Clinical Review Criteria
Sensory Integration Therapy (SIT)

For children with developmental and behavioral disorders

Kaiser Permanente Clinical Review Criteria are developed to assist in administering plan benefits. These criteria neither offer medical advice nor guarantee coverage. Kaiser Permanente reserves the exclusive right to modify, revoke, suspend or change any or all of these Review Criteria, at Kaiser Permanente’s sole discretion, at any time, with or without notice. Member contracts differ in their benefits. Always consult the patient’s Medical Coverage Agreement or call Kaiser Permanente Customer Service to determine coverage for a specific medical service.

Criteria

For Medicare Members

<table>
<thead>
<tr>
<th>Source</th>
<th>Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMS Coverage Manuals</td>
<td>None</td>
</tr>
<tr>
<td>National Coverage Determinations (NCD)</td>
<td>None</td>
</tr>
<tr>
<td>Local Coverage Determinations (LCD)</td>
<td>None</td>
</tr>
<tr>
<td>Local Coverage Article</td>
<td>None</td>
</tr>
</tbody>
</table>

For Non-Medicare Members

There is insufficient evidence in the published medical literature to show that this service/therapy is as safe as standard services/therapies and/or provides better long-term outcomes than current standard services/therapies.

The following information was used in the development of this document and is provided as background only. It is not to be used as coverage criteria. Please only refer to the criteria listed above for coverage determinations.

Background

The sensory integration (SI) framework was first described by an occupational therapist Jean Ayres, PhD, in the early 1970s and refers to the body’s way of handling and processing sensory inputs from the environment. This was based on a theory that the sensory system develops over time just like other higher order learning skills (such as cognition, language, and academic performance) and that deficits can occur in the process of developing a well-organized sensory system. A well-organized sensory system can integrate input from multiple sources primarily the three basic senses: vestibular, proprioceptive, and tactile. The vestibular system responds to gravity and movement, and the proprioceptive system receives inputs from joints and muscles. When these systems interact with the tactile sensation, sensory integration takes place. Normally, effective sensory integration occurs automatically, unconsciously, and without effort, but for some children it does not develop as efficiently as it should. Any dysfunction or disorder in the SI process may lead to problems in learning, response to sensory input, behavior, or motor development. According to Ayres’ theory these could be manifested as coordination problems; unusually high or low activity level; delays in speech, language, or motor skills; delays in academic achievements; under-reactivity to sensory stimulation; sensitivity to touch, movements, sounds, or sights; poor organization of behavior; lack of self-control; poor self-concept; and other signs and symptoms (Ayres 1972, 1977).

Based on her theory, Ayres developed the sensory integration therapy (SIT) with the goal of improving the way the brain processes and adapts to sensory information, as opposed to teaching specific skills. The therapy involves activities that are believed to organize the sensory system by providing vestibular, proprioceptive, and tactile sensory input. Techniques used include vestibular stimulation such as swinging in a hammock, using swing balls, bounce pads or scooter boards; tactile stimulation achieved by brushing parts of the child’s body or the use of weighted vests and other clothing (Ayres 1977).

Since that sensory integration dysfunction was described, sensory-based therapies have been increasingly used by occupational therapists and other health professionals to treat children with a range of symptoms and disabilities including autism, attention deficit hyperactivity disorder, fragile-x syndrome, brain injuries and others (Zimmer 2014). SIT is usually provided by certified therapists with special training and mentorship in the theory, techniques, and assessment tools unique to sensory integration theory. It is delivered in one-on-one sessions...
individualized to the child, one to three times a week, for several months or years. In these therapy sessions, the therapists combine primitive forms of sensation with motor activities according to a manualized protocol (Schaaf 2014).

Some authors distinguish sensory integration therapy from sensory-based interventions (SBIs) which are adult-directed sensory strategies that are applied to the child, most often in the school environment, to improve behaviors associated with modulation disorders. SBIs require less engagement of the child and are integrated into his/her daily routine to improve behavioral regulation (Case-Smith 2014).

SIT is controversial and a topic for debate by many professionals in medicine, psychology, and education (May-Benson 2010). According to a Policy Statement from the American Academy of Pediatrics on SIT (Zimmer et al, 2012) proponents of SI theory believe that inappropriate or deficient sensory processing is a developmental disorder responsive to therapy and that treatment can improve developmental outcomes. A definition of sensory processing disorder has been proposed, but it is not universally accepted. Standardized measures such as the Sensory Profile have been developed to classify a child’s sensory deficit. However, the possible diagnosis of a sensory processing disorder remains a challenging clinical issue, and it is unclear whether children who present with findings described as sensory processing difficulties have an actual disorder of the sensory pathway of the brain or that the deficits observed are associated with other developmental and behavioral disorders. The symptoms described in children with sensory processing disorders, overlap the behavioral differences seen in children with autism spectrum disorders, attention-deficit hyperactivity disorder, and developmental coordination disorders. Evaluating the effectiveness of sensory integration therapy presents another challenge due to the wide spectrum of symptom severity and presentation of the disorder, variations in response due to several factors, and lack of consistent outcome measures (Zimmer 2012).

