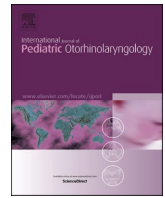





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Exploring teachers' knowledge and attitudes towards the inclusion of children with hearing impairment in mainstream education- A systematic review

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ABSTRACT

Introduction: Mainstreaming education is considered one of the most effective approaches to including children with hearing impairment (CWHI) in regular classrooms. The success of such inclusion in mainstream education depends on teachers' attitudes and knowledge towards hearing loss and inclusion. It was thus felt essential to document and understand the teachers' attitudes and knowledge towards the inclusion of CWHI in mainstream education.

Method: Systematic review was carried out to identify studies related to the teachers' attitudes and knowledge towards the inclusion of CWHI in mainstreaming education using PubMed, Scopus and Cochrane databases. The inclusion criteria included studies conducted in school teachers (both primary and secondary) using questionnaires to explore their knowledge and attitudes towards inclusion of CWHI in mainstream classrooms, published in English up to March 2024. The review followed the guidelines outlined in the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) statement.

Results: 366 articles were identified, and after screening, only seven studies were included in the present review that met the criteria. All seven studies reported positive attitudes among teachers towards the inclusion of hearing-impaired students in regular classrooms. Strategies such as modifying the teachers' working environment, providing training, and installing schools with assistive listening systems were found to eliminate the negative attitudes.

Conclusion: Both positive and negative attitudes persist among teachers towards the inclusion of children with hearing impairment in mainstream education. While there is overwhelming support for the inclusion of CWHI in mainstream classrooms, teachers' reluctance is mainly related to insufficient training and resources to meet the needs of these children.

1. Introduction

Globally, about 430 million people are suffering from hearing issues (5.37 % of the population), out of that 34 million are children (7.9 %) [1]. Early childhood hearing loss has a major effect on hearing, speech, and language development [2]. Studies have shown that hearing loss if identified before six months of age leads to better language outcomes as compared to those detected late. Untreated hearing loss in early childhood may impact physical, social, cognitive, and quality of life and is also associated with depression [3,4]. Childhood hearing loss acts as a barrier towards inclusive education and the fulfilment of the Sustainable Development Goal 4 by the United Nations [5].

Early hearing detection and intervention with suitable amplification devices, family-centered practices, preschool treatment groups and additional guidance in schools have enhanced the development of children with hearing loss [2,6,7]. To highlight the importance of right to education and inclusive education for all, key distinguished associations have released legislative statements and reports.

The Salamanca statement: Network for action on special needs education was adopted at the World Conference on Special needs Education held in Spain in 1994. It declared that each child has a fundamental right to education, including those with special needs. Regular schools should include all children, including those with special needs. It provided encouragement to the governments to prioritize inclusive

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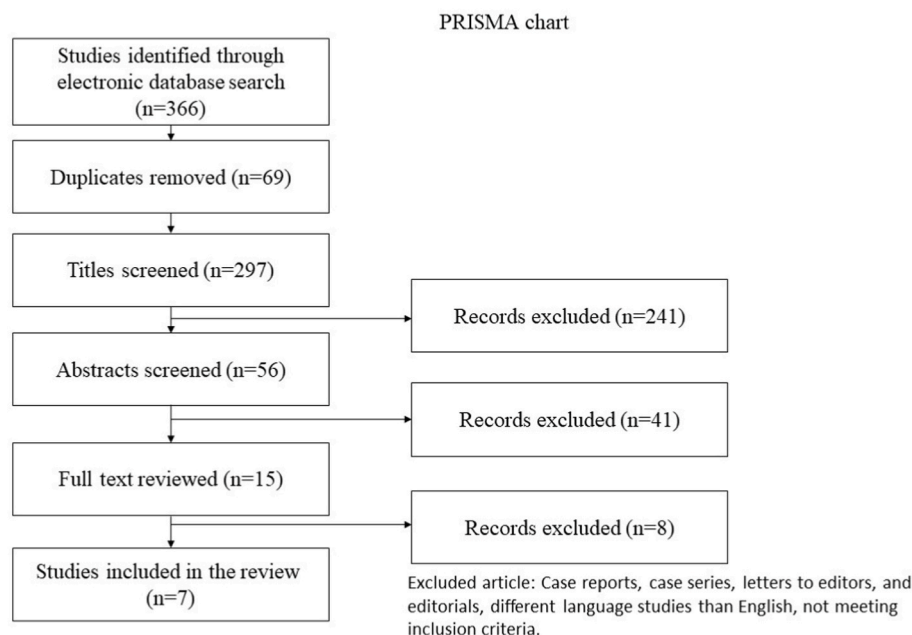


Fig. 1. PRISMA flowchart of included study.

