

## The use of Autism Mental Status Exam in an Italian sample. A brief report

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### Abstract

*The Autism Mental Status Exam (AMSE) is an eight-item observational assessment that allows clinicians to observe and document social and communication functioning and behavioral features in children during a clinical evaluation.*

*Previous findings indicated a high classification accuracy of the AMSE, when compared to ADOS (Autism Diagnostic Observation Schedule), administered to a high-risk population suspected to have an Autism Spectrum Disorder (ASD).*

*The present study reports the data obtained through the administration of AMSE to a sample of 98 Italian patients (11 females and 87 males) with a diagnosis of ASD formulated according to the diagnostic criteria of the DSM 5. All subjects were administered AMSE, ADOS and ADI-R.*

*Results show an acceptable internal consistency of the instrument*

*Received:* February 14, 2017; *Revised:* May 22, 2017; *Accepted:* June 20, 2017

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*(alpha = .63) and statistically significant correlations between AMSE total score and the ADOS scores.*

*Preliminary findings suggest that the AMSE might provide a rapid and reliable observational assessment in a population with a suspect of ASD.*

**Keywords:** Autism Spectrum Disorder; Autism Mental Status Exam; ADOS; ADI-R.

## 1. Introduction

According to the national and international guidelines and Diagnostic and Statistical Manual of Mental Disorders (DSM 5) (APA, 2013), the diagnosis of Autism Spectrum Disorder (ASD) should be based on interviewing caregivers, behavioral observations by the clinicians and use of standardized diagnostic instruments with good psychometric properties (Klin, Saulnier, Tsatsanis, & Volkmar, 2005; APA, 2013).

The most appropriate evaluation protocols for ASD include a clinical evaluation based on the DSM 5, as well as on the use of gold standard psychodiagnostic tests, such as Autism Diagnostic Observation Schedule (ADOS) (Lord, Rutter, Di Lavore, & Risi, 2002) and Autism Diagnostic Interview-Revised (ADI-R) (Rutter, Bailey, & Lord, 2003). Nevertheless, the use of these tests have some limitations: a long-lasting time required for their application, the need of clinicians specifically trained for the appropriate use of the instruments, the reliability/availability of the caregiver, and materials not always appropriate for all subjects.

In clinical settings ADOS and ADI-R administrations are not always possible because of time required for their completion (Shattuck & Grosse, 2007; Grodberg, Weinger, Halpern, Parides, Kolevzon, & Buxbaum, 2014).

As a result, clinicians often use a clinical evaluation without the support of standardized measures.

According to literature, other assessment tools for ASD – faster to administer and with good psychometric properties – have been described, such as the Autism Mental Status Exam (AMSE). The AMSE was developed in 2011 by Grodberg and colleagues at the Seaver Autism Center for Research and Treatment at the Mount Sinai School of Medicine. It is a brief diagnostic classification test, including eight items, that can allow clinicians to observe and document the social, communicative and behavioral functioning of people with ASD.

A training curriculum on the AMSE, with a digital manual and practice assessments using animated video simulations of clinical evaluation based on individuals of different ages and levels of functioning are available online ([www.autismmentalstatusexam.com](http://www.autismmentalstatusexam.com)). Validated translations are available in numerous languages. (Grodberg *et al.*, 2014).

The AMSE aims to provide the basis for a standardized observation that can help to document signs and symptoms of autism as well as, to support the clinical diagnosis of ASD and to provide a cut-off score to support the clinical judgment.

It can be used by clinical with specific expertise in the diagnosis of ASD.

The AMSE does not require extra work, in fact, it uses the information provided by the direct observations of patients during the routine clinical examination and allows to organize and systematically document the data collected.

The AMSE is based on an observational assessment, but it also provides opportunity to record clinical information reported by caregivers or by patients.

The combination of observed signs and reported symptoms provides the best diagnostic accuracy (Risi, Lord, Gotham, Corsello, Chrysler, Szatmari *et al.* 2006; Grodberg *et al.*, 2014).

Findings from an initial phase of testing, have shown an excellent inter-rater reliability and a strong classification accuracy when compared to the ADOS (Grodberg, Weinger, Kolevzon, Soorya & Buxbaum 2012; Grodberg *et al.*, 2014). High levels of specificity (94%) and sensitivity (81%) were also found (Grodberg *et al.*, 2012; Grodberg *et al.*, 2014). Preliminary validation of the AMSE in a large, high-risk sample ranging from toddlers to adults suspected of ASD indicated excellent inter-rater reliability and strong classification accuracy when compared with the ADOS (Grodberg *et al.*, 2012). Further investigations of the AMSE' sensitivity and specificity in detecting an independent DSM-5 diagnosis of ASD in adults, also revealed excellent psychometric properties (sensitivity = .91, specificity = .93; Grodberg *et al.*, 2014). Findings of a recent study (Grodberg, Siper, Jamison, Buxbaum, & Kolevzon, 2016) indicate a sensitivity of 94% and a specificity of 100% for a group of children aged between 18 months and 5 years.

