

Speech and Language Performance of 3 Year Old Children Born Preterm: A Preliminary Report

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Introduction

The association between preterm birth and an increased risk for cognitive impairment and academic struggles later in life is well established. In particular, preterm infants are known to be at risk for delayed language acquisition even without evidence of brain injury.

We hypothesized there would be differences in the speech and language performance of a cohort of preterm infants at 3 years of age compared to normative data. We further hypothesized there would be a positive association between birth weight/gestational age of preterm infants and their speech and language performance at 3 years of age.

Methods

Forty-three (43) children were recruited from the Low Birth Weight Clinic at Children's Medical Center Dallas and the Pediatrix Tots Clinic at Baylor University Medical Center with a mean age of 37.8 months (range 36-45 months). Mean gestational age at birth was 28.6 weeks (range 23-35 weeks) and mean birth weight was 1219.8 grams (range 550-2525 grams). Children had no history of hearing loss, structural abnormalities such as cleft lip or palate, or prolonged mechanical ventilation after NICU discharge.

Each child underwent a hearing screening, the Battelle Developmental Inventory Screening Test, and 40 of the 43 children underwent the Goldman-Fristoe 2 Test of Articulation (GFTA-2). Primary caregivers completed the MacArthur-Bates Communicative Development Inventory-III (CDI-III) for each child. Each child's spontaneous speech was recorded during a 30-minute interactive play session with their primary caregiver.

Speech samples were transcribed and analyzed using the Systematic Analysis of Language Transcripts (SALT) program (University of Wisconsin-Madison). Each participant was matched to a group of control children based on age and gender. The Bonferroni correction was applied such that P-values <0.00625 were considered significant.

Preliminary Results

The mean age equivalent on the Battelle was 36.3 months (range 14-51 months), consistent with the group's mean age of 37.8 months.

