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The Relationship Between Hearing Aid Use and Quality of Life in Children with Hearing Loss: A Systematic Review

Claressa Paskhalia Theodora Lona[1], Bambang Suprayogi Resi Utomo[2*], Fransiskus Harf Poluan[3], Lina Marlina[4]

[1,2,3,4] Department of Otorhinolaryngology, Head and Neck Surgery Faculty of Medicine Universitas Kristen Indonesia, General Hospital of Universitas Kristen Indonesia, Jakarta, Indonesia

ABSTRACT

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Background: Hearing loss in children is a common condition that may negatively affect speech and language development, academic performance, social interaction, and emotional well-being. Early intervention with hearing aids is widely recommended to improve auditory function and support communication development. However, the extent to which hearing aid use influences the quality of life of children with hearing loss remains unclear.

Objective: To determine the relationship between hearing aid use and quality of life in children with hearing loss based on the Hearing Environments and Reflection on Quality of Life (HEAR-QL) questionnaire.

Methods: A systematic review of observational studies was conducted using multiple electronic databases. Study selection was performed according to predefined inclusion and exclusion criteria. The methodological quality of the included studies was assessed using appropriate risk-of-bias assessment tools.

Results: A total of 1,761 studies were identified through database searching. Following screening and eligibility assessment, two studies met the inclusion criteria. Both studies reported that children with hearing loss had lower quality-of-life scores than children with normal hearing. Hearing aid use was associated with improved quality-of-life scores; however, these scores remained lower than those observed among children with normal hearing.

Conclusion: Hearing aid use is associated with improved quality of life in children with hearing loss. Nevertheless, the quality of life of children using hearing aids remains lower than that of their normal-hearing peers, highlighting the need for comprehensive rehabilitation and ongoing support.

KEYWORDS:

Hearing aid, HEAR-QL, Pediatric audiology, Social interaction, Emotional functioning, Communication skills

1. INTRODUCTION

Hearing loss in children is a serious and relatively common condition. Approximately 12,000 newborns are diagnosed with hearing loss each year in the United States.[1] Hearing loss may be congenital, resulting from either genetic or non-genetic causes, or acquired due to diseases such as otitis media, injuries, excessive use of certain medications, and exposure to high levels of noise.[2,8]

Untreated hearing loss in children can negatively affect speech, language, academic, emotional, and psychosocial development. Since speech development is closely related to hearing ability, severe hearing loss may result in significant delays in speech and language development, particularly during the pre-lingual period.[3]

According to the World Health Organization (WHO), approximately 430 million people worldwide (around 5% of the global population) experience hearing loss, and nearly 34 million of them are children, most of whom live in low- and middle-income countries.[4] In Asia, Indonesia ranks fourth among countries with the highest prevalence of hearing loss, with a prevalence rate of 4.6%.[5] Based on data from the Free Health Check Program (Cek Kesehatan Gratis [CKG]) up to December 31, 2025, a total of 18,697,124 individuals underwent hearing screening, and 337,056 were identified having hearing impairment.[6] WHO estimates that approximately 60% of hearing loss cases in children can be prevented through public health initiatives. For children who

Corresponding Author: Bambang Suprayogi Resi Utomo

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experience hearing loss, early intervention is essential to reach their full potential.[4]

Recent studies from the American Academy of Pediatrics (AAP) have shown that early detection and prompt intervention, including the use of hearing aids, play an important role in maximizing children's cognitive, social, and academic potential.[7]

Management of hearing loss in children includes various rehabilitation approaches, such as hearing aids (HAs), cochlear implants, and other assistive hearing devices. Hearing aids are generally recommended for children with mild to moderate hearing loss, who may experience difficulty hearing conversations, particularly in noisy environments, but are still able to participate in daily communication with additional effort.[8] Evaluation of hearing loss should consider the type, severity, laterality, age of onset, and other contributing factors. However, better outcomes are generally observed among children who use hearing aids consistently and at an earlier age.[9]

To address these limitations, hearing-specific quality-of-life instruments have been developed. One such instrument is the Hearing Environments and Reflection on Quality of Life (HEAR-QL) questionnaire.[10,11] Therefore, a systematic review is needed to integrate existing research findings and provide a more comprehensive understanding of the quality of life of children with hearing loss who use hearing aids compared with children with normal hearing, as assessed using the HEAR-QL instrument.

