



## POLICY STATEMENT

# Sensory Integration Therapies for Children With Developmental and Behavioral Disorders

## abstract

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Sensory-based therapies are increasingly used by occupational therapists and sometimes by other types of therapists in treatment of children with developmental and behavioral disorders. Sensory-based therapies involve activities that are believed to organize the sensory system by providing vestibular, proprioceptive, auditory, and tactile inputs. Brushes, swings, balls, and other specially designed therapeutic or recreational equipment are used to provide these inputs. However, it 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. *Pediatrics* 2012;129:1186–1189

### BACKGROUND: DEVELOPMENT OF THE SENSORY SYSTEM

Sensory integration is a framework first described by occupational therapist A. Jean Ayres, PhD, in the 1970s. It refers to the body's way of handling and processing sensory inputs from the environment.<sup>1</sup> Ayres felt that the sensory system develops over time, much like other aspects of development (language, motor, etc), 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 (visual, auditory, proprioceptive, or vestibular). Ayres postulated that sensory integration dysfunction occurs when sensory neurons are not signaling or functioning efficiently, leading to deficits in development, learning, and/or emotional regulation.

SECTION ON COMPLEMENTARY AND INTEGRATIVE MEDICINE  
and COUNCIL ON CHILDREN WITH DISABILITIES**KEY WORDS**sensory integration, sensory processing, sensory integration  
therapy

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The ability of the brain to process sensory information from the environment has been an expanding area of basic neuroscience research. Hubel and Wiesel were among the first to document the important effects of early experience (eg, deprivation) on the way visual sensory input is processed in the brain.<sup>2-5</sup> Animal and human research is beginning to explore how other senses are processed and integrated<sup>6-10</sup> and how those processes are disrupted in specific syndromes (eg, autism,<sup>11,12</sup> schizophrenia<sup>13,14</sup>) and by specific experiences (eg, institutionalization, international adoption<sup>15,16</sup>).

### STATEMENT OF THE PROBLEM

Since Ayres<sup>1</sup> described sensory integration dysfunction in the 1970s, sensory-based therapies have been used increasingly, mainly by occupational therapists (but sometimes other health professionals) to treat a range of symptoms seen in children presenting from across a variety of settings, including the home, community organizations, clinics, and schools. Sensory integration, sensory “diets,” and other sensory-based therapies typically are based on classic sensory integration theory but often do not use all of the originally described sensory integration protocols. Sensory-based therapies involve activities that are believed to organize the sensory system, by providing vestibular, proprioceptive, auditory, and tactile inputs, by using brushes, swings, balls, and other specially designed equipment to provide these inputs. Occupational therapists and other health professionals may also use a sensory processing approach when identifying and modifying barriers that limit the individual's ability to participate in everyday activities or occupations.

Proponents of sensory integration theory believe that inappropriate or deficient sensory processing is

a developmental disorder amenable to therapy and that treatment can improve developmental outcomes.<sup>17</sup> A definition of sensory processing disorder has been proposed but has not been universally accepted.<sup>18</sup> Standardized measures, such as the Sensory Profile,<sup>19</sup> have been developed to classify a child's sensory deficits. The Sensory Profile provides a standard method for professionals to measure a child's sensory processing abilities and to provide a profile of the effect of sensory processing on functional performance in the daily life of a child.<sup>20</sup> Such standardized measures are commonly used by occupational therapists to quantify how much these developmental and behavioral differences affect the child's functional performance of the daily activities of childhood.

The possible diagnosis of sensory processing disorders remains a challenging clinical issue. In the sensory processing disorder classification system proposed by Miller et al,<sup>18</sup> sensory processing disorders are subdivided into 3 specific patterns: sensory modulation disorder, sensory discrimination disorder, and sensory-based motor disability. These patterns are then categorized into subtypes. Sensory modulation disorder is subdivided into overresponsive, underresponsive, and sensory seeking/craving subtypes. Sensory discrimination disorder has no subtypes. Sensory-based motor disability is subdivided into postural disorder and dyspraxia.

