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# Cross-Cultural Comparison of Sensory Behaviors in Children With Autism

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## KEY WORDS

- autistic disorder
- child behavior
- cross-cultural comparison
- environment
- sensation

Parents of children with autism frequently report that their children exhibit unusual responses to sensory experiences. Little research is available, however, describing how parents' and children's culture and environment might influence parents' reports of their children's behaviors. This study compared the frequency of parent-reported responses to sensory experiences in children from two countries—Israel and the United States. We administered the Short Sensory Profile to primary caregivers of children with autism spectrum disorders (ASD) and typically developing peers. Results indicate that Israeli parents reported unusual responses to sensory experiences less frequently than U.S. parents for both ASD and typically developing children. U.S. children with ASD demonstrated significantly greater difficulty in the Auditory Filtering and Visual/Auditory Sensitivity domains than Israeli children with ASD. These findings indicate a need to further explore the influence of culture and environment on caregiver perceptions of the responses to sensory experiences of children with ASD.

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Research has indicated that people with autism spectrum disorders (ASD) process sensory information differently from others (Bennett, 1996; Brock, Brown, Boucher, & Rippon, 2002; Frith, 2003; Mottron, Burack, Stauder, & Robaey, 1999; Ornitz, 1974) and that 80%–95% of people with ASD experience unusual responses to sensory experiences. Sensory processing disorders in children with ASD have been described in the auditory, visual, tactile, gustatory, olfactory, kinesthetic, and proprioceptive systems (Kientz & Dunn, 1997; Rogers, Hepburn, & Wehner, 2003; Tomchek & Dunn, 2007); such children have a high frequency of under-responsiveness and sensory avoiding behaviors and a low frequency of sensory seeking in comparison with typically developing peers (Ben-Sasson et al., 2007, 2008).

Research also suggests that neurological development, including sensory processing, is subject to environmental influences. For example, Gal, Dyck, and Passmore (2002) found that various sensory environments (i.e., aversive, neutral,

and appetitive) may have a direct effect on behaviors such as stereotyped movements in children with ASD. Cermak and Daunhauer (1997) found that institutionalization can have an effect on responses to sensory experiences.

A person's culture influences values, interactions, social customs, and family structures, which help organize the environment in which he or she lives. The *Occupational Therapy Practice Framework: Domain and Process* (2nd ed.) defines *culture* as the “customs, beliefs, activity patterns, behavior standards, and expectations accepted by the society of which the client is a member” (American Occupational Therapy Association, 2008, p. 645). Evidence suggests that a person's cultural environment has an effect on many facets of development, illness, and behavior (Karno & Jenkins, 1993), including expressed emotion (Kleinman, 1988; Lewis-Fernández, 1996) and the expression and experience of pain (Kirmayer, 2008). Culture also is hypothesized to play a role in the prevalence and risk and

protective factors for some disorders (Canino & Alegria, 2008).

Although people with neurological disorders, including ASD, might be expected to show similar symptoms across cultures, no data exist to show that this is the case. The purpose of this study was to examine differences in responses to sensory experiences in two countries—Israel and the United States. We compared age-matched, typically developing children and children with ASD across the two cultures.

## Method

### Participants

The study's inclusion criteria required participants to be 5–12 yr old and either to be typically developing (no medical or psychological diagnoses) or to have an ASD diagnosis. Diagnosis of ASD was noted in participants' records according to criteria from the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; American Psychiatric Association, 1994). Data were gathered from two separate datasets: one from the United States (an SPSS database from a large study on autism) and the other from Israel (an SPSS database from a large study on sensory processing in children with and without disabilities). Approval to conduct the study was granted through an interagency authorization agreement for data sharing from Thomas Jefferson University. Child participants from both datasets who met the current study's inclusion criteria were entered into one database for group comparison.

### Measures

The Short Sensory Profile (SSP; McIntosh, Miller, Shyu, & Dunn, 1999), the research version of the Sensory Profile (Dunn, 1999), is a 38-item caregiver questionnaire that assesses sensory processing abilities in children aged 3–11 yr. Items are scored on a five-point Likert scale, with 1 = *behavior is always observed* and 5 = *behavior is never observed*. Separate scores are calculated for seven sections: Tactile Sensitivity, Taste/Smell Sensitivity, Movement Sensitivity, Underresponsive/Seeks Sensation, Auditory Filtering, Low Energy/Weak, and Visual/Auditory Sensitivity. A Total score

provides a combined score. Internal reliability ranges from .70 to .90 and internal validity correlations from .25 to .76 (McIntosh et al., 1999). Construct validity was established by correlating SSP scores with abnormal physiological responses to a series of sensory challenges (Miller, Reisman, McIntosh, & Simon, 2001). The U.S. version of the SSP has been formally translated into Hebrew and is widely used in Israel. Internal reliability of the SSP in 395 typically developing children in Israel was .92 (Engel-Yeger, 2010).

### Procedures

Primary caregivers of child participants completed the SSP following the standardized procedures. Data were combined from both datasets and analyzed with SPSS Version 11.5 (SPSS, Inc., Chicago). SSP scores were converted to standardized  $z$  scores using criteria developed by McIntosh et al. (1999).  $Z$  scores above  $-1.00$  indicate typical development, those from  $-1.00$  to  $-2.00$  indicate probable differences in the child's responses to sensory experiences, and those below  $-2.00$  indicate definite differences in the child's responses to sensory experiences. Independent two-tailed  $t$  tests were used to evaluate differences between typical participants and those with ASD in the two cultures. The criterion for statistical significance was set at .05 for all results in the study.