education systems and investments in early identification, intervention and vocation programs as well as teacher training programs [8]. Following this, the United Nations Convention on the Rights of Persons with Disabilities [9] acted as an essential document that outlined global policies towards inclusive education. It emphasized equal opportunity for persons with disabilities for education, vocational training and life-long learning opportunities to ensure full and equal participation. The World Report on Hearing [10] by the World Health Organization was developed as a collaborative work between experts and stakeholders to provide strategic direction and guidance towards ear and hearing care. The report emphasized the need to strengthen the training of team members such as teachers and social workers about the impact of hearing loss and their role in ensuring effective communication. The right of children with disabilities to education: a rights-based approach to inclusive education commissioned by the United Nations Children's Fund (UNICEF) provided a conceptual framework on inclusion of children with disabilities. It expected the governments to fulfil, respect, and protect the right to education of children with disabilities [11].

Inclusive education for children with hearing impairment (CWHI) ensures that these children are enrolled in a mainstream school like their hearing peers and given the same rights [12]. However, inclusive education might pose a challenge due to a lack of adequate academic resources, expertise and training [13]. To overcome such challenges, these children are often provided placements in school supported by a team of specialized professionals such as special educators, teachers and educational audiologists [14]. The teachers have maximum interaction with the children and should be aware of the specific requirements, such as modifications in the classroom, changes in the style of teaching and service delivery required. Thus, their knowledge and attitude would play an important role in successfully implementing inclusive educational programs [15].

While there have been studies exploring the knowledge and attitude of teachers towards mainstreaming CWHI in regular classrooms, the present systematic review aims to analyze and collate these findings.

2. Method

A systematic review was carried out based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [16]. A search was carried out to identify studies exploring the

knowledge and attitude of teachers towards the inclusion of CWHI in mainstream classrooms. Questionnaire-based studies among school teachers (both primary and secondary) exploring their knowledge and attitudes towards the inclusion of CWHI in mainstream classrooms were included in the review.

Studies published up to March 2024 in the English language were included. Studies among principals and other supporting school staff were not included. Studies which assessed disabilities other than hearing impairment were excluded. Case reports, case series, letters to editors, and editorials were excluded.

Electronic databases such as PubMed, Scopus, and Cochrane were searched using search terms and appropriate Boolean operators such as 'AND' and 'OR'. The population, intervention, comparison group and outcome (PICO) for the present review were as follows:

P- Teachers, educators.

I- Hearing impaired, hearing handicapped, hearing disabled, hearing disability, pediatric hearing loss, child with hearing loss.

C- None.

O- Knowledge, attitude, view, belief, opinion, perception, inclusive education, mainstream education, special educational need.

The search strings for PubMed are available as [Appendix-1](#). The search results were combined using the Mendeley desktop reference manager, and duplicate studies were removed. First and second authors independently screened the titles of all studies, followed by abstract screening. Full-text articles of the shortlisted abstracts were retrieved for full-text screening and data extraction. Any discrepancies in inclusion were resolved through discussion between all the authors. A pre-designed data extraction sheet was used for this study. The data extracted included the title of the study, author details, year of publication, participant details (type and number of teachers), details about the type of school, questionnaire and rating scales used, knowledge and attitudes towards inclusion of CWHI in mainstream education. The quality of the included studies was assessed using the Mixed Methods Appraisal Tool (MMAT) version 2018 [17].

3. Results

A total of 366 hits were obtained across the databases, of which 69 were duplicates. After duplicate removal, 297 studies were screened for the title. Fifty-six articles underwent abstract screening. A total of seven

Table 1
Characteristics of included studies.

Study Id	Study location	Study population	Questionnaire details
Keith et al. [18]	South Africa	90 junior primary teachers (females 100 %)	Questionnaire domains: demographic information, exposure to hearing impairment and disability, mainstreaming, attitudes towards inclusion (five-point Likert rating), competence in teaching integrated CWHI, role of speech language therapist and audiologist in inclusion
Lissi et al. [19]	Chile	–12 teachers (7 high school, 5 deaf educators; females 100 %)	Interview to explore teachers' beliefs related to deaf students' literacy competences and academic achievement, strategies used in classrooms that include CWHI accommodations, and views of inclusion process
Prakash [20],	India	100 school teachers (females 50 %, males 50 %)	Standardized 24 items questionnaire related to teachers' attitudes towards inclusion (6-point rating scale) Questionnaire domains: effective strategies for meeting the needs of all student, support for educational change, inclusive education
Charema [21],	Zimbabwe	104 primary school teachers, (52 teachers with CWHI, 52 teachers without CWHI; 30 % males., 70 % females)	Questionnaire domains: Management of classes in terms of inclusion, social and emotional development of children, cognitive development of a child (5-point rating scale)
Pérez-Jorge et al. [22]	Canary Islands	128 teachers (27 % males, 73 % females)	Questionnaire on opinions, attitudes, and competencies of teachers towards disability (5-point rating scale)
Moberg et al. [23]	Japan and Finland	Finland: 362 teachers Japan: 1518 teachers	– 19 items Questionnaire domains: general attitudes towards inclusive education, appropriateness for children with severe disabilities, appropriateness for non-special education needs children, avoiding labelling in inclusive education, teachers' efficacy.
Eriks-Brophy et al. [24]	Canada	63 elementary and high school teachers	Questionnaire domains: Teacher attitudes toward inclusion of CWHI, confidence in teaching CWHI, knowledge of hearing loss and strategies to facilitate teaching and learning, effect of inclusion on CWHI, effect of inclusion on hearing students, effect of inclusion on teacher workload, itinerant teachers of the deaf and hard of hearing (ITDHH) relationship, roles and responsibilities of teachers and support professional,

