Language Outcomes of Children with Unilateral Hearing Loss: A Multi-State Perspective

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Today's Topics

- Describe NECAP, a CDC-supported national outcomes database project
- Summarize characteristics of children with unilateral hearing loss
- Present language outcome data
- Identify characteristics of children with more successful language outcomes

NECAP Project Overview

- CDC-supported project to collect language outcome data on deaf and hard-of-hearing children birth to 3 across the United States
  - Establish individual state databases
  - Establish national database
  - Explore feasibility of interfacing with existing EHDI databases

Assessment Components

- Demographic form
- Release of audiologic information
- Minnesota Child Development Inventory
- MacArthur-Bates Communicative Development Inventories

States Currently Participating in NECAP

- Arizona
- Colorado
- Florida
- Idaho
- Indiana
- Maine
- North Dakota
- Oregon
- Texas
- Utah
- Wisconsin
- Wyoming

States Contributing to Unilateral Outcomes Analysis

- California
- Idaho
- Indiana
- Maine
- Texas
- Utah
- Wisconsin
- Wyoming

Service Provision to Children with UHL in Participating States

- Children with unilateral loss are categorically eligible
- Intervention directors estimated they receive referrals for 80% to 100% (depending on the state) of their UHL birth to 3 population
- Directors estimated 50% to 95% of UHL referrals enroll in intervention
  - Higher percent in deafness-specific programs

Amount of Intervention

- 40% of families receive EI services once a month
- Median = 120 minutes per month

➢ Children with bilateral loss in NECAP: Median = 300 minutes per month

Participants

- 132 children
- Assessed on 1 to 5 occasions
- Analysis includes each child’s most recent assessment

Participant Criteria for Language Outcomes Analysis

- Unilateral hearing loss
- Living in a state where children with UHL are categorically eligible for early intervention
- No other disabilities that would affect speech or language development

Language Outcomes Analysis: Participant Characteristics

- Chronological age
  - Range = 5 to 38 months
  - Mean = 22 months
- Gender
  - Boys = 63%
  - Girls = 37%
- Affected ear
  - Right = 52%
  - Left = 48%

Participant Characteristics

- English is spoken and/or written language of the home = 77%
- Hispanic ethnicity = 44%
- White race = 90%
- Medicaid eligible = 58%
- Hearing parents = 94%

