

Vocabulary Ability and Growth and Predictors of Better Outcomes

EHDI

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Today's Topics

- Describe NECAP
- Summarize sample characteristics
- Examine vocabulary growth over time
- Identify characteristics associated with better vocabulary outcomes
- Compare vocabulary development in children with unilateral vs. bilateral loss

Participants

- All families participated in NECAP
 - National Early Childhood Assessment Project
 - CDC-supported project examining language outcomes at the national level
 - Birth to 3
 - Children who are deaf or hard of hearing

States Represented in Sample

- Arizona
- California
- Florida
- Idaho
- Indiana
- Maine
- Minnesota
- New Mexico
- North Dakota
- Oregon
- South Dakota
- Texas
- Utah
- Wisconsin
- Wyoming

Participant Criteria

- Bilateral hearing loss
 - (all degrees -- mild to profound)
- English is written language of the home
- No other disabilities thought to affect speech or language development

Number of Participants/Assessments

- 837 children
- Assessed on 1 to 5 occasions
 - 436 children assessed once
 - 401 children assessed two or more times
- Total assessments = 1,499

Participant Characteristics

- Chronological age
 - Range = 9 to 36 months
 - Mean = 25.4 months
- Boys = 54%; Girls = 46%

Participant Characteristics: Adherence to EHDI Guidelines

Age at...	Median (mos)	Range (mos)
Identification	2	.05 to 31
Amplification	5	.5 to 36
Intervention	5	.25 to 35

*69% of children were identified by 3 months of age

*65% of children were in intervention by 6 months of age

*57% of children met EHDI 1-3-6

Participant Characteristics: Mother's Level of Education

Highest degree completed	% of primary caregivers
Less than HS	9%
High school diploma	37%
Vocational or Associates	19%
Bachelor's degree	25%
Graduate degree	10%

Participant Characteristics: Communication Mode of Family

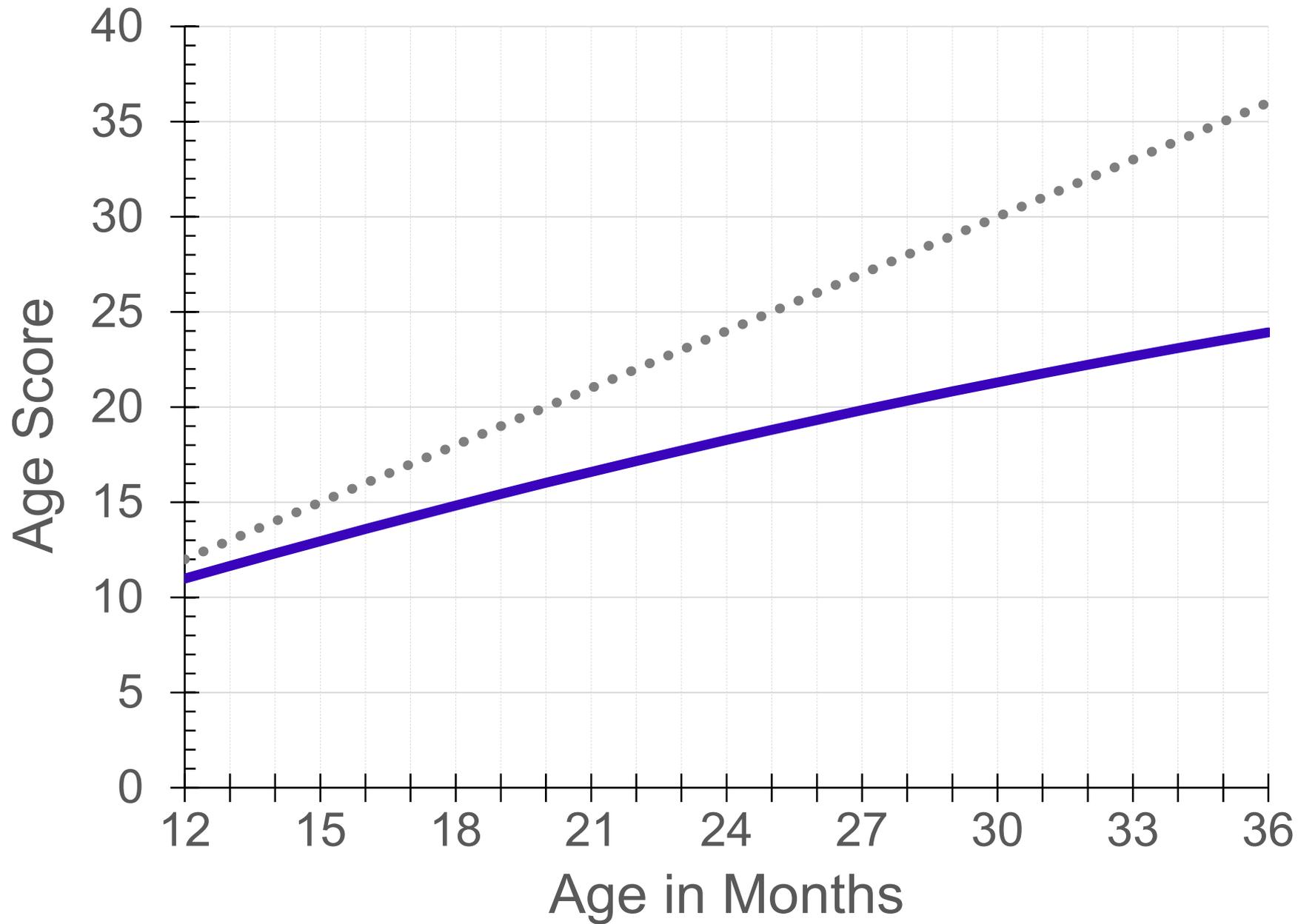
Communication mode used with child by family	% of primary caregivers
Primarily spoken language	71%
Spoken only	29%
Very occasional sign used	42%
Spoken + sign language	24%
Sign only	5%

