

Assessing Early Vocal Development

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*If you have an iPad running the most recent version of iOS, you can search the app store for and download the VDLI app. During the latter part of the session, there will be an opportunity to get support while practicing use of the app.



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Outline

- Background on typical vocal development
- Why monitor vocal development
- Strategies and tools for monitoring vocal development
- Vocal Development Landmarks Interview (VDLI)
 - Study on validity
- Small groups



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Typical Vocal Development



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Typical Vocal Development 0-2 Months

- Vegetative productions
 - Burps, coughs, sneezes
- Reflexive productions
 - Laughs, cries, squeals, grunts
- 'Quasivowels'
- Speech-like productions are rare

Ertmer & Iver, 2010; Oller, 2000



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Typical Vocal Development 1-4 Months

- Minimal control of vocal tract
- Emergence of controlled and vocalization varied in pitch and loudness 
- Vowel-like sounds 
- Consonant-like sounds
 - Raspberries, clicks, glottal stops 
- Grunts

Nathani et al., 2006; Oller, 2000; Stoel-Gammon, 2011



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Typical Vocal Development 3-8 Months

- Increasing volitional productions
- Vocal turn-taking
- High-pitched squeals, growls, vocalizations on inhalation
- Adult-like vowels 
- Marginal babbles (e.g. "b-ah") 

Ertmer & Iver, 2010; Oller, 2000



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Typical Development 5-10 Months

- Coordination of motor, tactile, perceptual, and auditory systems
- Canonical syllables (e.g. "ba") 
- Reduplicated babbling (e.g. "bababa") 
- Variegated babbling emerges (e.g. "badagee") 
- Increase in consonant inventory

Ertmer & Iyer, 2010; Oller, 2000; Oller, Eilers, Neal, & Schwartz, 1999; Stoel-Gammon, & Otomo, 1986; Von Hapsburg & Davis, 2006

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Typical Vocal Development 9-18 Months

- Advanced vocalizations intermixed with true words
- Increasing consonant inventory
- Complex syllable structures (e.g. CVC, VC, CCVC)
- Jargon 
- First word (10-13 months)
- Word approximations 
- Word combinations when expressive vocabulary is about 50 words

Bates, Dale, & Thal, 1995; Ertmer & Iyer, 2010; McCune & Vihman, 2001; Nathani et al., 2006; Oller, 2000; Robb, Bauer, & Tyler, 1994; Stoel-Gammon, 1998

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Monitoring Vocal Development



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Why monitor vocal development?

- identify infants at risk for later language delays
- gain insights regarding auditory development
- guide interventions and evaluation of outcomes

Vowels and pitch variation



Babbling sequences with [d] and [b]



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Strategies for monitoring vocal development

- Clinical observations/recordings
 - Labor intensive, poor ecological validity
- Parent report
 - Completed by familiar person(s) who knows child well
 - Potentially limited knowledge of language milestones

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Current Parent-Report Tools

- Communication and Symbolic Behavior Scales Developmental Profile (CSBS-DP) Caregiver Questionnaire - Wetherby & Prizant, (2002)
- Production Infant Scale Evaluation (PRISE) - Kishon-Rabin, et al. (2005)
- Infant Monitor of Vocal Production (IMP)- Robin Cantle Moore (2009)

0	1	2	3	4
Never produces C-V combinations	Produces 1-2 different C-V combinations	Produces 3-4 different C-V combinations	Produces 5-6 different C-V combinations	Produces 7+ different C-V combinations

Example from PRISE: "Does the infant produce different consonant-vowel combinations? For example: when the infant plays with toys or addresses one of the family members, does he produce parts of words, such as: ba, du, pi, etc.,?"

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Vocal Development Landmarks Interview (VDLI)

Moeller, M. P., Thomas, A. E., Oleson, J., & Ambrose, S. E. (2019). Validation of a parent report tool for monitoring early vocal stages in infants. *Journal of Speech, Language, and Hearing Research*, 62(7), 2245-2257. https://doi.org/10.1044/2019_JSLHR-S-18-0485



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VDLI Development

- Goals:
 - Reduce the need for verbal descriptions and adult modeling of infant vocalizations
 - Limit terms that could be misinterpreted by parents (e.g., babbling)
 - Calibrate examiners
 - High validity and accuracy of parent report
 - Use in the OCHL study (PIs: Moeller and Tomblin)




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VDLI Development

- Interactive interview using PowerPoint (via software or website) or app
 - Audio files of authentic infant vocalizations
 - Juxtaposes samples in paired comparison
 - Basal and ceiling rules
- Sections
 - Warm up
 - Precanonical (7 items)
 - Canonical (5 items)
 - Word (6 items)
- Developmental range: 6-21 months




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VDLI Response Types and Scoring

