

# Correspondence between the Brief Observation of Symptoms of Autism (BOSA) and the Autism Diagnostic Observation Schedule-2 (ADOS-2) in adolescents and adults

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## Background

- During the COVID-19 pandemic, autism assessments, such as the Autism Diagnostic Observation Schedule-2 (ADOS-2, Lord et al., 2012), could not be validly administered with masks or via telehealth.
- The Brief Observation of Symptoms of Autism (BOSA), derived from the ADOS-2, but based on interaction with a familiar other, has shown promise as an adapted tool for remote diagnostic testing (Dow et al., 2022).
- As COVID-19 restrictions have relaxed, new opportunities have emerged to explore the clinical utility of the BOSA and directly compare observations during this brief assessment to observations made during the ADOS.

## Objective

- To compare BOSA and the ADOS scores and classifications.

## Methods

### Participants (See Table 1)

- Participants were recruited for a diagnostic evaluation as part of an ongoing study aiming to validate the ADI-3.
- All participants had completed the BOSA-F2 and the ADOS-2 Module 3 (n=8) or Module 4 (n=23) at the same visit.
  - The ADOS-2 algorithm was used to determine classifications for Module 3 and Hus & Lord (2014)'s algorithm was used for Module 4.
- Best Estimate Clinical Diagnoses were made based upon all available qualitative information (ADI-R, Vineland, ADOS-2, IQ, BOSA), though diagnostic algorithms were not scored until after diagnoses were made.

### Analyses

- Correlations were used to explore the associations between ADOS and BOSA domain scores.
- McNemar's test was used to explore the association between ADOS and BOSA classifications.
- Sensitivity and specificity of each measure was computed.

## Results

**Table 1.**  
*Demographics and Descriptive Information (N=31)*

Variable	Mean (SD) or N (%)
Age (Years)	20.48 (6.47)
Gender	-
Male	16 (51.6%)
Female	10 (32.3%)
Gender Nonconforming	5 (16.1%)
Best Estimate Diagnosis	-
Non-ASD	5 (16.1%)
ASD	26 (83.9%)
ADOS-2 Module	-
3	8 (25.8%)
4	23 (74.2%)

**Table 2.**  
*Descriptive Information for BOSA & ADOS (N = 31)*

Variable	Mean (SD)	Range (min – max)
ADOS-2 Module 3	-	-
SA total	8.70 (2.07)	5 – 11
RRB total	1.50 (1.77)	0 – 5
ADOS Module 4	-	-
SA total	8.70 (3.82)	1 – 14
RRB total	2.13 (1.49)	0 – 6
BOSA-F2 Module 3	-	-
SC & SI total	8.00 (2.39)	5 – 12
RRB total	1.63 (1.06)	0 – 3
BOSA-F2 Module 4	-	-
SC & SI total	6.35 (3.89)	0 – 14
RRB total	1.35 (1.30)	0 – 5

Note. Autism Spectrum cutoff for ADOS-2 Modules 3 = 7; Autism Spectrum cutoff for ADOS Modules 4 = 8; Autism Spectrum cutoff for BOSA-F2 Module 3 = 5; Autism Spectrum cutoff for BOSA Modules 4 = 3

- ADOS Social Affect (SA) scores were positively correlated with BOSA Social Communication and Social Interaction (SC & SI) scores ( $r=.65, p<.001$ ).
- ADOS and BOSA Restricted Repetitive Behavior (RRB) domains were also correlated ( $r=.30, p<.05$ ).

**Table 3.**  
*Sensitivity/Specificity of the ADOS and BOSA*

		ADOS			
		Below cutoff (n=6)		Above cutoff (n=25)	
		N	%	N	%
Best Estimate Diagnosis	Non-ASD (n=5)	2	40%	3	60%
	ASD (n=26)	4	15%	22	85%
		BOSA			
		Below cutoff (n=6)		Above cutoff (n=25)	
		N	%	N	%
Best Estimate Diagnosis	Non-ASD (n=5)	2	40%	3	60%
	ASD (n=26)	5	19%	21	81%

- There was no difference between classifications on the ADOS or BOSA; 80% of the sample had the same classification (n=20 above; n=2 below cut-offs;  $p=1.0$ ).
- As shown in Table 3, Sensitivity was good on both instruments (ADOS: 85%, BOSA: 81%), though specificity was low in this small sample (40%).
- The majority of participants with a Best Estimate Diagnosis of ASD (65%) were above cut-offs on BOTH the ADOS and BOSA.

## Discussion

- Classifications on the ADOS Modules 3 and 4 and BOSA F2 were highly similar; 20% (n=9) participants were differently classified.
- Sensitivity of the ADOS (81%) and the BOSA (85%) were in acceptable ranges.
- Larger sample sizes are needed to evaluate specificity.
- Considering comparable sensitivity, the BOSA may present a more feasible option for researchers who wish to go beyond questionnaire for diagnostic confirmation and description verbally fluent adolescents and young adult samples.
- Notably, Best Estimate Clinical Diagnoses are based upon comprehensive diagnostic evaluations including the ADOS-2; therefore, it is not known whether important diagnostic information may be missed if the evaluation included only the BOSA.

## References

Dow, D., Holbrook, A., Toolan, C. McDonald, N., Sterrett, K., Rosen, N., Kim, S.H., & Lord, C. (2022). The brief observation of symptoms of autism (BOSA): Development of a new adapted assessment measure for remote telehealth administration through COVID-19 and beyond. *Journal of Autism and Developmental Disorders*, 52, 5383–5394. <https://doi.org/10.1007/s10803-021-05395-w>

Hus, V., & Lord, C. (2014). The autism diagnostic observation schedule, module 4: revised algorithm and standardized severity scores. *Journal of Autism and Developmental Disorders*, 44(8), 1996–2012. <https://doi.org/10.1007/s10803-014-2080-3>

Lord, C., Holbrook, A., Dow, D., Byrne, K., Grzadzinski, R., Sterrett, K., Toolan, C., & Kim, S. H. (2020). *Brief observation of symptoms of autism (BOSA)*. Western Psychological Services.

Lord, C., Rutter, M., DiLavore, P. C., Risi, S., Gotham, K., & Bishop, S. L. (2012). *Autism Diagnostic Observation Schedule: ADOS-2* (2nd ed.). Western Psychological Services Torrance.

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