MacArthur-Bates Communicative Development Inventories

- Assesses expressive spoken and sign vocabulary
- Parent-report instrument
- Age score assigned based on number of words child produces in spoken and/or sign language

Data Analysis

- Longitudinal analysis
- Examined vocabulary age scores and growth relative to chronological age using Hierarchical Linear Analysis (HLM)



Results: Vocabulary Acquisition

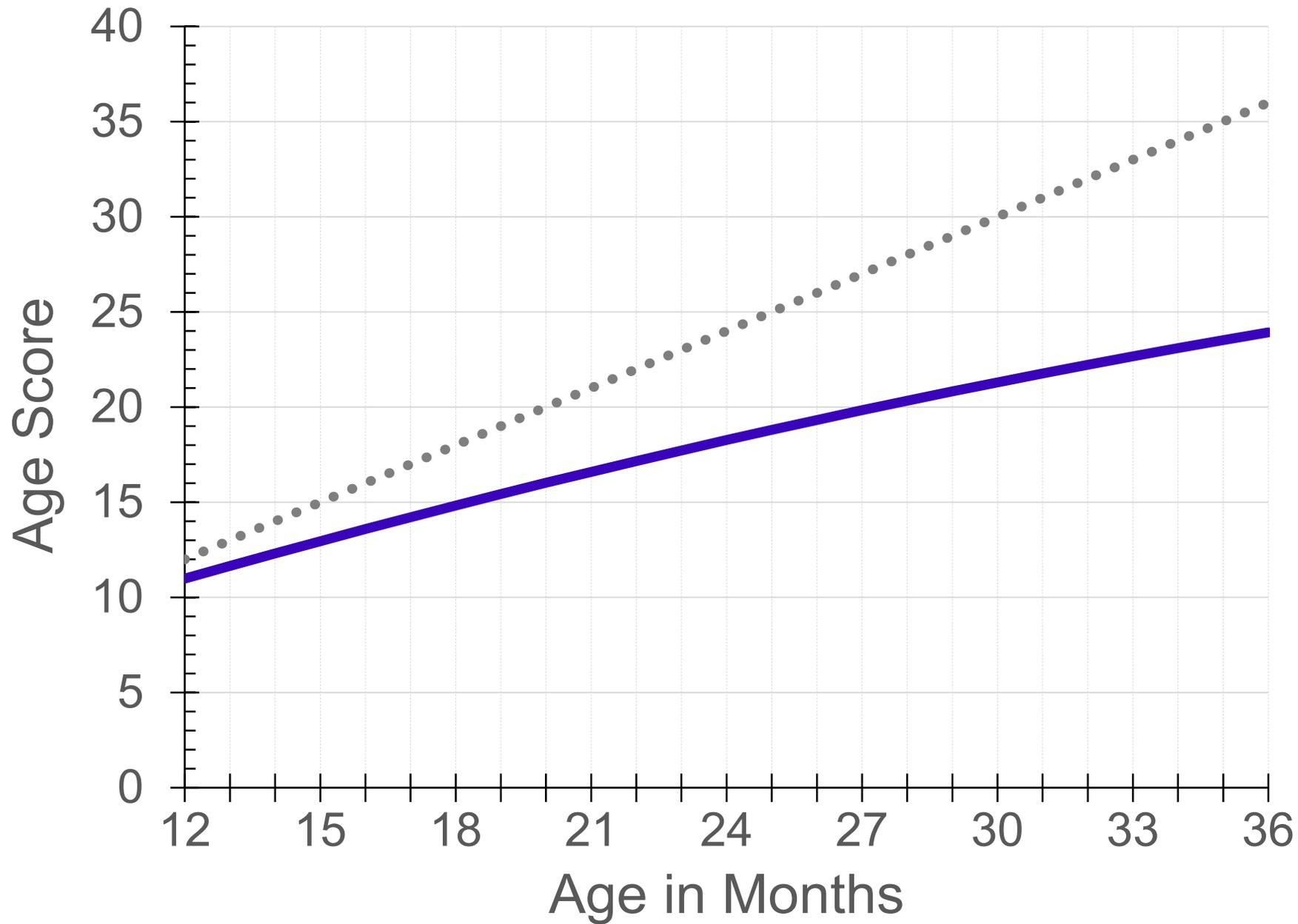
- At very young ages (12 to 15 mos) expressive vocabulary is close to age expectations
- As CA increases, vocabulary age score deviates further and further from age expectations