II. MATERIAL AND METHODS

Data Collection

Data collection were collected through a literature search guided by the PICO framework presented in **Table 1.**

Inclusion and Exclusion Criteria

The inclusion criteria were: (1) Studies investigating the association between hearing aid use and quality of life in children with hearing loss, (2) studies involving children aged 7–12 years, (3) observational studies, (4) studies utilizing the Hearing Environments and Reflection on Quality of Life (HEAR-QL26) questionnaire, (5) studies published between 2015 and 2025, (6) studies published in English.

The exclusion criteria were: (1) studies not relevant to the research topic, (2) studies involving participants older than 12 years. (3) review articles, (4) studies not use the HEAR-QL26 questionnaire, (5) studies not published in English, (6) studies without full-text access.

Literature Search Strategy

The literature search was conducted online using Google Scholar, Cochrane Library, PubMed, PubMed Central (PMC), BioMed Central (BMC), ScienceDirect, New England Journal of Medicine (NEJM), and ResearchGate. The keywords used in the search included "hearing aid" OR "hearing device", "children" OR "pediatric", "quality of life" OR "HEAR-QL26", "hearing loss".

The research question and search strategy were developed according to the PICO framework (Population, Intervention, Comparison, Outcome).

Table 1. PICO Framework of the Study

Population	**:**	Children with hearing loss
Intervention	**:**	Hearing aid use
Comparison	**:**	Quality of life of children with hearing loss compared with children with normal hearing
Outcome	**:**	HEAR-QL(Hearing Environments and Reflection on Quality of Life) score

Review Quality Assessment

The methodological quality of the included studies was assessed using the SIGN Methodology Checklist 3 for Cohort Studies.

Data Analysis

A descriptive synthesis was performed to summarize and compare the findings of the included studies regarding the relationship between hearing aid use and quality of life among children with hearing loss.

III. RESULTS

PRISMA Flow Diagram of Study Selection

This systematic review was conducted based on the PRISMA guidelines. Literature searches through PubMed Central, PubMed, Google Scholar, ScienceDirect, ResearchGate, BMC, Cochrane, and NEJM identified 1,761 studies. After the screening process, 1,429 studies were excluded due to duplication, non-English publications, and irrelevance to the research topic, leaving 332 studies for title screening. Following title screening, 176 studies were excluded because they were unrelated to the study objectives or were literature reviews. During abstract screening, 154 studies were excluded due to unavailable full-texts, failure to meet the age-related inclusion criteria, or inappropriate study designs. As a result, two studies remained for full-text eligibility assessment. The study selection process is presented in **Figure 1.**

Study Quality Assessment

The methodological quality of the included studies were evaluated using the Scottish Intercollegiate Guidelines Network (SIGN) Methodology Checklist 3, both studies were rated as acceptable (+).

Study Characteristics

Two studies met the inclusion criteria and assessed the quality of life of children with hearing loss using the HEAR-QL26 questionnaire. Both studies consistently reported lower

quality of life scores among children with hearing loss compared with normal hearing children. Batthyany et al. (2022) demonstrated lower scores across all HEAR-QL26 domains, including social, activity, and emotional functioning, resulting in a substantially lower quality of life score in the hearing loss group. Likewise, Alnowaiser et al. (2023) reported significantly lower total HEAR-QL26 scores among children with hearing loss than normal hearing children. Although the studies have different methods of score presentation, their findings consistenly indicated that hearing loss was associated with reduced quality of life in children. The characteristics and main findings of the included studies are summarized in **Table 2 and Table 3.**

