Sensory Integration Therapy and Auditory Integration Training

Policy Number: CS108.M
Effective Date: November 1, 2023

Instructions for Use

Table of Contents **Page**

Commercial Policy
• Sensory Integration Therapy and Auditory Integration Training

Application

This Medical Policy does not apply to the states listed below; refer to the state-specific policy/guideline, if noted:

State	Policy/Guideline
Indiana	None
Kentucky	None
Louisiana	None
New Jersey	Sensory Integration Therapy and Auditory Integration Training (for New Jersey Only)
New Mexico	Sensory Integration Therapy and Auditory Integration Training (for New Mexico Only)
Ohio	Sensory Integration Therapy and Auditory Integration Training (for Ohio Only)
Pennsylvania	Sensory Integration Therapy and Auditory Integration Training (for Pennsylvania Only)
Tennessee	Sensory Integration Therapy and Auditory Integration Training (for Tennessee Only)

Coverage Rationale

The following are unproven and not medically necessary for treating any condition due to insufficient evidence of efficacy:

- Sensory integration therapy (SIT)
- Auditory integration training (AIT)

Applicable Codes

The following list(s) of procedure and/or diagnosis codes is provided for reference purposes only and may not be all inclusive. Listing of a code in this policy does not imply that the service described by the code is a covered or non-covered health service. Benefit coverage for health services is determined by federal, state, or contractual requirements and applicable laws that may require coverage for a specific service. The inclusion of a code does not imply any right to reimbursement or guarantee claim payment. Other Policies and Guidelines may apply.

CPT Code	Description
97533	Sensory integrative techniques to enhance sensory processing and promote adaptive responses to environmental demands, direct (one-on-one) patient contact, each 15 minutes

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Description of Services

Sensory Integration Therapy (SIT)

SIT seeks to improve perception and integration of sensory information and thereby help individuals with learning disabilities improve their sensorimotor skills. In theory, this will result in improved behavior and academic performance. Therapy is usually provided by an occupational therapist (OT) and combines primitive forms of sensation with motor activity during an individual therapy session that typically lasts 60 to 90 minutes. The therapist provides vestibular, proprioceptive, and tactile stimulation during activities designed to elicit appropriate adaptive motor responses. Sensory integration techniques include the use of textured mitts, carpets, scooter boards, ramps, swings, bounce pads, suspended equipment, and weighted vests and blankets to encourage a noncognitive, creative, and explorative process. Therapy is usually given in 1 to 3 sessions per week over several months or a few years and it does not involve tutoring, the more traditional approach to treatment of learning disabilities (Salokorpi, 2002; Uyanik, 2003).

Auditory Integration Training

AIT was developed as a technique for improving abnormal sound sensitivity in individuals with behavioral disorders or autism spectrum disorders (Sinya et al., 2011). The Berard AIT protocol requires that a participant listen to modulated music on a specific device using high quality headphones for a total of 10 hours, over 10 or 12 consecutive days under the supervision of a professionally trained AIT practitioner (AIT Institute, 2018).

Clinical Evidence

Sensory Integration Therapy (SIT)

SIT been investigated as treatment for multiple sensorimotor disorders. There is insufficient evidence to demonstrate an increased clinical benefit of SIT when compared to standard care alone.

Cemali et al. (2022) conducted a single blind randomized controlled trial (RCT) to examine the effectiveness of sensory integration interventions on sensory, motor, and oculomotor skills in infants with cortical vision impairment (CVI) and Cerebral Palsy (CP). Thirty-four infants with CVI and CP aged 12–18 months were enrolled to the study. The infants were randomly divided into two groups as the control (n = 17) and intervention (n = 17) groups. The intervention group took sensory integration intervention 2 days a week for 8 weeks in addition to conventional physiotherapy 2 days a week for 8 weeks. The control group only received the conventional physiotherapy program 2 days a week for 8 weeks. The duration of the treatment sessions was 45 min for both interventions. Before and after the intervention, sensory processing functions were evaluated with the Test of Sensory Functions in Infants (TSFI), and motor functions were evaluated with the Alberta Infant Motor Scale (AIMS). There was a noted difference between the pre- and post-test mean TSFI total and AIMS scores in the intervention group and control group ($p < 0.001$). The intervention group mean TSFI scores showed a statistical difference compared to those of the control group. Mean post-intervention AIMS scores did not differ between groups. The authors concluded that sensory integration intervention delivered with the conventional physiotherapy program was more effective than the conventional physiotherapy program in increasing sensory processing skills in one measure in infants with CVI and CP. This study was limited by its heterogeneous patient population and short duration of follow-up (8 weeks). Infants with different types of CP may cause differences in results because different CP types exhibit different symptoms. Further studies should evaluate sensory integration therapy effect on motor development with longer interventions.

