

**Introduction:**

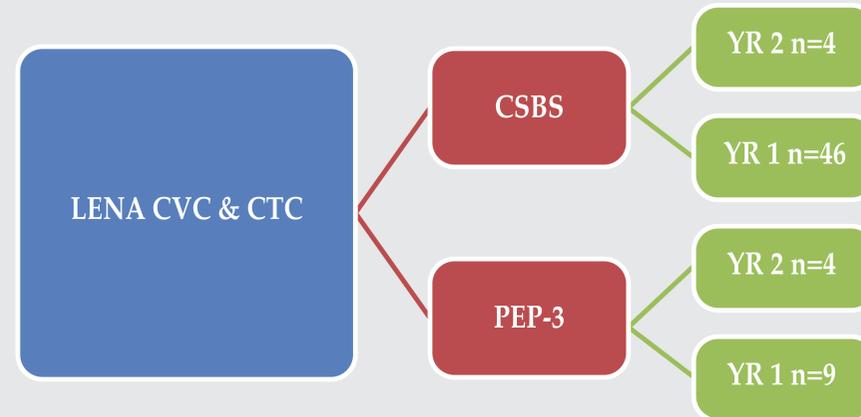
- Research has found significant relationships between LENA measures and age-equivalent scores from standardized assessments of language and nonverbal cognition for children with ASD (Dykstra, Sabatos-DeVito, Irvin, Boyd, Hume, and Odom, 2012).
- Warren et al (2010) found a significant relationship between LENA conversational turn counts and language skills of children with ASD as measured by the Communication and Symbolic Behavior Scales-Normed Edition (CSBS).
- However, both of these studies were limited in the number of LENA recordings collected and did not examine change in children's language over time.

**Purpose:**

- To investigate the development of communication in two cohorts of children with ASD who attended a two-year integrated preschool from a qualitative (standardized assessment) standpoint in relation to a quantitative measure (LENA counts).
- Both cohorts consisted of five children with ASD; all were male.

**Methods:**

- Subjects: two cohorts, each with five preschoolers with ASD; all were male.
- Bi-weekly LENA classroom and home recordings were collected for each child.
- LENA child vocalization counts (CVC) and conversational turn counts (CTC) were examined.
- Individual child communicative functioning (i.e., verbal and nonverbal language) was assessed using two standardized assessments: the Psychoeducational Profile-3 (PEP-3) and the CSBS.
- The PEP-3 measures communication, motor skills, and maladaptive behaviors of children with ASD (Schopler, Lansing, Reichler, & Marcus, 2005).
- The CSBS measures language predictors using the frequency and quality of the following items: joint attention, three point gaze shifts, use of gestures, shared positive affect, communicative words and word combinations, action schemas in play, and blocks stacked (Wetherby & Prizant, 1993).
- The PEP-3 and CSBS were administered at 3 time points during children's participation:
  1. prior to or at the beginning of the children's first year in preschool (Pre)
  2. in the summer after their first year of preschool (End YR 1)
  3. at the end of their second year in preschool (End YR 2)
- The recordings used for each child were an average of LENA counts from the first 3 recordings from their 1st year in preschool, an average from the last 3 recordings from their 1st year, and an average of the last 3 recordings from their 2nd year, to compare to their Pre, End YR 1, and End YR 2 standardized assessment data, respectively.



**Analyses:**

- PEP-3 subtest raw scores and composite scaled scores were converted to z-scores.
- All PEP-3 subtest scores were included except Problem Behavior, Personal Self-Care, and Adaptive Behavior.
  - All CSBS subtest raw scores were used except Symbolic Behaviors.
  - A correlative analysis was employed to determine whether changes in LENA measures were associated with standardized assessment changes.
    - If a correlation between LENA measures and standardized test scores was significant, a linear model was determined for predicting growth rate in standardized test scores with independent variables for LENA-measured growth and baseline test score.
  - A Spearman Rho correlation was used for the CSBS-LENA analyses due to an outlier.

**Results:**

- Using Pearson's r correlations, several significant predictive relationships were found between LENA counts and PEP-3 subtests. (see Table 1)
- A Spearman Rho correlation was calculated between LENA counts and the CSBS. (see Table 1)

LENA Measure	Year	PEP-3 or CSBS Subtest	r or (Rs)	N	Statistical Significance
Child Vocalization Count	1st	PEP-3 Characteristic Verbal Behavior	0.695	9	0.038
Child Vocalization Count	2nd	PEP-3 Visual Motor Imitation	-0.964	4	0.036
Child Turn Count	2nd	PEP-3 Maladaptive Behavior Sum	-0.956	4	0.044
Child Vocalization Count	2nd	CSBS Shared Positive Affect	(-1.00)	4	0.001
Child Turn Count	2nd	CSBS Repair Strategy	(1.00)	4	0.001
Child Turn Count	2nd	CSBS Multisyllables	(1.00)	4	0.001
Child Turn Count	2nd	CSBS Gestures Plus Vocalizations	(1.00)	4	0.001

**Discussion:**

- The positive correlation found between LENA CVC and Characteristic Verbal Behavior may be a result of echolalia and/or idiosyncratic speech typically seen in children with ASD, as LENA CVC does not classify vocalizations as meaningful or not.
- The negative correlation found between 2nd year Visual Motor Imitation and CVC may be due to the fact that three children in the 2nd year communicated with sign and/or other non-verbal communication means, which may have been classified as motor imitation.
- The negative relationship found between Maladaptive Behavior for 2nd year children and LENA CTC may suggest that when children display fewer stereotypic behaviors, they are more available to participate with adults in conversational turns.
- For 2nd year children, Gestures Plus Vocalizations increased as LENA CTC increased.
  - This suggests that when children use multiple modes of communication, they become more effective in their ability to participate in conversational turns with others.
- The positive relationship found between Repair Strategies and LENA CTC suggests that children are becoming more efficient communicators, i.e., they learn how to repair an unsuccessful communicative act in a way that is more effective and understandable.
- The positive relationship found between 2nd year children's use of multi-syllable words and LENA CTC suggests that language was becoming more complex, making it easier for adults to respond with more meaningful conversation.