Figure 1. Speech Sound Acquisition of Preterm Female Infants at Age 3 Years

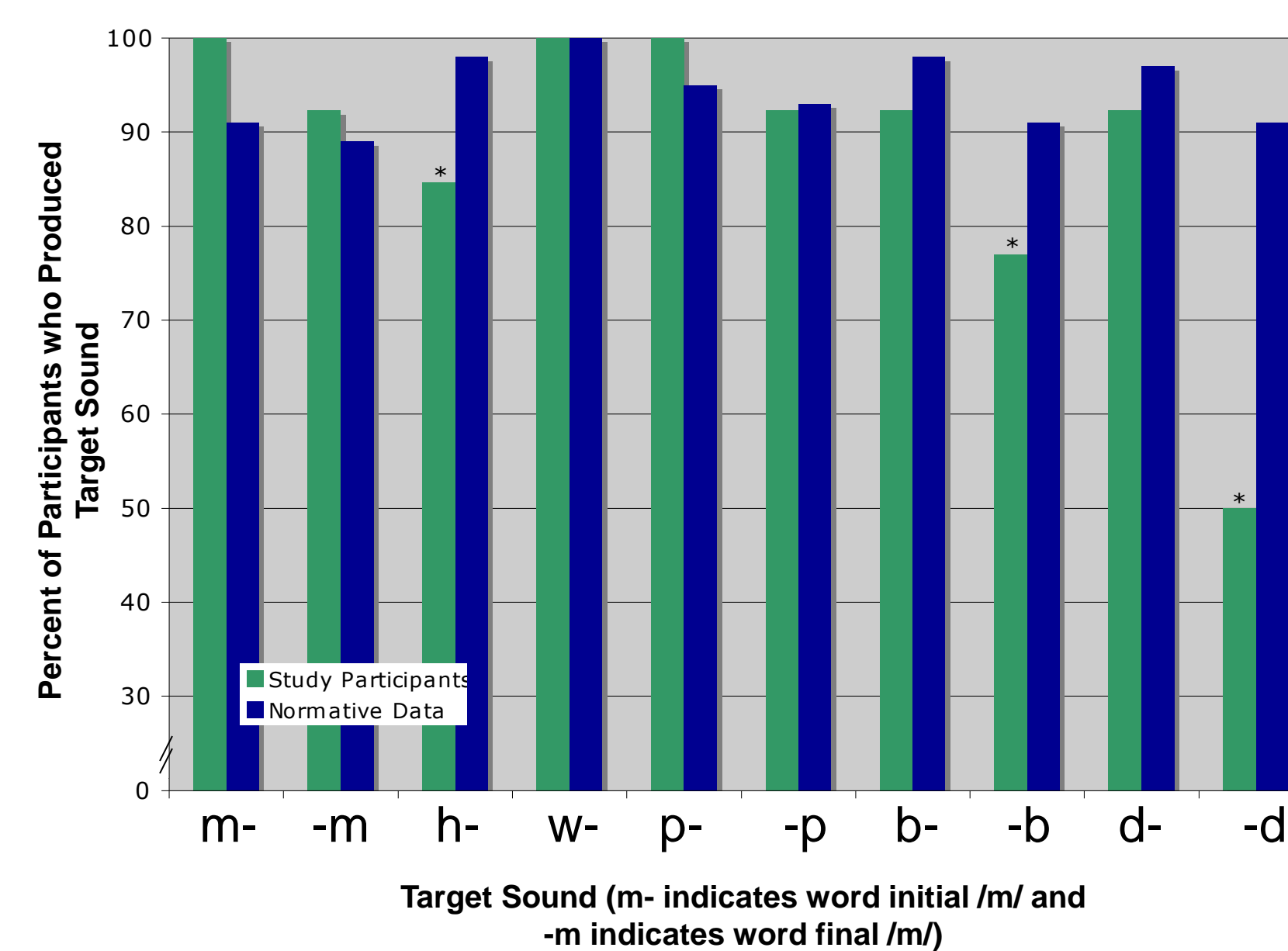


Figure 1 shows analysis of GFTA-2 data. Preterm female infants had not acquired 3 of the 10 phonemes (speech sounds) at age 3 years that would be expected to have been acquired based on normative data (Smit et al, 1990): h-, -b, and -d. Asterisk (*) indicates sounds that had not been acquired by 90% of study participants.

