EHDI Benchmarks and Additional Factors Impacting Language Outcomes in Young Children with Bilateral and Unilateral Hearing Differences

EHDI Conference

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Disclaimer
The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention (CDC).

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Authors

Allison Sedey, Ph.D.
University of Colorado-Boulder
Colorado School for the Deaf and the Blind
Allison.Sedey@colorado.edu

Beth Langer, Ph.D.
University of Colorado-Boulder
Beth.Langer@colorado.edu

University of Colorado Boulder

Today's Topics

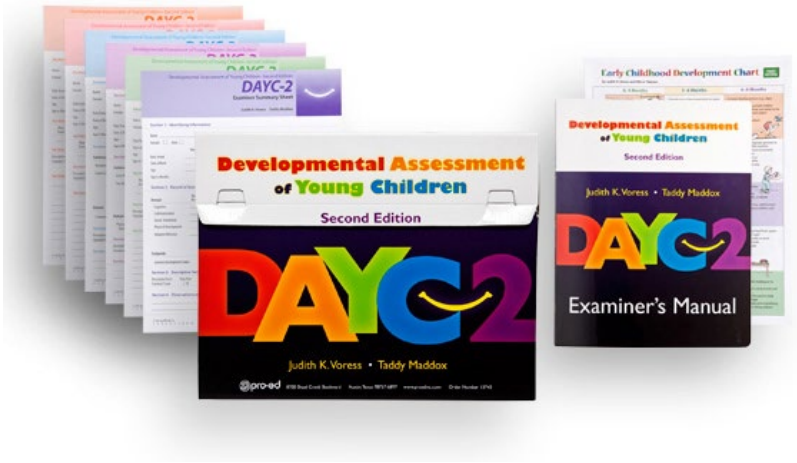
- Examine predictors of language outcomes
  - Bilateral hearing differences
  - Unilateral hearing differences
- Compare outcomes for children who meet various EHDI benchmarks
- Explore the relationship between language outcomes and:
  - Age of ID
  - Amount of time from ID to intervention

Project Database

- All data were collected under the ODDACE public health surveillance project (2020-2024)
- 16 programs across 14 states participated
- Supported programs in collecting language outcomes
- Combined data across programs to examine factors that impact language outcomes

Developmental Assessment of Young Children - DAYC-2

- Based on observation and parent report
- Examined Receptive Language subscale
- Skills credited if exhibited in spoken and/or sign language



MacArthur-Bates Communicative Development Inventories

- Assesses diversity of expressive vocabulary
- Parent-report instrument
- Includes both spoken and signed expressive vocabulary

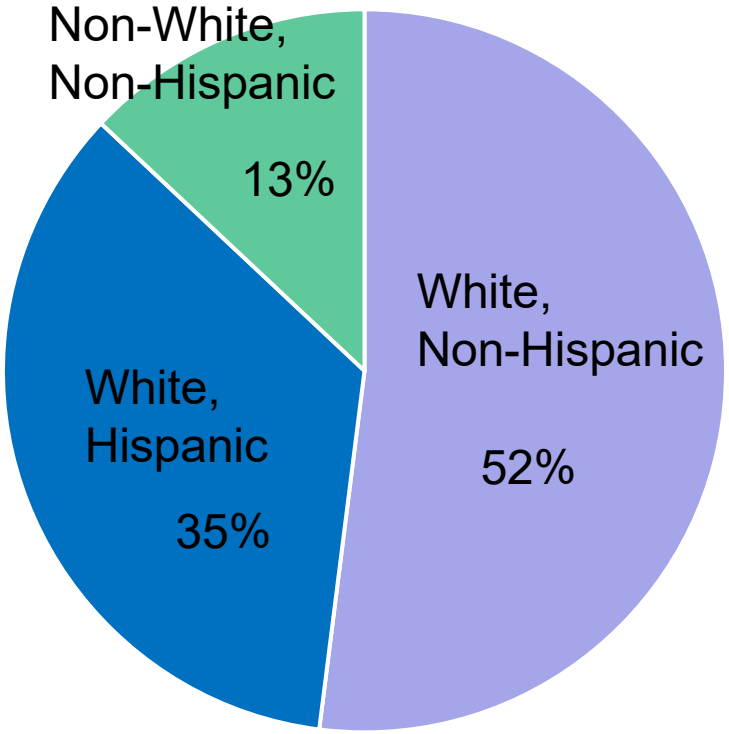
Participant Criteria

- 8 to 36 months of age
- All levels of hearing difference
- Onset = At birth
- English, Spanish, or ASL in the home
- Any communication mode
- No disabilities thought to affect language development
- Most recent assessment

