

The LOCHI study

The Longitudinal Outcomes of Children with Hearing Impairment (LOCHI) study is a population-based, prospective study that directly compares the outcomes of children with hearing loss who received early or later intervention (www.outcomes.nal.gov.au). The study includes approximately 450 children with hearing loss born in NSW, Queensland, and Victoria between 2002 and 2007. Depending on the stage of implementation of universal newborn hearing screening (UNHS) programs in the respective states at the time, the hearing loss of children was identified via either UNHS or standard care. Nonetheless, all of them shared the same post-diagnostic free, expert audiological services from Australian Hearing. This means that the results of children can be fairly compared, whenever and wherever their hearing loss was discovered. The uniqueness of the study on the world scene has been recognised with on-going grant funding from the USA National Institutes of Health, which enables the children to be followed up to age 9 years.

The research is being conducted by the National Acoustic Laboratories and its collaborators within the HEARing CRC. The lead researcher is Dr Teresa Ching.

When LOCHI children were assessed at 5 years of age,

- Children with hearing loss discovered via UNHS at birth and who received early intervention had better spoken language abilities than those whose hearing loss was discovered later than this. On average, children fitted with hearing aids before 6 months of age had higher language scores than those fitted later. For children with severe or profound hearing loss, those who received a cochlear implant before 12 months of age had significantly higher language scores than those who received a cochlear implant at an older age;
- Many children had marked deficits in pre-reading skills compared to their normal-hearing peers.

In summary, the LOCHI study has provided world-first evidence for the benefits at 5 years of age of early hearing-aid fitting by 6 months or cochlear implantation by 12 months of age combined with educational intervention for language development of children. As the study has revealed specific deficits in pre-reading skills, it also suggests that targeted intervention for development of these skills will be necessary for children to obtain the full benefit of early intervention. The research team is currently assessing the LOCHI children at 9 years of age. Long-term follow up of the existing cohort could confirm the societal as well as individual benefits of UNHS for enabling children with hearing impairment achieve language, academic and other outcomes commensurate with their cognitive potential.

Key outcomes and importance of findings

The significant effect of early implantation and the estimated effect size of delays in intervention on language outcomes highlight the need to streamline early intervention services to ensure that children who need cochlear implants receive them early. Evidence on children with ANSD and on the effect of frequency compression in hearing aids have been incorporated into clinical guidelines for pediatric amplification (American Academy of Audiology Guidelines for Pediatric Amplification, 2013; national hearing service protocols of Australian Hearing). We

have also identified early phonological deficits that may negatively impact on later literacy development, but that may be targeted for early education.

Research team: the chief investigators are Teresa Ching, Harvey Dillon, Linda Cupples, Henrik Dahl, Greg Leigh. The current team includes Lauren Burns, Laura Button, Chris Flynn, Miriam Gunnourie, Sanna Hou, Vivienne Marnane, Louise Martin, Karen McGhie, Jessica Sjahalam-King, Jessica Whitfield, Patricia Van Buynder, Vicky Zhang.

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Publications arising from the LOCHI study

<http://www.outcomes.nal.gov.au/papers.html>

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