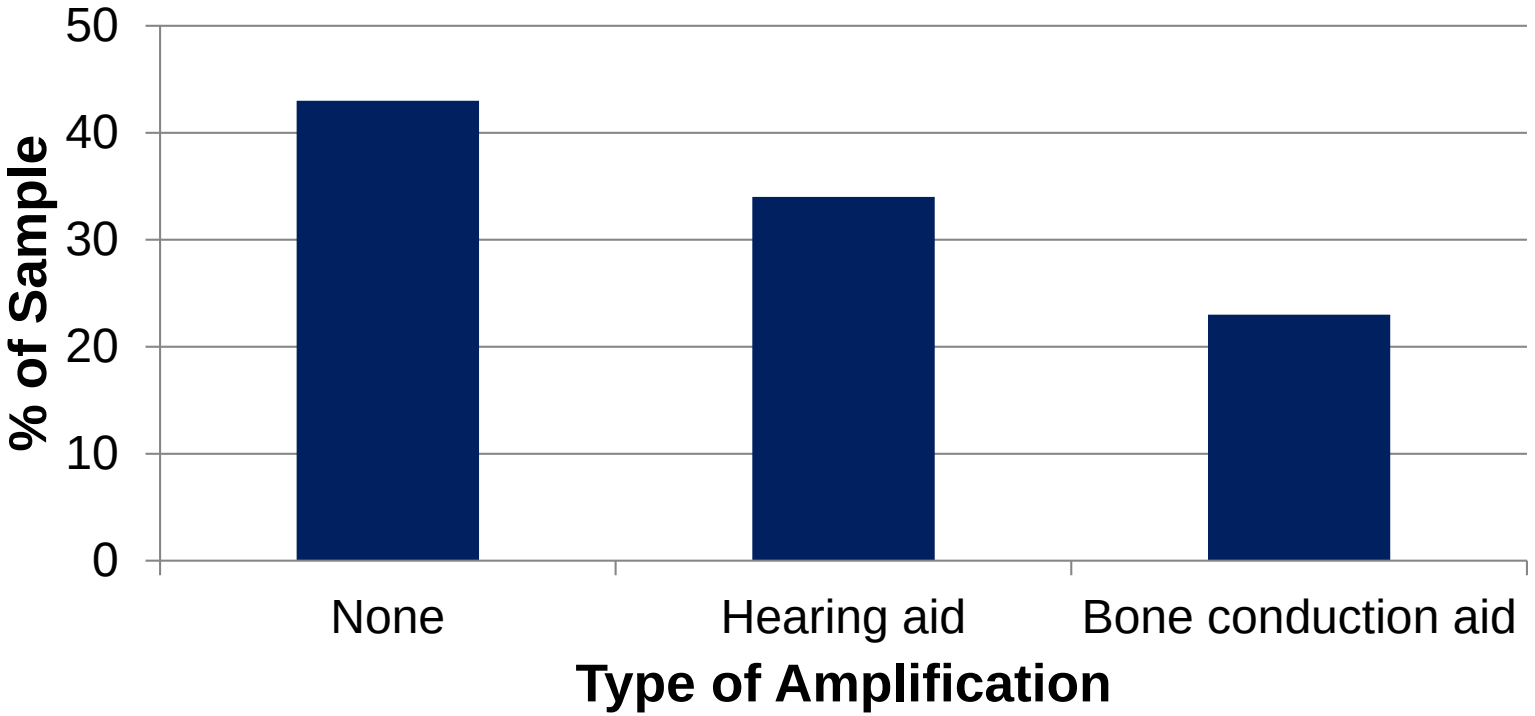
Participant Characteristics

Age at…	Median (mos)	Range (mos)
Identification	1.3*	.1 to 21
Amplification	6	1 to 36
Intervention	4*	.5 to 27