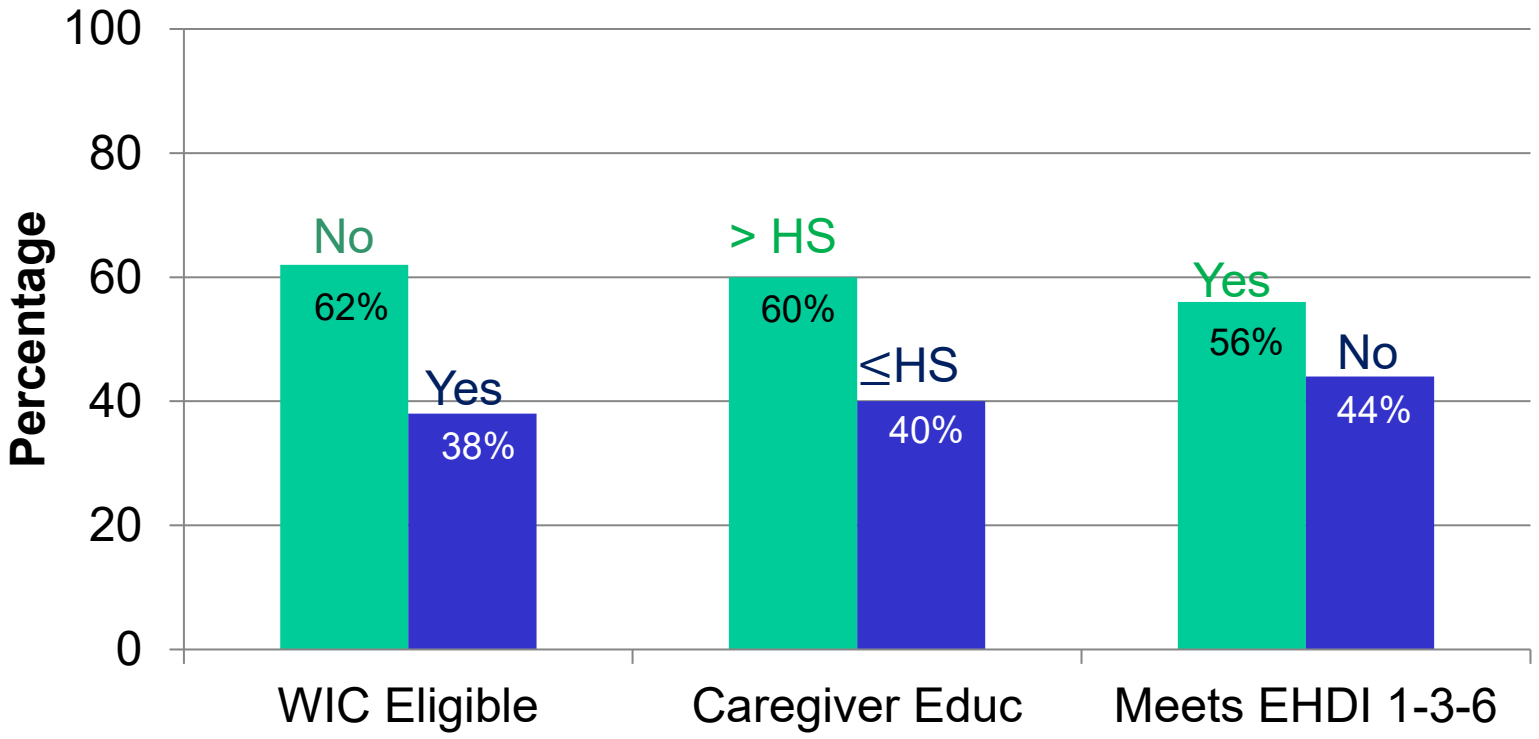
Number of Participants

- DAYC-2 Receptive Language
  - Bilateral = 474
  - Unilateral = 270
- MacArthur-Bates Expressive Vocabulary
  - Bilateral = 452
  - Unilateral = 255

Participant Characteristics: Race and Ethnicity



Participant Characteristics



Question 1

What factors are associated with language scores in children with bilateral and unilateral hearing differences?

