

## INFORMATION PAPER

### Research to Inform Practice

## Sensory Differences and Autism Spectrum Disorder

It is frequently reported that individuals with Autism Spectrum Disorder (ASD) respond to sensory stimuli differently than their typically developing peers (Dunn, Little, Dean, Robertson, & Evans, 2016). Sensory issues are often among the earliest symptoms observed by parents, with studies reporting anywhere from 45% - 95% of individuals with ASD presenting sensory-perceptual difficulties of some kind (Baranek, Wakeford, & David, 2008; Ben-Sasson et al., 2007; Tomchek & Dunn, 2007; Watling, Deitz, & White, 2001).

More specifically, some learners with ASD may present as over-responsive/hyper-sensitive to sensory input and go to great lengths to avoid stimuli such as loud or unexpected sounds, certain food textures or smells, or the feel of specific fabrics. On the other hand, some individuals may be described as under-responsive/hypo-sensitive to sensory input, and may have a diminished response to stimuli in their environment (e.g., may appear to have a decreased reaction to painful or aversive stimuli). Others may appear to seek out certain sensations and interests and may engage in repetitive, stereotypic and/or self-injurious behaviour, such as mouthing non-food items, touching everything or everyone in the environment, repetitively flicking a toy or object in a non-functional manner, or making noises (Miller, Anzalone, & Lane, 2007). The most commonly reported atypical responses to sensory input are highlighted in **Appendix A** (adapted from Leekam, Libby, Wing, Gould, & Taylor, 2002).

The most recent edition of the Diagnostic and Statistical

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**Information Papers** provide topical research summaries and recommendations based on empirical evidence in the field of Autism Spectrum Disorder. It is our aim that the information will guide thoughtful educational planning within the context of informed evidence-based practice and build awareness of potential benefits and risks for any intervention implemented.

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#### **Disclaimer**

*This document synthesizes current knowledge and offers recommendations for consideration. It does not constitute provincial education policy or commit Departments of Education & Early Childhood Development to the activities described. This document originates with the Interprovincial Autism in Education Partnership.*

Manual of Mental Disorders (DSM-5) includes sensory differences under the category of repetitive behaviours in the diagnostic criteria for ASD. Individuals with ASD may experience “Hyper- or hypo-reactivity to sensory input or unusual interest in sensory aspects of the environment (e.g. apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement” (American Psychiatric Association, 2013).

While there is ample evidence of sensory differences in individuals with ASD, the research related to intervention approaches to address these differences has produced inconsistent and controversial findings and has led to confusion among professionals and parents. Inconsistent and inconclusive evidence of the link between sensory systems and core symptoms of ASD continues to limit our understanding of the nature of sensory differences and the most effective interventions to mitigate these difficulties (Ben-Sasson et al., 2009; Dunn et al., 2016; Foss-Feig et al., 2012).

### **Why is understanding sensory differences in individuals with ASD important?**

Understanding the difficulty learners with ASD may have in tolerating or processing sensory information is important for all educators. Sensory differences in individuals with ASD pose a unique challenge to educators in terms of their potential impact upon the ability of learners to manage the demands of their environment in a manner that allows them to participate and learn (Saurez, 2012). As a result, it is critical for educators to be part of the process of determining if sensory differences may be interfering with learning, and to implement evidence-based interventions to address these challenges and support learners to be as successful and independent as possible.

### **What does the research tell us about sensory differences and intervention practices for individuals with ASD?**

There are many intervention approaches used to address sensory differences as part of a comprehensive educational plan for learners with ASD. One of the most common approaches involves the use of sensory-based interventions, founded upon theories of sensory processing, to address perceived sensory difficulties (Barton et al., 2015; McGinnis et al., 2013; Sniezyk & Zane, 2015).