Results: Vocabulary Acquisition

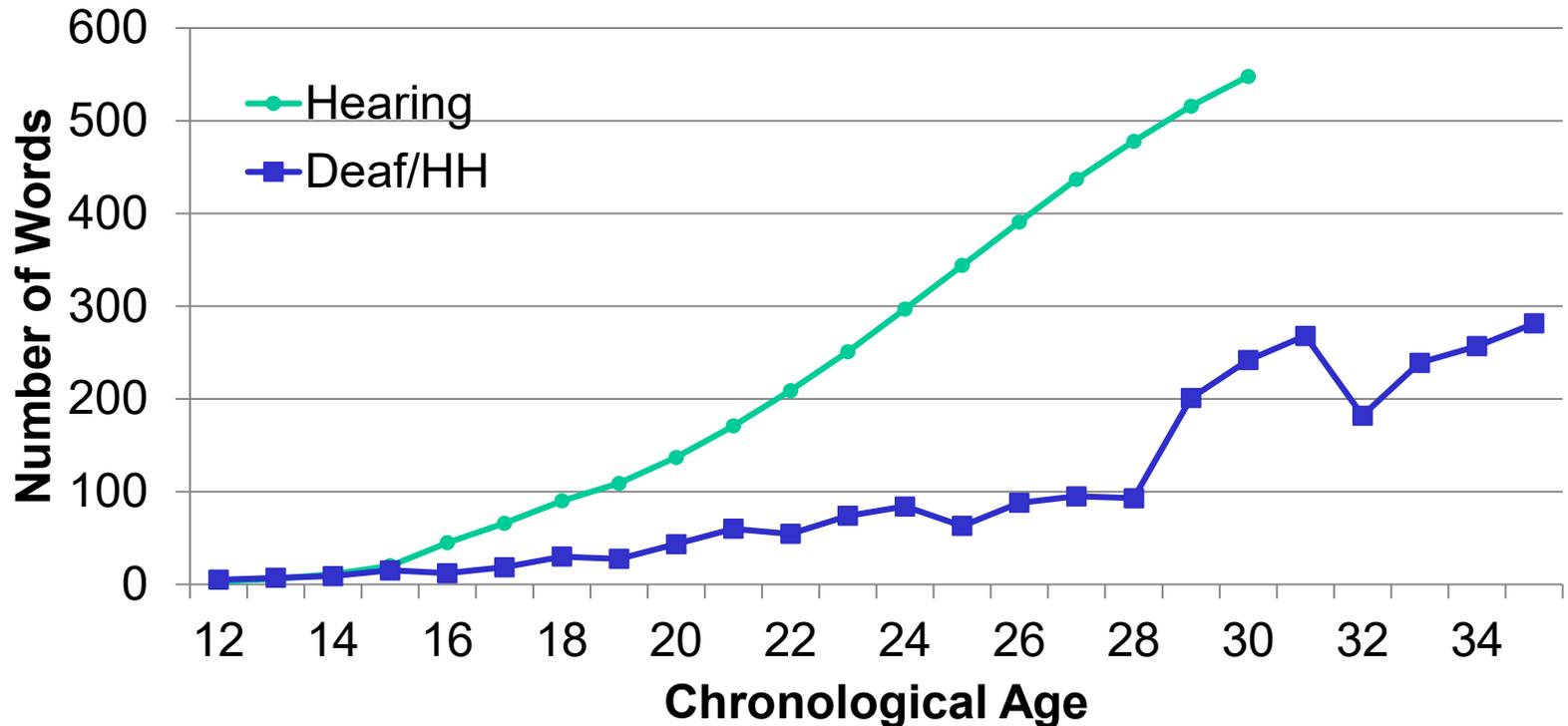
- Average amount of delay by CA:
 - 15 months = 2 months delay
 - 22 months = 5 months delay
 - 29 months = 8 months delay
 - 36 months = 12 months delay
- So gap is widening over time

Results: Vocabulary Acquisition

- Vocabulary growth from 1 to 3 years of age:
 - Average of .56 months growth for each actual month
 - Significant quadratic effect: There is a small but statistically significant lessening of growth as child gets older (not as much growth per month)