*79% of children were identified by 3 months of age

*73% of children were in intervention by 6 months of age

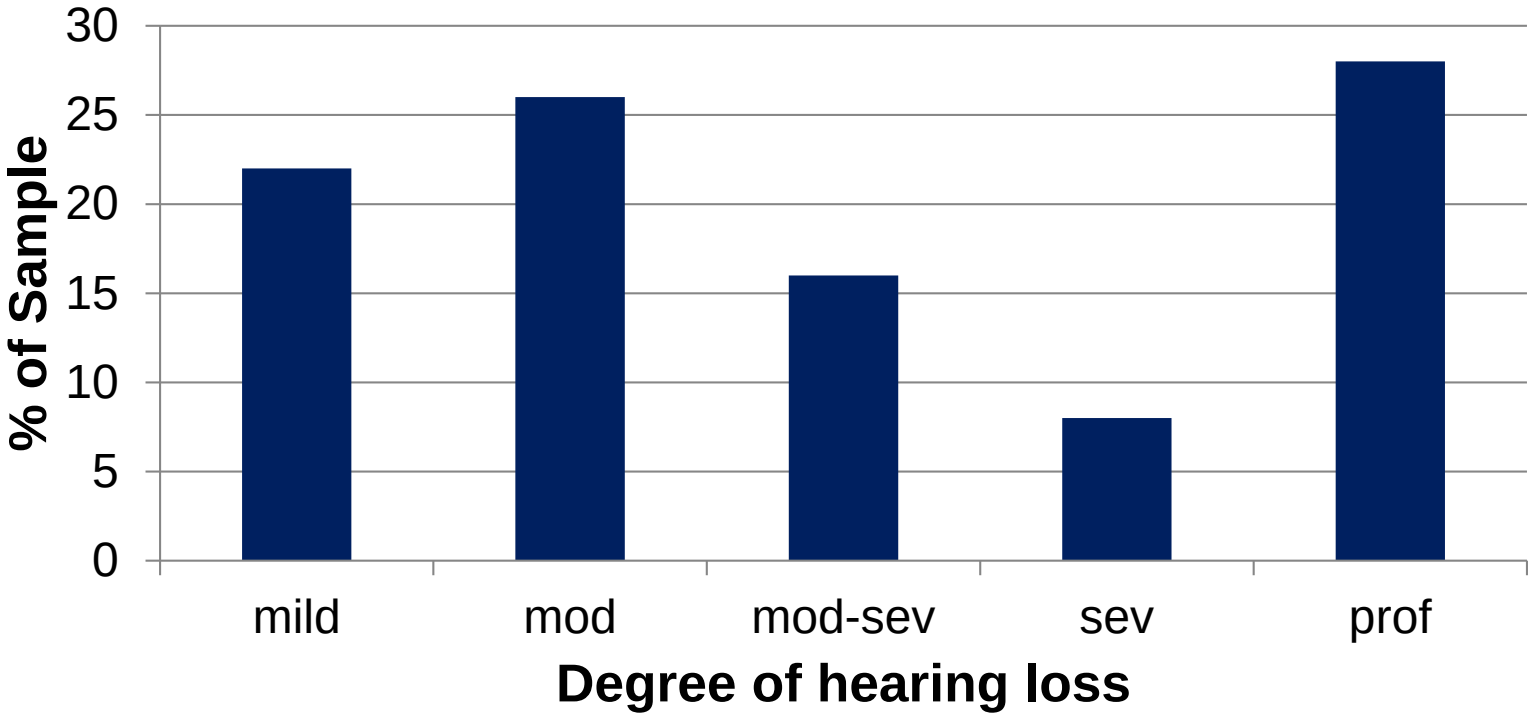
Amplification Use



Participant Characteristics

Highest degree completed	% of primary caregivers
Less than HS	21%
High school diploma	29%
Vocational or Associates	18%
Bachelor’s degree	23%
Graduate degree	9%

Degree of Loss in Affected Ear (available for 77 children)



Assessment 1: Minnesota Child Development Inventory

- Parent report
  - Parents respond “yes” or “no” to a variety of statements about their child
  - Example: “Has a vocabulary of 20 or more words”
- Scales adapted to reflect abilities in both spoken and sign language
- Examined Expressive Language and Conceptual Language subscales

Assessment 2: MacArthur-Bates Communicative Dev. Inventories

- Assesses spoken and signed expressive vocabulary
- Parent-report instrument

Language Outcomes Analysis: Number of Assessments

- Total Number of Children = 132
  - Minnesota Child Development Inventory = 78
  - MacArthur-Bates Comm Dev Inventory = 113