Figure 2. Speech Sound Acquisition of Preterm Male Infants at Age 3 Years

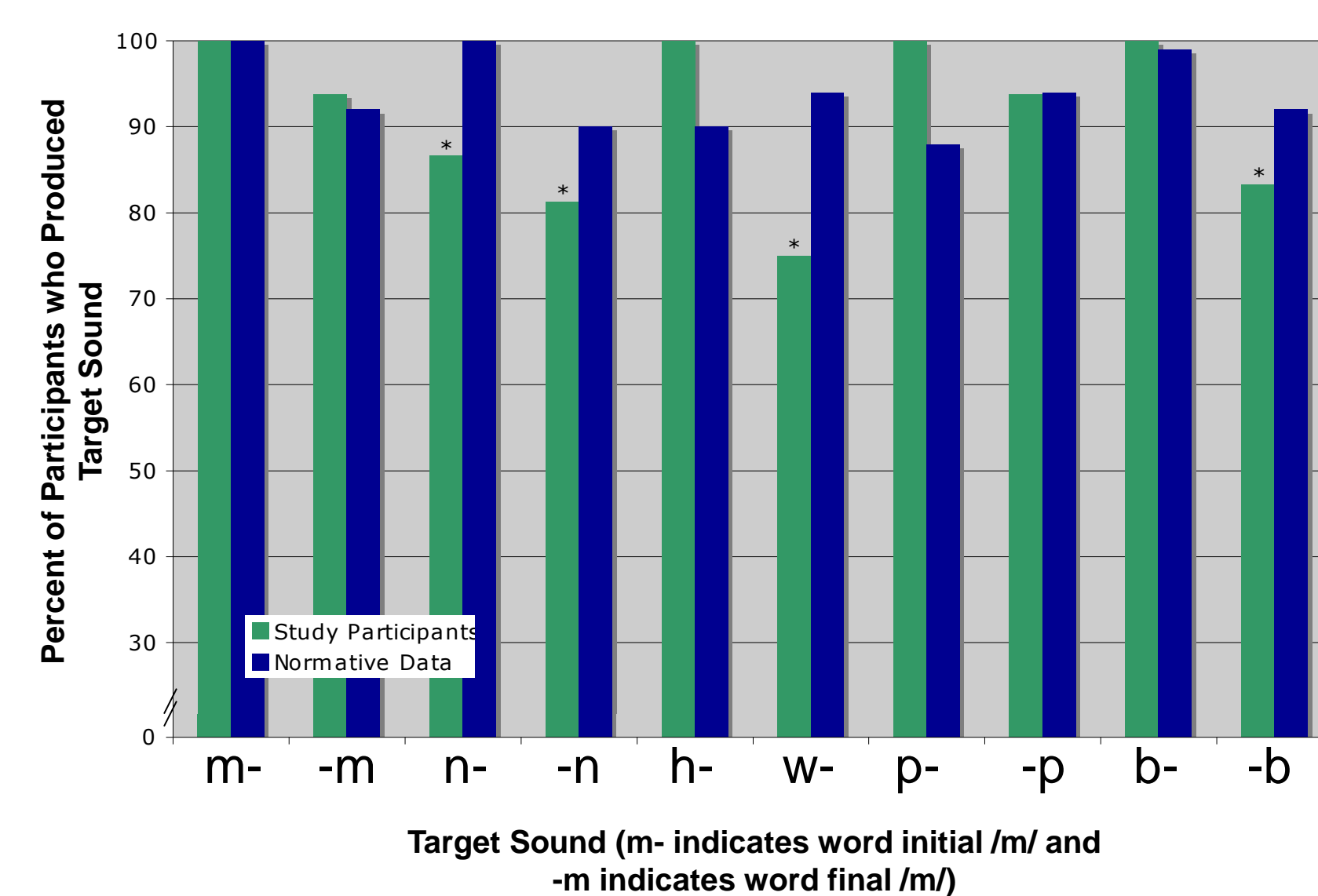
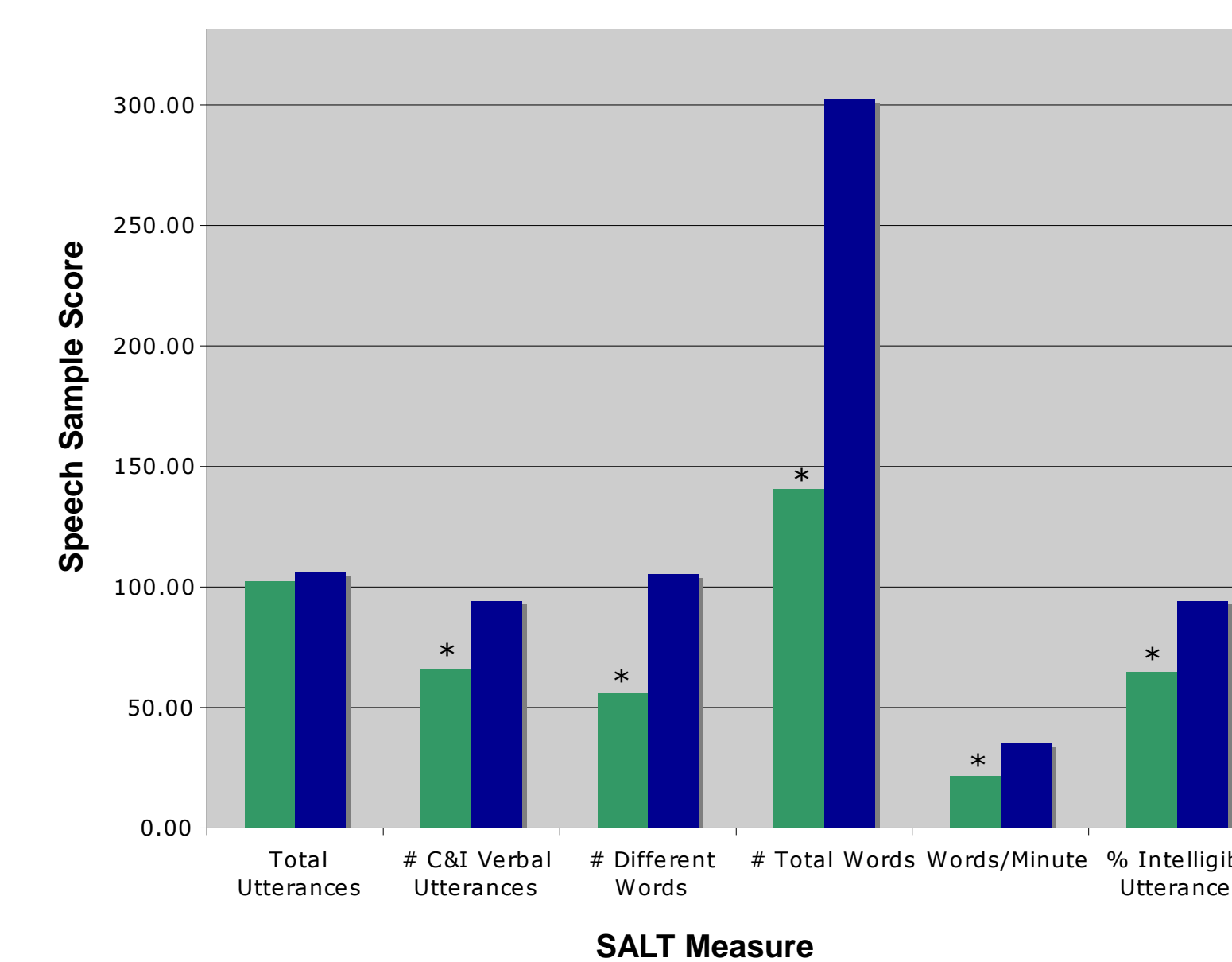