MacArthur-Bates CDI: Expressive Vocabulary – 50th Percentile



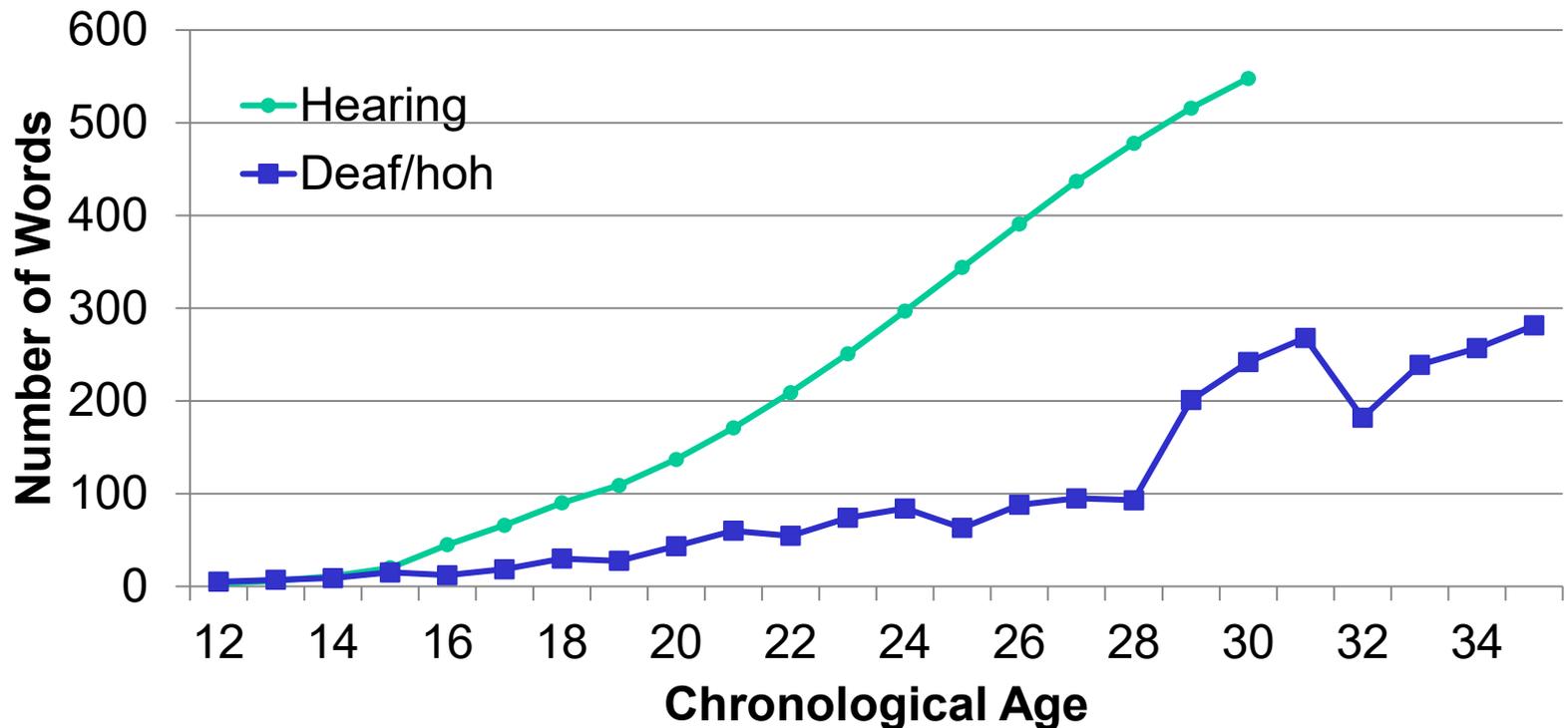
Results: Vocabulary Size

- Average vocabulary size delay
 - 15 months = 5 words behind
 - 18 months = 60 words behind
 - 24 months = 213 words behind
 - 30 months = 306 words behind

Results: Vocabulary Size

- After 18 months of age, on average:
 - Hearing children gain 37 new words per month
 - Deaf/HH children gain 18 new words per month

