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Use of Sensory Assessment Tools with Children diagnosed with Autism Spectrum Disorder (ASD)

Clinical Question

- P** (population/problem): In children with ASD up to 9 years of age,
I (intervention): which assessment tools
O (outcome): are effective for assessing sensory processing abilities?

Target Population

Inclusions:

- Children up to 9 years of age who present with a diagnosis of Autism Spectrum Disorder (ASD) according to the DSM-IV criteria

Exclusions:

- Individuals with an ASD diagnosis of Rett Syndrome or Childhood Disintegrative Disorder

Recommendation (See Table of Recommendation Strength following references)

It is recommended that if a standardized test is to be administered to assess sensory processing difficulties, use one of the following tools:

- Sensory Processing Measure for children age 5 to 12 years (*Asher 2007 [5], Glennon 2007 [5], Miller-Kuhaneck 2007 [5], Parham 2007 [5], Local Consensus [5]*)
- Short Sensory Profile for children 37 months up to age 9 (*Tomchek 2007 [4a], Asher 2007 [5], Dunn 1999 [5], McIntosh 1999 [5], Local Consensus [5]*)
- Infant/Toddler Sensory Profile for children between 7 and 36 months of age (*Dunn 2002 [5]*).

Discussion/summary of evidence

The quality of evidence for the use of sensory assessments with children with ASD is low.

1. **Sensory Processing Measure (SPM):** The SPM is designed as a screening tool to assist in identifying children with sensory processing difficulties; it is not meant for diagnostic purposes. It consists of three forms, designed to be used together; the home form, to be completed by the caregiver, the main classroom form, to be completed by the teacher and the school environments form, to be completed by other adults in the school environment familiar with the child (*Parham 2007 [5]*). The SPM provides norm-referenced standard scores for 5 sensory systems (visual, auditory, tactile, proprioceptive, and vestibular) and for praxis and social participation (*Glennon 2007 [5]*). Each form of the SPM takes approximately 15 to 20 minutes to administer and provides information regarding the difference in sensory function in various environments (*Parham 2007 [5]*). The SPM is particularly useful for children with ASD because it includes assessment of social participation (*Local Consensus [5]*).

Children with autism are expected to show elevated scores on the *Social Participation* and *Planning and Ideas* scales. Children with severe autism may have elevated scores on all scales on the SPM; but not all children with autism have sensory processing difficulties, and therefore may not have elevated scores (*Parham 2007 [5]*).

Reliability: Internal consistency (alpha coefficient) ≥ 0.75 for all scales and forms, indicating good internal consistency (*Parham 2007 [5]*) which Miller-Kuhaneck further established in their study (*Miller-Kuhaneck 2007 [5]*).

Two-week test–retest reliability ≥ 0.94 for all scales, indicating a high correlation and excellent stability of the scale scores over time (Asher 2007 [5], Parham 2007 [5]).

Validity: The SPM demonstrates sound content, face, and construct validity. The authors of the SPM took measures to ensure the content and face validity of the current SPM items and scales (Asher 2007 [5], Miller-Kuhaneck 2007 [5], Parham 2007 [5]). The author reports that “each SPM scale represents a theoretical construct that is defined by its item content and secondly, the scales can be scored and interpreted separately from one another,” assuring construct validity (Parham 2007 [5]). The structural validity of the Home form is stronger than that of the Main Classroom Form (Parham 2007 [5]). The authors provide factor analysis data to further establish the SPM’s structural validity. SPM scales appropriately distinguished between a normative sample and a sample of clinic-referred children with sensory processing difficulties indicating strong discriminant validity (Asher 2007 [5], Parham 2007 [5]).

