** [**Erin E. Barton**](http://foa.sagepub.com/search?author1=Erin+E.+Barton&sortspec=date&submit=Submit)**,** [**Joanna Neely Sewell**](http://foa.sagepub.com/search?author1=Joanna+Neely+Sewell&sortspec=date&submit=Submit) **,** [**Leslie Good**](http://foa.sagepub.com/search?author1=Leslie+Good&sortspec=date&submit=Submit)**, &** [**Mark Wolery**](http://foa.sagepub.com/search?author1=Mark+Wolery&sortspec=date&submit=Submit) **(2010). Effects of Weighted Vests on the Engagement of Children With Developmental Delays and Autism. *Focus Autism Other Dev Disabl*, 25, 3-11.**

The use of weighted vests for children with autism spectrum disorders and developmental disabilities is a common practice as part of sensory integration therapy programs. The purpose of the current investigation was to extend the research on the use of weighted vests for children with autism and developmental delays in a methodologically rigorous study. The study was conducted using an alternating treatment design. This allowed the comparison of three different conditions: weighted vest, vest with no weight (which served as a placebo), and no vest (which served as a baseline). The results showed no differentiation in engagement between conditions for any of the participants. Implications for practice and future research are provided.

**Bagatell, N., Mirigliani, G., Patterson, C., Reyes, Y., & Test, L. (2010). Effectiveness of therapy ball chairs on classroom participation in children with autism spectrum disorders. American Journal of Occupational Therapy, 64, 895–903. doi: 10.5014/ajot.2010.09149**

A single-subject design was used to assess the effectiveness of therapy ball chairs on classroom participation in 6 boys with autism spectrum disorder (ASD). The sensory processing pattern of each participant was assessed using the Sensory Processing Measure. Data on in-seat behavior and engagement were collected using digital video recordings during Circle Time. During baseline, participants sat on chairs. During intervention, participants sat on therapy ball chairs. Social validity was assessed by means of a questionnaire completed by the teacher. Each child demonstrated a unique response. The ball chair appeared to have a positive effect on in-seat behavior for the child who had the most extreme vestibular–proprioceptive seeking behaviors.Children with poor postural stability were less engaged when sitting on the therapy ball chair. The results illuminate the complex nature of children with ASD and the importance of using sound clinical reasoning skills when recommending sensory strategies for the classroom.

**2009**

[**Wuang YP**](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Wuang%20YP%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Wang CC**](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Wang%20CC%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Huang MH**](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Huang%20MH%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**, &** [**Su CY**](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Su%20CY%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**. (2009).** [**Prospective study of the effect of sensory integration, neurodevelopmental treatment, and perceptual-motor therapy on the sensorimotor performance in children with mild mental retardation.**](http://www.ncbi.nlm.nih.gov/pubmed/19708473)**Am J Occup Ther.** **63(4),441-52.**

**OBJECTIVE:** This quasi-experimental study compared the effect of sensory integrative (SI) therapy, neurodevelopmental treatment (NDT), and perceptual-motor (PM) approach on children with mild mental retardation.

**METHOD:** Children (N = 120) were randomly assigned to intervention with SI, NDT, or PM; another 40 children served as control participants. All children were assessed with measures of sensorimotor function.

**RESULTS:** After intervention, the treatment groups significantly outperformed the control group on almost all measures. The SI group demonstrated a greater pretest-posttest change on fine motor, upper-limb coordination, and SI functioning. The PM group showed significant gains in gross motor skills, whereas the NDT group had the smallest change in most measures.

**CONCLUSION:** SI, NDT, and PM improved sensorimotor function among children with mild mental retardation. The choice of sensorimotor approaches should be determined on the basis of the child's particular needs because each approach may have an advantage in certain aspects of sensorimotor function.

**Prior to 2009**

**Miller, L. J., Coll, J. R., & Schoen, S. A. (2007). A randomized controlled pilot study of the effectiveness of occupational therapy for children with sensory modulation disorder. *American Journal of Occupational Therapy*, *61*, 228–238.**

**OBJECTIVE:** A pilot randomized controlled trial (RCT) of the effectiveness of occupational therapy using a sensory integration approach (OT-SI) was conducted with children who had sensory modulation disorders (SMDs). This study evaluated the effectiveness of three treatment groups. In addition, sample size estimates for a large scale, multisite RCT were calculated.