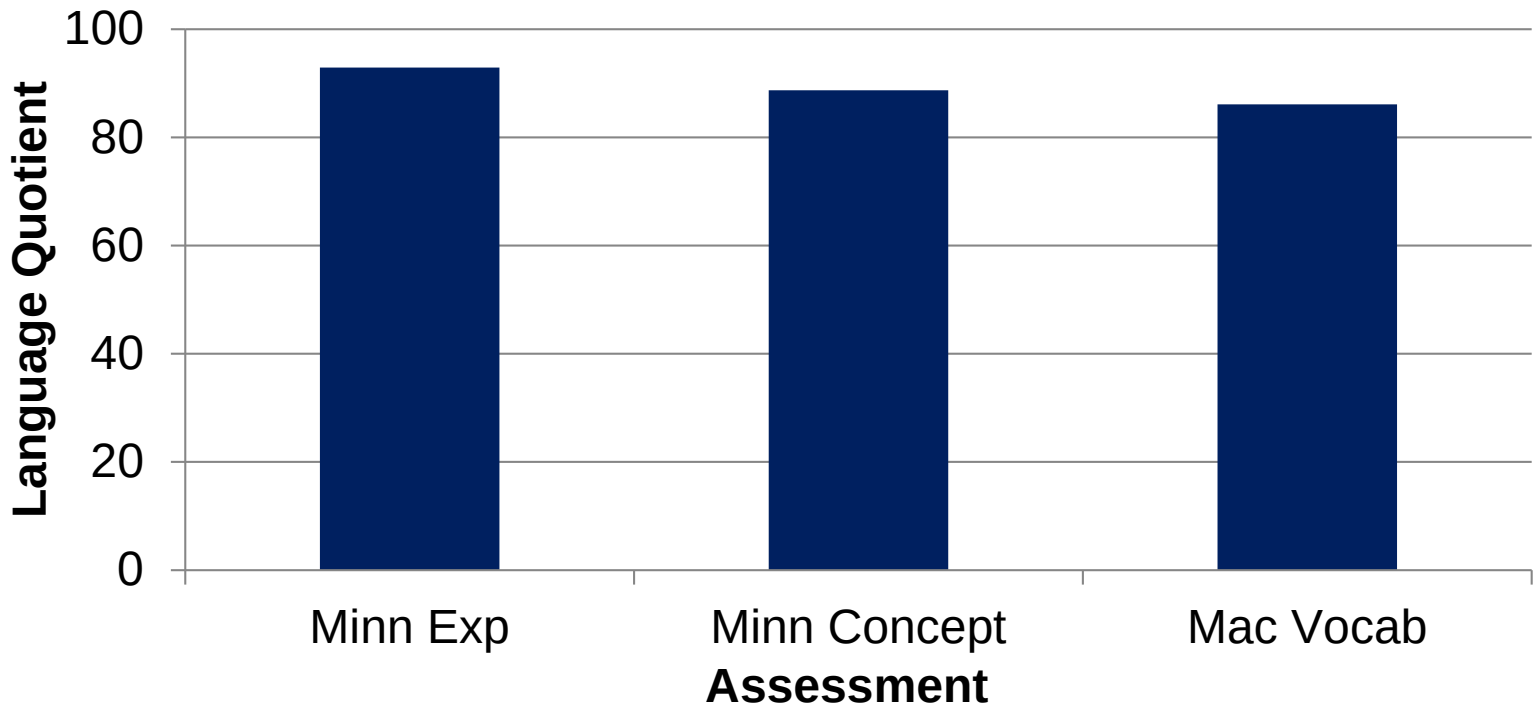
Determining Language Quotient

Language Age/Chronological Age x 100

