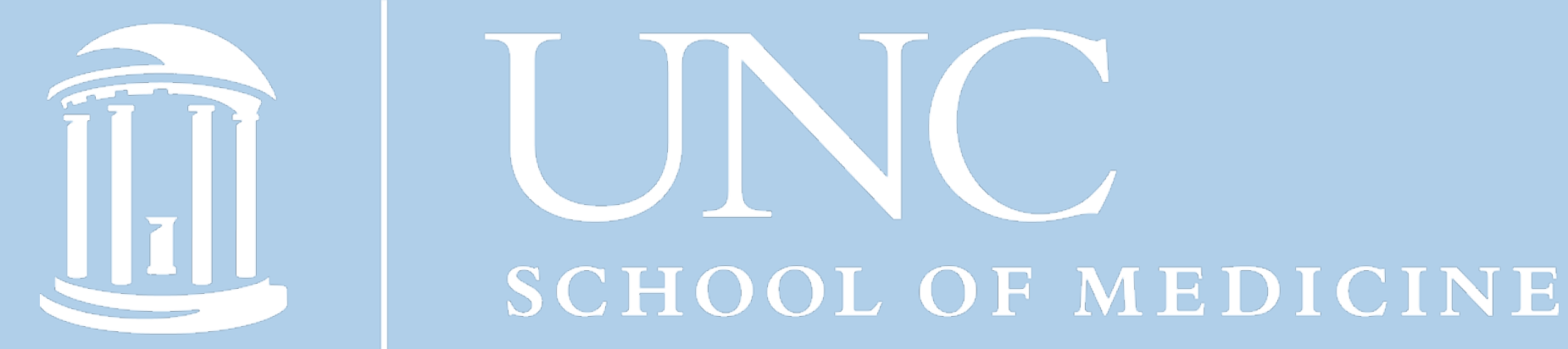


Influence of Hearing Aids on Speech and Language of Children with Mild Hearing Loss:

A Systematic Review

Emma Gibbings and Karson Moore

Division of Speech and Hearing Sciences, UNC-Chapel Hill



Background

One to six per 1000 children in the United States are born with hearing loss. While most of these children are diagnosed through Universal Newborn Hearing Screening, children with mild degrees of loss are more likely to be missed.

Hearing loss can have significant negative effects on development of speech and language, and hearing aids have been shown to mitigate these effects. However, less is known about the impact of hearing aids on the speech and language development of children with mild hearing loss. The researchers hoped to answer the question:

How does hearing aid intervention influence the language outcomes of children with mild hearing loss?

Methods

CINAHL Plus and PubMed were searched by the authors during January 2017. The following keywords were used to create the search:

- mild hearing loss OR mild hearing impairment,
- AND hearing aids OR amplification,
- AND children OR pediatric,
- AND language OR speech.

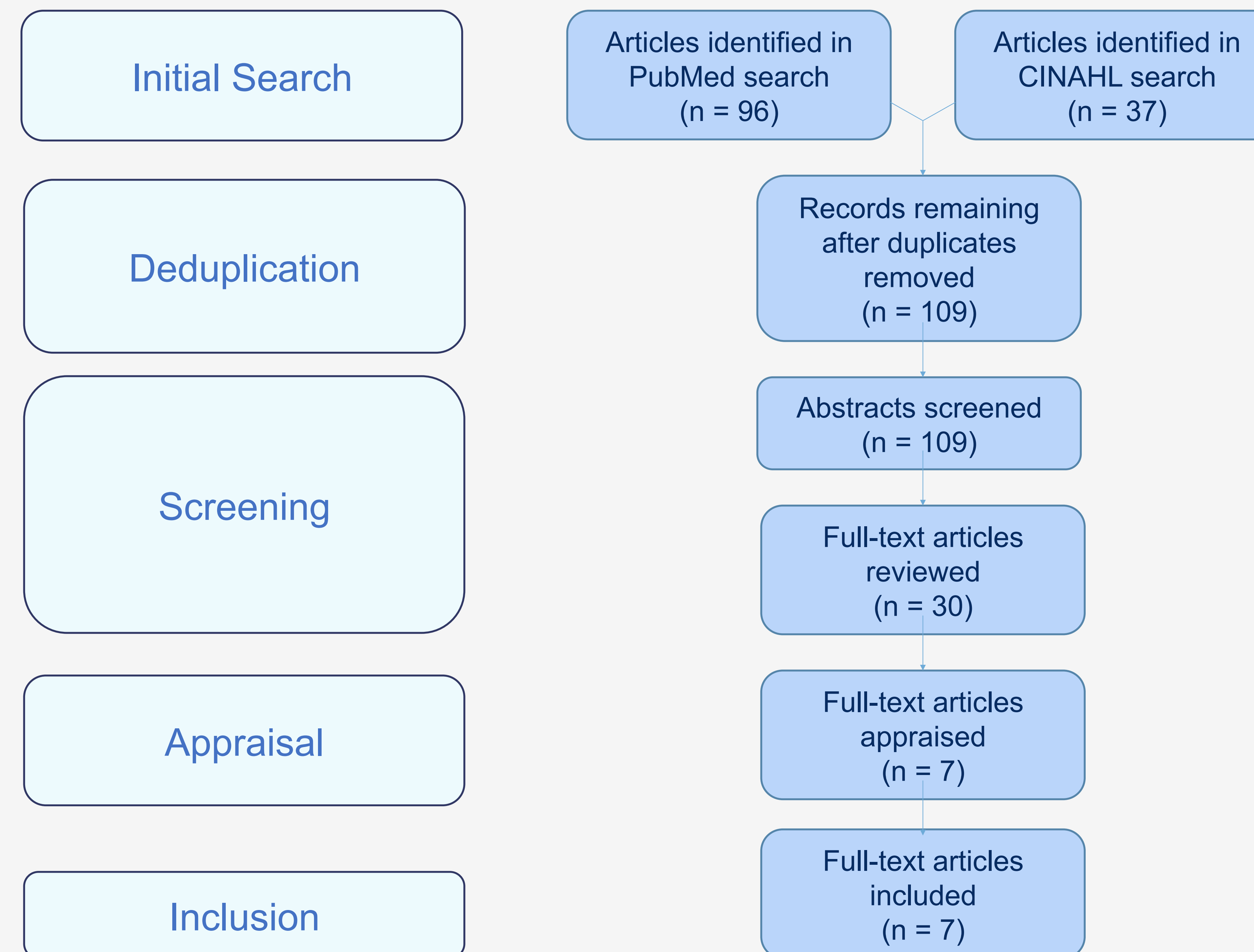
Articles were excluded if they were: case studies, expert opinions, or non-systematic reviews. Studies were excluded if they included: children with cochlear implants, adults (18 and over), children with Auditory Neuropathy Spectrum Disorder, or children diagnosed with greater degrees of hearing loss (moderate-profound).