Omairi et al. (2022) conducted a RCT to evaluate the outcomes of occupational therapy using Ayres Sensory Integration® in a sample of Brazilian children with autism spectrum disorder (ASD). Seventeen children with ASD ages 5–8 years (n = 9 in the intervention group, n = 8 in the usual-care control group) completed pretreatment characterization and baseline measurement. The intervention group received occupational therapy using Ayres Sensory Integration®, and the control group received usual therapeutic and educational services only. Participants received the intervention in 60-min sessions 3 times per week for 10 weeks. The authors conducted a pre–post assessment of self-care and socialization using the Pediatric Evaluation of Disability Inventory and individualized goal ratings. Participants in the intervention group scored higher on outcome measures of self-care ($p = .046$), social function ($p = .036$), and parent-identified goal attainment ($p < .001$) compared with the control group. Changes in the other domains were not statistically different between groups. The authors concluded that occupational therapy using Ayres Sensory Integration® was effective in

enhancing self-care, socialization, and goal attainment for children with ASD in a Brazilian cohort. Although the evaluators were blinded to group assignment, the parents were not. Thus, it is possible that some bias may have influenced parent-reported outcome measures. In addition, the sample sizes were small for each group and multiple comparisons were performed. Well designed, comparative studies with larger patient populations are needed to further describe safety and clinical outcomes.

Randell et al. (2022) conducted a parallel group randomized controlled trial (SenITA) to determine the behavioral, functional and quality-of-life outcomes of SIT for children with autism and sensory difficulties as compared to usual care in children in mainstream primary school with an autism diagnosis, and having processing difficulties. Exclusion criteria included children that had previous SIT, and/or current applied behavior analysis therapy. A total of 138 children were randomized via randomized permuted blocks, with 69 each assigned to the intervention group and comparator. The primary outcome assessed was improvement in problem behaviors (irritability and agitation). Secondary outcomes assessed were adaptive behavior, function and socialization, stress of carers, functional change, and sensory processing. The intervention used Ayres Sensory Integration® therapy administered in one hour sessions over 26 week period via two sessions per week for 10 weeks, then two sessions per month for 2 months and then one telephone session per month for 2 months. The comparator of usual care included those awaiting services, or those receiving sensory based interventions that did not meet the criteria as sensory integration. The results showed no statistically significant effects of SIT on the primary outcome after 6 months, and that no meaningful improvements were seen at 6 and 12 months across the secondary outcomes assessed (behavioral, adaptive functioning, socialization, carer stress, health utility or quality-of-life measures). There were some significant improvements observed in boys, and children with concomitant ADHD, however these findings should be considered hypothesis generating only, and future research is required. The authors concluded that SIT did not demonstrate superior clinical effectiveness over usual care across all outcomes measured.

In a population-based cohort study, Tzang et el. (2019) Investigated whether intervention with sensory integration training (SI) in children with attention deficit hyperactivity disorder (ADHD) was associated with a reduced risk of subsequent mental disorders. From children < 8-years-old newly diagnosed with ADHD in a nationwide population-based dataset, the investigators established a SI cohort and a non-SI cohort (n = 1945) matched by propensity score. Incidence and hazard ratios of subsequent psychiatric disorders were compared after a maximum follow-up of 9 years. The incidence of psychiatric disorders was 1.4-fold greater in the SI cohort, with an adjusted hazard ratio of 1.41 (95% confidence interval 1.20–1.67), comparing to the non-SI cohort. Risks were elevated for emotional disturbances, conduct disorders, and adjustment disorders independent of age, gender, or comorbidity. Among children with only psychosocial intervention, the incidence of psychiatric disorders was 3.5-fold greater in the SI cohort than in the non-SI cohort. The authors stated that to their knowledge, this is the first study showing an increased risk of developing psychiatric disorders in children with ADHD who received SI, compared to other children who did not receive SI. They further stated that potential adverse effects of SI in children with ADHD should be carefully examined. The findings are limited by the observational design of the study.

