

SORTING  
THROUGH THE  
SCIENCE

*Sensory Differences and ASD*

# AUTISM IN EDUCATION

RESEARCH SNAPSHOT



COMPREHENSIVE REVIEWS OF SENSORY-BASED INTERVENTIONS REPORT LIMITED EVIDENCE THAT THESE INTERVENTIONS BENEFIT CHILDREN WITH ASD.

## IF YOU HAVE EVER WORKED WITH A LEARNER WITH AUTISM SPECTRUM DISORDER (ASD), YOU HAVE PROBABLY HEARD, OR SAID, THINGS LIKE:

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“They have sensory issues,” or “They need a sensory break.” In fact, surveys of parents of individuals with ASD have shown that sensory issues are among the earliest characteristics noticed by those parents. Research indicates that between 45% and 95% of individuals with ASD present sensory-perceptual difficulties of some kind (Baranek, Wakeford, & David, 2008; Ben-Sasson et al., 2007; Tomchek & Dunn, 2007; Watling, Deitz, & White, 2001). You may have observed that some learners with ASD seem to be over-responsive/hyper-sensitive to sensory input and go to great lengths to avoid things like loud or unexpected sounds, certain food textures or smells, or the feel of specific fabrics. On the other hand, some individuals may be under-responsive/hypo-sensitive to sensory input, appearing to have decreased reactions to things like pain, loud noises, heat, or cold. Still others may appear to seek out certain sensations and interests and may engage in repetitive, stereotypic and/or self-injurious behaviour.



Understanding the difficulty learners with ASD may have in tolerating or processing sensory information is important for all educational personnel. Sensory differences in individuals with ASD pose a unique challenge in the school setting because they may impact the ability of learners to manage the demands of their environment and to participate and learn to their full potential (Suarez, 2012). However, while the evidence of sensory differences in individuals with ASD is clear, what is less clear is the best way for educators to support learners who experience these challenges. Research related to intervention approaches to address sensory differences has produced inconsistent and controversial findings and has led to confusion among professionals and parents.

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Advancing and disseminating knowledge of Autism Spectrum Disorder (ASD) in the area of educational instruction and practice throughout the Atlantic region.



## ONE OF THE MOST COMMON APPROACHES TO HELPING INDIVIDUALS WITH ASD DEAL WITH SENSORY DIFFERENCES INVOLVES THE USE OF SENSORY-BASED INTERVENTIONS.

These approaches have their roots in theories of sensory processing first proposed by occupational therapist A. Jean Ayres, in the early 1970s (Ayres, 1972). Based on this theory, Ayres developed a very specific approach to sensory-based intervention, often referred to as Ayres Sensory Integration (ASI). This approach requires a trained professional, usually an occupational therapist (OT) to follow clearly-defined procedures and engage in continuous monitoring of the intervention to ensure appropriate and consistent implementation (Schoen et al., 2019). It is important to note that many other sensory integration therapies and sensory-based interventions have grown from this theory as well, many without the defined training, structure, and monitoring requirements associated with Ayres Sensory Integration (Schoen et al., 2019). Supporters of sensory integration theory suggest that many behaviours demonstrated by individuals with ASD are caused by underlying deficits in processing and regulating sensory input. This theory led to the development of a range of sensory-based interventions, including sensory diets, brushing, deep pressure, weighted blankets/vests, sensory rooms, and so on.

Despite the fact that sensory-based interventions are widely used and widely studied in some disciplines, there is still little scientific evidence to support the use of most of these interventions for individuals with ASD. Comprehensive reviews of more than fifty years of research on interventions for individuals with ASD have consistently indicated that there is little or no evidence that would support the effectiveness of sensory-based interventions for individuals with ASD. Each of the reviews has indicated that additional high-quality research would be necessary before any firm conclusions could be drawn (National Clearinghouse on Autism Research and Practice (2020); National Autism Center, 2009/2015; Watling & Hauer, 2015; Wong et al., 2014).