Response Type	Description	Scale/Scoring (points)
Frequency rating	Judge how often the child produces the behavior using a 4-point Likert scale	Never = 0 Rarely = 1 Sometimes = 2 Frequently = 3
Inventory	Report the number of different vowels, consonants, or words the child produces	Scale varies based on the behavior. Scoring ranges from 0-3, depending on number of types for each behavior.
Accuracy rating	Judge accuracy of imitations	No imitation = 0 Far off = 1 Somewhat close = 2 Very close = 3




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PC 2-6








e (as in dress or bed) i (as in fish or bid) o (as in nook or up)	a (as in mama or hat) i (as in whee or see) u (as in moo or boot)	0-1 vowels Score: 0	2-3 vowels Score: 1	4 vowels Score: 2	5-6 vowels Score: 3
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CB 3-1








Never	Rarely	Sometimes	Frequently
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WP 4-1



No Imitation	Far Off	Somewhat Close	Very Close
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Research Questions

1. Does the VDLI capture the expected developmental progression from precanonical to canonical to word stages in infants and toddlers who are typically developing?
2. Are VDLI scores significantly related to a concurrent measure of early communication skills?
3. Is there internal consistency among the items in each of the VDLI subscales (precanonical, canonical, word)?




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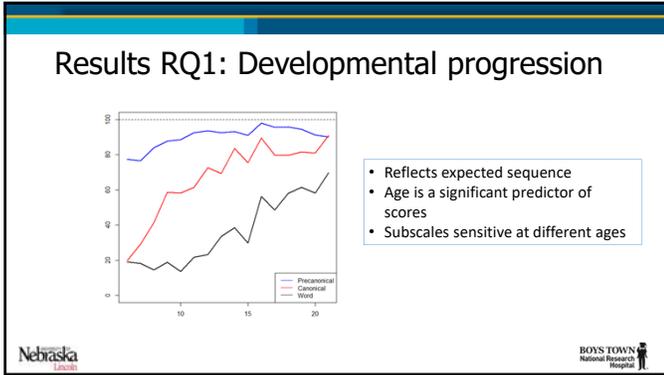
VDLI Validation Study

- 20 children each in eight age groups: 6-7, 8-9, 10-11, 12-13, 14-15, 16-17, 18-19, 20-21 months
- Internet supported parent interviews
- Parents also completed DP-3 and CSBS-DP

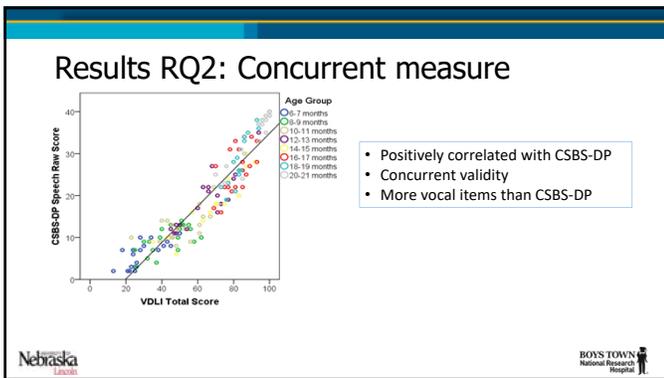
	Parent (n = 160)	Child (n = 160)
Gender		
Female	155 (96.9%)	75 (46.9%)
Male	5 (3.1%)	85 (51.3%)
Age		
Mean (SD)	31.16 years (4.77)	13.51 months (4.61)
Range	22-45 years	6-21 months
Education Level		
HS or less	13 (8.1%)	
Some college	9 (5.6%)	
4 year degree	65 (40.6%)	
Post graduate degree	73 (45.6%)	




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Results RQ3: Internal Consistency

- Cronbach's alpha showed the subscales reached acceptable levels of reliability with $\alpha = 0.82, 0.87, \text{ and } 0.96$ respectively.

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Next steps

- Do parents and examiners agree?
 - Obtained LENA recordings from 40 parent-child dyads in previous study, five infants selected from each age group
 - Compared parent report with clinician judgments of presence and relative frequency of vocal behaviors
- Further validation using data from users of the beta version of the VDLI app



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Summary

- Results indicate the VDLI is sensitive to age and has good concurrent validity and internal consistency.
- These findings provide support for the eventual use of the VDLI as clinical tool for tracking vocal and early verbal milestones.
- Future research will explore the level of agreement between parent report and researcher observations of child vocal behaviors.
- Future research will also make use of deidentified data submitted by users of beta version of the VDLI app.



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Quick intro to app and small groups

- 1) Mock interview with precanonical/canonical section (Kayla)
- 2) Mock interview with canonical/word section (Anne)
- 3) Practice with your tablet, including download help (Sarah)
- 4) Hands-on with our tablets (Sophie)



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Intro to VDLI App

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Intro to VDLI App

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Questions?

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