

## SENSORY PERCEPTION IN PRESCHOOL CHILDREN AFFECTED BY AUTISM SPECTRUM DISORDER: A PILOT STUDY

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### ABSTRACT

**Introduction:** Autism spectrum disorder (ASD) is a behavioral syndrome caused by a developmental disorder, biologically determined, with onset in the first three years of life. The areas concerned are mainly those related to social communication, social interaction and mutual functional and symbolic play.

In the last decades, different conceptions of autism have taken, also emphasizing different sensory-perceptual abnormalities as the basis of the central features of disorder.

This pilot study intends to address the issue of sensory perception in preschool children affected by ASD.

**Material and methods:** 11 ASD children were enrolled (7 males, 4 female) aged between 2.3 years and 4.6 years, (mean age  $3.29 \pm 0.72$ ). The control group consisted of 24 typical developing children (15 males, 9 females) (mean age  $3.08 \pm 0.87$ ). All subjects underwent assessment of sensory perceptual abilities according to the Bogdashina's Sensory Profile Checklist Revised (SPCR) evaluation (43).

**Results:** The two groups are comparable for age ( $p = 0.491$ ) and sex distribution ( $p = 0.755$ ).

Table 1 shows the comparison between the two groups results in the SPCR, specifically, individuals with ASD, showed significantly higher scores on near all perception areas evaluated than healthy controls, suggesting a clear perceptual impairment in ASD subjects. Only for olfactory perception two groups were comparable.

**Conclusions:** no significant differences in behavioral reaction to smell stimulation between ASD and typical developing children, and this result could be explained according to the early age of our sample that could cause high reactivity to smell stimulation also in typical developing examined children.

**Keywords:** Autism Spectrum Disorders, Preschool children, Perception, SPCR.

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### Introduction

Autism is a behavioral syndrome caused by a developmental disorder, biologically determined, with onset in the first three years of life. The areas concerned are mainly those related to social communication, social interaction and mutual functional and symbolic play.

The extreme clinical variability in ASD leading clinicians and researchers to consider a family of disorders, which, while retaining similar characteristics, has within it a significant variability that induced DSM-5 to define these conditions as Autistic spectrum disorders (ASD)<sup>(1-6)</sup>.

In the last decades, different conceptions of autism have taken, also emphasizing different sen-

sory-perceptual abnormalities as the basis of the central features of disorder. Moreover, other reports intend autism as a sensory disorder, rather than a social dysfunction, in which each direction work in isolation, and the brain is not capable of organizing the stimuli in correct manner<sup>(1-6)</sup>.

All ASD symptoms may be identified as direct effect of brain impairment that causes perceptual/sensory external inputs from the outside world more different from than these perceived by non-autistic brains. In this light, autism is as sensory integrative dysfunction that impact the brain ability to give meaning to sensations and to organize them into perceptions and finally into mind<sup>(1-6)</sup>.

According to the claims of some authors abnormal sensory experience is a feature of primary importance to explain the basic symptoms of autism, those considered as essential by the DSM-5 and ICD-10<sup>(1-6)</sup>.

This pilot study intends to address the issue of sensory perception in preschool children affected by ASD.

## Material and methods

### Population

During January-July 2016, 11 ASD children were enrolled (7 males, 4 female) aged between 2.3 years and 4.6 years, (mean age  $3.29 \pm 0.72$ ). ASD was diagnosed according to international criteria.

Exclusion criteria were the following: overweight ( $z\text{-BMI} > 85$  pc) and obesity ( $z\text{-BMI} > 95$  pc), cognitive disability ( $IQ < 70$ ), neurological disorders (ie headaches, epilepsy), chromosomal syndromes (eg. Down, Prader-Willi, Crouzon, Pierre-Robin), other psychiatric illness (ie. mood disorders, anxiety disorders, psychosis) and specific neuropsychological disorders<sup>(7-42)</sup>.

For comparison was used a control group consisting of 24 typical developing children (15 males, 9 females) (mean age  $3.08 \pm 0.87$ ).