Statistical Analysis and Outcome Variables

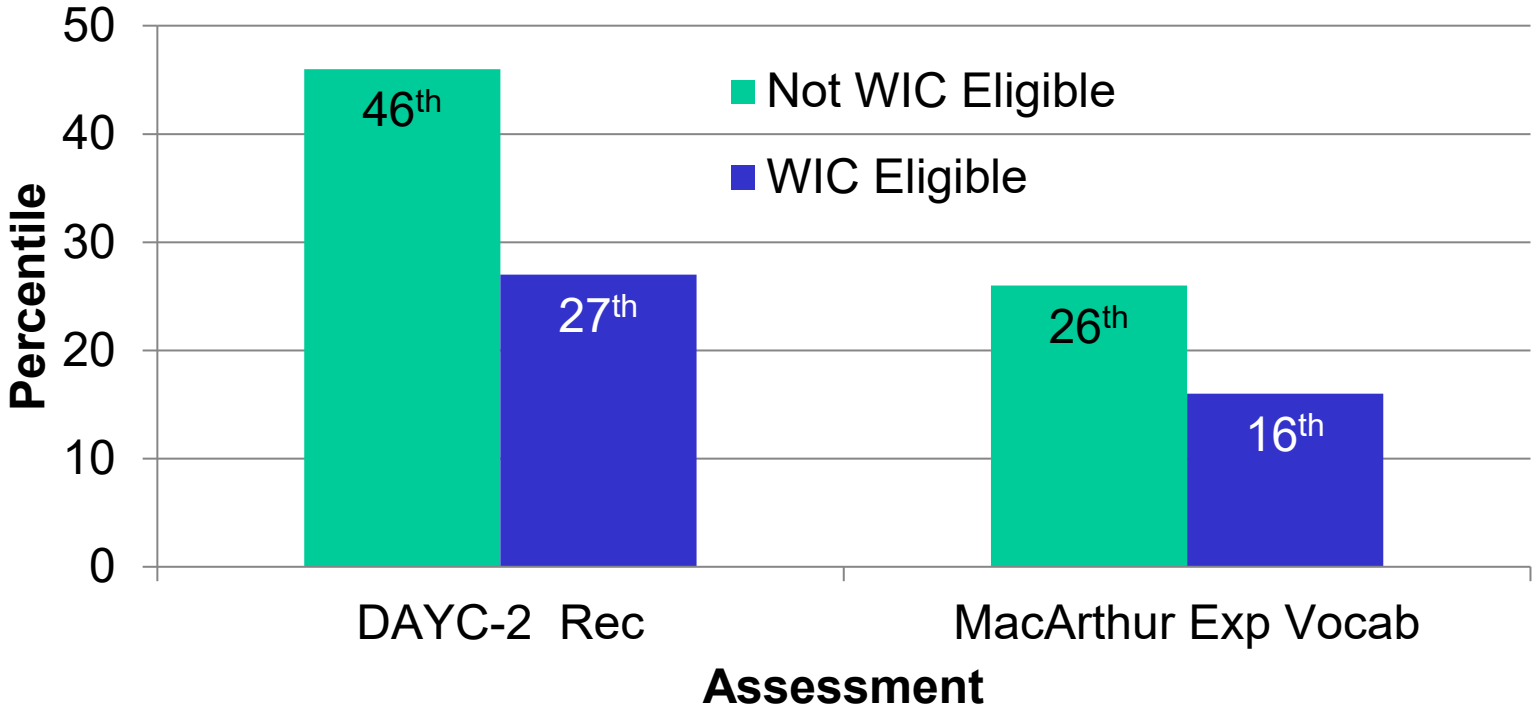
- DAYC-2 Receptive Language
  - Linear regression
  - Outcome variable = Percentile score
- MacArthur-Bates Expressive Vocabulary
  - Logistic regression
  - Outcome variable = At/Above 10^{th} percentile vs. Below 10^{th} percentile