MacArthur-Bates CDI: Expressive Vocabulary – 50th Percentile

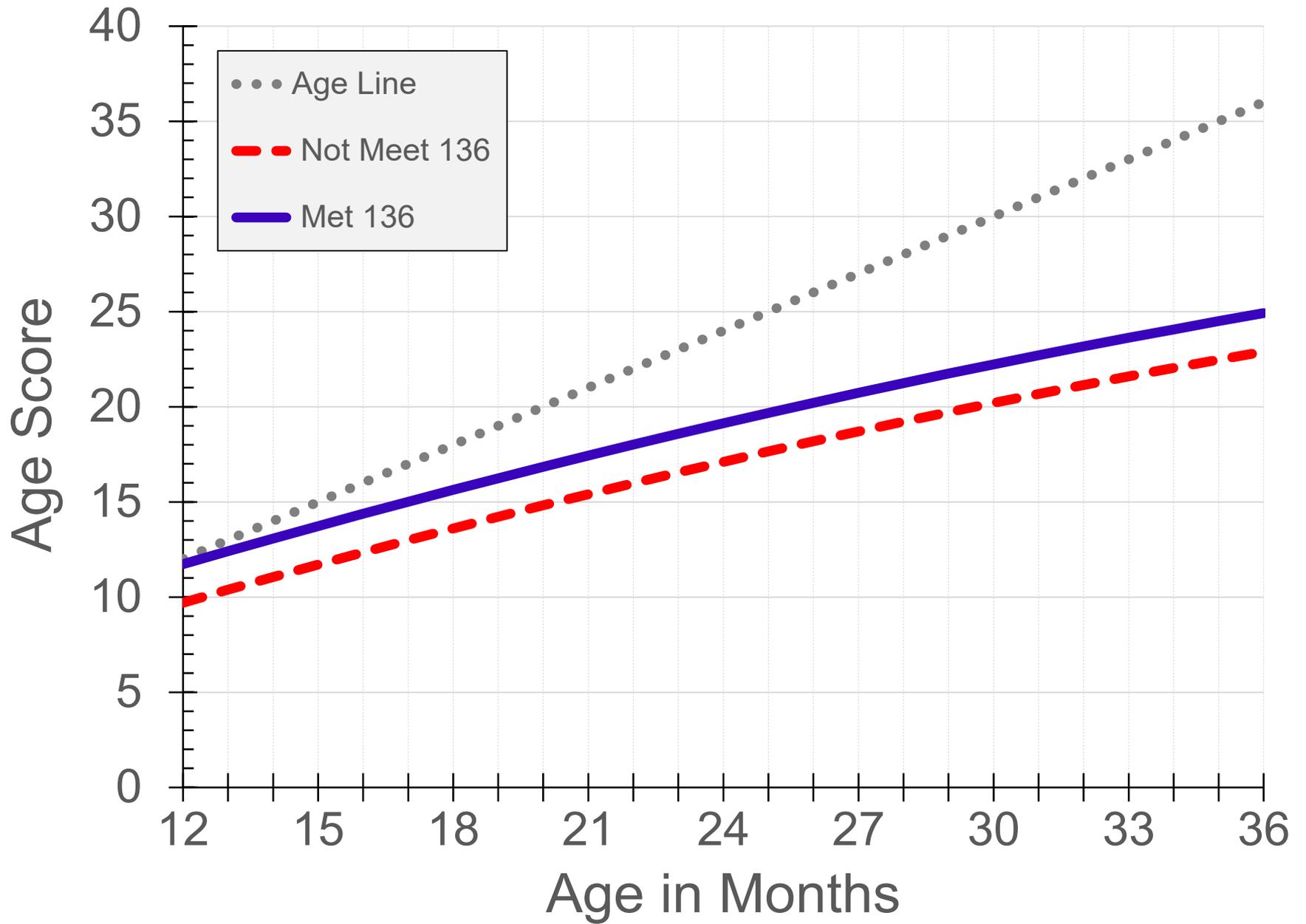


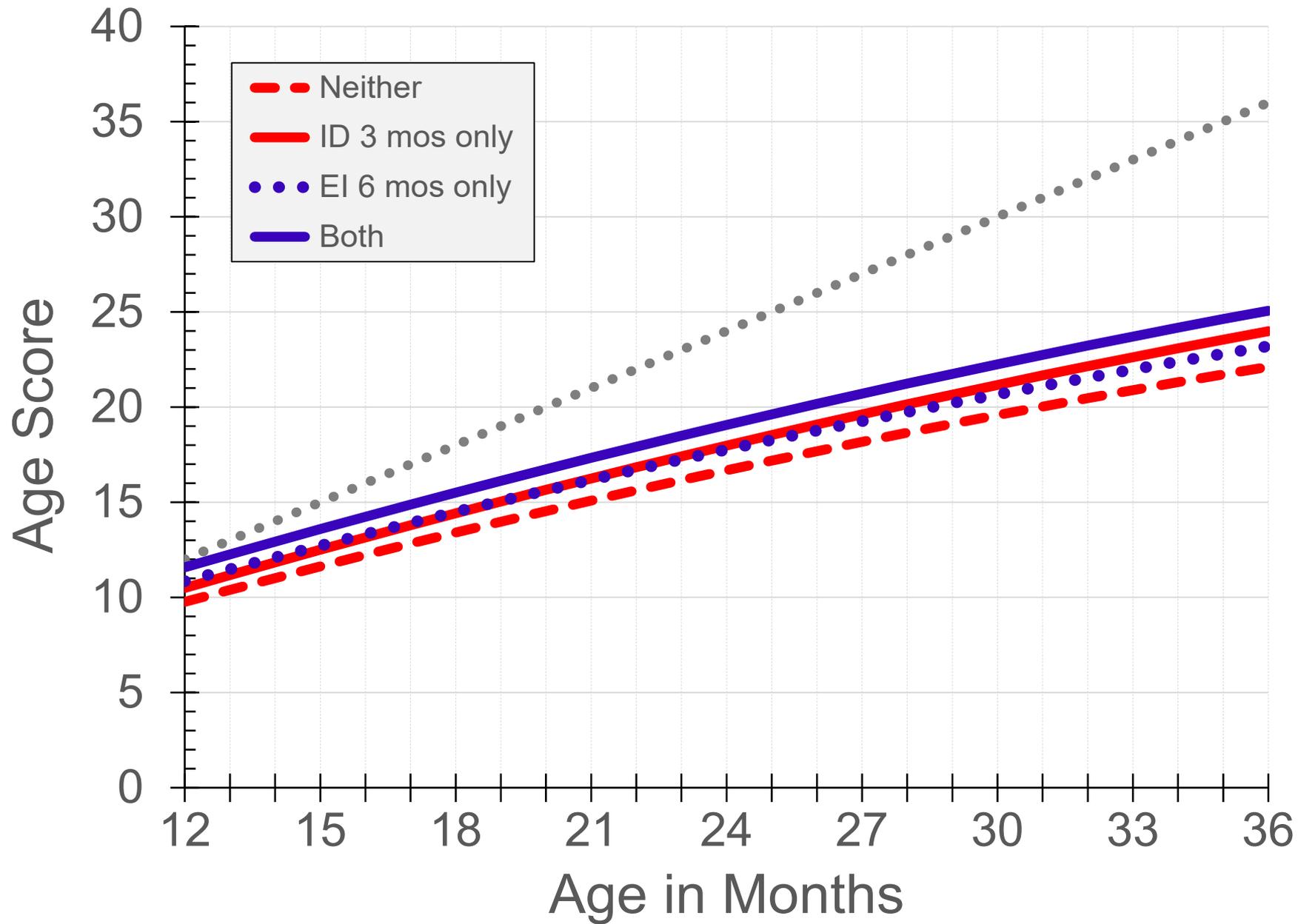
Analysis of Predictors

- Examined a variety of variables to determine which factors contributed to higher vocabulary age scores and improved growth over time
- Final model examined each variable controlling for the effects of all other variables