**METHOD:** Twenty-four children with SMD were randomly assigned to one of three treatment conditions; OT-SI, Activity Protocol, and No Treatment. Pretest and posttest measures of behavior, sensory and adaptive functioning, and physiology were administered.

**RESULTS:** The OT-SI group, compared to the other two groups, made significant gains on goal attainment scaling and on the Attention subtest and the Cognitive/Social composite of the Leiter International Performance Scale-Revised. Compared to the control groups, OT-SI improvement trends on the Short Sensory Profile, Child Behavior Checklist, and electrodermal reactivity were in the hypothesized **direction.**

**CONCLUSION:** Findings suggest that OT-SI may be effective in ameliorating difficulties of children with SMD.

**Miller, L. J., Schoen, S. A., James, K., & Schaaf, R. C. (2007). Lessons learned: A pilot study on occupational therapy effectiveness for children with sensory modulation disorder. *American Journal of Occupational Therapy*, *61*, 161–169.**

**OBJECTIVE:** The purpose of this pilot study was to prepare for a randomized controlled study of the effectiveness of occupational therapy using a sensory integration approach (OT-SI) with children who have sensory processing disorders (SPD).

**METHOD:** A one-group pretest, posttest design with 30 children was completed with a subset of children with SPD, those with sensory modulation disorder.

**RESULTS:** Lessons learned relate to (a) identifying a homogeneous sample with quantifiable inclusion criteria, (b) developing an intervention manual for study replication and a fidelity to treatment measure, (c) determining which outcomes are sensitive to change and relate to parents' priorities, and (d) clarifying rigorous methodologies (e.g., blinded examiners, randomization, power).

**CONCLUSION:** A comprehensive program of research is needed, including multiple pilot studies to develop enough knowledge that high-quality effectiveness research in occupational therapy can be completed. Previous effectiveness studies in OT-SI have been single projects not based on a unified long-term program of research.

**Watling RL,&** [**Dietz J**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Dietz%20J%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**.(2007). Immediate effect of Ayres's sensory integration-based occupational therapy intervention on children with autism spectrum disorders.AJOT, 61, 574-83.**

**OBJECTIVE:** This study examined the effects of Ayres' sensory integration intervention on the behavior and task engagement of young children with autism spectrum disorders (ASD). Clinical observations and caregiver reports of behavior and engagement also were explored to help guide future investigations.

**METHOD:** This single-subject study used an ABAB design to compare the immediate effect of Ayres's sensory integration and a play scenario on the undesired behavior and task engagement of 4 children with ASD.

**RESULTS:** No clear patterns of change in undesired behavior or task management emerged through objective measurement. Subjective data suggested that each child exhibited positive changes during and after intervention.

 **CONCLUSION:** When effects are measured immediately after intervention, short-term Ayres's sensory integration does not have a substantially different effect than a play scenario on undesired behavior or engagement of young children with ASD. However, subjective data suggest that Ayres's sensory integration may produce an effect that is evident during treatment sessions and in home environments.

**Mailloux Z,** [**May-Benson TA**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22May-Benson%20TA%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Summers CA**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Summers%20CA%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Miller LJ**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Miller%20LJ%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Brett-Green B**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Brett-Green%20B%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Burke JP**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Burke%20JP%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Cohn ES**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Cohn%20ES%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Koomar JA**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Koomar%20JA%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Parham LD**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Parham%20LD%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Roley SS**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Roley%20SS%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Schaaf RC**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Schaaf%20RC%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**, &** [**Schoen SA**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Schoen%20SA%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**. (2007). Goal attainment scaling as a measure of meaningful outcomes for children with sensory integration disorders. *AJOT, 61*, 254-9.**

Goal attainment scaling (GAS) is a methodology that shows promise for application to intervention effectiveness research and program evaluation in occupational therapy (Dreiling & Bundy, 2003; King et al., 1999; Lannin, 2003; Mitchell & Cusick, 1998). This article identifies the recent and current applications of GAS to occupational therapy for children with sensory integration dysfunction, as well as the process, usefulness, and problems of application of the GAS methodology to this population. The advantages and disadvantages of using GAS in single-site and multisite research with this population is explored, as well as the potential solutions and future programs that will strengthen the use of GAS as a measure of treatment effectiveness, both in current clinical practice and in much-needed larger, multisite research studies.