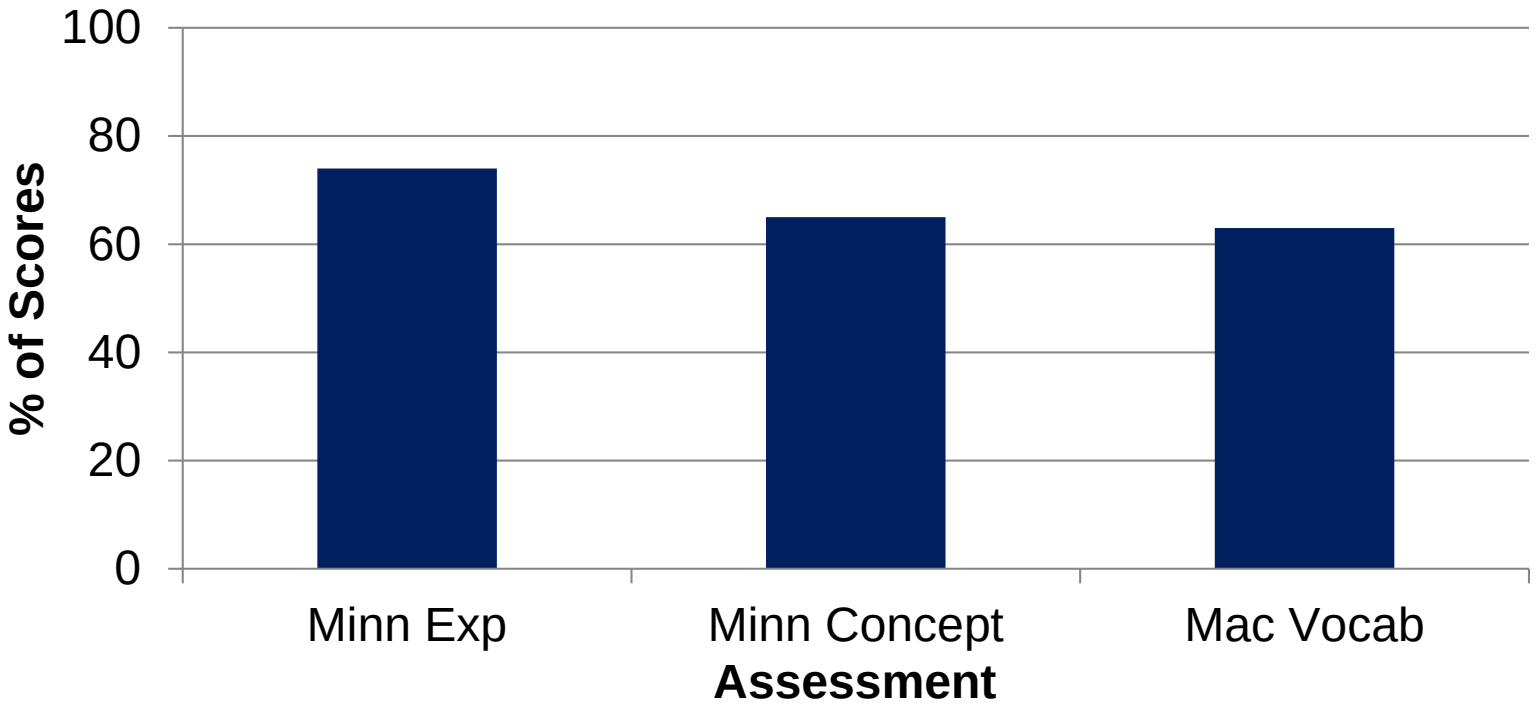
- If LQ = 100, Language Age = CA
- If LQ < 100, Language Age < CA
- If LQ > 100, Language Age > CA