Sensory-based interventions such as sensory integration therapy (SIT), auditory integration training (AIT), and sensory diets have evolved from a theory of neurodevelopment first proposed by A. Jean Ayres, an occupational therapist, in the early 1970s. Ayres set forth a hypothesis to explain the brain’s ability to perceive sensory information from the environment, organize and interpret it, and then formulate a physical or emotional response. Ayres proposed that, in addition to the basic five senses (hearing, vision, taste, smell and touch), the body must

also process information from the vestibular system (movement, speed, balance and direction) and the proprioceptive system (feedback from muscles and joints regarding where our body parts are in relation to each other and how they are moving). According to Ayres's theory, the sensory system integrates these seven senses with each other to provide an appropriate and functional interaction with a variety of contexts and people (Ayres, 1972; Cook, 1990; Williams, Lee, & Lalena,, 2009). Ayres proposed that the ability to do this skillfully develops over time and when this does not progress correctly, sensory integration or processing dysfunction occurs (Ayres, 1972; Hoehn & Baumeister, 1994; Miller et al., 2007).

Proponents of sensory integration theory hypothesize that many behaviours demonstrated by individuals with ASD are caused by sensory abnormalities associated with this underlying deficit in processing and modulating sensory input. They contend that the central nervous system ineffectively interprets environmental stimuli, interfering with an adaptive response (Addison et al., 2012). Sensory Integration Therapy (SIT) and sensory-based interventions have evolved from this theory of sensory processing and integration. The strategies associated with these interventions attempt to change how the brain processes and organizes sensations with the belief that, through facilitating sensory integration, individuals will be able to make more adaptive responses (Devlin, Healy, Leader, & Hughes, 2011). Examples of atypical responses to sensory stimuli are described in a number of parent/caregiver questionnaires used by practitioners in the assessment of sensory systems in individuals with ASD and other developmental disorders, e.g., the Sensory Profile (Dunn, 1999) and the Sensory Processing Measure – SPM (Parham, Ecker, Kuhaneck, Henry, Glennon, 2010). For a more detailed account of the most commonly used questionnaires please refer to TARGET: Texas guide for effective teaching sensory assessment (Texas Statewide Leadership for Autism Training, 2009).

Sensory integration therapy and sensory-based interventions involve a variety of activities that typically include a blend of controlled sensory stimulation and motor activity (Ayres, 1972; Bundy & Murray, 2002; Hoehn & Baumeister, 1994; Vargas & Camilli, 1999). Sensory stimulation involves directly applying one type of sensation, such as deep pressure, to the individual with the intention of evoking a behavioural response and facilitating the reorganization of the vestibular, tactile, and proprioceptive systems (Bundy & Murray, 2002; Hodgetts & Hodgetts, 2007). SIT is an active, learner-focused therapy in which the individual explores materials and equipment that challenge the use of sensory input to organize an adaptive response. Activities are selected through the use of specialized equipment and materials such as brushes, net swings, trapezes, scooter boards, therapy balls, blankets, weighted vests and ramps (Parham et al., 2007; Pollock, 2009).

A related intervention involves the use of "sensory diets." This intervention is based upon sensory integration theory, but requires less equipment than classical SIT and is often recommended for an inclusive setting. In a school or home program the learner is provided a schedule of applied stimulation such as brushing (Wilbarger Brushing Protocol, Wilbarger & Wilbarger, 1991) and deep pressure (massage, joint compression weighted vests, etc.) followed by activities that are assumed to meet the individual's sensory needs (Smith, Press, Koenig, & Kinealy, 2005). A sensory diet is designed to help the learner use modulating activities to stay

calm, yet alert and organized. When carried out at school, these activities are often integrated into the student's daily schedule and are typically provided under the supervision of a staff member who has been trained to carry out the intervention. The various techniques used within a sensory diet are usually incorporated within a broader sensory-integration based program, but also are used in isolation, e.g., therapy balls as alternative seating, weighted vests, etc. (Barton et al., 2015; Case-Smith & Arbesman, 2008; Case-Smith, Weaver, & Fristad, 2015; Leong, Carter, & Stephenson, 2015; Yunus, Liu, Bissett, & Penkala, 2015).

