Vocal production
in children with hearing loss is **delayed** at **9** and **12 months**, but **not** at **6 months**

Vocal development of infants with hearing loss

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Introduction

Vocal development precedes and is predictive of speech development, in children with and without hearing loss (HL). Previous studies found delayed vocal development in children with HL. However, most of these studies were conducted before the implementation of neonatal hearing screening (NHS). As a result of NHS and subsequent early intervention, vocal development may be different in the current generation of children with HL.

Method

In this longitudinal study, vocal production was assessed at 6, 9, and 12 months of age in children with and without HL. Additionally, hearing thresholds were obtained from audiology centers and auditory behavior was reported by parents at 6, 9, and 12 months.

- **Infant Monitor of vocal Production** (IMP; Cantle Moore, 2008), a structured 16-question parent interview, conducted by trained speech therapists. Q ceiling indicates stage of vocal achievement.
- **LittlEARS Auditory Questionnaire** (Kühn-Inacker, Weichbold, Tsiakpini, Coninx, & D'Haese, 2003), a 35-item parent questionnaire to assess auditory behavior (e.g., 'Does your child look for a speaker he/she cannot see?').

Results

- Vocal production of children with HL was similar at 6 months, but delayed at 9 and 12 months.
- Higher degree of HL was associated with lower Q ceiling at 9 and 12 months, but not at 6 months.
- Higher Q ceiling at 9 and 12 months – but not at 6 months - was associated with more sophisticated auditory behavior.

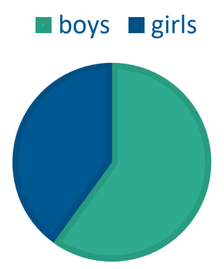
Discussion

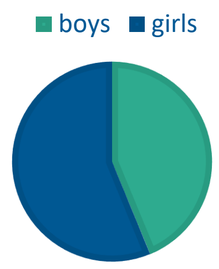
Our findings confirm previous research stating that vocal production until 6 months is driven by anatomical and oro-motor development, and thus not influenced by HL. Beyond this age, diminished auditory feedback results in lower levels of vocal achievement in children with HL. It should be noted that HL in the first few months of life can still have an effect on vocal development, but this will not show until after 6 months of age.

References 1. Cantle Moore, R. (2008). Infant monitor of Vocal production. North Rocks, Australia: RIDBC Renwick Centre. 2. Kühn-Inacker, H., Weichbold, V., Tsiakpini, L., Coninx, S., & D'Haese, P. (2003). LittlEars Auditory Questionnaire. Innsbruck, Austria: MED-EL Corporation. 3. Moeller, M. P., Hoover, B., Peterson, B., & Stelmachowicz, P. (2009). Consistency of hearing aid use in infants with early-identified hearing loss. American Journal of Audiology, 18, 14-23.

Participants

Children with HL (n=30)	Children without HL (n=32)
boys girls	boys girls

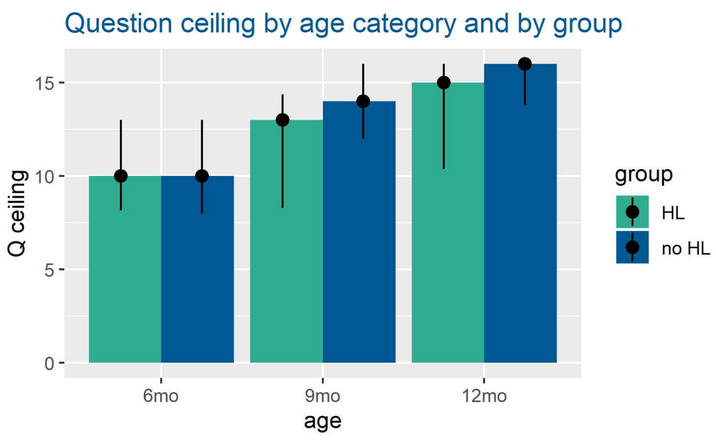


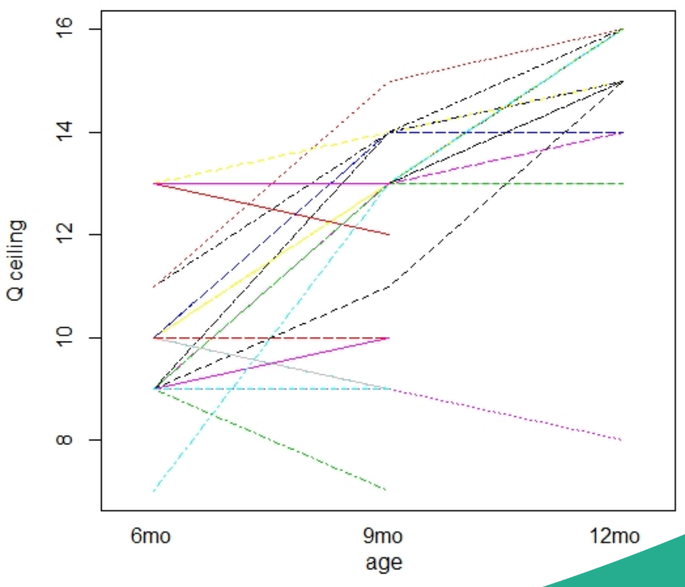


Participant characteristics	
✓ bilateral HL	✗ (suspected) additional problems
✓ Dutch as best language	✗ auditory neuropathy
✓ hearing parents	✗ CI activation/adjustment

Degree of HL	n
Mild (21-40 dB)	3
Moderate (41-60 dB)	12
Severe (61-90)	6
Profound (>90 dB)	3
Missing (but at least 40dB in best ear)	6

Figures





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