

LENA: Exploring novel approaches to language assessment and intervention

COLORADO HOME INTERVENTION PROGRAM

NOVEMBER 5, 2011



Christine Yoshinaga-Itano, PhD

Dinah Beams

Jill Gilkerson, PhD

Robyn Cattle Moore, Ph.D.

Kristin Uhler, Ph.D.

Rosalinda Baca, Ph.D.

Mallene Wiggins, M.A.

Conflict of Interest Disclosure



- **Dr. Jill Gilkerson is the Director of Research at the LENA Foundation**
- **Dr. Christine Yoshinaga-Itano has no financial relationship with the LENA Foundation**

Longitudinal study: Number of children with hearing loss identified between 1997-2003

- **65-70% of all possible participants**
 - Infants identified with hearing loss in Colorado
 - Born 1997 through 2003
- **All birthing hospitals in Colorado established universal newborn hearing screening programs by 1999**



- **N= 146 children with longitudinal data (3 or more assessments) from 48 to 87 months of age**
 - **Children with non-verbal cognitive development within the normal range**
 - **English-speaking families**
 - **Hearing parents**

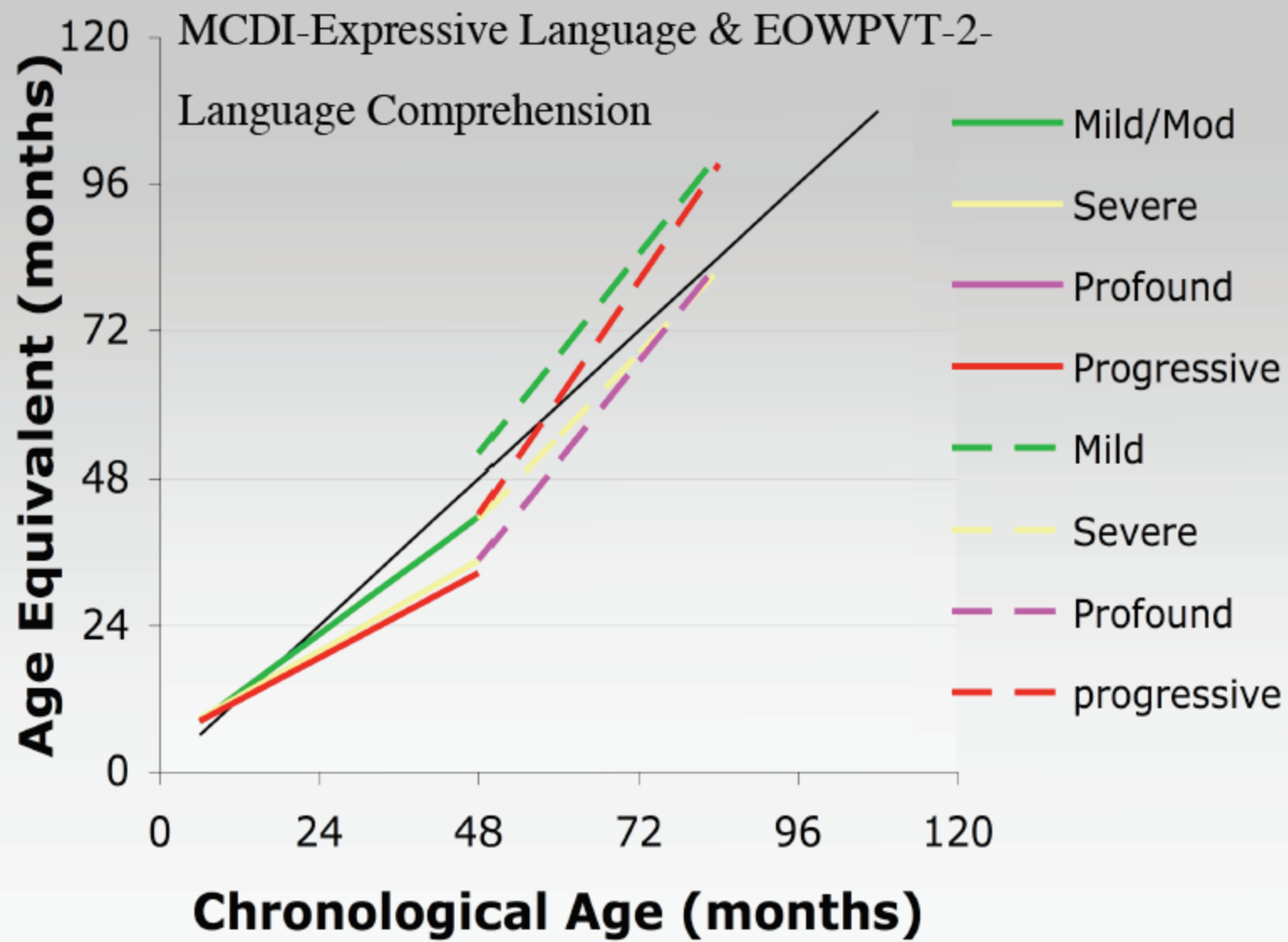


- **Four assessment occasions: 48, 60, 72, 84 (+/- 3 months)**
- **Median age of identification: 3 months**
- **Median age of intervention start: 8 months**

Children with severe to profound HL: 48 to 87 mo.



- **N= 87 had severe to profound HL**
 - Children with cochlear implants (N=49)
 - ✦ Age of ID by 6 months: 55%
 - ✦ Age of ID by 12 months: 86%
 - Children with hearing aids (N=35)
 - ✦ Age of ID by 6 months: 68.4%
 - ✦ Age of ID by 12 months: 76%
- **N=48 had mild to moderate HL**



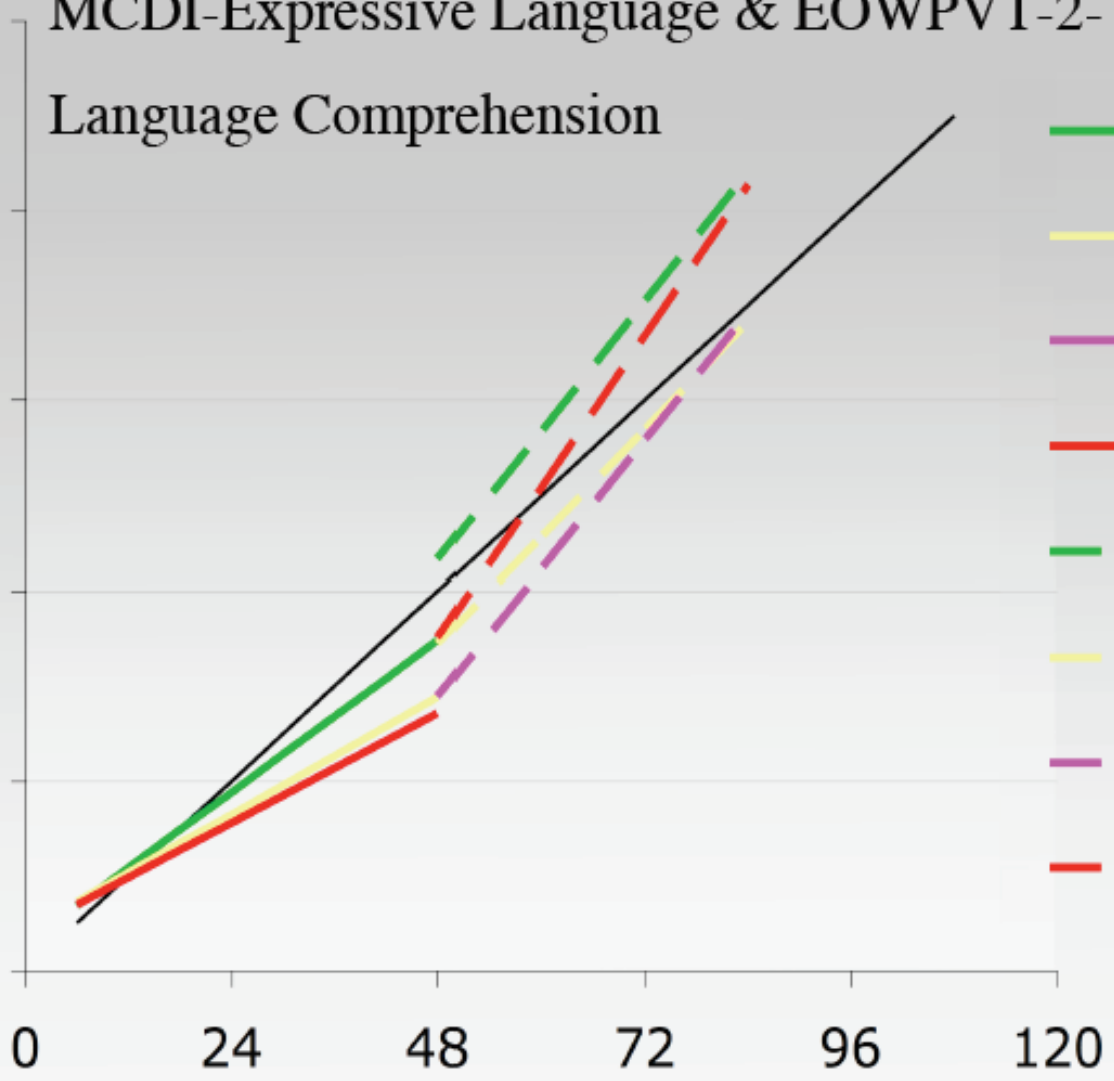
Do individual child characteristics systematically differentiate the language trajectories in young children with hearing loss?



