Where Science Impacts Education

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MANCHESTER 1824
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Science before cochlear implants

1925

1945

1965

1985

Educational impact

VERY limited access to spoken language via hearing for children with profound losses

- Poor language and literacy outcomes
- Graduate from high school reading and writing at a 4th grade level – like an 8-year-old hearing student

Unchanged for more than a century (Conrad, 1979; Pinter & Patterson, 1916; Qi & Mitchell, 2012)

Writing samples then

I go to outside. I go waiting soon start school bus. People line door walked in school bus and sit down. The bus driver traveled far to zoo. Wait soon then stop.

(8-year-old deaf student)

Two smarts men have the equipment to the depth of ocean with bowl head and heavy outfit, impossible to go there but it is successful.

(deaf college student)

Science impacting education today

Cochlear implants provide access to spoken language via hearing for children with profound losses ……

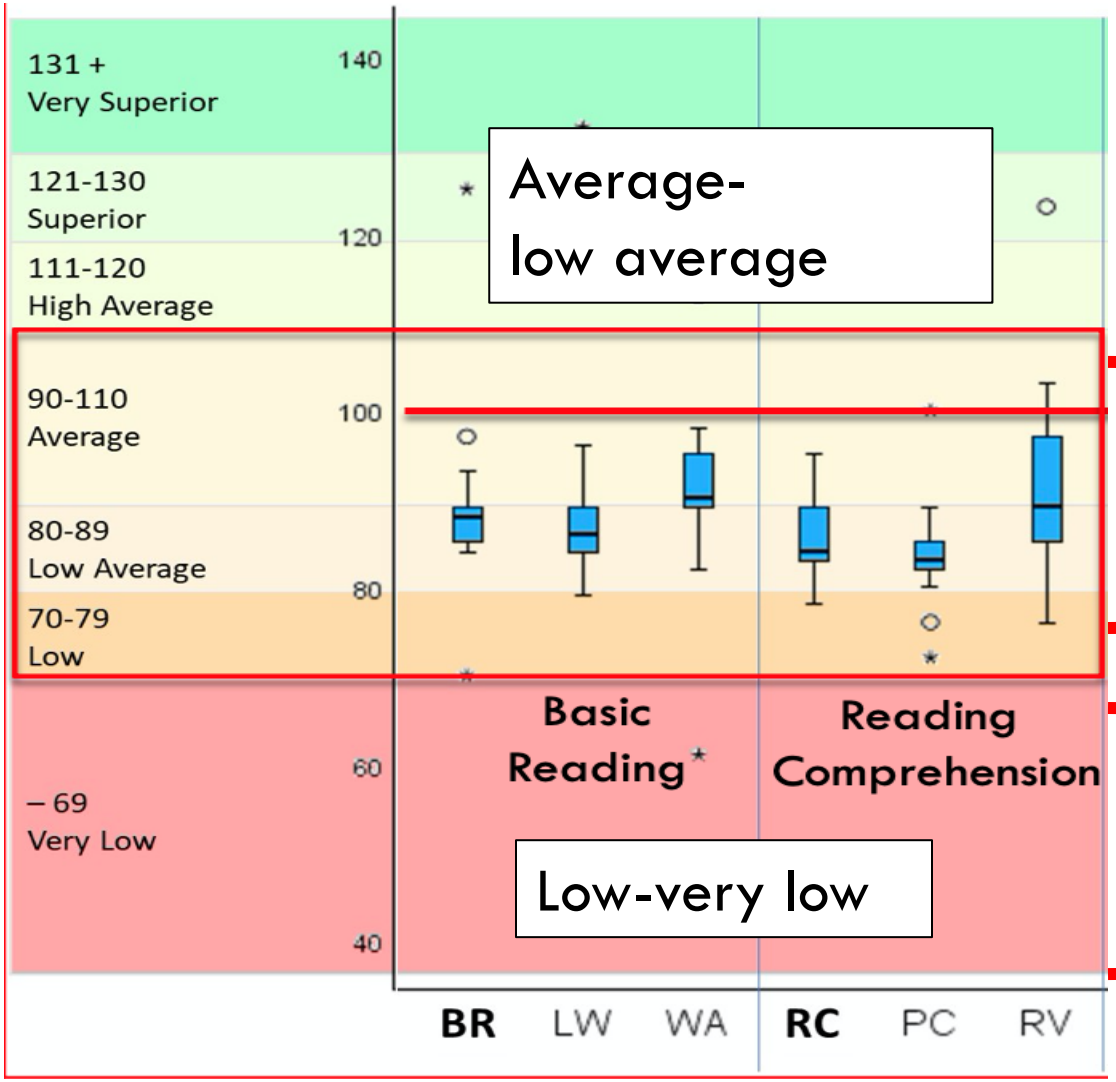
for the first time in the history of deaf education!