Factors Associated with Lower Language Scores ($p < .05$): Bilateral

Children at higher risk of language delay:

- Older chronological age
  - Gap widens as age increases
- Lower level of education of primary caregiver
- Eligible for WIC
- Moderate-severe to profound hearing levels
- Minority race and/or ethnicity
- Didn’t meet EHDI 1-3-6 guidelines

Bilateral Mean Language Percentiles: WIC Status



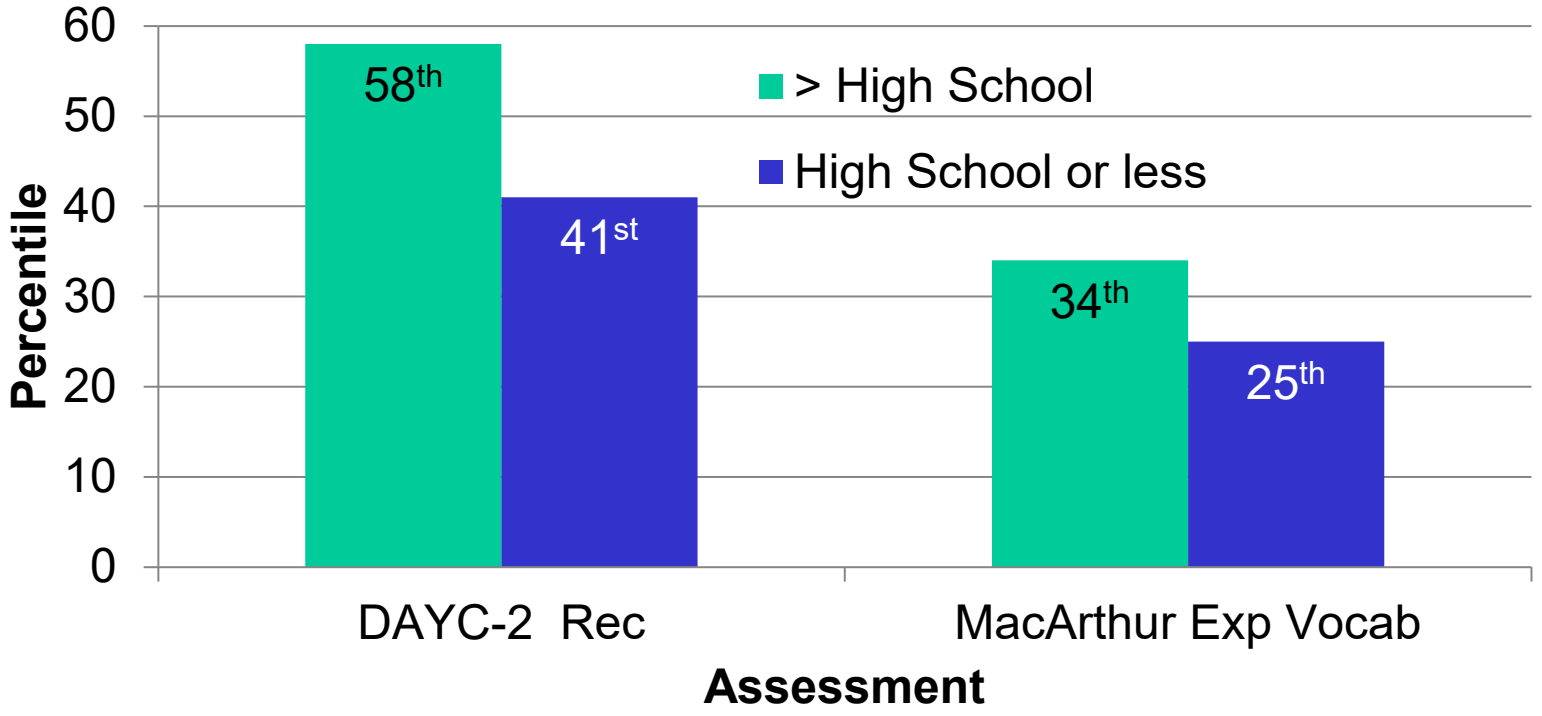
Mean percentile for hearing children in the normative sample = 50th