Authors independently reviewed for inclusion/exclusion, quality appraisal, and data extraction. A consensus procedure was utilized for any differences. Inter-rater reliability was determined at every step in the review process.

Results

Author(s)	Quality Appraisal
Ambrose et al, 2014	Good quality
Kiese-Himmel, 2008	Good quality
Kiese-Himmel et al, 2008	Lesser quality
Penna et al, 2015	Lesser quality
Tomblin et al, 2015	Lesser quality
Tomblin et al, 2014	Good quality
Walker et al, 2015	Good quality

Results



Author	Participants	Outcomes/Results
Ambrose et al	N= 70	Children with mild hearing loss were not significantly different from the control group in percentage of consonants produced correctly in the Open and Closed Set Test.
Kiese-Himmel	N _{Total} = 33 N _{MHL} = 10	Most children with mild hearing loss measured in the normal range of vocabulary at the first assessment and improved over time.
Kiese-Himmel et al	N _{Total} = 250 N _{MHL} = 22	Did not show significant differences in receptive and expressive aural/oral vocabulary size. With the use of appropriately fit hearing aids, mild hearing loss does not have adverse effects on speech/language development.
Penna et al	N _{Total} = 110 N _{MHL} = 37	Performed poorer than expected on phonemic discrimination, lexical development, and phonological development. With appropriately fit hearing aids and speech therapy, speech/language development will progress like children with normal hearing. All children late identified due to lack of NBHS.
Tomblin et al	N = 227	Language abilities improve with duration of hearing aid use. Children with the largest hearing aid benefit, measured with the Speech Intelligibility Index (SII), showed the most positive language growth pattern.
Tomblin et al	N = 180 N _{MHL} = 76	Speech sound production is like normal hearing children. Benefited from hearing aids like children with greater degrees of hearing loss.
Walker et al	N = 38	Children with mild hearing loss who consistently used amplification outperformed children who did not in expressive morphosyntax, articulation, phonological awareness and memory, speech perception in noise, and cumulative auditory experience.

Results continued

Of the 133 articles originally identified, seven articles meet inclusion criteria. All articles were longitudinal study designs published between 2008-2015. Several articles were written by the same authors.

Speech/language scores for children with mild hearing loss who use amplification were comparable to normal hearing peers in five of the seven studies examined. These studies were all conducted in countries with newborn hearing screening (NBHS) where children received early intervention services and consistently used amplification. Walker et al. (2015) found that children with mild loss who wore hearing aids outperformed children with similar losses who did not wear amplification. Penna et al. (2015) found that children with mild losses performed poorer than expected on speech and language testing, but all children were late-identified and fit after developing language. While the outcomes were variable, age at intervention seemed to influence speech and language outcomes.

Discussion

Evidence exists to support hearing aid intervention in children with mild hearing loss for the development of speech and language. However, the evidence is not sufficient to make a strong recommendation for hearing aid intervention in these cases. Only one study directly compared the outcomes of children with mild hearing loss with and without hearing aids. As evidenced in this review and others, amplification is not essential for the development of speech and language in children with mild hearing loss.

Future research should be conducted in this area to provide a more complete understanding of the impact of mild hearing loss on speech and language development, as well as how hearing aids influence this process.

References

References are available upon request. Please contact: karson_moore@med.unc.edu

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