LQs of 80+ are within the normal range compared to hearing children

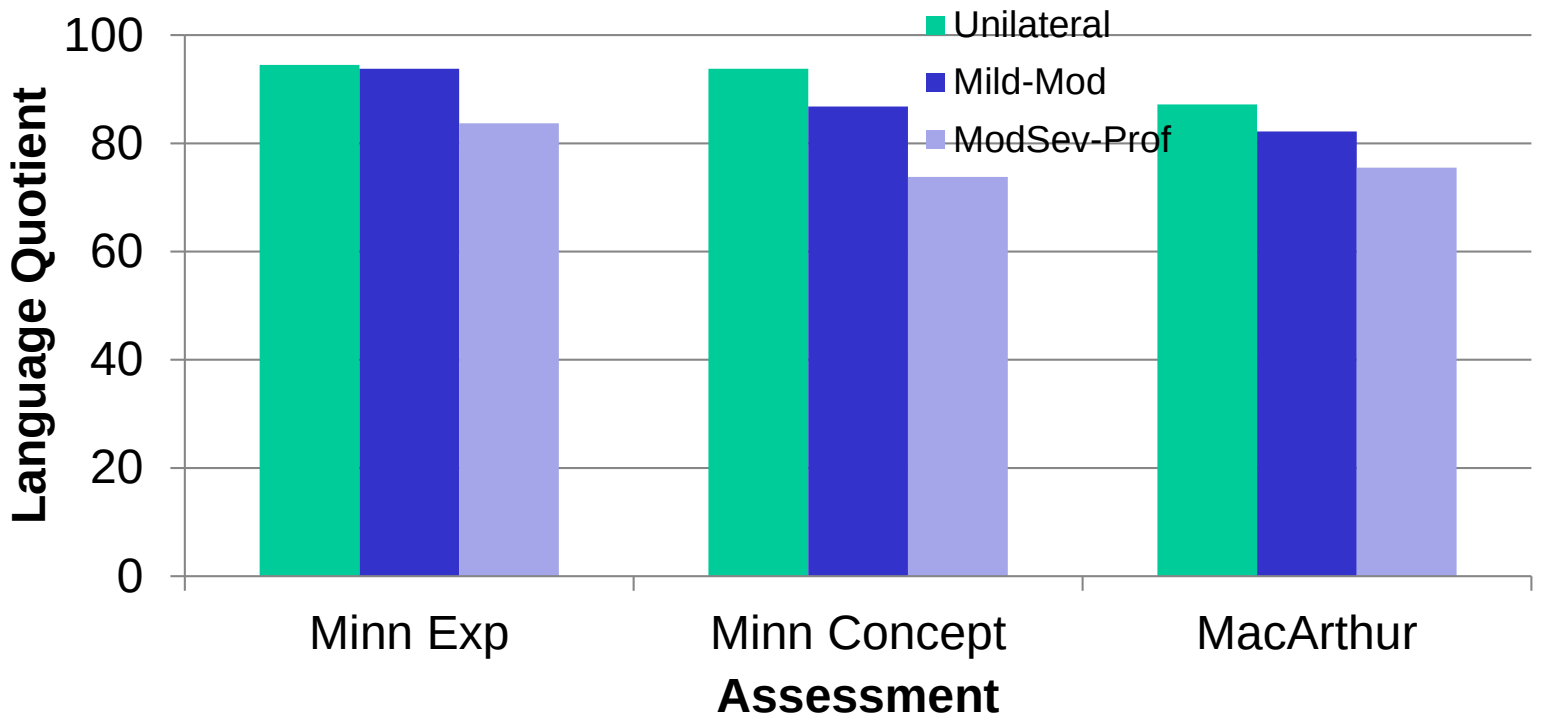
Mean Language Quotients



Percentage of Scores in the Average Range (LQ = 80+)