Despite the fact that SIT is the most widely studied treatment within the discipline of occupational therapy, there is still little empirical evidence to support SIT and related sensory-based interventions for individuals with ASD (Barton et al., 2015; Case-Smith, Weaver, & Fristad, 2015; Davis, Durand, & Chan, 2011; Dunn et al., 2016; Leong, Carter, & Stephenson, 2015; Losinski, Sanders, & Wiseman, 2016; Murdock, Dantzler, Walker, & Woods, 2014; Sniezky & Zane, 2015; Watkins & Sparling, 2014). Studies are threatened by weak treatment fidelity (implementation of the intervention) and methodological rigor (adequate selection and description of participants, random assignment to alternative interventions, adequate sample sizes and defined outcome measures) which makes it difficult to draw conclusions regarding outcomes of SIT with any degree of confidence (Barton et al., 2015; Case-Smith, Weaver, & Fristad, 2015; Baranek, 2002; Lang et al., 2012; Losinski, Sanders, & Wiseman, 2016; Parham et al., 2007; Pollock, 2009; Sniezky & Zane, 2015). Comprehensive reviews of sensory-based interventions including weighted vests, brushing programs (e.g., Wilbarger brushing protocol), sensory diets, multi-sensory environment (e.g., Snoezelen room, sensory rooms) and auditory integration training (AIT), provide minimal evidence these interventions correct underlying sensory problems or provide any benefit for individuals with ASD (Kane, Luiselli, Dearborn, & Young, 2004; Lang et al., 2012; Leong & Carter, 2008; National Autism Center, 2009/2015; Odom et al., 2010; Prior et al, 2011; Sinha, Silove, Hayen, & Williams, 2011; Wong et al., 2013). However, it is also important to recognize that there is ongoing research examining if and how sensory processing may impact emotional regulation in individuals with ASD (Critchley & Garfinkel, 2017; DuBois, Ameis, Lai, Casanova, & Desarkar, 2016; Fiene & Brownlow, 2015; Schauder, Mash, Bryant, & Cascio, 2015) and investigating the possible effectiveness of particular sensory-based interventions (Krombach, 2016; Schilling & Schwartz, 2004). Future well- controlled scientific studies may provide valuable information in these areas (Dunn et al., 2016).

*Comprehensive reviews of sensory integration therapy (SIT) and related sensory-based techniques report inconsistent and limited evidence that these interventions can correct underlying sensory problems and/or benefit children with ASD.*

A 2011 review conducted by The Australian Society for Autism Research (ASFAR) identifies the most effective models of practice in early intervention for individuals with ASD up to the age of seven. The review reports that, although learners may show marked responses to sensory information, "there is currently no evidence that SIT, sensory diets, brushing programs or weighted vests can correct underlying sensory problems" (Prior & Roberts, 2006, p.37).

Comprehensive reviews of interventions for individuals with ASD up to the age of 22 have consistently indicated that there is little or no evidence that would support the effectiveness of sensory-based interventions for individuals with ASD. They indicate that additional high-quality research would be necessary before any firm conclusions could be drawn (National Autism Society, 2009/2015; Watling & Hauer, 2015; Wong et al., 2013). A 2015 review of studies that examined the use of sensory-based interventions in school further supported previous results, indicating that, “findings suggest that sensory interventions applied in the school context may not have benefit” (Case-Smith, Weaver, & Fristad, 2015).

Additionally, these reviews indicate that there is very limited research to support the use of multi-sensory environments (Snoezelen/ sensory rooms) with individuals with ASD. These rooms were initially developed by two Dutch therapists, Jan Hulsegge and Ad Verheul, in the 1970s and were designed to provide a soothing and stimulating environment for institutionalized patients with dementia and profound developmental disorders by delivering stimuli to various senses, using lighting effects, color, sounds, music, scents, etc. (Kwok, To, & Sung, 2003). One review concluded that, “there is no evidence to support the rationale of this practice, and multisensory rooms do not meet the principles and elements of best practice and effective intervention” (Prior et al., 2011, p. 36), a finding supported by well-controlled research studies (McKee, Harris, Rice, & Silk, 2007; Stephenson & Carter, 2011). This is especially significant given that Snoezelen rooms or versions of such sensory rooms, are located and utilized in a number of schools across the Atlantic Provinces.