Factors Associated with Lower Language Scores ($p < .05$): Unilateral

Children at higher risk of language delay:

- Older chronological age (MacArthur only)
  - Gap widens as age increases
- Lower level of education of primary caregiver
- Eligible for WIC

Unilateral Mean Language Percentiles: Caregivers' Level of Education



Mean percentile for hearing children in the normative sample = 50th

Unilateral Hearing Differences

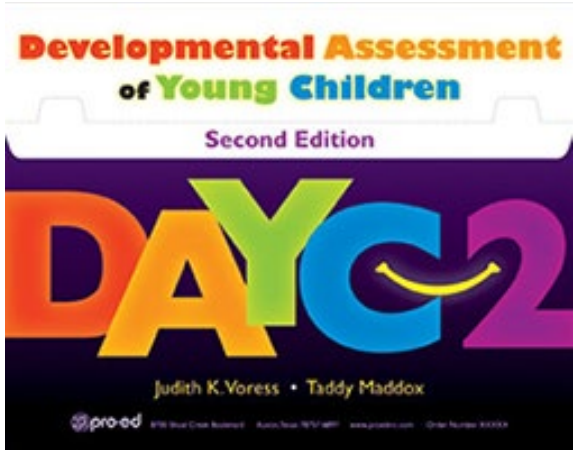
- Factors NOT predictive of language scores for unilateral:
  - Minority race and/or ethnicity
  - Meeting EHDI 1-3-6 guidelines
  - Hearing level in affected ear
  - Affected ear (right vs. left)

Question 2

Do children with bilateral hearing differences who meet 1-2-3 demonstrate better language outcomes than children who meet 1-3-6 (but not by 1-2-3)?