ROSALINDA BACA, 2009

MCDI-Expressive Language & EOWPVT-2-
Language Comprehension

Age Equivalent (months)



Chronological Age (months)

- Mild/Mod
- Severe
- Profound
- Progressive
- Mild
- Severe
- Profound
- progressive

UNCHANGABLE CHARACTERISTICS:
Degree of Hearing loss, non-verbal
cognitive development, age of
identification, maternal level of education



**BACA, SEDEY, YOSHINAGA-ITANO,
2013**

MODEL PREDICTION OF VARIANCE OF LANGUAGE AT 84 months and rate of language development



- **68% of variance in EOWPVT at 84 mo.**
- **71% of the variance in TACL III at 84 mo.**

- **46% of rate of language growth for EOWPVT**
- **81% of rate of language growth for TACL III
(receptive syntax)**



Mother's Education- no. (%)

<12 years (No High school)	7 (4.8)
12 years (High school diploma)	46 (31.7)
13-15 Some college	23 (15.8)
16+ College graduate	69 (47.3)



**Age of identification of hearing loss
– mos.^b**

Median (SD)

1.5 (8.13)

Range

0-41

Leiter IQ – full scale score

Mean (SD)

104 (14)

Range

74-140

EOWPVT III LANGUAGE OUTCOME AT 84 MONTHS AND RATE OF LANGUAGE GROWTH



- **Predictor variables:**
 - Non verbal cognitive development
 - Degree of Hearing Loss
 - Age of Identification
 - Maternal Level of Education

- Explained intercept 37% (language at 84 months) &
- 39% in slope (rate of language development)

PREDICTIVE POWER



- Degree of Hearing Loss
- Non-verbal cognitive quotient (Leiter International Performance Scale)
- Maternal Level of Education
- Expressive Language Quotient at 36 months
 - (parent imitation, parent expansion, symbolic play of child, personal-social development of child, emotional availability, parental stress, mastery motivation)
- Frequency of Parent Words (birth through 36 mo.)
 - (9, 15, 21, 27, 36, 48, 60, 72) - about 1000 videotapes 25-30 minutes)

PARENT WORD FREQUENCY



- **16% of variance in EOWPVT III**
- **12% of variance in TACL 3rd ed**
- **Parents in upper quartile >1515 words – had children with a 29 month advantage in expressive vocabulary at 84 months over the children with parents in the lower quartile <=984 words**
- **Children with parents in the upper quartile for parent word frequency had a 15 month advantage in receptive syntax over the children with parents in the lower quartile**

MATERNAL LEVEL OF EDUCATION



- 5.4% variance of language outcome at 84 months on EOWPVT III
- 3.2% variance of language outcome at 84 months on TACL, 3rd ed.

- 8% of variance in rate of language development on EOWPVT III
- 5.4% of variance in rate of language development on TACL 3rd ed.