Results of Predictive Analysis

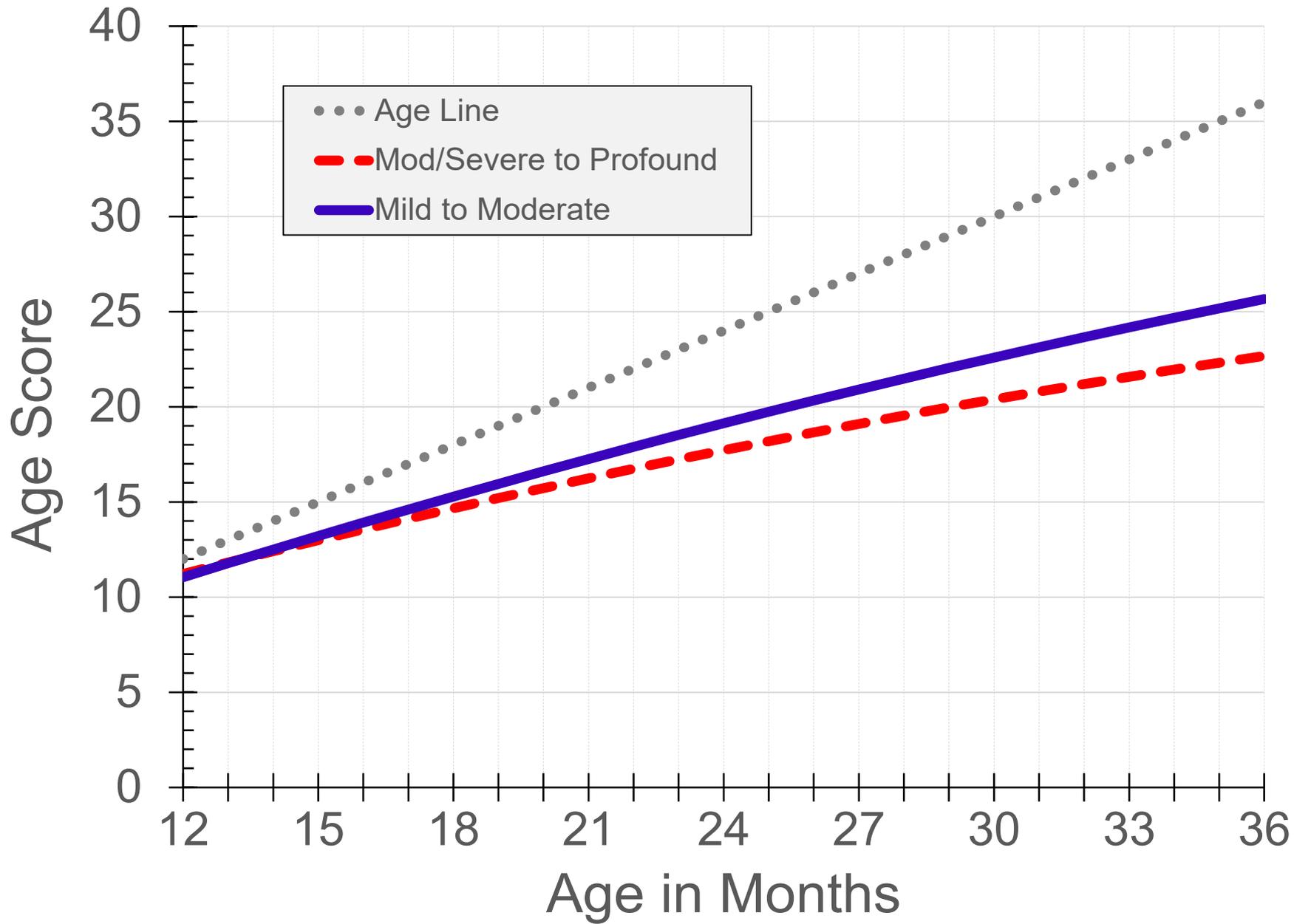
- No significant differences between boys and girls