Figure 2 shows analysis of GFTA-2 data. Preterm male infants had not acquired 4 of the 10 phonemes (speech sounds) at age 3 years that would be expected to have been acquired based on normative data (Smit et al, 1990): n-, -n, w-, and -b. Asterisk (*) indicates sounds that had not been acquired by 90% of study participants.

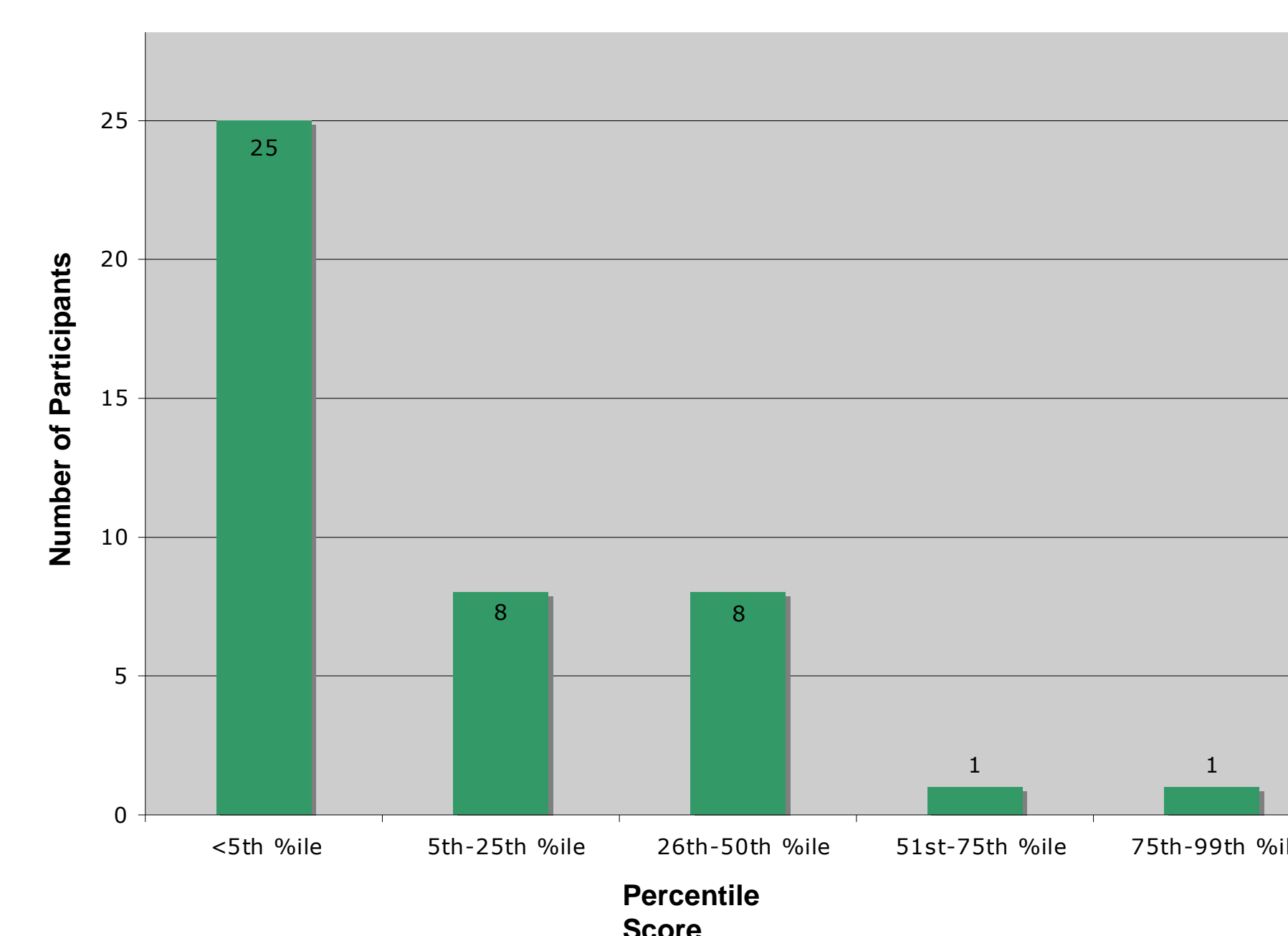
Preliminary Results

Figure 3. SALT Analysis of Speech and Language Measures in Preterm Infants at Age 3 Years