The most limiting factor in the research concerning sensory integration therapy is that many studies fail to show any connection between sensory-based interventions and improvements in any specific areas of difficulty or target behaviour in learners with ASD (Davis, Durand, & Chan, 2011; Leong, Carter, & Stephenson, 2015; Murdock, Dantzler, Walker, & Woods, 2014; Sniezky & Zane, 2015; Watkins & Sparling, 2014). It is also questioned if the treatment effects suggested by some supporters of sensory interventions are truly the result of the prescribed intervention or the result of other factors such as parental expectations, approval, added attention, practice, desensitization to stimuli, and/or imposed structure (Baranek, 2002; Barton et al., 2015; Devlin et al., 2011; Myers, Plauché Johnson, 2007; Perry & Condillac, 2003; Stephenson & Carter, 2009; Yunus, Liu, Bissett, & Penkala, 2015).

It is important to note that much of the literature refers to unusual responses to sensory information as a sensory processing disorder (SPD); yet it is unclear whether or not SPD exists as an identifiable developmental diagnosis. Researchers continue in their efforts to identify significant biomarkers of sensory processing disorders in individuals with ASD. However, currently there is no strong evidence that the sensory pathways of the brain are disordered or that these sensory differences are unique to those with ASD (American Academy of Pediatrics, 2012). Difficulty in tolerating or processing sensory information is evident in learners with a range of diverse needs (Perry & Condillac, 2003; Tomchek & Dunn, 2007; Watling & Deitz, 2007). These observations have led the American Academy of Pediatrics to recommend pediatricians not use SPD as a diagnosis. SPD is not included as a specific diagnosis in the current edition of the Diagnostic and Statistical Manual (DSM-5), as the committee responsible

for the most recent edition of this manual recommended that more research be done before considering sensory processing disorder a separate diagnostic category (American Academy of Pediatrics, 2012).

A second explanation for many behaviours reported as atypical sensory responses is provided by the field of Applied Behaviour Analysis (ABA). ABA is defined as “a scientific approach for discovering environmental variables that reliably influence socially significant behaviour and for developing a technology of behaviour change that takes practical advantage of those discoveries” (Cooper, Heron, & Heward, 2007, p. 3). 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. Behaviour analysts examine the ways in which factors in the environment influence behaviour and/or the purpose (function) of the behaviour for the individual (Addison et al., 2012; Devlin et al., 2011; Hanley, Iwata, & McCord, 2003).

Proponents of an environmental explanation of behaviour contend that in order to address behaviour, including behaviours believed to be responses to sensory information, it is necessary

*Behaviour analytic procedures have proven effective across a range of behaviours, including those often associated with sensory difficulties.*

to identify the events or conditions in the environment that precede and follow that behaviour (Devlin et al., 2011). Behaviours believed to be associated with sensory differences may be explained by the effect these behaviours produce for the individual which, in turn, serve to maintain the behaviour (Hanley et al., 2003). The understanding of behaviour is drawn from established principles of learning (Cooper et al., 2007; Devlin et al., 2011; Ryan, 2011), which demonstrate that 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 sensory stimuli from finger mannerisms, humming or tapping (Dounavi, 2011; Hanley et al., 2003; Hodgetts, Evans, & Misiasek, 2011).

Behaviour analysis focuses on determining the underlying function of a particular behaviour (i.e. the environmental influences on these behaviours). Practitioners conduct a functional behaviour assessment (direct observation and repeated measurement of behaviour) to assess the sensitivity of behaviour to specific consequences (Hanley et al., 2003; Iwata et al., 1982/1994). This analysis provides a means to determine which function-based interventions are likely to be effective in addressing the target behaviour. Interventions may include procedures to teach or increase alternative behaviours and skills, as well as to strategies to reduce or prevent interfering or problem behaviours (ASAT, 2012).