- **LOW SES: 12 years - High school diploma or lower**
- **HIGH SES: 16+**

HALF HOUR VIDEOTAPE SAMPLE



**Parent-word- Frequency
– total words ^c**

Lower quartile

984

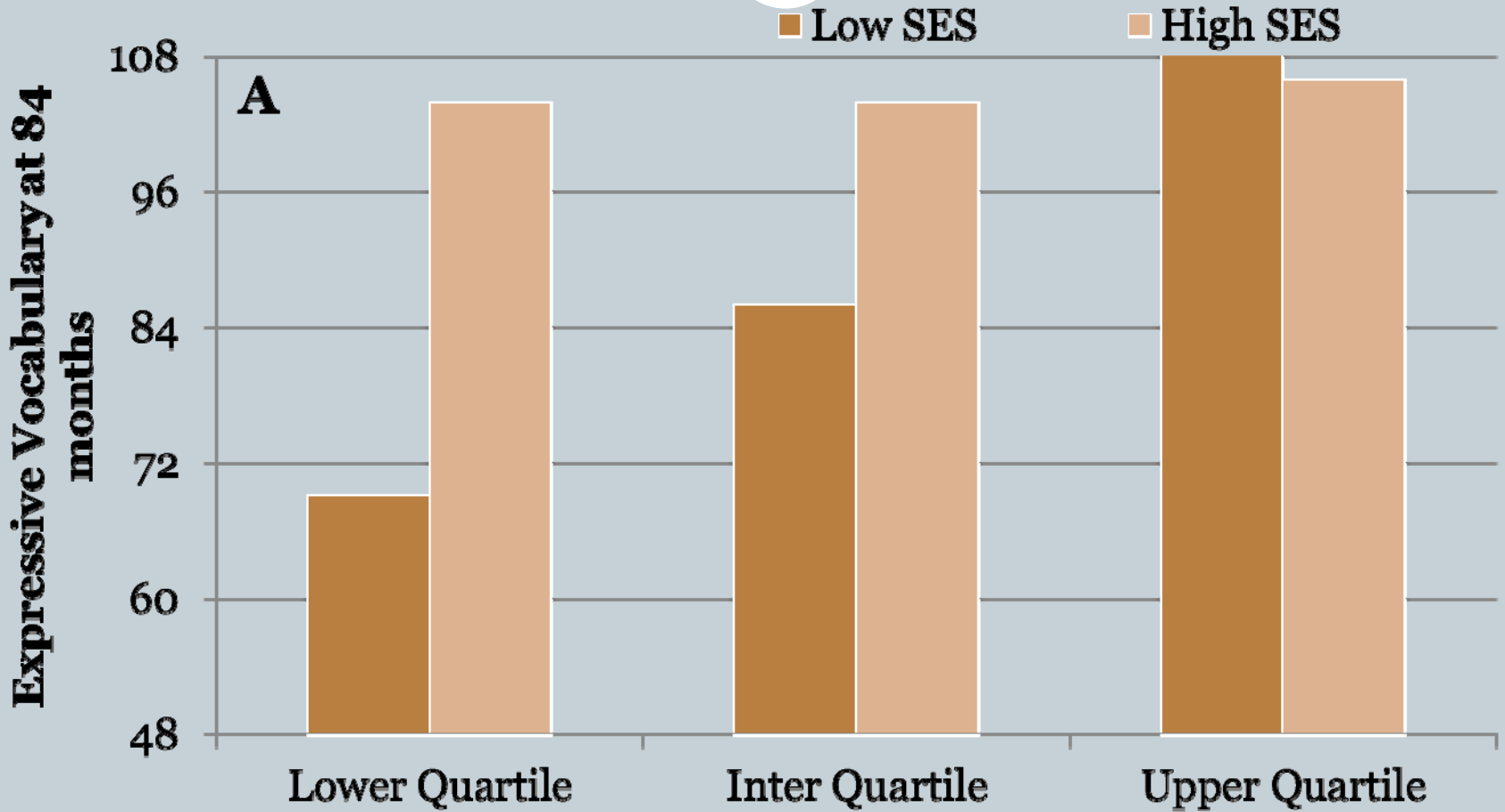
Middle quartile

1245

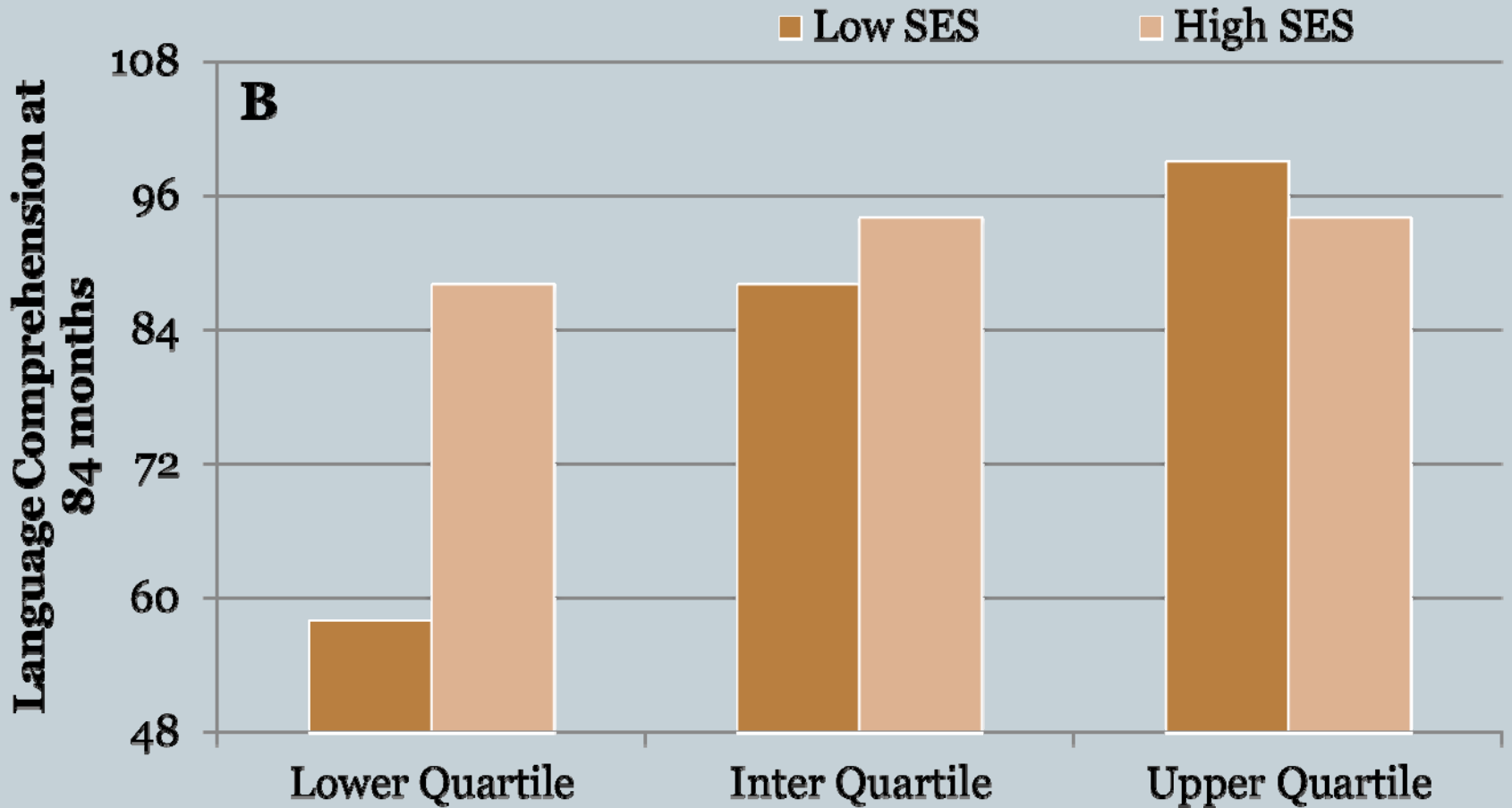
Upper quartile

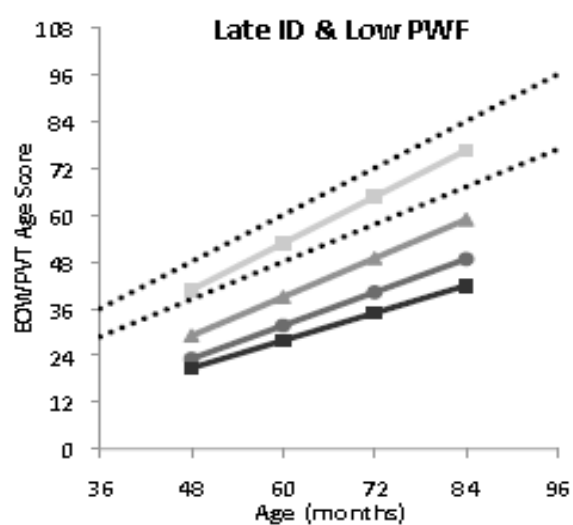
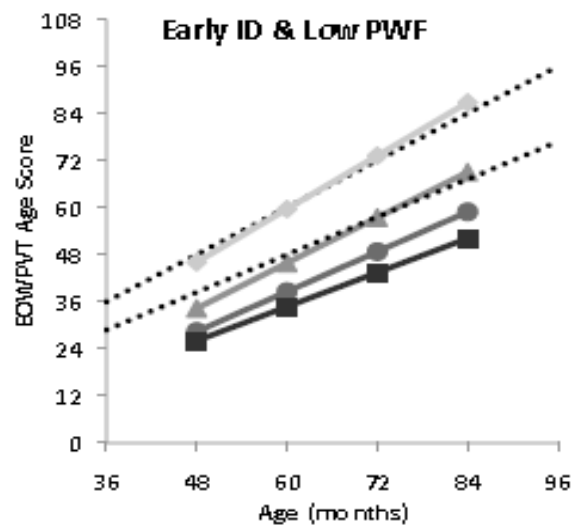
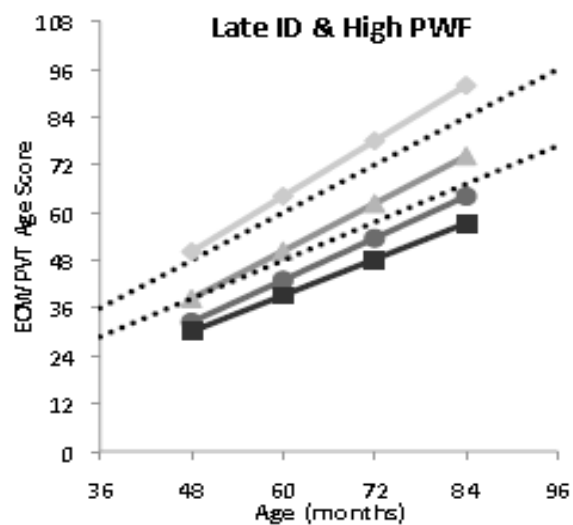