Kashefimehr et al. (2018) studied the effect of SIT on different aspects of occupational performance in children with ASD. The study was conducted on an intervention group (n = 16) receiving SIT and a control group (n = 15) with 3- to 8-year-old children with ASD. The Short Child Occupational Profile (SCOPE) was used to compare the two groups in terms of the changes in their occupational performance and the Sensory Profile (SP) was used to assess sensory problems. The intervention group showed significantly greater improvement in all the SCOPE domains, as well as in all the SP domains, except for the "emotional reactions" and "emotional/social responses" domains, ($p < .05$). The authors concluded that the effectiveness of SIT in improving occupational performance in children with ASD as a health-related factor is supported by their findings. Limitations of this study include small patient population and lack of long-term follow-up.

In a systematic review of 3 randomized controlled trials, 1 retrospective review, and 1 single-subject ABA design, Schaaf et al. (2018) studied the effects of Ayres Sensory Integration® (ASI) in children with autism. The authors reported that 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. This review is limited by the small number of studies, and unknown long-term follow-up.

In a non-randomized controlled trial, Lecuona et al. (2017) investigated the effect of ASI on the development of premature infants in the first 12 months of life. A pre-/post-test experimental design was used to randomly divide 24 premature infants from a low socioeconomic setting. 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. Infants were divided into a control and experimental group. The experimental group received 10 weeks of ASI intervention. The authors

reported that ASI intervention had a positive effect on the sensory processing and development of premature infants, especially in terms of cognitive, language and motor development. This study is limited by small sample size, lack of long-term follow-up and non-randomization.

A comparative effectiveness review was conducted by Weitlauf et al. (2017) for the Agency for Healthcare Research and Quality (AHRQ) to evaluate the effectiveness and safety of interventions targeting sensory challenges in autism spectrum disorder (ASD). Twenty-four studies were identified including 20 RCTs, 1 nonrandomized trial and 3 retrospective cohort studies. The included studies compared interventions incorporating sensory-focused modalities with alternative treatments or no treatment. The authors concluded that sensory-related outcomes improved in children receiving a sensory integration (SI)-based intervention compared with those receiving usual care or other treatment (low strength of evidence). Motor skills outcomes were improved in children receiving SI-based treatment compared with those receiving usual care or other treatment (low strength of evidence). Studies in the review had small sample sizes and typically limited duration of intervention and follow-up after intervention.

A systematic review which examined the research evidence for SIT and sensory-based intervention (SBI), for children with ASD and sensory processing disorders was conducted by Case-Smith et al (2015). A total of 19 studies were reviewed; 5 examined the effects of sensory integration therapy and 14 examined sensory-based intervention. Two of the five SIT studies were RCTs; one RCT compared SIT to usual care, one compared SIT to a fine motor activity protocol, and one was a case report. Two RCTs found positive effects for SIT 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 (weighted vests or therapy balls), to influence a child's state of arousal. The authors concluded that although small RCTs resulted in positive effects for SIT, additional rigorous trials using manualized protocols for SIT are needed to evaluate effects for children with ASDs and sensory processing problems. The studies were small samples, did not use blinded evaluation, examined short-term interventions, and did not examine retention of intervention gains.

In a systematic review, Watling and Hauer (2015) evaluated the effectiveness of ASI and SBIs for individuals with ASD. The authors describe ASI as a play-based method that uses active engagement in sensory activities to draw out the individual’s adaptive responses and improve their ability to successfully meet environmental challenges. Twenty-three abstracts met the inclusion criteria, 3 of which were systematic reviews and 5 of which were RCTs. The authors concluded that moderate evidence was found to support the use of ASI and the results for sensory-based methods were mixed. The authors recommended that higher level studies with larger samples, using the fidelity measure in studies of ASI, and using systematic methods in examination of SBIs should be performed.