Well-controlled scientific studies have shown that interventions based on Applied Behaviour Analysis are effective in making meaningful changes in a wide range of behaviours that may interfere with learning and independence, including those often associated with sensory difficulties, such as tantrums, self-injury, repetitive vocal and motor behaviour, food refusal, etc. (Addison et al., 2012; Cooper et al., 2007; Devlin et al., 2011; Dounavi, 2011; Hanley et al., 2003; Potoczak, Carr, & Michael, 2007; Ryan, 2011). Several systematic reviews conducted over the past ten years have highlighted the effectiveness of behavioural approaches in treating the difficulties associated with ASD (National Autism Center, 2009/2015; Odom et al., 2010; Prior et al., 2011). Additionally, recent studies comparing the effects of behaviour analytic procedures to the effects of sensory integration strategies have demonstrated that ABA-based interventions result in the most significant improvements in target behaviours (Addison et al., 2012; Cox, Gast, Luscre, & Ayres, 2009; Devlin et al., 2011; Dounavi, 2011; Leong, Carter, & Stephenson, 2015; Quigley, Peterson, Frieder, & Peterson, 2011; Sniezyk & Zane, 2015; Yunus, Liu, Bissett, & Penkala, 2015).

## Summary

Although not all individuals with ASD display sensory difficulties, there is evidence these types of difficulties are prevalent in this population and may interfere with performance and learning (Baranek, 2002; Ben-Sasson et al., 2009; Foss-Feig et al., 2012; Myles et al., 2004). Currently there is empirical evidence to support the use of behaviourally based interventions in the treatment of sensory differences when they interfere with learning. By contrast, the lack of research supporting sensory integration therapy (SIT) and related sensory-based interventions places the role of these therapies in question for individuals with ASD (Barton et al., 2015; Case-Smith, Weaver, & Fristad, 2015; National Autism Center, 2009/2015; Odom et al., 2010; Prior et al., 2011; Leong & Carter, 2008; Sniezyk & Zane, 2015).

Despite the lack of evidence supporting the efficacy of SIT and related interventions, these approaches remain popular and are frequently included in students' educational plans. In surveys conducted in 1999 and 2004, a high percentage (82%) of occupational therapists surveyed reported using sensory integration as a frame of reference and incorporating sensory integration techniques when working with learners with ASD (Olson & Moulton, 2004; Watling, Deitz, Kanny, & McLaughlin, 1999). This trend was also evident in a 2006 survey of 552 parents of individuals with ASD. In this survey, SIT was reported as the third most commonly implemented treatment for ASD, ahead of interventions with solid empirical support such as those based on Applied Behaviour Analysis (Leong, Carter, & Stephenson, 2015; Green et al., 2006; Sniezyk & Zane, 2015).

*Research findings suggest that sensory interventions applied in the school context may not have benefit.*

This continued support and utilization of sensory integration techniques may be explained, in part, by the somewhat contradictory positions of organizations that establish the scope of

practice for occupational therapists. The American Occupational Therapy Association (AOTA) is explicit in its position on sensory integration and related practices. “AOTA recognizes SI as one of several theories and methods used by occupational therapists and occupational therapy assistants working with students in public and private schools” (American Occupational Therapy Association, 2009, p. 838). The Canadian Association of Occupational Therapists (CAOT), in a 2015 position statement, specifies that individuals with ASD and their families should have access to “evidence-informed, interprofessional and collaborative health services throughout their lifespan” (Canadian Association of Occupational Therapists, 2015, p.1). This collaboration is particularly important and valuable for learners with ASD and their families due to the unique, and often complex, challenges of each individual situation. Researchers and practitioners in the field of Occupational Therapy have also recommended that professionals in the field incorporate strategies based on Applied Behaviour Analysis into their work and have supported the benefits of further research in this area (Welch & Polatajko, 2016).

## Implications for Practice

In light of the controversy surrounding the efficacy of sensory-based interventions, what are the “best practice” guidelines for educators in addressing sensory difficulties in learners with ASD?