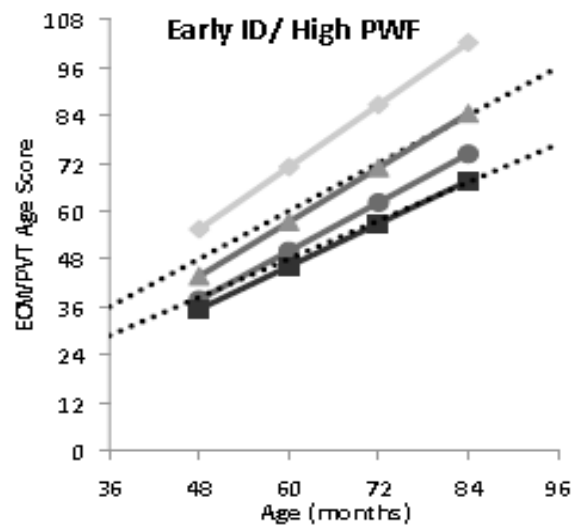
1515

PARENT WORD FREQUENCY: EOWPVT III



PARENT WORD FREQUENCY: TACL





- Baseline Mild/Med
- Effect of SEV HL + IQ
- ▲— Effect of SEV HL
- Effect of SEV HL + IQ + MLE

BIRTH THROUGH THREE YEARS



- 213 infants/toddlers followed longitudinally from age of identification through 3 years of age
- Born 1998-2003 (none included in 1998 study)
- Included children with additional disabilities
- PREDICTIVE VARIABLES:
 - Age of identification (before 3 months), degree of hearing loss (mild, severe, profound, progressive), non-verbal cognitive status
 - **Maternal level of education did not add additional explanatory power**

EOWPVT



- **66% of the variance of language outcome at 36 months**
- **48% of rate of language growth**