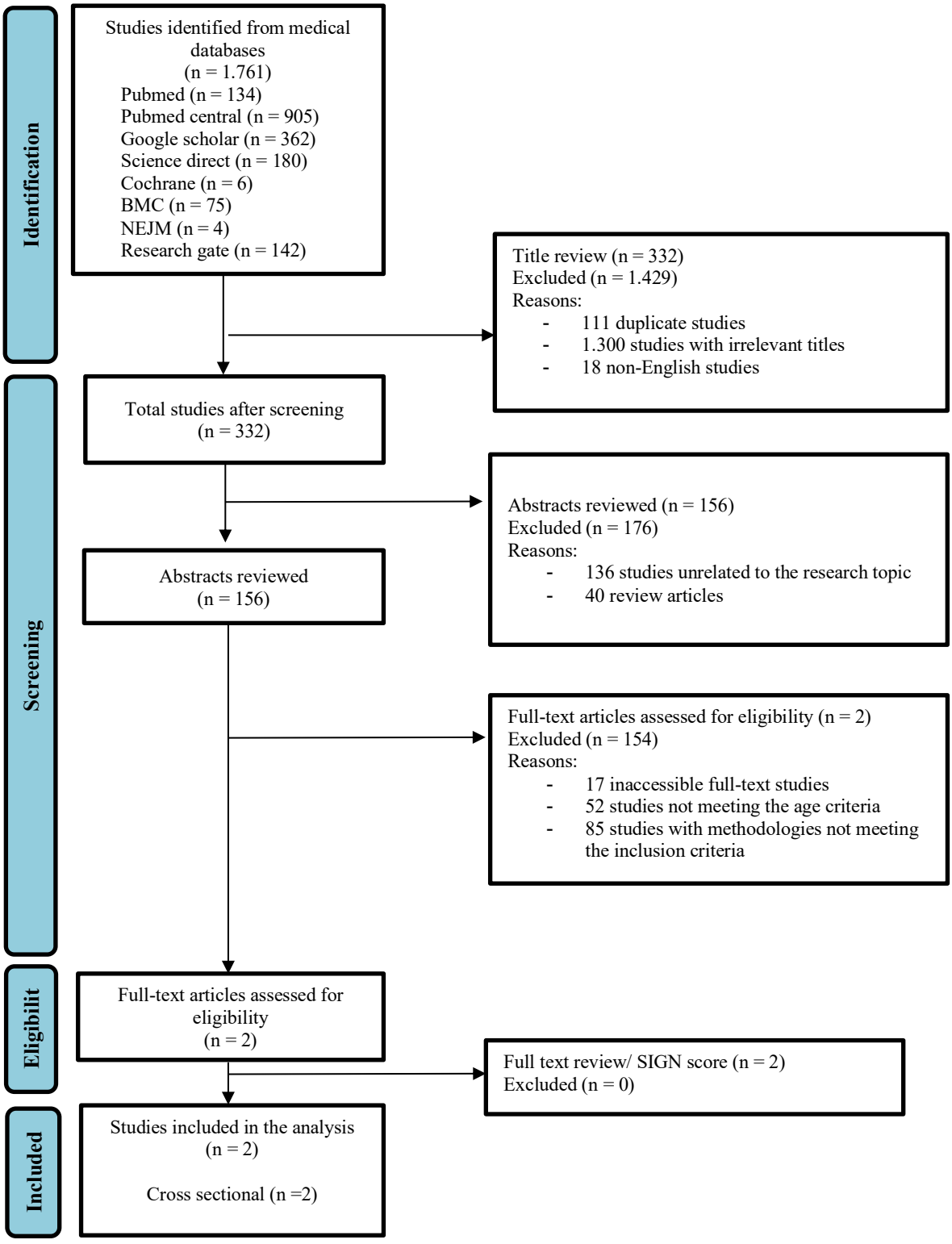

Figure 1. PRISMA Flow Diagram

Table 2. Study Characteristics

Study	Country	Design study	SIGN score	Subjects	n	Age (years)	Type of Hearing Loss	Duration of HA Use
Batthyany, *et al*., 2022[10]	Netherlands	*Cross-sectional*	+	Case	38	10	*Mild - severe bilateral hearing loss*	> 6 months
				Control	37			
Alnowaiser, *et al*., 2023[12]	Saudi Arabia	*Cross-sectional*	+	Case	10	10	*Mild – severe hearing loss*	
				Control	10			

Note: Case = children with hearing loss using hearing aids; Control = children with hearing loss not using hearing aids; HA = Hearing Aid

Table 3. Study Findings

			HEAR-QL26 Score			
Study	Subject	n	Social	Activity	Emotional	Total
Batthyany, *et al*., 2022[10]	Case	38	56±19	91±14	72±18	73±17
	Control	37	89±8	100	98±4	95,6±4
Alnowaiser, *et al*., 2023[12]	Case	10				1785
	Control	10				2402,5

IV. DISCUSSION

This systematic review evaluated the relationship between hearing aid use and quality of life among children with hearing loss using the Hearing Environments and Reflection on Quality of Life (HEAR-QL) questionnaire. Two cross-sectional studies met the inclusion criteria and were included in the final analysis. Overall, both studies consistently demonstrated that children with hearing loss reported lower quality-of-life scores than children with normal hearing, despite the use of hearing aids. The most affected domains were social, emotional, and activity-related functioning.

Quality of Life in Children with Hearing Loss

The findings of this review suggest that hearing loss substantially affects multiple aspects of children's lives beyond auditory function alone. Communication difficulties associated with hearing loss may interfere with language development, peer interactions, classroom participation, and emotional well-being.[13] As a result, children with hearing loss are more likely to experience social isolation, reduced self-confidence, and challenges in establishing interpersonal relationships.[12,14] These factors may explain the consistently lower HEAR-QL scores observed among children with hearing loss compared with their normal-hearing peers.