Based on the current research, it cannot be said with any degree of certainty that sensory integration-based techniques facilitate educational goals or have any long-term positive effect on the core characteristics of autism. Although some of the sensory-based practices recommended to address sensory difficulties in individuals with ASD may not be harmful, and indeed some may even be pleasurable, they may interfere with learning opportunities or delay the implementation of proven and more effective interventions. Experts caution that the inappropriate implementation of these approaches (e.g., contingent use of sensory input following disruptive behaviour) may inadvertently reinforce and strengthen challenging behaviours over time (Devlin et al., 2011; McGinnis, Blakely, Harvey, Hodges, & Rickards, 2013). Research has shown 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). Since reinforcement causes behaviour to increase over time, this can be problematic if the sensory activity immediately follows a challenging or interfering behaviour. However, if the 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.

Without sufficient empirical evidence of effectiveness of SIT and sensory-based interventions, educators are encouraged to use interventions with a stronger evidence base. There are empirically supported alternative interventions for the types of functional problems and behaviours that sensory-based therapies claim to address (National Autism Center, 2009/2015; Odom et al., 2010; Prior et al., 2011; Leong & Carter, 2008). Refer to the Autism in Education

Partnership’s Information Paper, *Evidence-Based Practice* (Bulmer et al., , 2012/2016), which summarizes the results of comprehensive research reviews and identifies those practices classified as having sufficient empirical evidence of effectiveness. Additionally, the paper considers the requirements necessary for schools to implement evidence-based practice system-wide. It highlights the importance of selecting interventions based upon an understanding of the empirical evidence. Further, it emphasizes that this understanding should be integrated with knowledge about the student and related circumstances, the expertise and experience of the educators and professionals involved, and by the ongoing collection and analysis of data as an intervention is implemented.

*Many of the activities that are incorporated in sensory-based interventions may function as positive reinforcers for learners with ASD and may increase challenging and interfering behaviour over time.*

“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. Specific task and environmental modifications to support student outcomes identified through the program planning process are practical in many educational programs and can be used in conjunction with other interventions to promote more effective participation in the learning environment. A series of **GUIDING QUESTIONS** may assist educators in making decisions concerning the need for, and type of, intervention to address specific behaviours that may be problematic for individuals with ASD or may interfere with learning or participation in the school community (see **Appendix B**).

Comprehensive educational programs for learners with ASD benefit from input and collaboration from professionals representing a variety of disciplines, including ASD consultants/specialists, occupational therapists, psychologists, speech-language pathologists, and physiotherapists, among others. The range of training, experience, and expertise these professionals bring to the discussion can prove to be a valuable resource, and can assist educators to integrate meaningful activities (communication, self-care, play, leisure and learning) into daily routines and natural environments (Baranek, 2002; CAOT, 2015; Law, 2006; Sahagian & Whalen, 2003; Scheibel & Watling, 2016). It should also be recognized 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 such a diverse team, however, is that partner professionals often view challenging or interfering behaviour from different perspectives. For example, while occupational therapists may focus on what a behaviour looks like (topography), behaviour analysts look for the environmental influences on the behaviour (function). This can create disagreement within a team, and confusion for parents and school staff, as various professionals may recommend different intervention approaches. 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
  - the learner’s strengths, needs, interests, and current repertoire of skills
  - supporting 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
- If addressing a challenging or interfering behaviour, work as a team to clearly define the behaviour in observable and measurable terms
- 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 will data 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 data indicate that the intervention is not effective

Although multidisciplinary collaboration in support of learners with ASD who experience sensory differences can present challenges, it also provides a unique opportunity to enhance professional experience, engage in respectful critical dialogue, and build mutual respect and understanding, while also serving the best interest of the learner and family. As Leaf and McEachin (1999, p. 5) point out, “We must work together. We have to agree to disagree. We have to rely upon data that supports treatment effectiveness. We have to focus on the child. We have to value the unique blend that comes from incorporating all the perspectives within a team.”

January 2013/ January 2018

***This paper is produced by the Autism in Education (AIE) Partnership. It will be amended as new information comes to light through relevant research and literature. If you would like to make a comment or provide additional information related to this topic area, please forward to: [Shelley McLean@apsea.ca](mailto:Shelley_McLean@apsea.ca)***

To cite this article: Bulmer, S., Eustace, A., McDonnell, L., McLean, S., Adams, R., Breitenbach, Cowan, I., Jackman, P., Jozsa, S., & Michaud, J. (2013/2017). Autism in Education Partnership, Atlantic Provinces Special Education Authority, Halifax, Nova Scotia.