Pfeiffer et al. (2011) evaluated the effectiveness of sensory integration (SI) interventions in children with ASD. Thirty-seven children (ages 6-12) with ASD were randomly assigned to a fine motor or SI treatment group. Significant improvements were observed, including goal attainment (sensory processing and regulation, functional motor skills, and social-emotional skills), although the effect size was small when rated by parents (0.125) and moderate when rated by teachers (0.360). Autistic mannerisms, measured by a subscale of the Social Responsiveness Scale (SRS), also significantly improved compared with controls, with a small effect size (0.131). No other significant differences were reported in other behavioral measures, such as the Sensory Processing Measure (SPM) or the Vineland Adaptive Behavior Scales, 2nd Edition (VABS-2). No follow-up assessments beyond the study endpoint were conducted. The significance of this study is limited by small sample size and short follow-up period.

Wuang et al. (2009) compared the effect of sensory integrative (SI) therapy, neurodevelopmental treatment (NDT), and perceptual-motor (PM) approach on children with mild developmental delay. A total of 120 children 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. 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. Confidence in the conclusions about the efficacy of SI for improvements in sensorimotor function among children with mild developmental delay was reduced by the restricted age range (ages 7 to 8) of the study sample, a nonequivalent control group, differences in the intensity and frequency of home practice sessions, and a lack of long-term follow-up.

A randomized controlled trial conducted by Fazlioglu et al. (2008) examined the effects of a SI protocol on low-functioning children (ages 7 to 11) with autism. Study participants were randomized to a treatment group (n = 15) and a control group (n = 15). The control group patients did not participate in SI program but attended regularly scheduled special education classes. The intervention program used in this study was based on “The Sensory Diet” and included a prescribed schedule of somatosensory stimulation activities targeting 13 behaviors across sensory modalities and motor skills

development and conducted in a specially arranged sensory room. The results from the study suggested that sensory integration programs have positive effects on behaviors of children with autism. Study limitations include lack of power analysis to determine if study had enough power to accurately detect differences between treatment and controls and lack of a follow up period.

Clinical Practice Guidelines

American Academy of Pediatrics (AAP)

In 2020, the AAP Council on Children with Disabilities published guidelines for the identification, evaluation and management of children with autism spectrum disorders (ASDs). Regarding sensory therapies, the guidelines state that sensory based interventions may be included in the context of motor and behavioral therapies and in educational settings, and the evidence to support the general use of commonly used sensory based interventions is limited. Sensory goals may be included in treatment objectives.

American Occupational Therapy Association (AOTA)

In an updated practice guideline for individuals with autism spectrum disorder (Tomchek et al., 2016), the AOTA includes the following as interventions for sensory integration:

- Ayres Sensory Integration (ASI)® to address individualized goal areas with measurement by Goal Attainment Scaling (B-moderate evidence).
- Multisensory activities to improve occupational performance and behavior regulation (B-moderate evidence).
- ASI to improve sleep, adaptive skills, autism features, and sensory processing (C–I-weak/insufficient evidence).
- Multisensory center and non-customized sensory diets to improve occupational performance and behavioral regulation (I-insufficient evidence).
- Sound therapies to improve behavioral regulation (I-insufficient evidence).
- Dynamic seating to improve in-seat and on-task behavior and engagement (I- insufficient evidence).
- Linear movement or tactile input (via surgical brush) to improve learning or behavior (I- insufficient evidence).
- Environmental modifications (i.e., sound-absorbing walls and ceiling with additional halogen lighting) to improve attention behaviors, emotional control, and classroom performance (I- insufficient evidence).
- Weighted vests to support improved behavior or performance in daily life activities (D-not recommended due to ineffectiveness and/or potential harm outweighs the benefits).

Auditory Integration Training (AIT)

There is limited published literature regarding AIT. The extant literature is limited to uncontrolled studies with small numbers of participants, and treatment protocols have not been standardized. Furthermore, safety concerns have been raised as this treatment may cause distress and/or damage hearing (American Academy of Audiology 2010). The efficacy and safety of this training has not been demonstrated by larger studies with comparison groups using standardized protocols.

The Agency for Healthcare Research and Quality (AHRQ) published an updated comparative review on interventions targeting sensory challenges in children with autism spectrum disorder (ASD). Inclusion criteria were studies comparing interventions incorporating sensory-focused modalities with alternative treatments or no treatment, and inclusion of at least 10 children with ASD ages 2–12 years. The authors extracted and summarized data qualitatively because of the significant heterogeneity, as well as the strength of evidence (SOE). In regard to auditory integration-based approaches which included evidence in 4 small RCTs (2 moderate and 2 high risk of bias), they concluded that these did not improve language outcomes (low SOE) (Weitlauf et al., 2017).