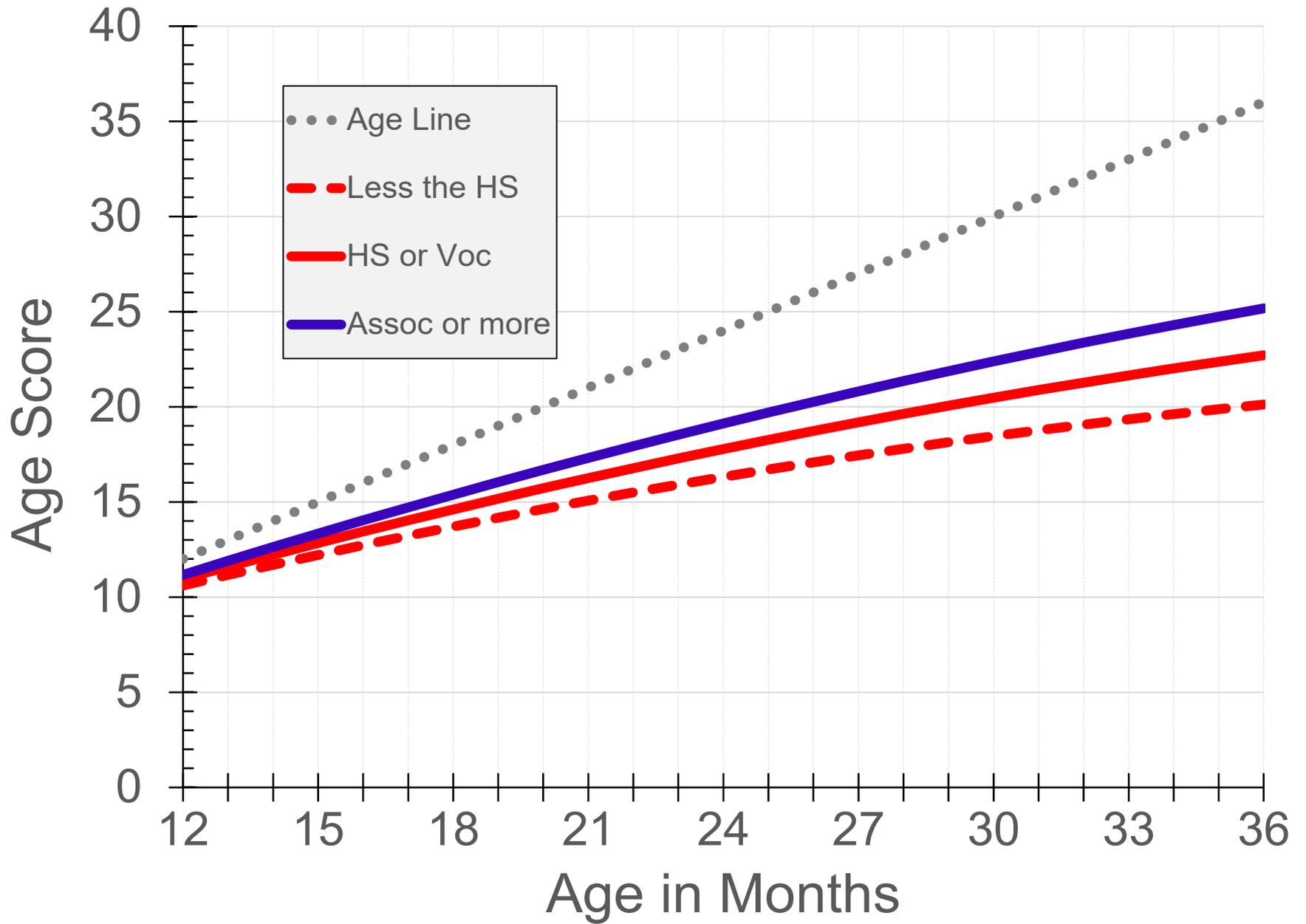


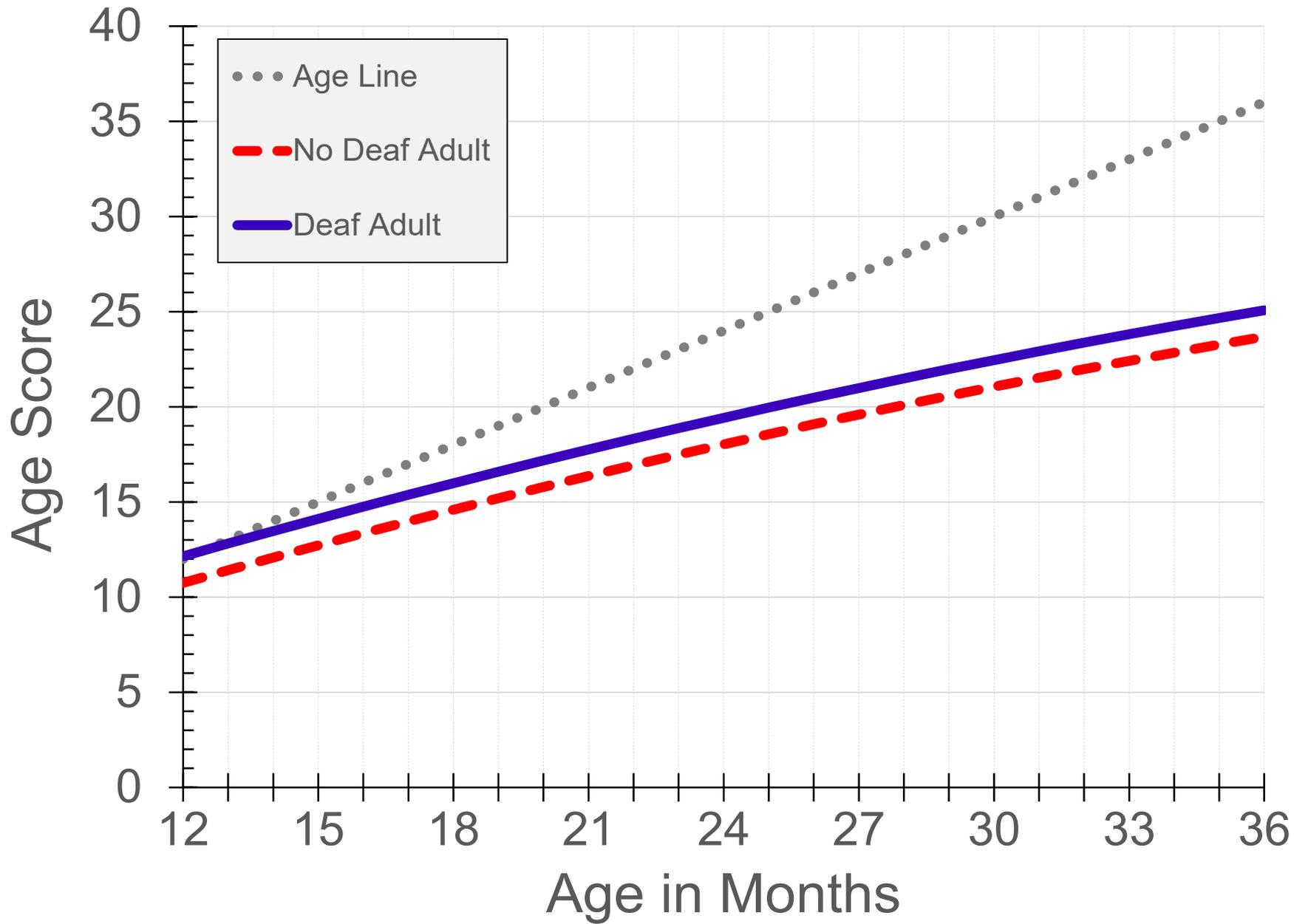


Predictive Analysis: Meeting EHDI

- Children who meet one of the two EHDI guidelines have higher vocabulary scores than those who meet neither criteria
- But children who meet BOTH parts of the guidelines are performing better than those who just meet one aspect
- Children identified by 3 months demonstrate higher growth rates