Number of Participants: Bilateral Hearing Difference

N = 430



N = 407

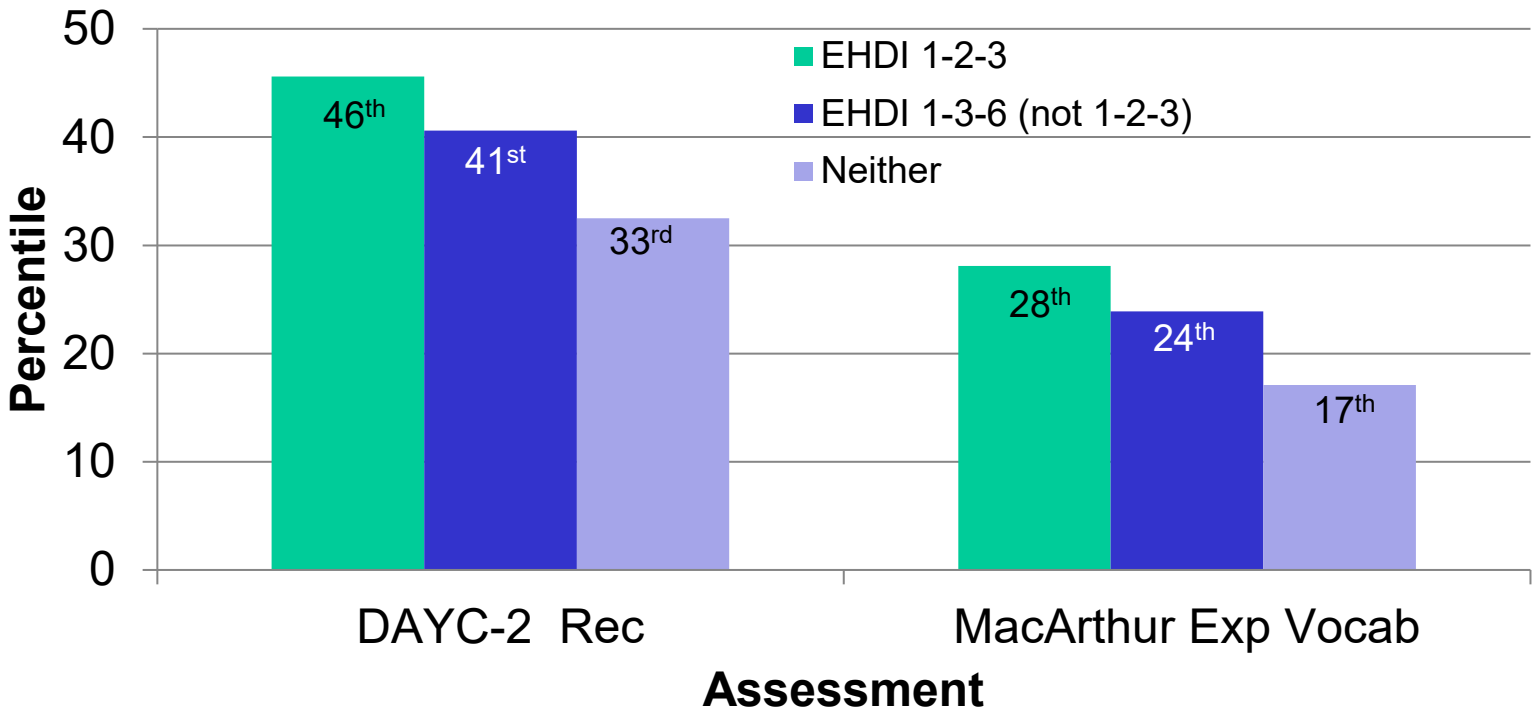
EHDI 1-2-3 vs. 1-3-6

Controlled for age, hearing level, caregiver's level of education, race/ethnicity, & WIC status

Trend toward higher language scores (DAYC-2 Receptive and MacArthur-Bates Expressive Vocab) for children meeting 1-2-3 vs. 1-3-6 (but not by 1-2-3)

However, differences were NOT statistically significant ($p > .05$)

Mean Language Percentiles: Differing EHDI Benchmarks



Mean percentile for hearing children in the normative sample = 50th

Question 3

Given the trend toward higher language scores for children meeting 1-2-3, is earlier ID and reduced time from ID to intervention associated with higher language scores?

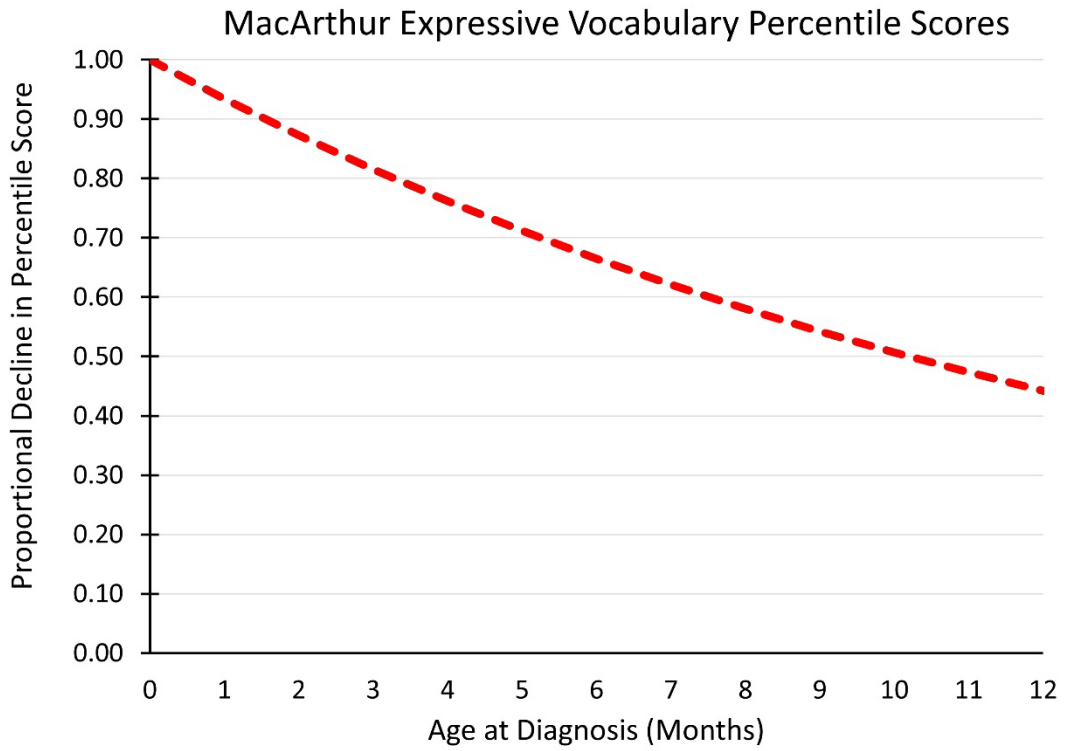
Age of ID and Time from ID to Start of Intervention