Mean Language Quotients: Unilateral and Bilateral

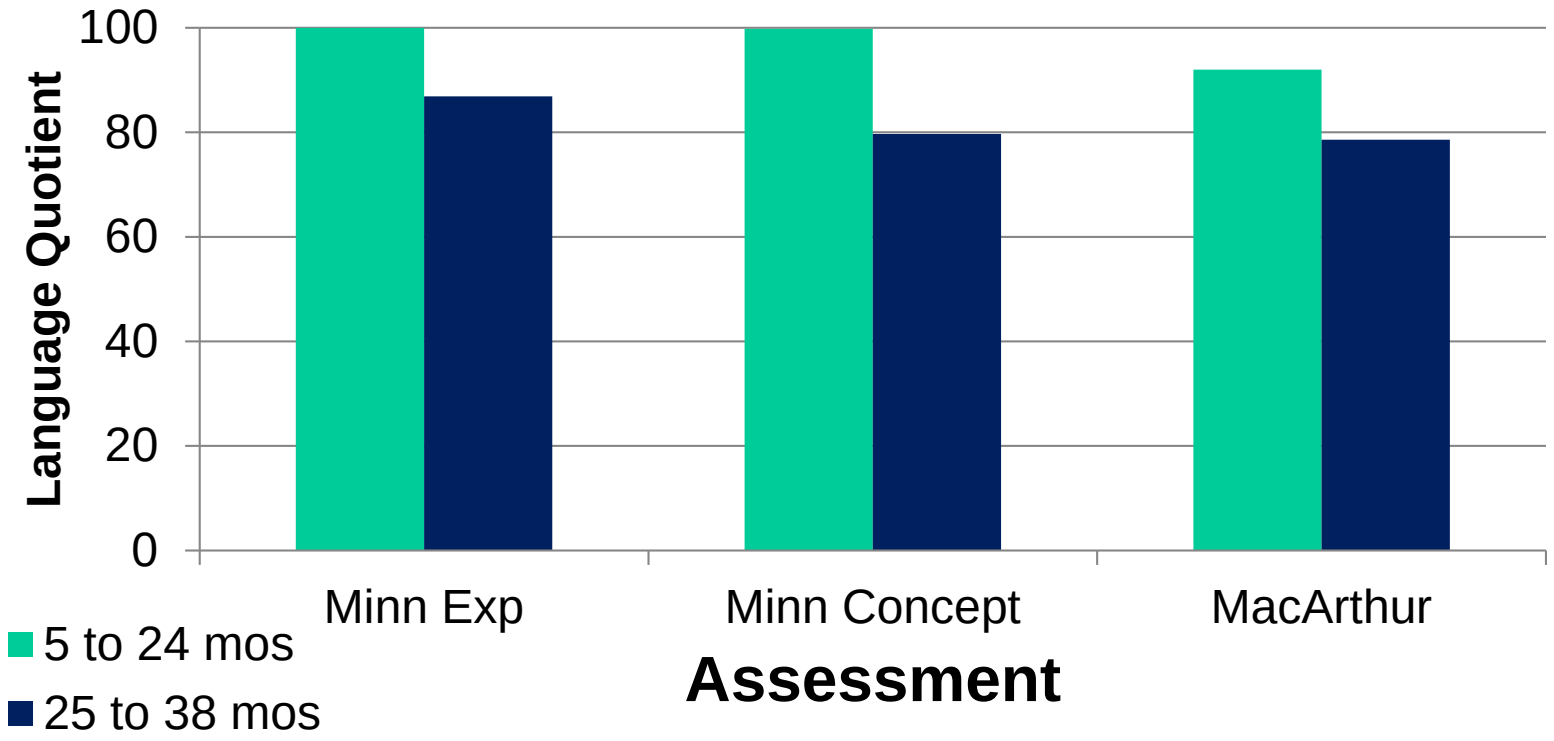


One-Way ANOVAs: No sig diff between UHL and mild-mod; Sig diff ($p < .05$) between all other groups

Sub-Group Comparisons

- No significant difference ($p > .05$) based on:
  - Gender (boy vs. girl)
  - Affected ear (right vs. left)
  - Degree of loss in affected ear
  - Home language (English vs. Spanish)
  - Parents' hearing status (deaf vs. hearing)
  - Use of amplification (hearing aid vs. none)
  - Medicaid status

Language Outcomes: Age Group Comparisons



**Significant differences ($p < .01$) between age groups on all three assessments

Language Outcomes: Sub-Group Comparisons

- Significant partial correlations ($p < .01$) -- controlling for CA - between mother's level of education and:
  - Minnesota Expressive LQ: $r = .41$
  - Minnesota Conceptual LQ: $r = .39$

- Borderline significant ($p = .065$) with:
  - MacArthur LQ: $r = .32$

Conclusions

- Depending on the assessment, 25% to 35% of the participants demonstrated delayed language
  - Previous research reports similar percentages of children with UHL who demonstrate academic difficulties

Conclusions

- Language delays typically not apparent until the child is 2 years of age
  - Language demands increase exponentially just prior to this age
  - Average expressive vocabulary size at:
    - 12 months = 5 words
    - 18 months = 85 words
    - 24 months = 300 words

Conclusions

- It is very difficult to predict which subgroups of children with UHL are at more risk for language delays
  - Some indication that children of mothers with lower levels of education are at increased risk

Clinical Implications

Children with UHL should be re-evaluated just after turning 2 years old and again at transition to preschool so that data-driven decisions can be made regarding delivery of intervention services