Educational impact

Deaf students with CIs reading and writing comparable to their hearing peers – average to low average range

- Mayer & Trezek (2018) – literature review of 21 studies (N=1000 CI users) over a 20-year period (1997-2016)
- Wang et al. (2021) – meta-analysis of 47articles looked at group differences between CI users (N=900) and hearing peers
- Most recent studies (Davidson et al., 2025; Figueroa et al., 2020; Grantham et al., 2022; Mayer et al., 2021; Mayer & Trezek, 2023; 2024)

Finding for CI users (Mayer & Trezek, 2024)



After Cochlear Implantation

Before Cochlear Implantation

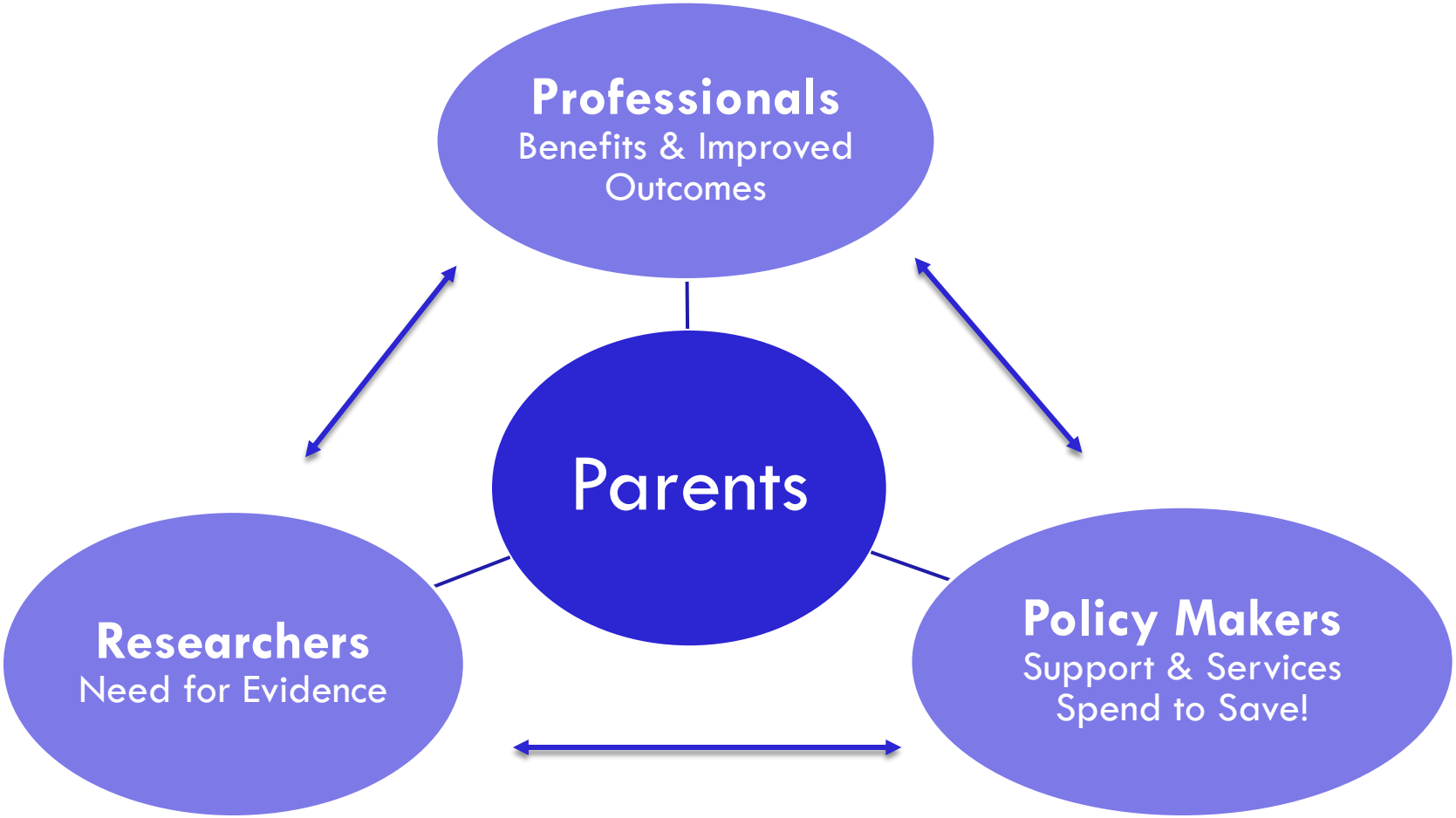
Omar (16 years, bilateral CIs, Pashtu)

The reason why I don't like the new average class size changes is because I am a deaf/hard of hearing student and so this increase of class sizes will make it really hard for me to learn anything, especially when it gets too noisy.