Controlling for age, hearing level, caregiver's level of education, race/ethnicity, and WIC status…

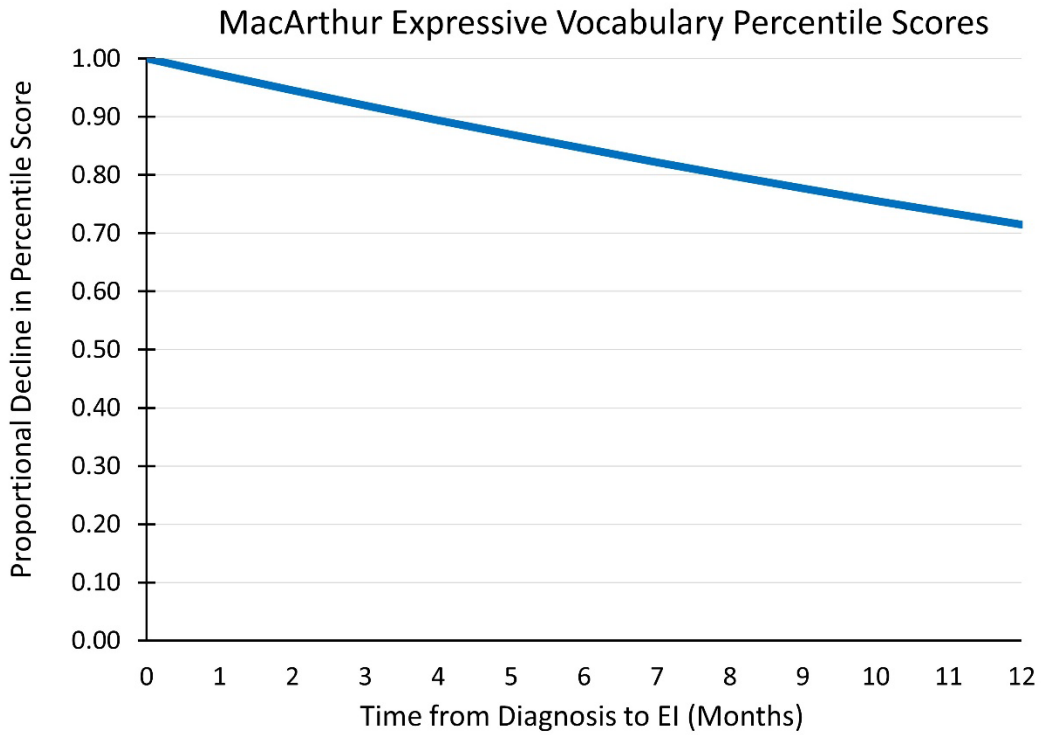
Age of identification was a significant predictor of both DAYC-2 Receptive Language and MacArthur-Bates Expressive Vocab percentiles

Amount of time from identification to start of intervention was also a significant predictor of percentiles on both assessments

Impact of Age of Identification



Impact of Number of Months from Identification to Intervention



Conclusions

- Meeting EHDI 1-3-6 guidelines is a significant predictor of language outcomes
- In this sample only 56% of children met these guidelines

Conclusions

- Although children meeting 1-2-3 did not achieve significantly higher language scores than children meeting 1-3-6…
- Looking at age of ID as a continuous variable revealed earlier identification predicted higher language scores

Conclusions

- Regardless of age of ID, a shorter time from ID to intervention was associated with higher language scores

With Appreciation

- to the families who shared their children's information with ODDACE
- to the interventionists who took the time to complete and send in the assessments
- to the ODDACE Assessment Coordinators
- to the ODDACE Project Assistants