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***Note: The Autism in Education Partnership sincerely thanks Amy McGinnis Stango, M.S., OTR/L, M.S., BCBA, for her valuable comments on an earlier version of this information paper. We appreciate her assistance in improving this document.***

#### **January 2013/ January 2018**

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## **Appendix A**

(adapted from Leekam et al., 2007)

Sensory items used in the Diagnostic Interview for Social and Communication Disorders (DISCO) (Wing & Gould 1970).

Category Sensory Items from DISCO (9th Version)
<b>Auditory</b> <ol style="list-style-type: none"><li>1. Distressed by sounds that do not affect others Responds negatively to unexpected/loud noises Holds hands over ears</li><li>2. Unusual fascination with certain sounds Enjoys strange noises/makes noise for noise sake</li><li>3. Unusually acute hearing</li></ol>
<b>Visual</b> <ol style="list-style-type: none"><li>1. Unusually interested in bright lights and shiny things</li><li>2. Gets unusually excited at seeing things spin</li><li>3. Twists or flicks hands or objects near eyes</li><li>4. Looks at object from many different angles for no apparent reason</li></ol>
<b>Proximal/Touch</b> <ol style="list-style-type: none"><li>1. Unusual interest in the feel of certain surfaces</li><li>2. Scratches or taps on different surfaces</li><li>3. Negative reaction to touch</li><li>5. Aimless manipulation of objects</li><li>6. Dislikes being washed, having hair washed, nails cut, hair cut, teeth brushed</li></ol>
<b>Smell/Taste</b> <ol style="list-style-type: none"><li>1. Unusual tendency to explore objects or people by smelling them</li><li>2. Has very unusual food preferences</li><li>3. Eats a very small range of foods; refuses food that is lumpy or needs chewing</li></ol>
<b>Other oral</b> <ol style="list-style-type: none"><li>1. Tends to put everything into his/her mouth</li><li>2. Mouths objects frequently</li></ol>
<b>Kinaesthetic</b> <ol style="list-style-type: none"><li>1. Enjoys being spun round more than age peers</li><li>2. Spins round or runs round in circles more than age peers</li></ol>
<b>Pain</b> <ol style="list-style-type: none"><li>1. Indifference to pain, heat and cold</li><li>2. Decreased awareness of pain and temperature</li></ol>
<b>Mixed</b> <ol style="list-style-type: none"><li>1. Plays with saliva, urinates to make puddles, smears feces</li><li>2. Self-injures if not prevented</li><li>3. Stimulates self (e.g., taps chin, regurgitates food) without injury</li><li>4. Destructive activities involving repeated tearing or breaking of things</li><li>5. Over breathing</li></ol>

## **Appendix B**

The following **GUIDING QUESTIONS** may assist educators in making decisions concerning the need for, and type of, intervention to address specific behaviours.

**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 community?**

**3) Is an intervention required?**

- Does the behaviour interfere with learning?
- Does the behaviour interfere with health or safety?
- How often does the behaviour occur?
- Is the behaviour itself stigmatizing for the learner?
- Does the behaviour interfere with peer relationships?
- Is it a priority for the learner? family? school? community?
- Will successful intervention have a direct positive effect for the learner or family?

**4) What is the possible communicative function of the behaviour?**

- What factors or situations are associated with occurrence or non-occurrence of the behaviour?
- What happens prior to the behaviour and following the behaviour?
- How do people react when the behaviour occurs?
- Does it occur without social input (e.g., when other people are not interacting with the learner)?

**5) 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 Standards Project and comparable reviews)?
- Is the intervention itself exclusionary? Stigmatizing?
- Is the intervention a good fit for use in the school environment (appropriate personnel resources and adheres to school or board 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?

## 6) 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?

**(Note:** It should be recognized 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).