The one sensory-based treatment approach for individuals with ASD that has recently been determined to have sufficient research support to be classified as an evidence-based intervention is the Sensory Integration approach originated by A. Jean Ayres (1979/2005). A recent comprehensive review of the literature on interventions for individuals with ASD completed by the National Clearinghouse on Autism Evidence and Practice (NCAEP) identified three well-controlled scientific studies that support the effectiveness of Ayres Sensory Integration (Steinbrenner et al., 2020). The report emphasized that this approach is only considered evidence-based when carried out under the direct supervision of a trained and certified clinician (typically an occupational therapist), and when the intervention is implemented with the appropriate intensity, usually multiple times each week. Importantly, the authors of this review also provide a strong caution for educators and parents, explaining that “educators and caregivers are not qualified or expected to independently deliver Ayres SI treatment to children with autism.” They explain that, “though an OT trained in this approach may address sensory concerns in the classroom, classical SI therapy takes place in clinical settings (Nowell et al., 2020, p. 4).

A 2015 REVIEW OF STUDIES THAT EXAMINED THE USE OF SENSORY-BASED INTERVENTIONS IN SCHOOL SUPPORTED PREVIOUS RESULTS, INDICATING THAT, “FINDINGS SUGGEST THAT SENSORY INTERVENTIONS APPLIED IN THE SCHOOL CONTEXT MAY NOT HAVE BENEFIT” (CASE-SMITH, WEAVER, & FRISTAD, 2015).



**IF A SENSORY ACTIVITY FUNCTIONS AS A REINFORCER FOR A PARTICULAR LEARNER, AND IT IS USED STRATEGICALLY AND INTENTIONALLY AS SUCH (I.E. THE LEARNER IS PROVIDED WITH THE ACTIVITY AS A CONSEQUENCE OF ENGAGING IN A DESIRED BEHAVIOUR), THE RESULT MAY BE AN INCREASE IN DESIRED BEHAVIOUR IN THE FUTURE.**

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It is important to consider that many of the activities that are incorporated in sensory-based interventions may function as positive reinforcers for learners with ASD (Barton et al., 2015; McGinnis et al., 2013). Many people may not realize that delivering a reinforcer when problem behaviour happens usually causes that behaviour to stop in the moment. The individual has received the desired consequence, so the behaviour is no longer necessary. This may cause the adult to believe that the intervention “worked.” Unfortunately, since reinforcement also causes behaviour to increase over time (the learner will behave in the same way to get the consequence in the future), delivering a sensory activity when problem behaviour starts may result in an increase in problem behaviour in the future. Delivering the sensory activity as a consequence of the learner demonstrating desired behaviour, instead of problem behaviour, may increase the desired behaviour in the future.

### **IT IS IMPORTANT TO WEIGH THE POTENTIAL RISKS VERSUS BENEFITS**

It is also important for educational personnel, as well as for parents, caregivers, and partner professionals to be aware that there may be risks associated with the use of sensory-based interventions.

The most serious risk is to the health and safety of learners with ASD, as evidenced by the death of a student with ASD in Quebec in 2008.

([https://www.thestar.com/news/canada/2008/06/20/blanket\\_suffocates\\_autistic\\_boy\\_in\\_quebec.html](https://www.thestar.com/news/canada/2008/06/20/blanket_suffocates_autistic_boy_in_quebec.html)). In spite of this tragedy, and others caused by similar procedures, wrapping learners with ASD in blankets or mats is still happening, as is the use of weighted blankets, weighted vests, compressions vests, etc.

ALTHOUGH SOME SENSORY-BASED INTERVENTIONS RECOMMENDED FOR LEARNERS WITH ASD MAY NOT POSE A RISK TO THEIR PHYSICAL SAFETY, AND INDEED SOME OF THESE INTERVENTIONS MAY EVEN BE PLEASURABLE, THEY MAY POSE OTHER RISKS, INCLUDING:

- interfering with learning opportunities and resulting in the loss of instructional time that is crucial to the learner’s educational program and skill development.
- delaying or preventing the implementation of interventions that have been proven to be effective in reducing challenging behaviour in learners with ASD and helping them build important skills.
- stigmatizing the learner with ASD, causing the learner to stand out from peers, and resulting in reduced opportunities to participate in meaningful social interactions.
- inadvertently reinforcing and strengthening challenging behaviours over time.



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In light of the controversy and confusion over the use of sensory-based interventions for learners with ASD, what are the “best practice” guidelines for educational personnel addressing sensory difficulties in learners with ASD in the school setting?

Without research support for most sensory-based interventions, particularly without the direct support and supervision from a trained occupational therapist, educators are encouraged to use approaches with a stronger evidence base. There are research-supported interventions for the types of challenging and interfering behaviours that sensory-based therapies claim to address. To date, the best available research evidence has demonstrated that interventions based on behavioural strategies have the strongest scientific evidence of effectiveness.