**Schaaf RC,&** [**Nightlinger KM**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Nightlinger%20KM%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**. (2007). Occupational therapy using a sensory integrative approach: a case study of effectiveness. *AJOT, 61*, 239-46.**

**OBJECTIVE**: This article presents a case report of a child with poor sensory processing and describes the disorders impact on the child's occupational behavior and the changes in occupational performance during 10 months of occupational therapy using a sensory integrative approach (OT-SI).

**METHOD:** Retrospective chart review of assessment data and analysis of parent interview data are reviewed. Progress toward goals and objectives is measured using goal attainment scaling. Themes from parent interview regarding past and present occupational challenges are presented. **RESULTS**: Notable improvements in occupational performance are noted on goal attainment scales, and these are consistent with improvements in behavior. Parent interview data indicate noteworthy progress in the child's ability to participate in home, school, and family activities. **CONCLUSION**: This case report demonstrates a model for OT-SI. The findings support the theoretical underpinnings of sensory integration theory: that improvement in the ability to process and integrate sensory input will influence adaptive behavior and occupational performance. Although these findings cannot be generalized, they provide preliminary evidence supporting the theory and the effectiveness of this approach.

[**Parham LD**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Parham%20LD%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Cohn ES**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Cohn%20ES%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Spitzer S**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Spitzer%20S%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Koomar JA**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Koomar%20JA%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Miller LJ**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Miller%20LJ%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Burke JP**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Burke%20JP%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Brett-Green B**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Brett-Green%20B%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Mailloux Z**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Mailloux%20Z%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**May-Benson TA**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22May-Benson%20TA%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Roley SS**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Roley%20SS%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Schaaf RC**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Schaaf%20RC%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**,** [**Schoen SA**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Schoen%20SA%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**, &** [**Summers CA**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Summers%20CA%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_RVAbstract)**. (2007). Fidelity in sensory integration intervention research. *AJOT, 61*, 216-27.**

**OBJECTIVE:** We sought to assess validity of sensory integration outcomes research in relation to fidelity (faithfulness of intervention to underlying therapeutic principles).

**METHOD:** We identified core sensory integration intervention elements through expert review and nominal group process. Elements were classified into structural (e.g., equipment used, therapist training) and therapeutic process categories. We analyzed 34 sensory integration intervention studies for consistency of intervention descriptions with these elements.

**RESULTS:** Most studies described structural elements related to therapeutic equipment and interveners' profession. Of the 10 process elements, only 1 (presentation of sensory opportunities) was addressed in all studies. Most studies described fewer than half of the process elements. Intervention descriptions in 35% of the studies were inconsistent with one process element, therapist-child collaboration. **CONCLUSION:** Validity of sensory integration outcomes studies is threatened by weak fidelity in regard to therapeutic process. Inferences regarding sensory integration effectiveness cannot be drawn with confidence until fidelity is adequately addressed in outcomes research.

[**Smith SA**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Smith%20SA%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DiscoveryPanel.Pubmed_RVAbstractPlus)**,** [**Press B**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Press%20B%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DiscoveryPanel.Pubmed_RVAbstractPlus)**,** [**Koenig KP**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Koenig%20KP%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DiscoveryPanel.Pubmed_RVAbstractPlus)**, &** [**Kinnealey M**](http://www.ncbi.nlm.nih.gov/sites/entrez?Db=pubmed&Cmd=Search&Term=%22Kinnealey%20M%22%5BAuthor%5D&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DiscoveryPanel.Pubmed_RVAbstractPlus)**.(2005). Effects of sensory integration intervention on self-stimulating and self-injurious behaviors. *AJOT, 59*, 418-25.**

This study compared the effects of occupational therapy, using a sensory integration (SI) approach and a control intervention of tabletop activities, on the frequency of self-stimulating behaviors in seven children 8-19 years of age with pervasive developmental delay and mental retardation. Daily 15-min videotape segments of the subjects were recorded before, immediately after, and 1 hour after either SI or control interventions performed during alternating weeks for 4 weeks. Each 15-min video segment was evaluated by investigators to determine the frequency of self-stimulating behaviors. The results indicate that self-stimulating behaviors were significantly reduced by 11% one hour after SI intervention in comparison with the tabletop activity intervention (p = 0.02). There was no change immediately following SI or tabletop interventions. Daily ratings of self-stimulating behavior frequency by classroom teachers using a 5-point scale correlated significantly with the frequency counts taken by the investigators (r = 0.32, p < 0.001). These results suggest that the sensory integration approach is effective in reducing self-stimulating behaviors, which interfere with the ability to participate in more functional activities.