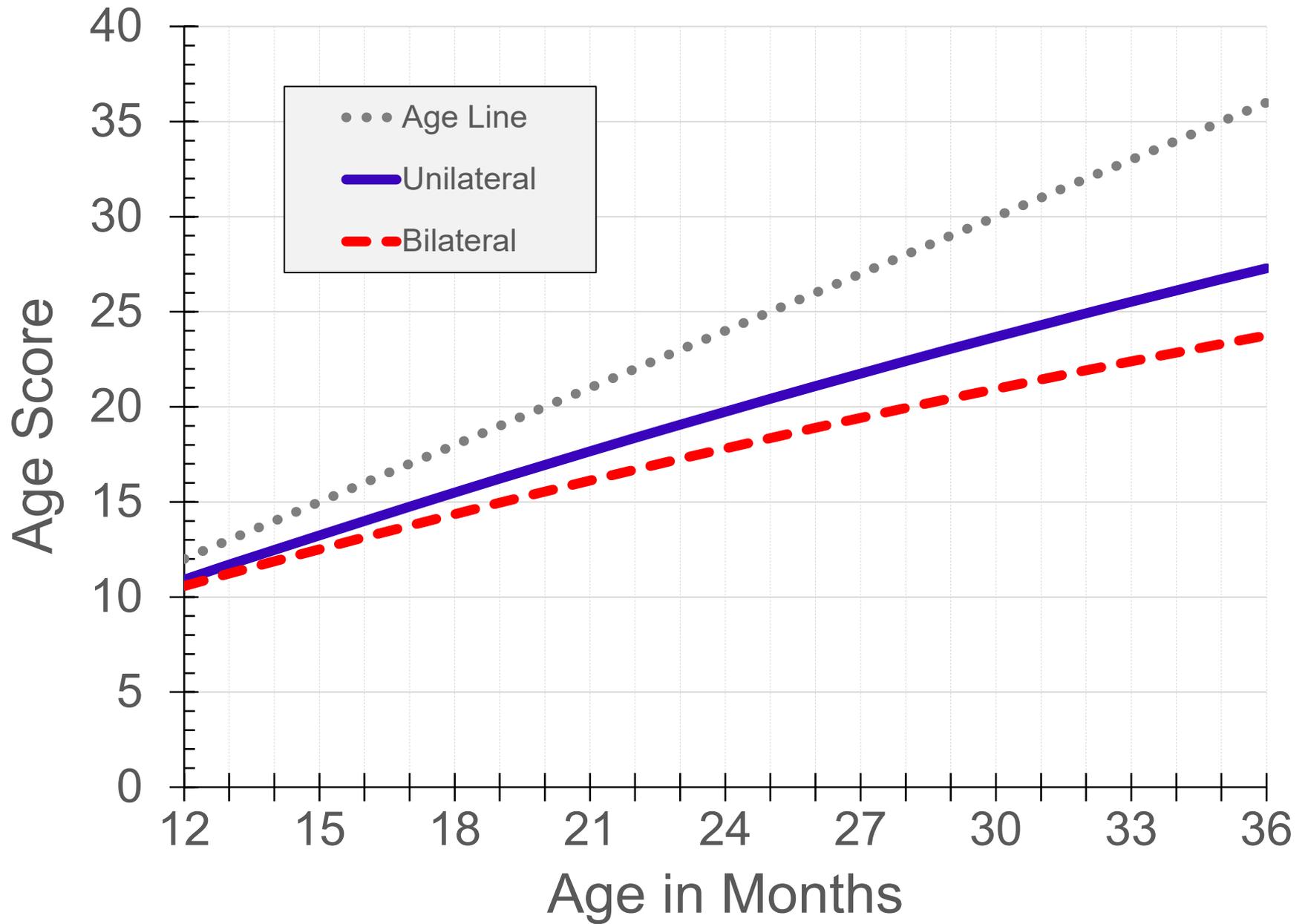






Participants with Unilateral Loss

- 228 children
- Assessed on 1 to 5 occasions
- Total assessments = 409



Results: Unilateral vs. Bilateral

- Children with unilateral loss demonstrate higher vocabulary scores than children with bilateral loss
- Growth rates are higher for children with unilateral loss compared to bilateral
 - Two groups are comparable at 16 months
 - By 36 months unilateral group is 4 months ahead
- However, significant vocabulary delays are apparent in many children with unilateral loss

Conclusions

- As language demands increase over time, gap between CA and Language Age widens
- By 30 months of age, on average, children who are deaf/hh are 9 months behind typically developing peers
- Rate of vocabulary growth is 56% of typical acquisition rates

Conclusions

- Factors associated with higher vocabulary age scores:
 - Meeting EHDI 1-3-6
 - Less severe degrees of hearing loss
 - Higher levels of maternal education
 - One or more Deaf/HH parents (including both those who use sign language and those who use spoken language)

Conclusions

- Factors associated with greater amounts of vocabulary growth over time:
 - Less severe degrees of hearing loss
 - Higher levels of maternal education
 - Hearing loss in just one ear

Clinical Implications

- Beginning at 18 mos, hearing children produce 35 to 40 new words per month
- Beginning at 18 months, children who are d/hoh average 18 new words per month
- It is important for parents and interventionists to keep typical development in mind when assessing progress and setting goals
- Concentrated efforts to increase expressive vocabulary size are warranted

Clinical Implications

- Risk factors for more significant delays (e.g., lower maternal education levels, more severe degrees of hearing loss, late identification or intervention) should be considered when determining quantity and intensity of services
- Drawing on skills and knowledge of deaf adults may improve intervention outcomes