

# EVALUATION OF A PEDIATRIC OUTCOME MEASURE TO ASSESS AUDITORY DEVELOPMENT

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## Background

The primary goal of Early Hearing and Communication Development (EHCD) programs is to provide effective intervention by six months of age to maximize the infant's natural potential to develop language and literacy skills. Intervention with hearing aids is a common choice among families of infants identified as having permanent childhood hearing impairment (PCHI). Audiologists have access to scientifically-based strategies and clinical tools to ensure the hearing aids are fitted appropriately to the infant<sup>1,2,3,4,5</sup>.

## Outcome Evaluation in Infants

Outcome evaluation is a key component of the pediatric hearing aid fitting process, however, there is little research related to what a typical outcome might be for an infant who wears hearing aids and how to systematically track the child's auditory development and performance over time. A lack of clinical tools with known normative properties, feasibility, validity and utility has been a barrier to outcome evaluation in infants with hearing aids.

The University of Western Ontario Pediatric Audiological Monitoring Protocol Version 1.0 (UWO PedAMP)<sup>6</sup> consists of a battery of outcome evaluation tools and aims to systematically evaluate several auditory-related outcomes of infants and children with permanent hearing loss who may or may not wear hearing aids. One of the tools included in the UWO PedAMP that is suitable for use with infants is the LittIEARS<sup>®</sup> Auditory Questionnaire<sup>7</sup>.

## LittIEARS<sup>®</sup> Questionnaire

The LittIEARS is a 35-item questionnaire that assesses the auditory behavior of infants during the first two years of hearing. Norms have been developed from German-speaking families<sup>8</sup>, it has been validated in children with cochlear implants in Germany and Italy<sup>9</sup>, it is reliable and has good internal consistency and predictive accuracy<sup>5</sup>. The norms have also been validated in 15 different languages in children with normal hearing.

The questionnaire has not been validated with Canadian children from English-speaking families and there are currently no normative values for children who wear hearing aids.

## Purpose

The LittIEARS<sup>®</sup> Auditory Questionnaire was used with infants and children in Canada in order to:

- 1) Validate existing normative values with English-speaking individuals in Canada,
- 2) Develop preliminary normative values for infants and children who wear hearing aids,
- 3) Compare scores of various subpopulations:
  - a) Individuals with PCHI who do not wear hearing aids
  - b) Individuals with other existing medical conditions, and to
- 4) Facilitate clinical administration of the tool within the UWO PedAMP.

## Method

Pediatric audiologists at four clinical sites administered the LittIEARS to parents/caregivers of infants and children seen as part of a routine clinical appointment through Ontario's Infant Hearing Program (OIHP). The OIHP follows children from birth to age six years and the parents/caregivers filled out the entire questionnaire.

Parents/caregivers of infants and children with the following profiles completed the questionnaire:

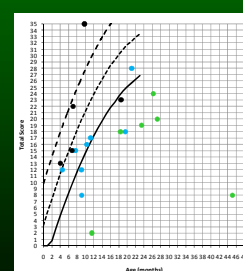
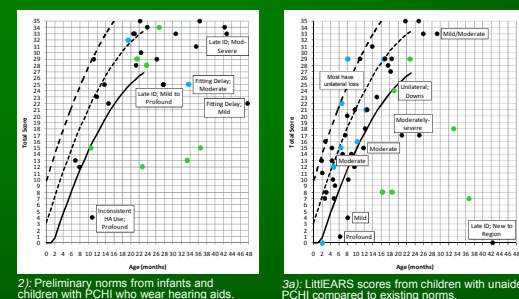
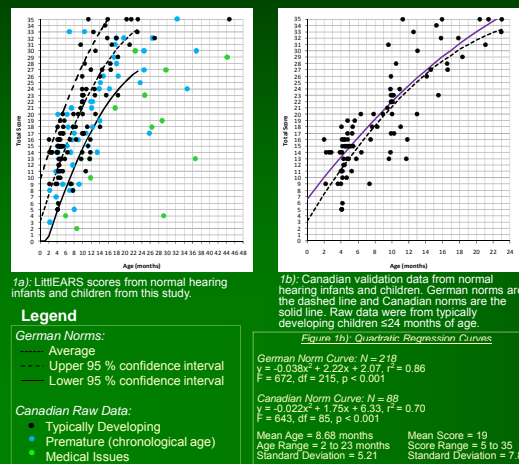
- Normal hearing
- Permanent childhood hearing loss (PCHI) of various degrees
- PCHI with hearing aids
- Unaided PCHI
- All of the above including other medical conditions

## Participants

Subpopulation	Number of Participants	Number of Administrations	Mean Age (months)*	Age Range (months)†	% Premature**
Normal Hearing	151	167	11.57	2.00 – 44.63	41.05
ANSD	15	19	15.30	4.07 – 45.10	73.33
Middle Ear Dysfunction	12	12	7.33	1.83 – 27.73	25.00
Unaided PCHI	35	53	15.00	1.90 – 66.43	31.43
Aided PCHI**	35	37	29.92	6.90 – 65.23	17.14
<b>Total</b>	<b>248</b>	<b>288</b>	<b>15.82</b>	<b>1.83 – 66.43</b>	<b>37.50</b>

\*Chronological age  
 \*\*Born 37 weeks gestational age or earlier relative to a 40 week term  
 \*\*\*Clinicians follow OIHP hearing aid fitting protocol<sup>6</sup>

## Results



## 4) Clinical Administration Results

- LittIEARS is sensitive to other medical issues beyond PCHI which supports an extended age administration. Therefore, modifications to the administration rules and the score sheet were completed as part of the development of the UWO PedAMP.
- Preliminary respondent and clinician report indicated that the items were easy to understand and the questionnaire was feasible and utilizable in clinical practice.
- Examination of the LittIEARS (including modified instructions and score sheet) by the Network of Pediatric Audiologists of Canada revealed that 92% felt it was a suitable clinical tool.

## Summary & Clinical Implications

The LittIEARS is a short questionnaire that parents/caregivers and clinicians find easy to implement and the existing normative values are suitable for use with infants and children with normal hearing from English-speaking families in Canada. The questionnaire is also sensitive to other medical issues, however more data is required to develop normative values for these special populations.

Preliminary data from infants and children with aided PCHI are promising because they are sensitive to children with delays in hearing aid fitting and other medical issues. Future work will continue in order to develop normative values for infants and children with PCHI who wear hearing aids. It is of interest to evaluate the impact of degree of hearing loss and other complex factors on auditory development in infants and children.

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