2. **Sensory Profiles:** Several studies have found that the Short Sensory Profile and the Infant/Toddler Sensory Profile are sensitive enough to differentiate sensory processing difficulties in children with autism from their typically developing peers (Tomchek 2007 [4a], Watling 2001 [4a], Ermer 1998 [4a], White 2007 [4b], Kientz 1997 [4b]).
 - The Short Sensory Profile (SSP) includes a 38 item caregiver questionnaire using a 5 point Likert scale. It includes the following sections: Tactile sensitivity, taste/smell sensitivity, movement sensitivity, under-responsive/seeking sensation, auditory filtering, low energy, visual /auditory sensitivity and a total sensory processing score.
 - The Infant/Toddler Sensory Profile for children ages 7 to 36 months contains 48 test items and includes 5 sensory processing sections and four quadrant scores.


Reliability: Internal reliability for the SSP was calculated using Cronbach’s Alphas and ranged from 0.70 to 0.90 with the highest reliability rating for the Total Sensory Processing score (McIntosh 1999 [5]). Internal reliability for the Infant/Toddler Sensory Profile ranged from 0.42 to 0.86 (Dunn 2002 [5]). The test–retest reliability for the SSP has not been published at this time. Test-retest reliability for the Infant/Toddler Sensory Profile ranged from 0.74 for quadrant score to 0.86 for sensory processing section scores (Dunn 2002 [5]).












Validity: Internal validity correlations for the SSP ranged from 0.25 to 0.76 and were all significant at $p < 0.01$ (McIntosh 1999 [5]). “Content validity for the SSP was based on a literature review, expert review, and category analysis based on a national study. Convergent and discriminant validity were examined, comparing SP scores with the School Function Assessment. Profile results were compared with skin conductance responses, confirming Dunn’s hypothesis of sensory processing: Subjects with low thresholds had greater responsivity than did those with high thresholds” (Asher 2007 [5]). Evidence of convergent and discriminant validity for the Infant/Toddler Sensory Profile are discussed in the test manual (Dunn 2002 [5]).

Health Benefits, Side Effects and Risks

There are no side effects or risks to using the Sensory Processing Measure, the Sensory Profile (short form), or the Infant/Toddler Sensory Profile. The health benefit of these assessments tools includes gaining caregiver’s perspective of sensory processing abilities resulting in improved treatment planning and patient care.

References/Citations

Note: When using the electronic version of this document,  indicates a hyperlink to the PubMed abstract. A hyperlink following this symbol goes to the article PDF when the user is within the Cincinnati Children's Hospital Medical Center (CCHMC) network.

1. **Asher, I. E.:** Occupational therapy assessment tools: An annotated index 2007, [5]  _____.
2. **Dunn, W.:** *Infant/Toddler Sensory Profile User's Manual*. San Antonio, 2002, [5] .
3. **Dunn, W.:** *Sensory Profile User's Manual*. San Antonio, 1999, [5] .
4. **Ermer, J., and Dunn, W.:** The sensory profile: a discriminant analysis of children with and without disabilities. *Am J Occup Ther*, 52(4): 283-90, 1998, [4a] _____  _____.
5. **Glennon, T. J.; Miller-Kuhaneck, H.; Henry, D. A.; Parham, L. D.; and Ecker, C.:** SPM PowerPoint 2007. Accessed 7-17-2008 from <http://www.sensoryprocessingmeasure.com/> [5] .
6. **Kientz, M. A., and Dunn, W.:** A comparison of the performance of children with and without autism on the Sensory Profile. *Am J Occup Ther*, 51(7): 530-7, 1997, [4b] _____  _____.
7. **Local Consensus:** at the time the BESt was developed. [5].
8. **McIntosh, D. N.; Miller, L. J.; and Shyu, V.:** *Sensory Profile User's Manual* San Antonio, 1999, [5] .
9. **Miller-Kuhaneck, H.; Henry, D. A.; Glennon, T. J.; and Mu, K.:** Development of the Sensory Processing Measure-School: initial studies of reliability and validity. *Am J Occup Ther*, 61(2): 170-5, 2007, [5] _____  _____.
10. **Parham, L. D.; Ecker, C.; Miller-Kuhaneck, H.; Henry, D. A.; and Glennon, T. J.:** *Sensory Processing Measure User's Manual*. Los Angeles, 2007, [5] .
11. **Tomchek, S. D., and Dunn, W.:** Sensory processing in children with and without autism: a comparative study using the short sensory profile. *Am J Occup Ther*, 61(2): 190-200, 2007, [4a] _____  _____.
12. **Watling, R. L.; Deitz, J.; and White, O.:** Comparison of Sensory Profile scores of young children with and without autism spectrum disorders. *Am J Occup Ther*, 55(4): 416-23, 2001, [4a] _____  _____.
13. **White, B. P.; Mulligan, S.; Merrill, K.; and Wright, J.:** An examination of the relationships between motor and process skills and scores on the sensory profile. *Am J Occup Ther*, 61(2): 154-60, 2007, [4b] _____  _____.