In the study by Batthyany et al., children with hearing loss demonstrated lower scores across all HEAR-QL domains, particularly in social functioning.[10] This finding highlights the importance of hearing ability in facilitating social participation and effective communication during childhood, a critical period for psychosocial development.[15,16,17]

Effect of Hearing Aid Use on Quality of Life

Hearing aids are widely recognized as the primary rehabilitation option for children with mild-to-moderate hearing loss. By amplifying environmental sounds and speech signals, hearing aids may improve auditory access and communication abilities. The studies included in this review suggest that hearing aid use contributes to improved quality of life; however, the quality-of-life outcomes remain lower than those observed among children with normal hearing.[10,18,19]

Several factors may explain this finding. First, hearing aids do not completely restore normal hearing function. Children may continue to experience difficulties understanding speech in noisy environments, localizing sound sources, and engaging in complex social interactions.[10] Second, delayed diagnosis and intervention may result in developmental deficits that cannot be fully reversed, even after hearing amplification is provided.[20] Consequently, while hearing aids offer substantial benefits, additional interventions such as speech therapy, educational support, and psychosocial counseling may be necessary to optimize quality-of-life outcomes.[17,21,22]

HEAR-QL as a Hearing-Specific Quality-of-Life Instrument

The HEAR-QL questionnaire was specifically developed to evaluate hearing-related quality of life in children and adolescents. Unlike generic quality-of-life instruments, HEAR-QL focuses on hearing-related challenges in everyday situations, including communication difficulties, social participation, and emotional responses to hearing impairment. Therefore, the use of HEAR-QL in both included studies provided a more comprehensive assessment of the impact of hearing loss on children's daily functioning.[10,11]

However, differences in reporting methods were observed between studies. Batthyany et al. reported domain-specific and total HEAR-QL scores, whereas Alnowaiser et al. reported only total scores.[10,12] These methodological differences limited direct comparisons and prevented more detailed synthesis of domain-specific outcomes.

Clinical Implications

The findings of this review emphasize the importance of early identification and intervention for childhood hearing loss. Early hearing aid fitting may improve communication abilities and reduce the negative impact of hearing loss on psychosocial development.[10] Furthermore, multidisciplinary management involving audiologists, otolaryngologists, speech-language therapists, educators, and family members is essential to maximize functional outcomes and quality of life.[17,21]

Healthcare providers should also recognize that successful hearing rehabilitation extends beyond audiological improvement. Routine assessment of quality of life may help identify children who require additional support in social, emotional, or educational domains.[20]

Strengths and Limitations

A major strength of this review is the use of a hearing-specific quality-of-life instrument (HEAR-QL), which allows a more targeted evaluation of hearing-related outcomes than generic quality-of-life measures. In addition, both included studies demonstrated acceptable methodological quality according to the Scottish Intercollegiate Guidelines Network (SIGN) assessment.

Nevertheless, several limitations should be acknowledged. First, only two studies met the inclusion criteria, limiting the overall strength of evidence. Second, both studies used cross-sectional designs, which restrict causal inference regarding the effect of hearing aid use on quality of life. Third, differences in sample size, reporting methods, and outcome presentation reduced comparability between studies. Finally, the small number of available studies precluded quantitative synthesis through meta-analysis.

Future research involving larger sample sizes, prospective study designs, and standardized HEAR-QL reporting is needed to provide stronger evidence regarding the long-term impact of hearing aid use on quality of life among children with hearing loss.

V. CONCLUSION & RECOMMENDATIONS

In conclusion, children with hearing loss experience lower quality of life than their normal hearing peers, particularly in social, emotional, and activity-related domains. Although hearing aid use contributes to improved quality of life outcomes, these outcomes remain lower than those observed in children with normal hearing. Therefore, early identification, timely hearing aid fitting, and comprehensive multidisciplinary support are essential to optimize the quality of life and overall development of children with hearing loss.

Future studies should involving larger sample sizes and standardized HEAR-QL26 reporting are needed to strengthen the evidence regarding the relationship between hearing aid use and quality of life in children with hearing loss. Future research should also explore the influence of clinical, social, and environmental factors, including age at intervention, duration of hearing aid use, family support, and educational accommodations, to better understand determinants of quality of life and optimize rehabilitation outcomes in this population.

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