From a behaviour analytic perspective, atypical sensory responses observed in individuals with ASD can be explained by understanding the relationship between the environment and the behaviour. Behaviours are learned through interactions with the environment and are maintained by the consequences they produce (i.e. behaviours that produce a desired effect are more likely to occur in the future). These consequences can include access to a desired outcome, object, or activity; escape from, or avoidance of, a non-preferred or aversive situation; or consequences that are pleasurable in and of themselves, such as pleasurable sensations from behaviours like humming, hand-flapping, spinning, or rocking.

“Best practice” guidelines indicate that educational programs for learners with ASD need to incorporate appropriately-structured learning environments that take into account individual differences, strengths, and needs. Knowing the learner well, and understanding how the learner’s behaviour is influenced by the environment, can help educators make adjustments to the environment to reduce interfering behaviours and teach learners with ASD skills and strategies that will help them participate more successfully in the school setting.

The Canadian Academy of Health Sciences points out that, "For many Autistic individuals, repetitive or stereotyped behaviour may be a means of coping with stress or communicating the presence of a stressor. Therefore, reducing stress or teaching a more effective means of communication would be the appropriate targets of service rather than reducing the repetitive behaviour itself" ([Canadian Academy of Health Sciences, 2022, p. 183](#)).

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**School teams, families, and partner professionals may find it helpful to ask the following questions when considering possible interventions for learners with ASD:**

1. What is the specific behaviour of interest (BOI)? (What can be observed?)
2. How does the behaviour impact the learner in school? At home? In the community?
3. What are possible intervention options?
  - What is the evidence to support the intervention?
  - Is the intervention considered evidence-based with this population (e.g., accepted as evidence-based for individuals with ASD in systematic reviews such as the National Clearinghouse on Autism Research and Practice, the National Standards Project, and others)?
    - Can the intervention be used as an antecedent strategy (choice-making; task interspersal)?
    - Can the intervention function as a reinforcer for desired behaviours?
  - Is the intervention itself exclusionary? Stigmatizing?
  - Is the intervention a good fit for use in the school environment (appropriate personnel resources and adherence to school, board/district, and provincial policies)?

- Do staff members who will carry out the intervention have adequate training and supervision?
- Is there adequate time allotted and are procedures in place to monitor the intervention?
- Are there risks associated with implementing the intervention? Are there risks in not implementing the intervention?

#### 4. How is the intervention to be applied?

- What do we want to teach the learner to do instead of the targeted behaviour?
- How will we teach and reinforce the new skill?
- Can effectiveness of the intervention be measured?
- How will we monitor progress in an objective way?
- Is there a plan to help the learner generalize the skills outside the teaching situation or learning environment?
- When will the intervention be reviewed?



Comprehensive educational programs for learners with ASD also benefit from input and collaboration from professionals representing a variety of disciplines, including ASD consultants/specialists, occupational therapists, psychologists, speech-language pathologists, behaviour analysts, and physiotherapists, among others. The range of training, experience, and expertise these professionals bring to the discussion can be an extremely valuable resource, and can help school teams embed the most important priorities and activities (communication, self-care, play, leisure and learning) into the learner's educational program and daily schedule.

It is also important to keep in mind that problem behaviours, especially those representing a significant change from the individual's typical behaviour, may indicate an underlying medical condition. The learner's educational plan or behaviour support plan may require input and collaboration by appropriate medical professionals.

One of the challenges of working with a multidisciplinary team is that different professionals often view challenging or interfering behaviour from different perspectives. When this situation arises, it may be helpful to consider the following (Brodhead, 2015; Scheibel & Watling, 2016; Stango, 2017):

- Establish clear priorities based on
  - skills and behaviours that are meaningful for the learner and family
  - strengths, needs, interests, and current skill set of the learner
  - support for the learner's independence and successful participation in school, home, and community
- Clarify the roles and nature of involvement of each partner professional
- Collaborate to write goals that are specific, measurable, and have clear timelines
- Work as a team to clearly define the behaviour in observable and measurable terms if addressing a challenging or interfering behaviour.
- When deciding on the intervention approach, consider
  - the research base for the intervention
  - any risk to learner safety, dignity, and/or instructional time
  - the values and preferences of the learner and family
  - the resources required to implement the intervention
  - the "fit" between the proposed intervention and the context
- Collaborate to determine how the effectiveness of the intervention will be measured, including
  - what data will be collected, when, and by whom
  - what data collection system will be used
  - how often data will be reviewed
- Agree upon how the team will respond if data indicate that the intervention is effective in changing the behaviour in the desired way, AND how the team will respond if the intervention is not effective.