Sokhadze et al. (2016) conducted a study using Berard's technique of auditory integration training (AIT) to improve sound integration in children with autism. It was proposed that exposure to twenty 30-min AIT sessions (total 10 h of training) would result in improved behavioral evaluation scores, improve profile of cardiorespiratory activity, and positively affect both early [N1, mismatch negativity (MMN)] and late (P3) components of evoked potentials in auditory oddball task. Eighteen children with autism spectrum disorder (ASD) participated in the study. A group of 16 typically developing children served as a contrast group in the auditory oddball task. The study reflected a linear increase of heart rate variability measures and respiration rate. Comparison of evoked potential characteristics of children with ASD versus typically developing children revealed several group difference findings, more specifically, a delayed latency of N1 to rare and frequent stimuli, larger MMN: higher P3a to frequent stimuli, and at the same time delayed latency of P3b to rare stimuli in the autism group. Parental questionnaires demonstrated improvements in behavioral symptoms such as irritability, hyperactivity, repetitive behaviors and other important behavioral domains. The authors concluded that the results of the study propose that more controlled research is necessary to document behavioral and psychophysiological changes resulting from Berard AIT and to provide explanation of the neural mechanisms of how auditory integration

training may affect behavior and psychophysiological responses of children with ASD. The findings of this study need to be validated by larger, well-designed studies.

Sinha et al. (2011) conducted a systematic review to evaluate AIT and included 6 RTCs with 171 individuals with autism. Three RTCs did not demonstrate the benefit of AIT over control conditions. The remaining trials identified improvements at 3 months for the AIT group based on improvements of total mean scores for the Aberrant Behavior Checklist, which is of questionable validity. There were no reported significant adverse effects of AIT. The reviewers concluded that more research is needed to determine the effectiveness of AIT for autism.

Clinical Practice Guidelines

American Academy of Audiology (AAA)

A 2010 position statement by the AAA Task Force on Auditory Integration Training (AIT) concludes that AIT (by any name) is investigational. The Academy believes that prospective, systematic research of this technique is needed to demonstrate its efficacy.

American Speech-Language-Hearing Association (ASHA)

The ASHA prepared an evidenced-based technical report regarding AIT (ASHA, 2004). They noted that, despite approximately one decade of practice, this method has not met scientific standards for efficacy and safety that would justify its inclusion as a mainstream treatment for a variety of communication, behavioral, emotional and learning disorders.

National Institute for Health and Care Excellence (NICE)

In a 2013 guidance document for the support and management of autism spectrum disorder in patients under 19 years of age, NICE states that auditory integration training to manage speech and language problems in children and young people with autism should not be used.

U.S. Food and Drug Administration (FDA)

This section is to be used for informational purposes only. FDA approval alone is not a basis for coverage.

The equipment used for sensory integration therapy and auditory integration training is not considered medical in nature, and therefore, not regulated by the FDA.

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Policy History/Revision Information

Date	Summary of Changes
07/01/2024	**Application** ***New Mexico*** • Added language to indicate this policy does not apply to the state of New Mexico; refer to the state-specific policy version
11/01/2023	**Related Policies** • Removed reference link to the Medicare Advantage Coverage Summary titled *Rehabilitation: Cardiac and Medical* **Supporting Information** • Updated *Description of Services*, *Clinical Evidence*, and *References* sections to reflect the most current information • Archived previous policy version CS108.L

Instructions for Use

This Medical Policy provides assistance in interpreting UnitedHealthcare standard benefit plans. When deciding coverage, the federal, state or contractual requirements for benefit plan coverage must be referenced as the terms of the federal, state or contractual requirements for benefit plan coverage may differ from the standard benefit plan. In the event of a conflict, the federal, state or contractual requirements for benefit plan coverage govern. Before using this policy, please check the federal, state or contractual requirements for benefit plan coverage. UnitedHealthcare reserves the right to modify its Policies and Guidelines as necessary. This Medical Policy is provided for informational purposes. It does not constitute medical advice.

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