Children with autism spectrum disorder (ASD) struggle to cope with the demands of daily life in a variety of contexts (Liss et al., 2001). The social and communication difficulties that are part of ASD directly contribute to these children’s struggles. It is also not clear the degree to which difficulties in processing of sensory information may also limit their performance of age appropriate daily living activities.

This study examined the relationship of sensory processing scores to daily living skills in children with ASD. Understanding this relationship may enable occupational therapists to more effectively support self-care occupations and appropriately target interventions, so that these children can function as successfully and independently as possible in their environments.

**Background**

Many children with ASD have deficits in sensory processing, which has been defined as “functions related to sensation occurring in the central nervous system; and includes reception, modulation, integration, and organization of sensory stimuli” (p. 480, Bundy, Lane, & Murray, 2002) and has been demonstrated repeatedly in the literature. For example, parents of 40 young children with ASD reported deficits in 8 out of 10 factors on the Sensory Profile (Dunn, 1999) including deficits in tactile sensitivity, under-responsive/seeks sensation, and auditory filtering (Watling, Deitz, & White, 2001). In addition, children with ASD (n=38) differed in their sensory processing from both typical children (n=1075) and children with attention deficit hyperactivity disorder (n=61) based on parent report using the Sensory Profile (Ermer & Dunn, 1998). It was also reported by Tomcheck and Dunn (2007) that 95% of 281 preschool children with ASD showed sensory processing dysfunction on the Short Sensory Profile (SSP) total score. As a final example, the social, emotional, and behavioral responses on the Vineland Maladaptive Behavior scores for 22 young children with ASD were shown to be associated with SSP scores (Baker, Lane, Angley, & Young, 2008).

Sensory processing deficits are also apparent on other caregiver report instruments. Using the Sensory Experiences Questionnaire, 69% of 56 children with autism had overall sensory symptoms (Baranek, David, Poe, Stone, & Watson, 2006). Ninety percent of 33 individuals with autism had sensory symptoms determined by the Diagnostic Interview for Social and Communication Disorders, which collects information on a range of behaviors and developmental skills, including sensory symptoms (Leekam, Nieto, Libby, Wing, & Gould, 2007). Children with autism differed from comparison children in both the frequency and pattern of sensory abnormality (abnormalities across multiple sensory domains). In addition, sensory differences persisted across both age and IQ domains.

**Occupational performance**

Occupational therapists are concerned with the ability of children with ASD to function within their home, school, and community environments, and seek to support the development of their daily living skills. Theories of occupational performance indicate that sensory processing abilities contribute to one’s ability to successfully complete activities of daily living (Baum & Baptiste, 2002). White, Mulligan,
Merrill, and Wright (2007) suggest that addressing sensory processing challenges may be useful for many children having difficulty with basic self-care tasks. Therapists apply theory and research and address the sensory difficulties of children with ASD assuming that this may help to remediate a variety of daily living skills. The results of this study show that, though this may be partially true, therapists need to address more than the sensory processing differences in these children.

Method
A convenience sample of 20 children was drawn from three non-profit agencies in Calgary and one in Edmonton. To be included, children were ages 5 to 7.5 years old; diagnosed with ASD by a developmental pediatrician or chartered psychologist based on criteria specified in the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2000); had an IQ of 79 or above on the Kaufman Brief Intelligence Test- Matrices Test (Kaufman & Kaufman, 1990); and parents spoke and read English to complete the Short Sensory Profile (Dunn, 1999), the Self Care Functional Skills scale of the Pediatric Evaluation of Disability Inventory (PEDI) (Haley, Coster, Ludlow, Haltiwanger, & Andrellos, 1992), and provide written consent.

Children with more typical cognitive development were selected in order to examine the relationship without confounding effects due to more global developmental delays. Children in early school years were selected as self-care skills are very important for school participation.

