

Background

- Cochlear implantation (CI) in children with single-sided deafness (SSD + CI) has been shown to improve speech perception in quiet and in noise, and sound localization abilities (Brown, 2022).
- The importance of consistent CI use to maximize auditory outcomes is becoming more well understood (Holder, et al. 2020; Holder and Gifford, 2021). For children with SSD + CI, increased daily CI use has been associated with greater spatial release from masking (Park, et al. 2023).
- Despite robust counseling regarding the importance of full-time CI use on outcomes, clinicians are observing variable use rates in the SSD + CI population, especially notable in very young children (e.g., Macielak, et al. 2024). Approximately 35% of SSD + CI recipients at our institution presently demonstrate limited CI use (<4.3 hrs/day).
- The specific factors associated with reduced CI wear time in children with SSD + CI are presently unknown.

Purpose

The aim of the current study was to identify specific barriers to full-time use in children with SSD + CI.

Methods

- Pediatric SSD + CI users implanted at Boston Children's Hospital were identified by Electronic Medical Record system.
- The Pediatric Cochlear Implant Use Questionnaire (PCIUQ) was used to query parents/guardians of children with SSD + CI about their child's habits and behaviors of CI use.
- The PCIUQ was administered in person during a patient's routine CI appointment, over the phone, or via mail.
- Datalogging values were obtained through the manufacturer software, chart review and parent report. The relationship between datalogging values and total PCIUQ score was evaluated to determine the validity of the questionnaire in this population.
- Results of the questionnaire were scored by subject, age group (0-5, 6-11 and 12+ yrs), and device usage (< 4.3 and > 4.3 hours/day); leading barriers were identified.
- Individual questions across the 3 PCIUQ versions were analyzed and grouped by themes to investigate emerging barrier themes in children with SSD + CI.

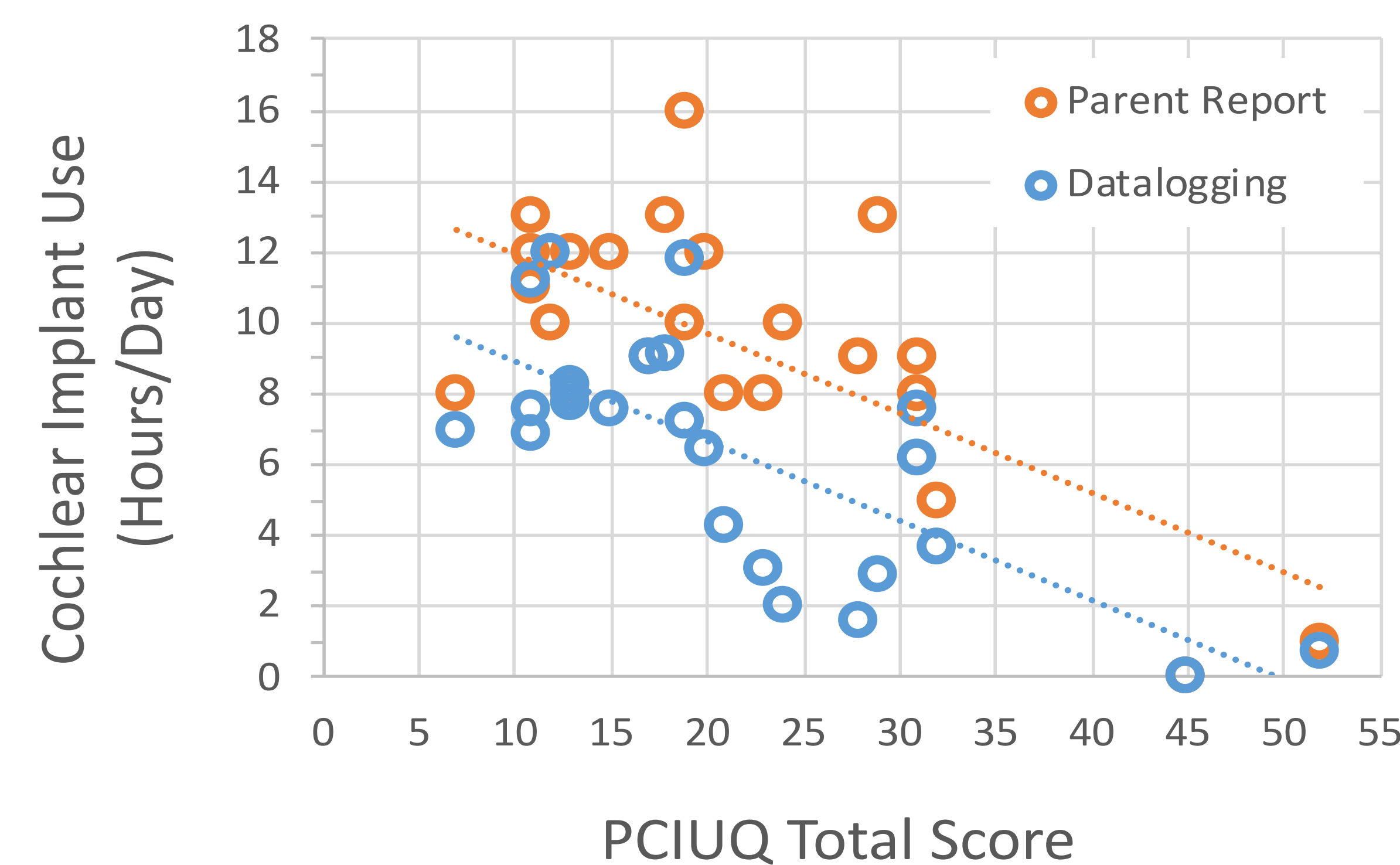
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- Park, L. R., Gagnon, E. B., & Dillon, M. T. (2023). Factors that influence outcomes and device use for pediatric cochlear implant recipients with unilateral hearing loss. *Frontiers in Human Neuroscience*, 17. <https://doi.org/10.3389/fnhum.2023.1141065>