The aims of the current study are: a) to compare the AMSE results with those obtained by ADOS e ADI-R; b) to evaluate the clinical utility of the AMSE in the diagnostic process of an Italian sample with ASD.

## 2. Methods

### 2.1. Participants

94 patients (10 females and 84 males) of chronological ages 24 - 145 months ( $M = 77.15$ ,  $SD = 30.05$ ) received a comprehensive diagnostic assessments for ASD, based on the protocol used at the Oasi Institute for Research on Mental Retardation and Brain Aging, Troina, Italy, a specialized centre for the diagnosis and treatment of developmental disorders.

The sample includes the following age group: 2-4 years old = 27 participants; 5-7 years old = 32 participants; 8-10 years old = 25 participants; 11-12 years old = 10 participants. The participants presented with different levels of intellectual functioning: 16 individuals with  $IQ \geq 70$  and 65 with  $IQ < 70$ . IQs ranged from 30 to 114 ( $M = 56.12$ ,  $SD = 20.66$ ) and were measured using the Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV; Wechsler, 2013) or – according to the severity of the intellectual level - the Leiter International Performance Scale-Revised (LIPS-R; Roid & Miller, 1997); an artificial neural network (Di Nuovo, Di Nuovo, & Buono, 2012) was used for adjusting the IQ from different testing sources. The artificial neural network is not a direct measure, it provides a computerized algorithm based on the standardized scores integration derived from intellectual and adaptive tests, allowing IQ estimation in people with intellectual disability, where only tests other than Wechsler scales can be administered. Thirteen children under 5 years of age received a diagnosis of Global Developmental Delay (APA, 2013), since it was not possible to make a systematic assessments of their intellectual functioning because of their behavioral characteristics and early ages.

## 2.2. Procedure

Each participant received a developmental assessment by a multidisciplinary team consisting of a child and adolescent psychiatrist, a psychologist, a specialized educator and a social worker.

The psychodiagnostic assessment was made using a standard specific protocol for the diagnosis of ASD, which provides: 1) tests to assess intellectual and adaptive functioning, such us Wechsler scales and the Vineland Adaptive Behavior Scales (VABS; Sparrow, Balla, & Cicchetti, 2003); 2) ASD diagnostic scales, such as ADOS and ADI-R. ADOS was administered and scored by research-reliable ADOS raters, whereas the ADI-R was administered and scored by a psychologist experienced in the use of ADOS and ADI-R on a routine basis.

The AMSE was also administered by a psychologist to all participants within the clinical observation.

### 2.3. Measures

#### 2.3.1. Autism Mental Status Exam

The AMSE includes eight operationalized items, namely: eye contact, interest in others, pointing skills, language, pragmatics of language, repetitive behaviors & stereotypy, unusual or encompassing preoccupations, unusual sensitivities. Each item is scored 0 (no symptom), 1 (mild symptom), 2 (moderate/severe symptom). Social items must be observed during the clinical examination, but pragmatics of language, encompassing preoccupations, and unusual sensitivities items can be reported or observed. In these three items, the score is attributed if the item is observed. Scoring instructions for these three items also provide flexibility based on the functioning level.

The possible total scores range from 0 to 14. The cut-off is  $\geq 5$  (Grodberg *et al.*, 2012) and high scores reflect greater severity.

#### 2.3.2. Autism Diagnostic observation Schedule

The ADOS (Lord *et al.* 1999) is a standardized, semi-structured diagnostic scale used to assess social, communicative and behavioral symptoms associated with ASD. It is administered through structured play and conversational interview that includes a series of social presses and other opportunities to elicit the ASD symptoms. For the administration the examiner selects one from four different ADOS modules, depending on the expressive language level and chronological age of the individual. Scores are aggregated into symptom clusters that correspond to DSM-IV criteria for a diagnosis of autism.

#### 2.3.3. Autism Diagnostic Interview-Revised

ADI-R (Rutter *et al.*, 2003) is a standardized investigator-based interview conducted with the parents of individuals with suspected autism or ASD.

The interview contains 93 items in three areas of content, namely: communication, social interaction, and restricted/repetitive behavior and covers the referred individual's full developmental history. It is divided into five sections: opening questions, communication questions, social development and play questions, repetitive and restricted behavioral questions, and questions about general behavioral problems. The interview, used by researchers and clinicians, can be used for diagnostic purposes for anyone with a mental age of at least 18 months.

### 3. Data Analysis

Internal consistency was assessed using Cronbach's Alpha.

Pearson correlation was used to examine the relationship between AMSE total scores and the ADOS and ADI-R total scores. Correlations between the total scores of AMSE and the sub-total scores of the various ADOS and ADI-R algorithms were also calculated. The item Pragmatics of language of AMSE was not included in the total scores calculation since it was Not Applicable for the most of participants.