Note: Full tables of evidence grading system available in separate document:

- [Table of Evidence Levels of Individual Studies by Domain, Study Design, & Quality](#) (abbreviated table below)
- [Grading a Body of Evidence to Answer a Clinical Question](#)
- [Judging the Strength of a Recommendation](#) (abbreviated table below)

Table of Evidence Levels (see note above)

<i>Quality level</i>	<i>Definition</i>
1a† or 1b†	Systematic review, meta-analysis, or meta-synthesis of multiple studies
2a or 2b	Best study design for domain
3a or 3b	Fair study design for domain
4a or 4b	Weak study design for domain
5	Other: General review, expert opinion, case report, consensus report, or guideline

†a = good quality study; b = lesser quality study

Table of Recommendation Strength (see note above)

<i>Strength</i>	<i>Definition</i>
“Strongly recommended”	There is consensus that benefits clearly outweigh risks and burdens (or visa-versa for negative recommendations).
“Recommended”	There is consensus that benefits are closely balanced with risks and burdens.
No recommendation made	There is lack of consensus to direct development of a recommendation.
Dimensions: In determining the strength of a recommendation, the development group makes a considered judgment in a consensus process that incorporates critically appraised evidence, clinical experience, and other dimensions as listed below.	
<ol style="list-style-type: none"> 1. Grade of the Body of Evidence (see note above) 2. Safety / Harm 3. Health benefit to patient (<i>direct benefit</i>) 4. Burden to patient of adherence to recommendation (<i>cost, hassle, discomfort, pain, motivation, ability to adhere, time</i>) 5. Cost-effectiveness to healthcare system (<i>balance of cost / savings of resources, staff time, and supplies based on published studies or onsite analysis</i>) 6. Directness (<i>the extent to which the body of evidence directly answers the clinical question [population/problem, intervention, comparison, outcome]</i>) 7. Impact on morbidity/mortality or quality of life 	

Supporting Information

Introductory/background information

Children with ASD most often demonstrate sensory processing difficulties. Typically clinical observations are used to identify areas of concern; however, the Short Sensory Profile and the SPM offer a way to gather additional information on the child. They are also useful for screening purposes to determine if further assessment of sensory processing abilities is necessary.

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Search strategy

1. Databases

OVID Medline

OVID Cinahl

Pedro

All OVID EBM Reviews- Cochrane DSR, ACD Journal Club

Ebsco Host

www.otseeker.com

2. Search Terms:

Sensory, children, assessment, occupational therapy

3. LIMITS AND FILTERS: English, humans; Additional articles from reference lists

Known conflicts of interest

Conflict of interest declarations were completed as stated above and none were found.

Note

Copies of this Best Evidence Statement (BESt) are available online and may be distributed by any organization for the global purpose of improving child health outcomes. Website address: <http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/ev-based/default.htm>

Examples of approved uses of the BESt include the following:

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- the BESt may be adopted or adapted for use within the organization, provided that CCHMC receives appropriate attribution on all written or electronic documents; and
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Note

This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.

Reviewed by Clinical Effectiveness