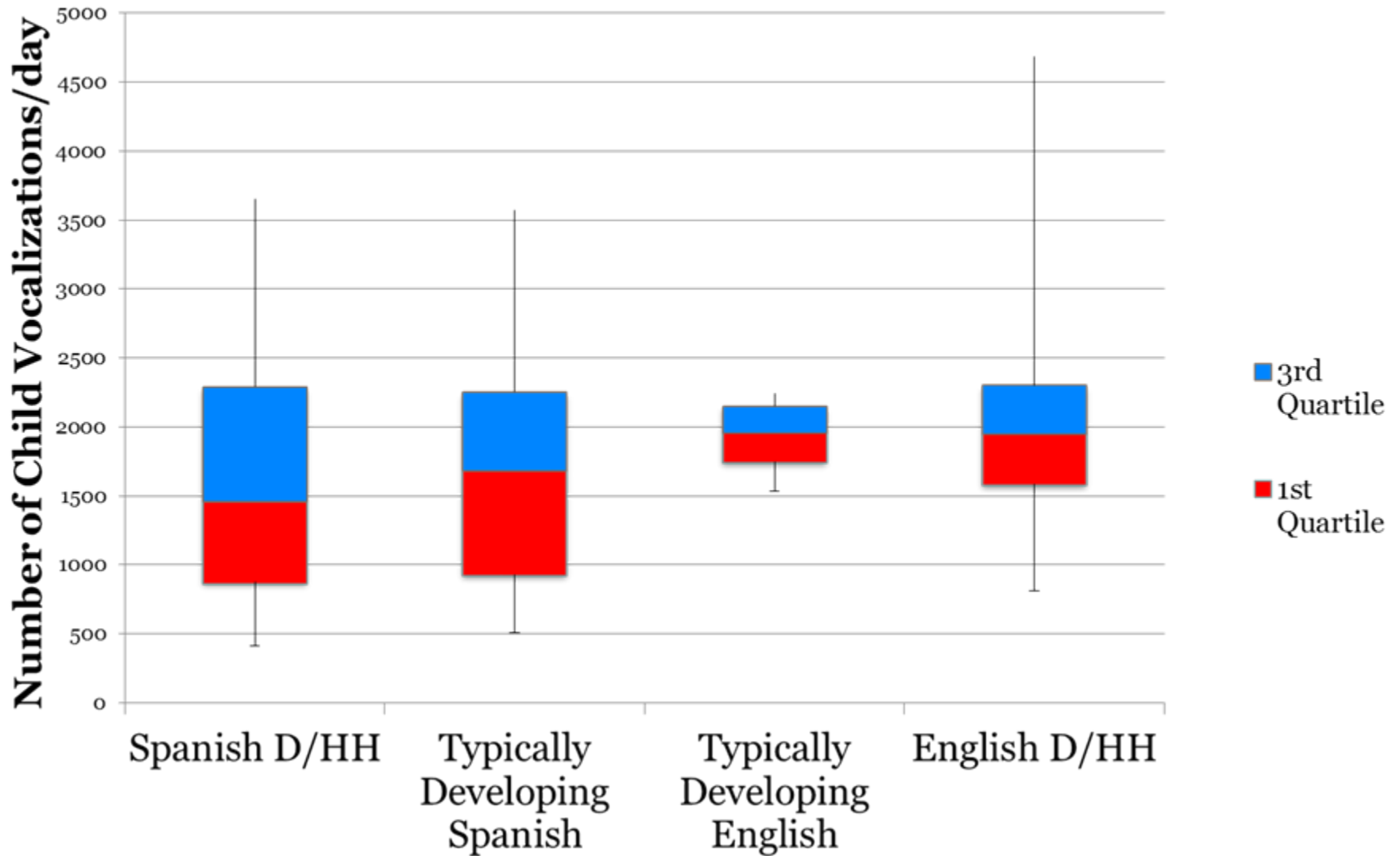
- **Non-verbal cognitive level explained 57.6% of the variance of language outcome at 36 months**
- **NV cognitive level accounted for 39.2% of rate of language development**