Results

- 24 questionnaires were completed by parents/guardians of children with SSD + CI.
- Children ranged in age from 2 – 18 yrs
 - Age of implantation = Range 1 – 17 yrs
 - Duration of CI use = Avg 19.5 mo; Range 2 – 58 mo
 - 29% (7/24) were low or non-users (<4.3 hrs/day)

Figure 1. Subjective and objective cochlear implant use plotted as a function of PCIUQ total score for each subject.



- The total PCIUQ score was well correlated to both objective and subjective reports of CI use.
 - $r^2 = 0.47$ and 0.54 , for subjective and objective datalogging, respectively.
- On average, parent report of CI use was 3 hours more than datalogging values obtained through the manufacturer programming software.

Figure 2. Leading barriers by age group and CI usage.

	0-5 years (n=10)	6-11 years (n=7)	12+ years (n=7)
<4.3 hrs/day	<ul style="list-style-type: none"> When my child's processor dies, I have a backup battery with me. 13 The processor frequently falls off. 11 If my child is sick or does not feel well, they do not like to wear their processor. 11 		<ul style="list-style-type: none"> If my child is sick or does not feel well, they do not like to wear their processor. 10 My child frequently removes their processor. 10 My child dislikes the feeling of having the processor on their head, or they describe pain or discomfort. 9
>4.3 hrs/day	<ul style="list-style-type: none"> The processor frequently falls off. 11 I fear breaking/losing their equipment. 11 	<ul style="list-style-type: none"> If my child is sick or does not feel well, they do not like to wear their processor. 19 I fear breaking/losing their equipment. 11 	<ul style="list-style-type: none"> My child takes off the processor to avoid losing/damaging it (e.g., sports, playing outside, swimming, etc.). 11 When my child's processor dies, they have a backup battery with them. 11

- Leading barriers varied by the age of the child and objective CI usage.
- There were no inconsistent users in the 6-11 year-age group.
- In the 0-5 year-age group, retention was a leading barrier for both inconsistent and consistent users.

Results Cont.

Figure 3. Specific questions were categorized into 7 main themes.

