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Background

Language ENvironment Analysis (LENA) technology is a metric that has the capability to record and analyze the language environments of young children (Xu, Yapanel, & Gray, 2009) and provides measures of adult word count (AWC), child vocalization count (CVC), and conversational turn count (CTC) for each 16 hour recording obtained. A recent meta-analysis by Wang and colleagues reported the use of LENA in 37 published studies (2017). But, less than a third of those studies include populations of children with developmental disabilities, and even less report on relationships between LENA variables and other measures of child language.

The current study aims to answer the following questions:

1. Do the LENA variables CVC, CTC and MLU significantly correlate to standard measures of expressive language?
2. How do these relationships differ among typically developing and clinical populations?

Methods

Participants

This study used data from 150 participants across four diagnostic categories:

- Autism spectrum disorder (ASD)
- Developmental language disorder (DLD)
- Hearing loss (DHH)
- typically developing (TD)

Participants were matched based on parent and child gender, child age, and parent education.

	Total	ASD	DLD	TD	DHH	DLD (expressive)
	n=150	n=60	n=30	n=30	n=15	n=15
Age (months)	32.2 (5.1)	32.9 (5.3)	32.7 (4.7)	32.4 (5.1)	29.9 (4.7)	30.6 (5.2)
Female (%)	13	13	13	13	20	13
Race/Ethnicity (%)						
Caucasian/White	57	30	70	73	73	87
Hispanic	15	32	0	3	13	0
African American	13	12	23	10	0	13
More than one race	10	25	0	0	0	0
Asian	1	2	0	0	7	0
Other/decline	5	0	7	13	7	0

Measures

- LENA output variables:
 - Child Vocalization Count (CVC)
 - Conversational Turn Count (CTC)
 - Mean Length Utterance (MLU)
- Preschool Language Scale-5 (PLS-5)
- MacArthur-Bates Communicative Development Inventories (MCDI)
- 20-minute **language samples** (LS) analyzed in SALT for total utterances (TU), total words (TW), number of different words (NDW), and mean length utterance (MLUw)
- 10-minute **parent child interactions** (PCX) analyzed in SALT for TU, TW, NDW, and MLUw

Results

Table 3. Correlations for typical group

	CVC	CTC	MLU
PLS	0.25	0.39*	0.25
MCDI	0.09	0.23	0.16
NDW (LS)	0.17	0.08	0.66*
TW (LS)	0.27	0.17	0.64*
MLUw (LS)	0.2	0.22	0.66*
TU (LS)	0.09	-0.16	0.11
NDW (PCX)	0.41*	0.13	0.43*
TW (PCX)	0.32	0.2	0.60*
MLUw (PCX)	0.1	0.11	0.70*
TU (PCX)	0.28	0.39*	0.24

* p < 0.05

Table 2. Correlations for disability group

	CVC	CTC	MLU
PLS	0.42*	0.54*	0.03
MCDI	0.46*	0.51*	0.42
NDW (LS)	0.46*	0.55*	0.35*
TW (LS)	0.40*	0.47*	0.41*
MLUw (LS)	0.17	0.29*	0.29*
TU (LS)	0.34*	0.39*	0.42*
NDW (PCX)	0.28*	0.35*	0.40*
TW (PCX)	0.44*	0.50*	0.43*
MLUw (PCX)	0.35*	0.38*	0.33*
TU (PCX)	-0.01	0.12	0.18

* p < 0.05

Conclusions

- Results indicate significant relationships between LENA variables and other measures in both typically developing and children with developmental delays.
- Correlations between the two groups differ significantly:
 - A more consistent moderate correlation is seen between child LENA variables (CVC, CTC and MLU) and all standard and observed measures of language in the disability group compared to typically developing.
 - Stronger correlations for the LENA variable of MLU are seen across all observational assessments for the typically developing group
- The correlations between all three LENA variables and language measures in the disability group suggests a possibility to use LENA as a potential predictive measure of the standardized assessments in both research and clinical practice.

Limitations and Future Directions

- LENA variables do correlate with other standard measures of language even for disability populations, but it is important to continue exploring these relationships in future studies.
- The significant differences between the two groups calls for future research in validating LENA amongst multiple disability groups more exhaustively.
- Next steps should include the transcription of LENA recordings from multiple disability populations in order to better understand the differences seen between groups so that we can more accurately recommend the use of LENA among these populations.

References

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More Information

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This study was funded by the National Institute of Health (1R01DC014709, R03DC012639) and the Institute for Educational Sciences (R324A150094, R324A090181). All authors declare no conflict of interest.