Sensory processing disorder or a similar diagnosis has been included in Zero to Three's *Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood Revised*<sup>21</sup> and the *Diagnostic Manual for Infancy and Early Childhood of the Interdisciplinary Council on Developmental and Learning Disorders*,<sup>22</sup> where “regulatory-sensory processing disorder” in infants has also been classified as a developmental

difference for this group. For older children and adolescents, no commonly accepted definition of sensory processing disorder exists. Some experts have proposed that the definition of autism spectrum disorders in the forthcoming *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* be expanded to include definitions of associated sensory issues, such as under- and over-responsiveness; however, the committee that is preparing the textbook has requested that more studies be performed before sensory processing disorder can be officially recognized.<sup>23</sup>

It remains unclear whether children who present with findings described as sensory processing difficulties have an actual “disorder” of the sensory pathways of the brain or whether these deficits represent differences associated with other developmental and behavioral disorders. Specifically, the behavioral differences seen in children with autism spectrum disorders,<sup>24</sup> attention-deficit/hyperactivity disorder,<sup>25</sup> and developmental coordination disorders<sup>26</sup> overlap symptoms described in children with sensory processing disorders. Studies to date have not demonstrated that sensory integration dysfunction exists as a separate disorder distinct from these other developmental disabilities. Furthermore, numerous challenges exist for evaluating the effectiveness of sensory integration therapy, including the wide spectrum of symptom severity and presentation, lack of consistent outcome measures, and family factors, which make response to therapy variable.<sup>27-29</sup>

Despite the challenges of defining and studying the effectiveness of sensory integration therapy, it is possible that the treatment of sensory processing difficulties is helpful to children who have problems identified in sensory processing measures. Some published case series and observational studies

have reported positive outcomes of sensory integration therapy for children with sensory processing disorders.<sup>27,29</sup> Older meta-analyses<sup>30,31</sup> and at least 2 more recent reviews<sup>32,33</sup> have been published that suggested a positive trend in meeting occupational goals with the use of sensory integration therapy. However, the authors of the 1999 meta-analysis cautioned that most studies in the field were of insufficient scientific rigor to be included in a meta-analysis, studies varied in the use of outcome measures, and the ability to draw conclusions and detect a treatment effect was limited.<sup>31</sup> Many of the more recent studies, unfortunately, share some of these traits.

One recent small study cautions health care practitioners about the possible negative behavioral effects of sensory integration therapy in certain populations. Devlin et al<sup>34</sup> reported on the comparative effects of sensory integration therapy and behavioral interventions on rates of challenging or self-injurious behavior in 4 children in whom autism spectrum disorder was diagnosed. A functional assessment was conducted to identify the variables maintaining the challenging behaviors. The sensory integration therapy was designed by an occupational therapist who was trained in sensory integration therapy. The sensory integration therapy and a behavioral intervention were compared within an alternating treatments design. Results from this study clearly demonstrated that the behavioral intervention was more effective in reducing challenging behavior and self-injurious behavior than was the sensory integration therapy. Finally, in the best treatment phase, only the behavioral intervention was implemented, and further reduction was observed in the frequency of challenging behavior and self-injurious behavior.

## RECOMMENDATIONS

1. At this time, pediatricians should not use sensory processing disorder as a diagnosis. When these sensory symptoms are present, other developmental disorders—specifically, autism spectrum disorders, attention-deficit/hyperactivity disorder, developmental coordination disorder, and anxiety disorder—must be considered and thoroughly evaluated, usually by appropriate referral(s) to a developmental and behavioral pediatrician, child psychiatrist, or child psychologist. The American Academy of Pediatrics clinical report on the management of children with autism spectrum disorders is a useful resource to help with these referrals.<sup>35</sup>
2. Pediatricians should recognize and communicate with families about the limited data on the use of sensory-based therapies for childhood developmental and behavioral problems.
3. If the pediatrician is managing a child whose therapist is using sensory-based therapies, the pediatrician can play an important role in teaching families how to determine whether a therapy is effective.
  - a. Help families design simple ways to monitor effects of treatment (eg, behavior diaries, pre-post behavior rating scales). Help the family be specific and create explicit treatment goals, designed at the onset of therapy, focused on improving the individual's ability to engage and participate in everyday activities (eg, ability to focus, tolerate foods, and be in a room with loud noises).
  - b. Set a time limit for seeing the family back to discuss whether the therapy is working to achieve the stated goals.

4. Pediatricians should inform families that occupational therapy is a limited resource, particularly the number of sessions available through schools and through insurance coverage. The family, pediatrician, and other clinicians should work together to prioritize treatment on the basis of the effects the sensory problems have on a child's ability to perform daily functions of childhood.

With input from the following committees/councils: COCWD, ASC, SOAI, COPACFH, SOAH, SODBP, SON, SOEH, and COCHF.

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