SIT is a therapy and thus it is not regulated by the FDA. SIT has been reviewed by MTAC earlier in 2005 and did not meet the committee’s evaluation criteria. It is being re-reviewed based on requests for its coverage.

Medical Technology Assessment Committee (MTAC)
Sensory Integration Therapy
11/28/2005: MTAC REVIEW

Evidence Conclusion: The results of Vargus’ (1999) meta-analysis show that sensory integration therapy was not more effective than other alternative therapies in improving psychoeducational, behavior, language, motor, and sensory perceptual functions among the groups studied. The studies included in the meta-analysis did not provide sufficient data on the ages of participants, the types of disabilities, or details on therapies provided. There were also variations and differences in the characteristics of the participants, intervention methods, hours of therapy received, ratio of therapists to children, evaluation of the therapy, duration between therapy and re-testing, and outcomes measured. The authors of the meta-analysis were thus unable to determine the effect of sensory integration therapy among different ages or among individuals with different types of disabilities. Humphries and colleagues (1992) compared sensory integrative therapy among children with learning disabilities and sensory integration dysfunction to another active treatment (perceptual-motor training), and to no treatment. There were some significant baseline differences between the study groups, and both the sensory integrative therapy and the perceptual-motor therapy were performed by the same occupational therapists, which may be a potential source of bias. Their results show significant pretest-posttest differences between the three groups in the motor functions but not in the psychoeducational variables. The difference in the motor performance between the two active therapies was statistically insignificant. In conclusion, the current literature does not provide a clear definition or description of the sensory integration therapy, and does not provide evidence that the therapy is more effective than an alternative therapy or no treatment for children with learning disabilities, or neurodevelopmental delay.

Articles: The search yielded 126 publications, the majority of which were review articles. There were four systematic reviews; two meta-analyses: Ottenbacher 1982 and Vargus 1998; an article combining the results of only two studies (Kaplan 1993); and a number of controlled trials. Many of the studies revealed by the search were conducted in the 1970s and 1980s, their sample sizes varied from 10 to 92 participants, and the majority were poorly controlled. The search on the use of sensory integration therapy for autistic children revealed one small case series with 10 children. The most recent meta-analysis and a randomized controlled trial (RCT) were critically appraised. The RCT selected was included in the meta-analysis but was reviewed, as it was the largest trial identified and had a relatively better quality design. Evidence tables were made for the following studies: Vargas S, Camilli G. A meta-analysis of research on sensory integration treatment. Am J Occup Ther. 1999;53:198-198. See Evidence Table 1. Humphries T, Wright M, Snider L, McDougal B. A comparison of the effectiveness of sensory integrative therapy and perceptual-motor training in treating children with learning disabilities. J Dev Behav Pediatr. 1992;13:31-40. See Evidence Table 1.
The use of Sensory integration therapy in the treatment of neuro-developmentally delayed children does not meet the Kaiser Permanente Medical Technology Assessment Criteria.

12/06/2015: MTAC REVIEW
Sensory Integration Therapy

**Evidence Conclusion:** The results of the meta-analysis (Vargus, et al, 1999) reviewed earlier for MTAC suggested that the benefits of sensory integration therapy on psychoeducational and motor functions was significantly better than no treatment among the individuals studied, but it was not superior to other alternative treatments. The authors cautioned about interpreting the results and concluded that there was insufficient evidence to determine the effectiveness of the SI approach. The search for more recent evidence after that last review identified a pilot trial that investigated the effectiveness of SI interventions in children with autism spectrum disorders, a RCT that compared SIT to usual care in children with autism, and a larger RCT that compared SIT to two other active treatments and a control among children with mild mental retardation. Schaaf and colleagues, 2014 (Evidence table 1), randomly assigned 32 children aged 4-8 years, with autism and sensory difficulties to either an occupational therapy/sensory intervention (OT/SI) group or a control group. The study was randomised, and controlled, with proper randomization procedure, and power analysis. However, it was very small and parents who rated their child’s goals and other outcomes were not blinded to the treatment allocation, which is a source of bias. In addition the OT/SI was not compared to an alternative occupational therapy with the same intensity and duration of intervention. The overall results showed significant positive improvement in Goal Attainment Scores (GAS) in the two study groups, but children in the OT/SI group scored significantly higher than the controls.

