

The LENA Automatic Autism Screen: Additional Validation

Jill Gilkerson
LENA Foundation

Steven A. Rosenberg
Department of Psychiatry
University of Colorado Denver

Renee Charlifue-Smith
JFK Partners
University of Colorado Denver

Cordelia C. Robinson
JFK Partners
University of Colorado Denver

Jeffrey A. Richards
LENA Foundation

Dongxin Xu
LENA Foundation

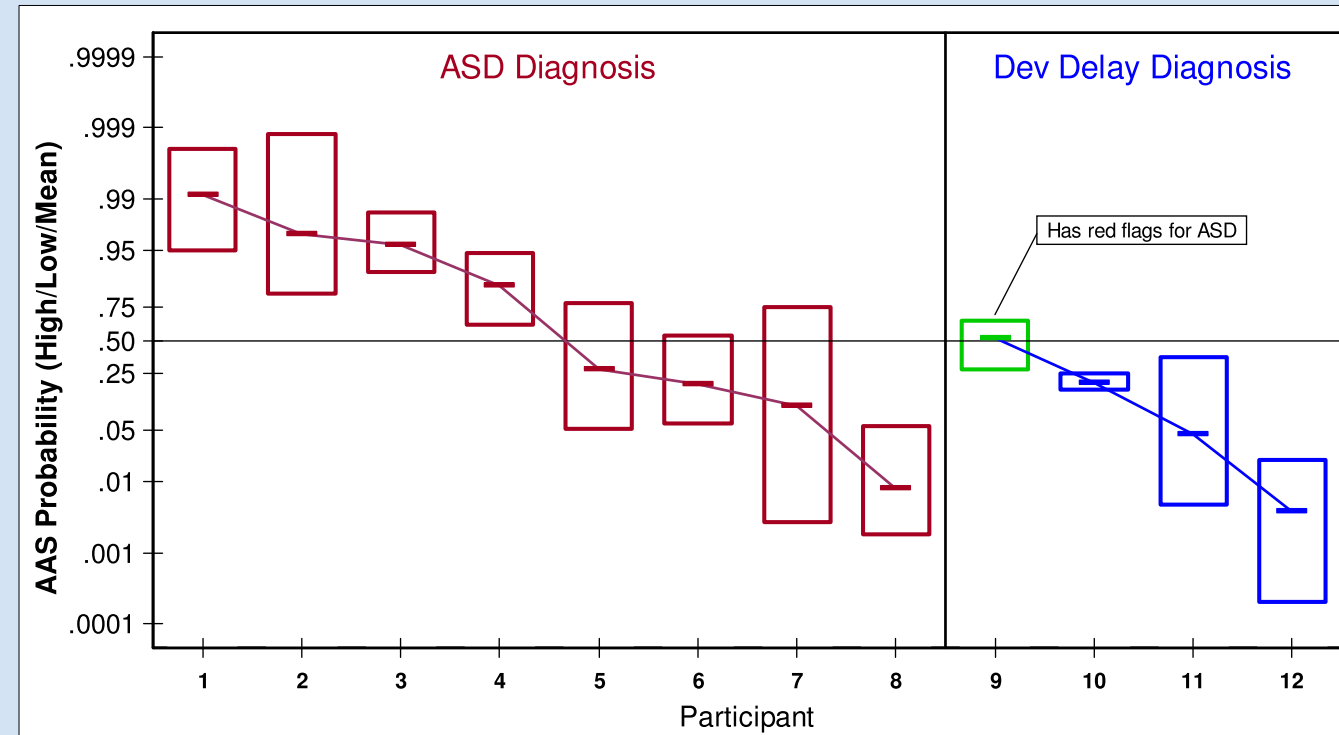
Introduction

A report by Oller et al. (PNAS, 2010) established that automated analysis of child vocal output captured by LENA recordings can successfully differentiate children with autism from typically developing children and children with language delays. Their method utilized 12 theoretically relevant acoustic parameters extracted from segments labeled automatically as key child vocal output by the LENA System. The LENA Foundation's current automated procedures utilize a different algorithm, designed specifically to maximize group differentiation, which yielded equal-error probability sensitivity/specificity rates of .88 for the ASD/non-ASD differentiation, and .86 for ASD vs. DD differentiation (Xu et al., 2010).

Methods

The purpose of the current study is to test the accuracy of the LENA Foundation's algorithms for identifying children at risk for autism. Children are currently being recruited from three diagnostic subsets: 30 children with ASD, 30 children with developmental delays and 30 typically developing children. Each child completes three full-day LENA recordings within a 10-day period. Audio data is uploaded and processed on the LENA Foundation's supercomputer. At the time of processing, the LENA Foundation is blind to the diagnosis of the child. Once results have been generated, they are sent to JFK Partners for clinical use.

Automatic Autism Screen Results: JFK Partners Preliminary Validation



Methods (continued)

Subsequently, JFK Partners sends the LENA Foundation diagnostic information on the children, including ADOS scores if they have been diagnosed with autism. The LENA Foundation uses this diagnostic information to examine the validity of the automatic screen, comparing results with child clinical diagnoses and performance on the ADOS.

Preliminary Results

This poster presents preliminary results for the current sample of 12 that includes 8 children diagnosed with ASD and 4 children with developmental delays. Among the children with ASD, 6 of 8 received at least one "high risk" assessment based on automatic analysis of their vocal output, compared to 0 of 4 of the DD children.

Overall agreement between the automatic screen and the child's clinical diagnosis (ASD or other DD) was 83% (10/12), with Sensitivity (6/8) of 75% and Specificity (4/4) of 100%. Agreement between the screen and the ADOS was 71% (5/7), with Sensitivity (4/5) at 80% and Specificity (1/2) at 50%.

Conclusions

For this small sample, the automatic screen continues to show a promising ability to identify children at risk for ASD and to distinguish between children with ASD and those with other developmental disabilities.

Accuracy of LENA Automatic Screen: Predicting Overall Diagnosis

		Auto Screen		
		ASD	non-ASD	
Clinical Diagnosis	ASD	6	2	8
	non-ASD	0	4	4
		6	6	12

Agreement of LENA Automatic Screen With ADOS: ASD Thresholds

		Auto Screen		
		ASD	non-ASD	
ADOS	ASD	4	1	5
	non-ASD	1	1	2
		5	2	7



For additional information, contact:
Jill Gilkerson, Ph.D.
LENA Foundation
Boulder, CO 80301
JillGilkerson@LENAFoundation.org