## Results

Our sample included 54 typically developing participants (28 from Israel, 26 from the United States) and 57 participants with ASD (37 from Israel, 20 from the United States). No significant differences were found in age,  $F(3, 107) = 1.76, p > .05$ , or gender,  $\chi^2(1, N = 54) = 0.30, p > .05$ , across the two countries. Significantly more boys than girls were in both the U.S. and the Israeli groups,  $\chi^2(1, N = 111) = 7.70, p < .005$ , but the frequency of boys or girls included did not differ across countries,  $\chi^2(1, N = 57) = 0.49, p > .05$ . Comparison of mean scores of participants with ASD from the United States and Israel yielded significant differences in Auditory Filtering,  $t(55) = 2.21, p < .05$ , and Visual/Auditory Sen-

sitivity,  $t(55) = 4.53, p < .001$ , with participants from Israel scoring higher (indicating fewer sensory symptoms). Notably, children with ASD from both countries scored lower than  $-1.00$  on most subtests.

For typically developing participants, significant differences were found between the groups on Tactile Sensitivity,  $t(52) = 2.26, p < .05$ ; Underresponsive/Seeks Sensation,  $t(52) = 3.8, p < .001$ ; Auditory Filtering,  $t(52) = 3.66, p < .001$ ; and Visual/Auditory Sensitivity,  $t(52) = 3.87, p < .001$ , as well as on the Total score,  $t(52) = 3.52, p < .001$ . Mean scores of typically developing participants from Israel were higher than those from the United States on all sections (indicating better ratings on the SSP).

## Discussion

Examination of SSP scores in typically developing participants from both cultures provides perspective for comparing participants with ASD across these cultures. As expected, all  $z$  scores for typically developing participants in both countries fell within normal ranges; however, typically developing participants from Israel scored higher on all sections and significantly higher on four of the seven sections and on the Total score. This finding suggests that fewer caregivers reported unusual responses to sensory experiences for Israeli participants. In light of findings that U.S. SSP scores are reliable for the Israeli population (Engel-Yeger, 2010), these differences suggest either that typically developing participants in Israel may not respond behaviorally to sensory experiences as intensely as typically developing children in the United States or that Israeli caregivers are less likely to rate a response to a sensory experience as "significantly different" than usual.

Participants in both ASD samples demonstrated more unusual responses to sensory experiences than the typically developing comparison groups. This finding is consistent with the literature (Gal, Cermak, & Ben-Sasson, 2007; Rogers et al., 2003; Tomchek & Dunn, 2007) and adds further evidence that children with ASD have significantly more unusual responses to sensory experiences. Of particular interest,

Israeli caregiver reports rated the children with ASD as having better auditory filtering and fewer problems with visual/auditory sensitivity than did U.S. caregiver reports. This finding warrants further investigation to determine whether it is related to cultural differences influencing the caregivers' reports (i.e., do Israeli caregivers have a different cultural standard for auditory filtering and visual/auditory sensitivity than U.S. caregivers?) or to actual population differences (do children from different geographic areas or different cultures exhibit differences in sensory performance?).

One way to consider our findings is to look at the results using Super and Harkness's (2002) developmental niche framework. This framework suggests that by organizing a child's environment, culture is a factor that shapes the course of child development. A child's developmental niche comprises three operational subsystems: (1) the physical and social settings, (2) the historically constituted customs and practices of child care and child rearing, and (3) the psychology of caretakers. The interaction of these subsystems creates a specific cultural developmental niche that organizes a child's daily environment and thus influences development.

Applying this framework to the findings of our study, one would expect the participants from each culture to have different developmental niches that subsequently influence the child's development. As a descriptive study, our findings only suggest that differences may exist between cultures; further investigation of the aspects of the developmental niche, the child, and the interactions between them is warranted to understand cultural differences in sensory processing. The developmental niche framework is also useful in supporting assessment of context-specific cultural aspects that may affect the interpretation of assessment findings, including assessments of sensory processing.

## Implications for Occupational Therapy Practice

The results of this study have the following implications for occupational therapy practice:

- When planning and providing intervention for children with ASD and other disabilities, therapists need to be mindful of the influence of culture on their sensory processing.
- When using assessments that examine sensory processing on the basis of parent-reported responses to sensory experiences cross-culturally, therapists need to consider the impact of culture and environment when interpreting results.

## Conclusion

Although the findings from this study yield important information about cultural differences in sensory processing, the findings must be interpreted with caution because of several limitations of the study. Convenience samples were used for both the U.S. and the Israeli groups; thus, the sample may not be representative of the population of children with ASD in these countries. Second, the sample sizes of the ASD groups were discrepant (37 participants from Israel, 20 from the United States); this difference may have had an impact on findings. Finally, the sample of participants with ASD from both countries was selected on the basis of chart diagnosis from the respective referral sites. It is possible that the criteria, assessments, and cut scores were different in varying settings and affected the sample of participants included.

Despite these limitations, the findings from this study provide important direction for future research examining sensory processing in children with ASD across cultures and have important implications for professionals working with children with ASD from varying cultures. The study raises the need to discover both inherent and culturally mediated differences that may affect parents' perceptions of sensory processing differences between children with and without disabilities from different cultures. Further research is needed to determine the nature and extent of the influence that environment in general, and specifically the cultural environment, has on sensory processing. ▲

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