All subjects underwent assessment of sensory perceptual abilities according to the Bogdashina's Sensory Profile Checklist Revised (SPCR) evaluation<sup>(43)</sup>.

### Bogdashina's Sensory Profile Checklist Revised (SPCR)

The revised checklist of the sensory-profile (SPCR, Sensory Profile Checklist-Revised) was organized as a screening tool for the compilation of the sensory profile of an ASD child. Its descriptors

are based on information from personal accounts of autism and close observation of autistic children individuals. The SPCR includes 20 categories that cross all seven sensory systems, to cover the possible modes of sensory experiences of autistic people. This approach to the problem by "internal" points out that not all the sensory experiences are abnormal, and some of them could be considered "superability" and represent strengths rather than weaknesses. "Narrow" the terms to describe different sensory perceptions proved very useful to distinguish between several "unusual" allows you to draw close to the individual child deficits using its strengths<sup>(43)</sup>.

SPCR is completed by the child's parents. However, despite the parents' input is vital, especially as regards the sensory history of the child and his behavior at home, it is also necessary observation in the clinic or school to consolidate the information provided by the parents, and to verify certain points marked in the SPCR as "unsafe". The observation is conducted in the form of sampling "episodic": when there is the target behavior tick a box. To organize and summarize the observations, the checklist of observations prove to be very useful<sup>(43)</sup>.

### Statistical analysis

For comparison between the two groups (ASD and controls) t- testing and Chi-square test, where appropriate, were applied. p values  $< 0.05$  were considered statistically significant.

For statistical analysis it used the software STATISTICA (data analysis software system, version 6, StatSoft, Inc. (2001).

## Results

The two groups are comparable for age ( $p = 0.491$ ) and sex distribution ( $p = 0.755$ ).

Table 1 shows the comparison between the two groups results in the SPCR, specifically, individuals with ASD, showed significantly higher scores on near all perception areas evaluated than healthy controls, suggesting a clear perceptual impairment in ASD subjects. Only for olfactory perception two groups were similar.

## Discussion

The main findings of the present study may be identified in significantly higher scores for more

items of SPCR in ASD subjects than typical developing children.

Specifically, this finding pinpoints the presence of important impairment in more perceptual abilities suggesting a key role for sensory evaluation in ASD subjects.

In 2011, Narzisi et al.<sup>(44)</sup> studied sensory profiles in children with and without ASD with significant differences in Auditory and Touch and Multisensory Processings, such as differences in Modulation of Sensory Input, Affecting Emotional Responses and Behavioral Outcomes of Sensory Processing. Our results tend to confirm these findings and highlight the impairment in View, Hearing, Touch, Taste, Proprioception and Vestibular system.

On the other hand, ASD subjects have an abnormal cross-modal interaction between the auditory and the somatosensory systems, likely associated with abnormal involvement of the nonclassical auditory pathways. In this light, ASD children and adolescents have altered intersensory processing profiles when compared with typically developing children.

Our findings show no significant differences in behavioral reaction to smell stimulation between ASD and typical developing children, and this result could be explained according to the early age of our sample that could cause high reactivity to smell stimulation also in typical developing examined children<sup>(45-50)</sup>.

	ASD N=11	TD N=24	P
Age	3.091±0.831	3.083±0.776	0.979
View	13.455±3.142	4.167±1.810	<0.001
Hearing	12.091±3.590	4.042±1.922	<0.001
Touch	8.818±4.729	4.958±1.967	0.002
Smell	4.109±2.343	4.292±1.853	0.804
Taste	6.727±3.289	4.583±1.692	0.015
Proprioception	7.545±3.698	4.542±2.064	0.004
Vestibular system	8.091±3.910	3.792±1.444	<0.001

**Table 1:** shows comparison between ASD and typical developing (TD) children among SPCR subscales. For comparison between the two groups (ASD and TD) t-Test was applied. p values<0.05 were considered statistically significant.

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