# References

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- **Ayres, A. J. (1972).** Sensory integration and learning disorders. Los Angeles: Western Psychological Services.
- **Baranek, G. T., Wakeford, C. L., & David, F. J. (2008).** Understanding, assessing and treating sensory-motor issues in young children with autism. K. Chawarska, A. Klin & F. Volkmar (Eds.), *Autism Spectrum Disorders in Infancy and Early Childhood*. NY, Guilford Press.
- **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.
- **Ben-Sasson, A., Cermak, S. A., Orsmond, G. I., Tager-Flusberg, H., Carter, A. S., Kadlec, M. B., & Dunn, W. (2007).** Extreme sensory modulation behaviours in toddlers with autism spectrum disorders. *American Journal of Occupational Therapy*, 61, 584-592.
- **Brodhead, M. T. (2015).** Maintaining professional relationships in an interdisciplinary setting: Strategies for navigating nonbehavioral treatment recommendations for individuals with autism. *Behavior Analysis in Practice*, 8(1), 70-78.
- **Case-Smith, J., Weaver, L. L., & Fristad, M. A. (2015).** A systematic review of sensory processing interventions for children with autism spectrum disorders. *Autism*, 19(2), 133-148.
- **Canadian Academy of Health Sciences. (2022).** Autism in Canada: Considerations for future public policy development - Weaving together evidence and lived experience. Ottawa (ON): The Oversight Panel on the Assessment on Autism, CAHS.
- **McGinnis, A. A., Blakely, E. Q., Harvey, A. C., Hodges, A. C., & Rickards, J. B. (2013).** The behavioral effects of a procedure used by pediatric occupational therapists. *Behavioral Interventions*, 28, 48-57.
- **National Autism Center, 2009, National standards project report.** Retrieved from: <https://nationalautismcenter.org/national-standards-project/results-reports/>
- **Nowell, S. W., Szendrey, S., Steinbrenner, J. R., Hume, K., & Odom, S. L. (2020).** Sensory integration: A companion to the NCAEP report. The University of North Carolina at Chapel Hill, Frank Porter Graham Child Development Institute, National Clearinghouse on Autism Evidence and Practice Review Team.

- **Scheibel, G., & Watling, R. (2016).** Collaborating with behavior analysts on the autism service delivery team. *OT Practice*, 21(7), 15-19.
- **Stango, A. (2017, January).** Working together: Behavior analyst and occupational therapist collaboration. Presented for the New Brunswick Department of Education and Early Childhood Development, online webinar.
- **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, 6-19.
- **Steinbrenner, J. R., Hume, K., Odom, S. L., Morin, K. L., Nowell, S. W., Tomaszewski, B., Szendrey, S., McIntyre, N. S., Yucesoy-Ozkan, S., & Savage, M. N. (2020).** Evidence-based practices for children, youth, and young adults with Autism. The University of North Carolina at Chapel Hill, Frank Porter Graham Child Development Institute, National Clearinghouse on Autism Evidence and Practice Review Team.
- **Suarez, Michelle A. (2012).** Sensory processing in children with autism spectrum disorders and impact on functioning. *Pediatric Clinics of North America*, 59(1), 203-214.
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- **Tomchek, S. D. & Dunn, W. (2007).** Sensory processing in children with and without autism: A comparative study using the short sensory profile. *American Journal of Occupational Therapy*, 61(2), 190-200.
- **Watling, R. L., Deitz J. & White O. (2001).** Comparison of sensory profile scores of young children with and without autism spectrum disorders. *American Journal of Occupational Therapy*, 55(4), 416-423.
- **Watling, R., & Hauer, S. (2015).** Effectiveness of Ayers Sensory Integration® and sensory based interventions for people with autism spectrum disorder: A systematic review. *American Journal of Occupational Therapy*, 69(5), 1-8.
- **Wong, C., Odom, S. L., Hume, K., Cox, A. W., Fettig, A., Kucharczyk, S., Brock, M. E., Plavnic, J. B., Fleury, V. B., & Schultz, T. R. (2014).** Evidence-Based Practices for Children, Youth, and Young Adults with Autism Spectrum Disorder, Chapel Hill: The University of North Carolina, Frank Porter Graham Child Development Institute, Autism Evidence-Based Practice Review Group.



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