The only other statistically significant differences between the two groups were for the less care-giver assistance during self-care, and social activities observed in the treatment group. There were no statistically significant differences between the study groups in adaptive behaviors. The authors concluded that the results of the study provide preliminary support for the efficacy of manualized SI intervention. They however, noted that the results should be interpreted with caution until they are replicated in future larger studies. Pfeiffer and colleagues, 2011 (Evidence table 2), conducted a pilot trial to identify appropriate outcome measures, and address the effectiveness of sensory integration (SI) interventions in children with autism spectrum disorders (ASD). They randomized 37 children with ASD, 6-12 year of age to undergo either a fine motor (FM) or sensory integration therapy. Pretests and posttests measured social responsiveness, sensory processing, functional motor skills, and social-emotional factors. The study was randomized, controlled, and blinded. However, it was a small pilot trial with no power analysis or follow-up after the therapy ended. Its overall results showed significant positive improvement in GAS in the two study groups. Children in the SIT group had more significant changes in GAS and improvement in mannerism vs. those in the FM group. The differences in the other outcomes were statistically insignificant. The authors discussed limitations to the study and suggestions for future studies. They explained that standardized measures for determining progress are often inappropriate for children on the autistic spectrum because of the wide variety in behavior and developmental levels among the children, and their ability to complete the test while maintaining its validity. The authors also indicated that another challenge for using a standardized measure is the fact that the SIT forms, activities, and goals are individualized to the specific needs of each child, resulting in a wide range of goals and outcomes among the participants within a study. Wuuang and colleagues, 2009 (Evidence table 3) compared the effect of SIT, neurodevelopmental treatment (NDT), and perceptual-motor (PM) approach, and no treatment in 160 children 7-8 years of age with mild mental retardation. 120 were randomly assigned to one of the three active treatments and 40 children who fulfilled the inclusion criteria but could not attend the sessions because of its timing, were not randomized, did not receive any intervention during the study period, but were used as controls.

Each of the active interventions was delivered in a 1-hr. session 3 days per week for 40 weeks, and the children were assessed with measures of sensorimotor function at baseline and after completion of the study. The results show that postintervention, the active treatment groups significantly outperformed the control group on almost all measures. The SIT 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. The study had its advantages and limitations discussed in evidence table 3. Among the limitations is the inclusion of a selected group of patients, non-adjusting for confounding factors, and a lack of long-term follow-up. The authors recommended that the results be replicated in more studies with long-term follow-up. A 2012 Policy Statement by the American Academy of Pediatrics on sensory integration therapies for children with developmental and behavioral disorders states that is unclear whether children who present with sensory-based problems have an actual "disorder" of the sensory pathways of the brain or whether these deficits are characteristics associated with other developmental and behavioral disorders. Because there is no universally accepted framework for diagnosis, sensory processing disorder generally should not be diagnosed. Other developmental and behavioral disorders must always be considered, and a thorough evaluation should be completed. Difficulty tolerating or processing sensory information is a characteristic that may be seen in many developmental behavioral disorders, including autism spectrum disorders, attention-deficit/hyperactivity disorder,
developmental coordination disorders, and childhood anxiety disorders. Occupational therapy with the use of sensory-based therapies may be acceptable as one of the components of a comprehensive treatment plan. However, parents should be informed that the amount of research regarding the effectiveness of sensory integration therapy is limited and inconclusive. Important roles for pediatricians and other clinicians may include discussing these limitations with parents, talking with families about a trial period of sensory integration therapy, and teaching families how to evaluate the effectiveness of a therapy (Zimmer 2012). **Conclusion:** The evidence remains insufficient to support the effectiveness of sensory integration therapy in improving the behaviors and functional skills in children with developmental and/or behavioral disorders. Due to the individual nature of SIT and the large variation in individual therapists and patients, large multicenter randomized controlled trials among a more diverse population, with blinded assessment, and long-term follow-up are needed to determine the effectiveness the efficacy of this therapy and durability of outcomes.


The use of Sensory Integration Therapy does not meet the Kaiser Permanente Medical Technology Assessment Criteria.

<table>
<thead>
<tr>
<th>Date Created</th>
<th>Date Reviewed</th>
<th>Date Last Revised</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/30/2005 MDCRPC, 07/11/2017MPC</td>
<td>10/30/2005MDCRPC, 01/06/2015MPC, 11/03/2015MPC, 09/06/2016MPC</td>
<td>01/06/2015</td>
</tr>
</tbody>
</table>

MDCRPC Medical Director Clinical Review and Policy Committee
MPC Medical Policy Committee

**Codes**
CPT: 97533