In Figure 3, bars compare mean SALT scores of study participants to mean scores of the database controls. There were significant differences between our participants and database controls in each of the SALT measures analyzed except total utterances. Preterm infants produced fewer complete and intelligible utterances, fewer total words, and fewer different words compared to age- and gender-matched controls. In addition, children born preterm spoke more slowly and were more difficult to understand compared to control children. Asterisk (*) indicates $p < 0.00625$.

Figure 4. Preterm Infants' Performance at Age 3 Years on MacArthur-Bates CDI-III Language Section



In Figure 4, percentile scores for the CDI-III Language section are based on normative data matched for age and gender. Only 2 of the 43 participants (4.7%) scored above the 50th percentile, and 25 of the 43 participants (58.1%) scored below the 5th percentile in the language section.

Preliminary Results

Figure 5. MacArthur-Bates CDI-III Language Scores of Preterm Infants at Age 3 Years by Birth Weight and Gestational Age

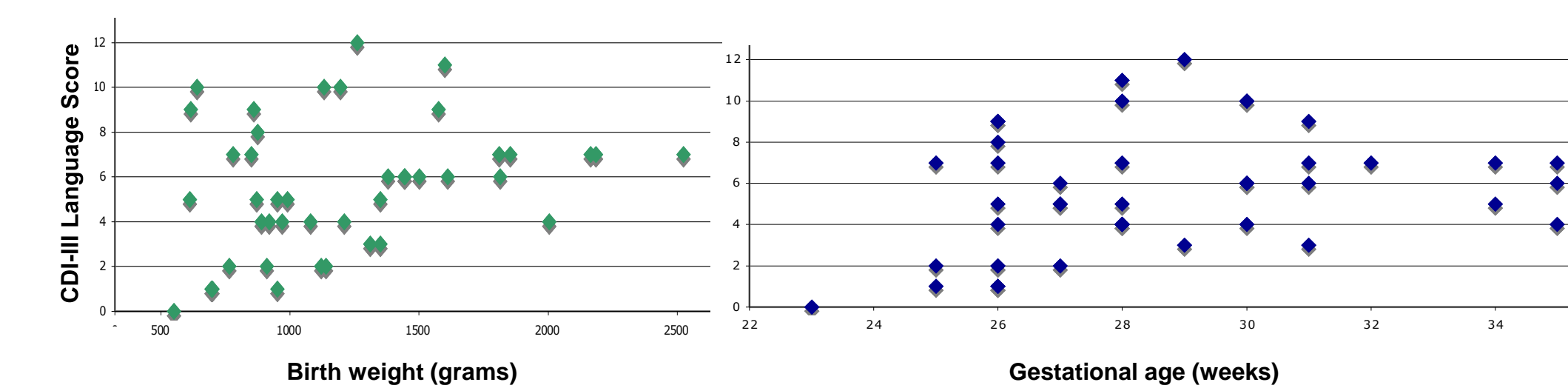


Figure 5 shows no correlation between birth weight or gestational age and CDI-III Language scores.

There was also no correlation between birth weight or gestational age and any SALT measures: total utterances, number of complete and intelligible utterances, total number of words, number of different words, mean length of utterance, words per minute and percent intelligibility.

Discussion

Preliminary analysis indicates there are differences in the speech and language of preterm infants at age 3 years compared to normative data. However, our analysis does not support a correlation between birth weight/gestational age of preterm infants and speech and language at age 3 years. Thus, parents and pediatricians must remain vigilant when assessing the speech and language of children born preterm, regardless of birth weight or gestational age. Further studies are needed to determine whether differences in the speech and language of preterm infants diminish, persist, or worsen with time.

Conclusion

Our data indicate there are differences in the speech and language skills of preterm infants at age 3 years compared to normative data, but these skills show no correlation with birth weight or gestational age. Thus, a higher birth weight or later gestational age does not necessarily imply a lesser risk for preterm infants.

Acknowledgments and References

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