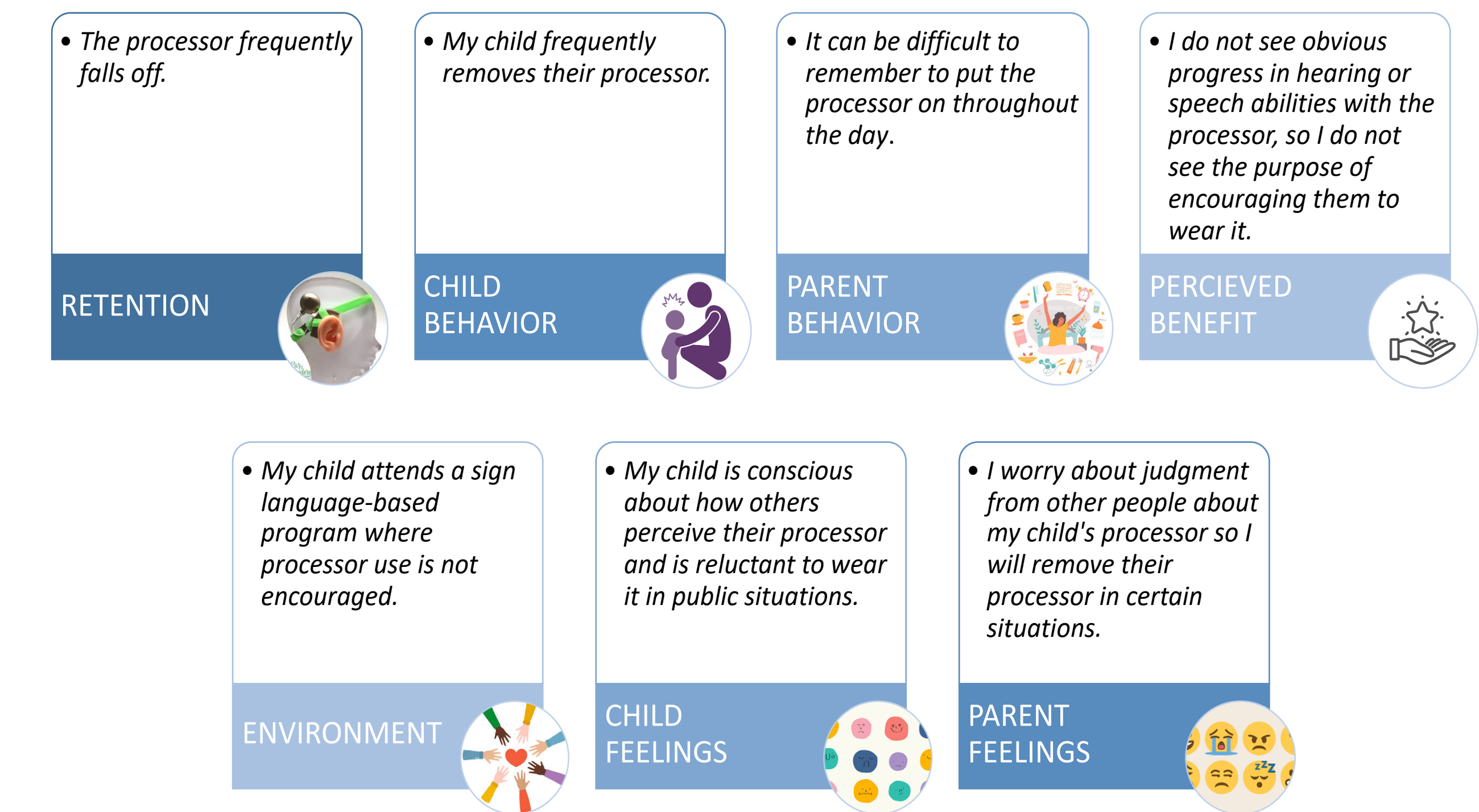
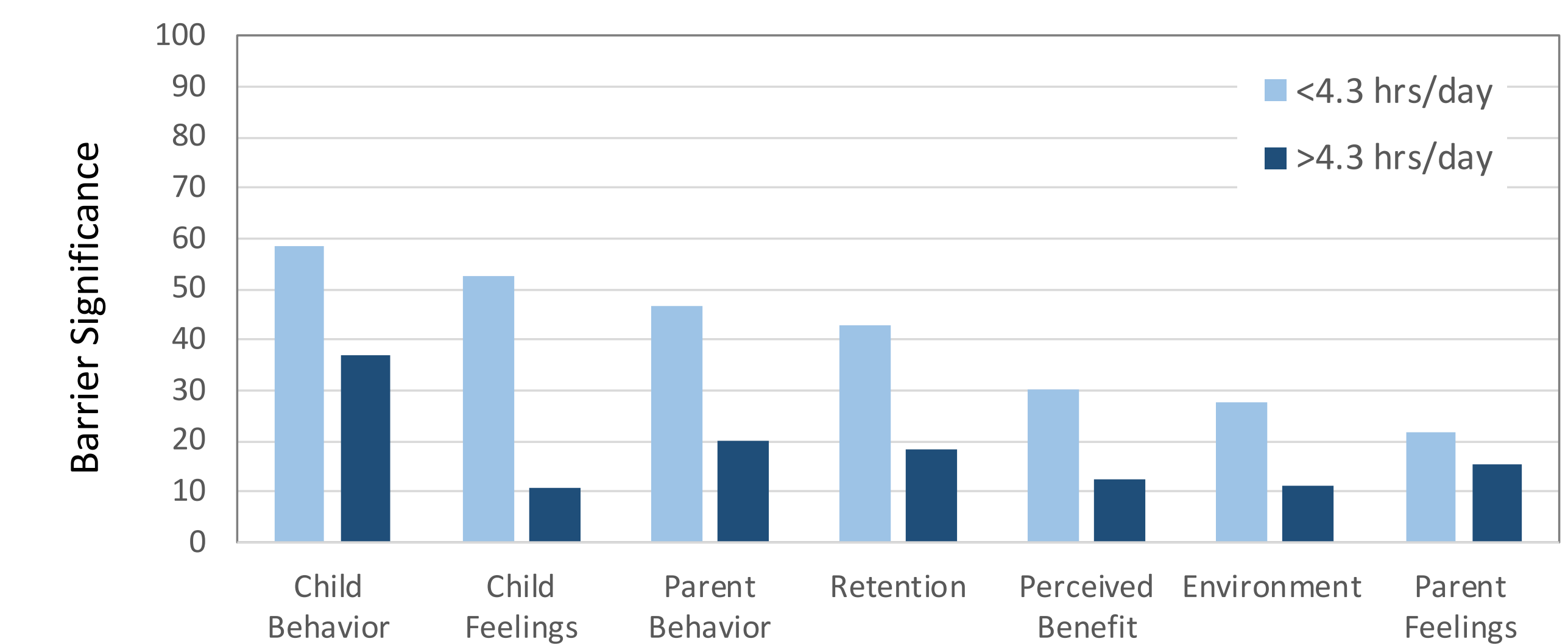


Figure 4. Barrier significance by thematic categories for children with <4.3 (n=7) and >4.3 (n=17) hours/day of CI use.



- Overall, guardians of inconsistent users reported increased barriers to CI use vs. consistent users.
- For inconsistent users, child behavior, child feelings, parent behavior and retention were the most significant thematic barriers.
- For consistent users, child behavior was the most significant thematic barrier.

Conclusions

- Similar to the CIUQ previously validated in adult CI recipients, the **PCIUQ** appears well correlated to CI use; higher datalogging values were correlated to a lower total score/less barriers.
- The most significant barriers varied based on the age of the patient and device usage.
- How these barriers compare to children with bilateral CIs is currently unknown. Future work is warranted to better understand if children with SSD + CI experience unique or similar barriers to their peers with bilateral CIs.
- Clinicians may find the PCIUQ a useful tool to identify the specific barriers experienced in inconsistent SSD + CI users, a necessary first step in supporting patient and families to increase CI wear time.