### 4. Results

Results obtained from statistical analysis showed an acceptable internal consistency of the AMSE (Cronbach's Alpha = .63).

Significant correlations were found between the AMSE total score and ADOS Communication Total score; AMSE Total score with ADOS Communication plus Social Interaction Total score; AMSE Total score with ADOS Imagination/creativity total score; AMSE Total score with ADOS Stereotyped Behaviors and Restricted Interests Total score. Significant correlations were also found between ADOS Communication Total scores and some AMSE items, namely, *Interest in others* and *Pointing Skills*; ADOS Imagination/creativity Total scores with *Pointing Skills*, *Language*; ADOS Stereotyped Behaviors and Restricted Interests Total scores with *Pointing Skill*.

With regard to ADI-R, significant correlations were not found after Bonferroni's correction.

Results are shown in table 1.

Table 1 - *Pearson coefficients, with Bonferroni correction, between ADI-R and AMSE, ADOS and AMSE*

	ADOS					ADI-R			
	TOT CO	TOT SI	TOT CO+SI	TOT C	TOT D	TOT A	TOT B	TOT C	TOT D
Eye contact	.22	.16	.25	.32	.29	.10	-.09	-.06	.00
Interest in others	.36*	.12	.32	.30	.09	.24	.04	-.09	-.21
Pointing skills	.36*	.16	.29	.48***	.39**	.08	-.15	-.10	-.22

Language	.25	.13	.22	.51***	.26	.01	-.27	-.18	-.28
Pragmatics of language	-	-	-	-	-	-	-	-	-
Repetitive behaviors & stereotypy	.07	.07	.08	.27	.31	.21	.13	.02	-.11
Unusual or encompassing preoccupations	.12	.10	.12	.26	.22	.12	.03	.11	.04
Unusual sensitivities	.15	.20	.20	.06	.20	.23	.20	.22	.04
AMSE Total	.37**	.26	.37*	.51***	.48***	.23	.04	.06	-.15

*Note:* TOT A = qualitative impairment in reciprocal social interaction; TOT B = qualitative impairment in communication; TOT C = restricted, repetitive, and stereotyped pattern of behavior, interests, and activities; TOT D = impairment in development  
 TOT CO = Communication Total; TOT SI = Social Interaction Total; CO+SI = Communication + Social Interaction Total; TOT C = Imagination/Creativity Total; TOT D = Stereotyped Behaviors and Restricted Interests Total.

(\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ )

## 5. Discussion

The AMSE is the first brief mental state instrument structured to document signs and symptoms of ASD without interfering with or adding burden to the clinical exam. The strong correlation between AMSE total scores and ADOS reported in another study (Grodberg *et al.*, 2016), indicates that the AMSE may be used in settings not equipped to conduct more comprehensive evaluations.

This is the first Italian study using the AMSE in the diagnostic process of an Italian children sample suspected to present with an ASD.

Results obtained from statistical analysis showed an acceptable internal consistency of the AMSE which confirm the data obtained in previous studies.

The correlations between ADOS and AMSE total scores found in this study suggested that AMSE might be used as a rapid and accurate standardized measure in order to support the first ASD diagnosis in children suspected to present with such a disorder, before a depth assessment in a specialized centre.

The absence of significant correlations between ADI-R and AMSE might be due to the fact that ADI-R algorithm is obtained through caregiver interviews, with specific questions about the period of 4-5 years; on the



contrary, AMSE scores are obtained through observations and information about the present behaviors. Therefore, the administration of AMSE has to be always accompanied by a careful collection of data on patient's clinical history. For this reason, we think that it cannot be used as a diagnostic instrument. Instead, it is meant to support an expert's clinical diagnosis when a patient is suspected of having ASD.

In our study, no statistical analysis was performed to verify the test's sensitivity and specificity level and it was not verified if the 5-score cut-off allows to identify all individuals with ASD. Therefore, further studies in Italian samples are needed to check these aspects.

Our preliminary findings are promising; however this study has several limitations. First, the participants present with various ages and levels of intellectual functioning; second, participants were referred to the Oasi Institute due to a suspected diagnosis of ASD or social/communication disorders and, therefore, at higher risk than the general population. According to ADOS and AMSE, tests were administered by the same psychologist and not by independent clinicians. Thus, the findings obtained and the correlations between the two tests could be influenced accordingly. With the aim of minimizing the bias, all cases should be evaluated by independent raters who are research-reliable on the ADOS.

Therefore, generalizability of results is limited and future studies are needed to investigate the use of the AMSE in samples that are stratified by level of cognitive and adaptive functioning and level of language. Furthermore, in order to demonstrate AMSE's validity to differentiate between ASD and other developmental disorders, the AMSE should be also used in studies enrolling children with other developmental disorders, such as communication disorders, ADHD, and learning disability.

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