(Excerpt from an essay on upcoming changes in the education system)

Advocating for CIs

Who needs to know about the educational impact?



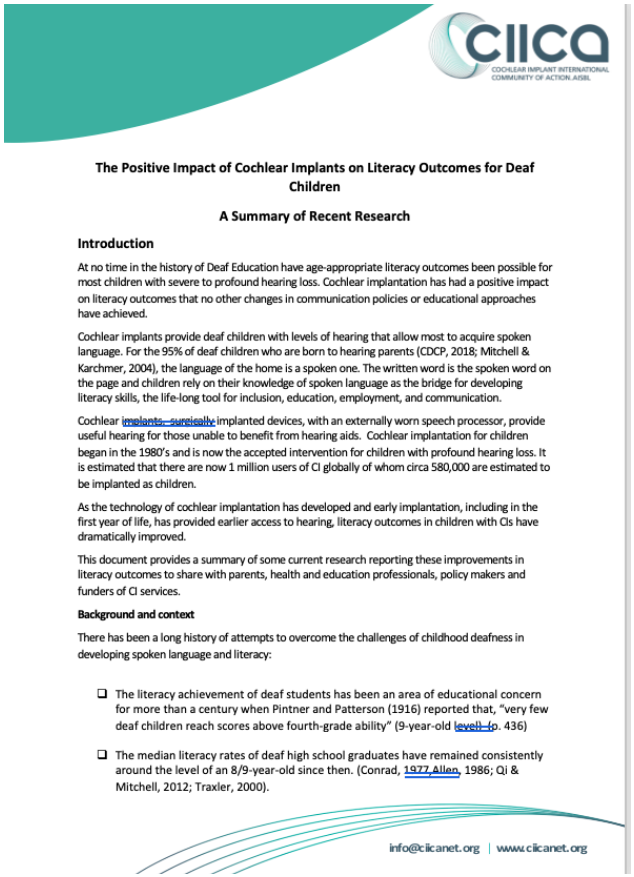
Impact for a 12-year-old CI user

When I turn off my implant, I feel like I am in the dark because I don't feel like I am part of the group. I can't hear or understand what my family or friends are talking about and that makes me feel lonely.

Some good things about this are, my sleep never gets interrupted. I can turn off any real loud sounds. I can stick magnets to my head. If the fire alarm goes off at school, I can turn off the sound. If someone is telling a boring story I can turn them off.

I'm glad I can hear like everyone else. With the implant I can hear more sounds, so I speak better and understand what people are saying. I don't feel like an outsider at school. I have lots of friends and I feel like I can do anything!

CIICA Briefing Paper



The Positive Impact of Cochlear Implants on Literacy Outcomes for Deaf Children

A Summary of Recent Research

Introduction

At no time in the history of Deaf Education have age-appropriate literacy outcomes been possible for most children with severe to profound hearing loss. Cochlear implantation has had a positive impact on literacy outcomes that no other changes in communication policies or educational approaches have achieved.

Cochlear implants provide deaf children with levels of hearing that allow most to acquire spoken language. For the 95% of deaf children who are born to hearing parents (CDCP, 2018; Mitchell & Karchmer, 2004), the language of the home is a spoken one. The written word is the spoken word on the page and children rely on their knowledge of spoken language as the bridge for developing literacy skills, the life-long tool for inclusion, education, employment, and communication.

Cochlear implants, surgically implanted devices, with an externally worn speech processor, provide useful hearing for those unable to benefit from hearing aids. Cochlear implantation for children began in the 1980's and is now the accepted intervention for children with profound hearing loss. It is estimated that there are now 1 million users of CI globally of whom circa 580,000 are estimated to be implanted as children.

As the technology of cochlear implantation has developed and early implantation, including in the first year of life, has provided earlier access to hearing, literacy outcomes in children with CIs have dramatically improved.

This document provides a summary of some current research reporting these improvements in literacy outcomes to share with parents, health and education professionals, policy makers and funders of CI services.

Background and context

There has been a long history of attempts to overcome the challenges of childhood deafness in developing spoken language and literacy:

- The literacy achievement of deaf students has been an area of educational concern for more than a century when Pintner and Patterson (1916) reported that, "very few deaf children reach scores above fourth-grade ability" (9-year-old level) (p. 436)
- The median literacy rates of deaf high school graduates have remained consistently around the level of an 8/9-year-old since then. (Conrad, 1977,Allen, 1986; Qi & Mitchell, 2012; Traxler, 2000).

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Available on the CIICA website