Results
On the Short Sensory Profile total score, three (15%) of the children scored in the ‘typical performance’ range, nine (45%) in the ‘probable difference’ range, and eight (40%) in the ‘definite difference’ range. With the exception of three children, the children with ASD were under or over responsive to sensory input from their environment in comparison to the responses of typical children. On the factor scores, 70% of the children scored in the typical performance category for movement sensitivity and visual/auditory sensitivity factors. The highest frequency for definite differences occurred on the auditory filtering factor (55%), followed by the factors for under-responsive/seeks sensation (40%) and low energy/weak (40%).

On the PEDI Self Care scale, the mean standard score was 30.0 (SD=9.6), with scores ranging from 13.6 to 50.8. On this scale, the mean standard score is 50, with a standard deviation of 10. Scores less than 30 indicate a significant degree of difficulty with self care activities. Ten children (50%) had scores in this range.

There was little, if any, ($r=.23$), relationship between standard scores on the PEDI and SSP category scores (typical= 1, probable difference = 2, definite difference= 3) (Munro, 2001). When PEDI scores were converted to categorical scores (scores 30+ = 1, scores < 30= 2), Spearman’s rho correlation was .36, indicating a small relationship (Munro).

Looking at individual children (see Table 1), the three children who scored in the typical range on the SSP had scores in the typical range on the PEDI (32 to 38). For the two children who scored the highest on the PEDI, one was in the definite difference range for the total SSP score and the other scored in the probable difference range.

Table 1- Scores on Short Sensory Profile and the Pediatric Evaluation of Disability Inventory

<table>
<thead>
<tr>
<th>Scores on PEDI</th>
<th>Typical (≥30)</th>
<th>Atypical (&lt;30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Score: Short Sensory Profile</td>
<td>Typical</td>
<td>3</td>
</tr>
<tr>
<td>Probable Difference</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Definite Difference</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

Implications
The high prevalence of sensory processing challenges in our sample is in keeping with the literature cited earlier. Clearly, occupational therapists should continue assessing the sensory processing of children diagnosed with ASD to help caregivers and others better understand their responses to their environment. Strategies can be implemented to enable children to better cope with their sensory experiences and to help others to appropriately modify the sensory environment so the children can focus on activities and occupational tasks. Activities can be tailored to their unique sensory needs.

The lack of a significant relationship between sensory processing and daily living skills in these 20 young children with ASD and relatively typical cognitive development suggests that there are other factors impacting the performance of self-care skills.
This study is not the first to identify a small relationship between self-care skills and sensory processing differences and therefore this finding is not simply due to the small sample or the measurement tool selected. Jasmin and colleagues (2009) also found no significant relationship between the total SSP score and daily living skills as measured on the Vineland Adaptive Behavior Scales for 35 Canadian children with ASD who were three to four years old. They found a relationship similar to ours with self-care on the WeeFIM ($r = .32$). Baker, Lane, Angley, and Young (2008) reported a correlation of .43 between the total SSP score and the Vineland Adaptive Behavior Scales daily living skills for 22 children ranging from two to eight years of age with ASD and a range of cognitive levels.

The weak relationship of sensory processing and daily living skills is no surprise to occupational therapists who are well aware of the multiplicity of factors that influence all areas of occupational performance. Addressing sensory processing alone will not necessarily result in an improvement in daily living skills. Therapists need to assess all the factors that may make daily living tasks challenging, look for ways to limit the impact of these constraints, and then directly address the specific tasks of concern to the child and family.

Children with ASD and atypical sensory processing can develop relatively typical daily living skills. For example, a child with sensitivity to various tactile inputs can be taught to dress himself independently using tolerated clothing textures allowing him to participate in a kindergarten program. Additional intervention may focus on increasing the range of textures tolerated in order to make clothing options easier in the future. Immediate intervention needs to be focused on the specific goals and tasks of priority to the child and family rather than on broad underlying processes (Hillier, 2007). Understanding the sensory processing of a child with ASD does not mean that one can predict their daily living skills. However, understanding their sensory processing provides rich contextual information within which to position intervention.

Future research needs to address the relative strength of different constraints experienced by children with ASD. Understanding the relative contribution of specific factors including sensory processing, motor skills, communication, behaviours, and social skills to occupational performance areas such as play and self-care for children with ASD would help identify discrete beginning points for intervention.

References