HIGH PERFORMERS

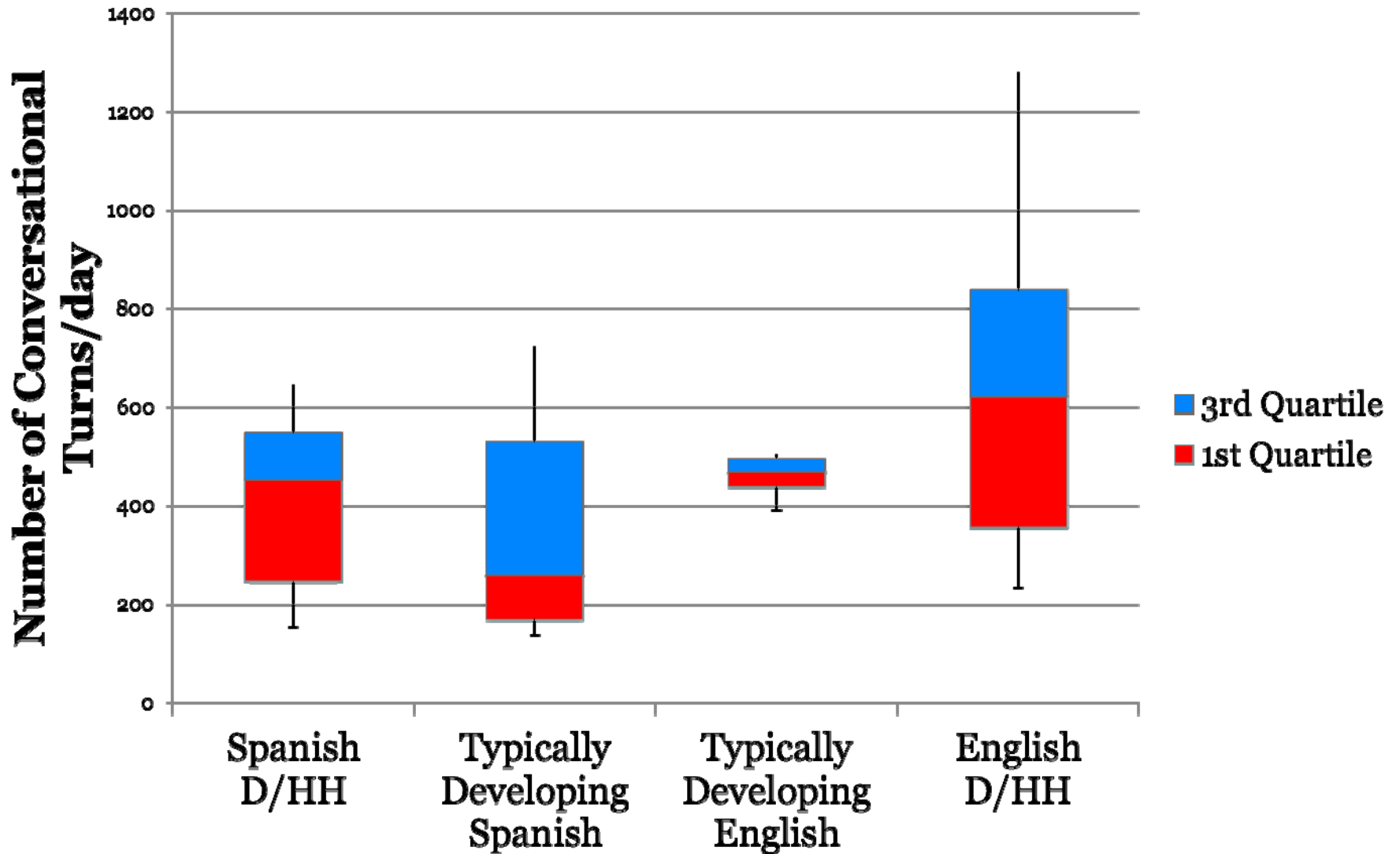


- N= 25 children
- estimated expressive language quotients of 80 or better at 36 months and slopes that followed or exceeded the age equivalent trajectory.
- representation across all levels of maternal education with 20% having 12 years or less.
- All 25 had NVCQ that were within normal limits.
- 68% were identified before three months of age and 80% before six months.
- 76% of this subgroup that had a mild or moderate hearing impairment.

Range: Child Vocalizations



Range: Conversational Turns



Range: Adult Word Count