Table 1 (continued)

Study Id	Study location	Study population	Questionnaire details
			role of the ITDHH, parents of CWHI (6-point rating scale)

CWHI- Children with hearing impairment.

Table 2
Attitudes of teachers towards inclusive education.

Study Id	Positive attitude towards inclusive education	Negative attitude towards inclusive education
Keith et al. [18]	positive effects of including CWHI in regular schools (52.2 %) and equal opportunities (61.1 %), inclusive education enables better understanding and acceptance (75 %) and helped to function better in hearing world (52.2 %), enabled better social adjustment (56.7 %)	Inclusion of CWHI would lower overall standard for the school (57.8 %) causing problems (50 %) and reduced attention for others (55.6 %)
Lissi et al. [19]	Teachers with special educators in their classes to assist them in teaching the CWHI showed more positive attitude.	NA
Prakash [20]	Overall positive attitude and willingness to teach CWHI. On comparison, female teachers displayed more positive attitudes than male teachers.	NA
Charema [21]	Teachers with and without CWHI in their class, displayed positive attitudes towards inclusive education.	
Pérez-Jorge et al. [22]	Positive attitudes exhibited towards curricular inclusion and acquisition of general competencies towards special educational support needs. Female teachers has more favorable attitude than male teachers.	
Moberg et al. [23]	Finnish teachers displayed more positive attitude as compared to Japanese teachers and were concerned about the efficacy of teachers in implementation of inclusive education. Finnish teachers displayed more readiness towards inclusion than Japanese teachers. Teachers from both countries with previous experience of inclusive education had more positive attitudes.	Japanese teachers indicated that labelling of CWHI cannot be avoided in inclusive education.
Eriks-Brophy et al. [24]	More than 80 % teachers accepted mainstreaming program in their regular classroom (83.9 %), inclusion of CWHI was the best educational option for majority of the children (80 %), and confirmed that inclusion will provide a positive learning environment to the CWHI (88.5 %)	NA

studies were included for full-length review and data extraction. Fig. 1 illustrates the PRISMA flowchart for the screening process followed for selection of the studies.

Table 1 summarizes the characteristics of the studies included in the review.

3.1. Knowledge towards inclusive education and mainstreaming

Variable findings were reported for knowledge levels about inclusive

Table 3
Quality Appraisal of the included study.

Study id	Is the sampling strategy relevant to address the research question?	Is the sample representative of the target population?	Are the measurements appropriate?	Is the risk of nonresponse bias low?	Is the statistical analysis appropriate to answer the research question?
Keith et al. [18]	Yes	Yes	Yes	Can't say	Yes
Lissi et al. [19]	Yes	Yes	No	Yes	Yes
Prakash [20]	Yes	Yes	Yes	Yes	Yes
Charema [21]	Yes	Yes	No	No	Yes
Pérez-Jorge et al. [22]	Yes	No	Yes	No	Yes
Moberg et al. [23]	Yes	Yes	Yes	Yes	Yes
Eriks-Brophy et al. [24]	Yes	Yes	Yes	Yes	Yes

education and suggestions to improve it among the teachers across the included studies. The heterogeneity could be attributed to the differences among the included studies. Keith et al. [18] that 72 % of the teachers in their study were unable to differentiate between mainstream and inclusive education. Lissi et al. [19] and Perez et al. [22] attributed difficulties towards teaching and engaging with CWHI to the lack of proper training for looking after CWHI. The teachers highlighted the need for proper curriculum and classroom modifications by the school management for effective teaching [20]. Charema et al. [21] attributed improved knowledge levels to prior exposure to CWHI, while Perez-Jorge et al. [22] attributed improved knowledge to initial training that equipped the teachers to respond better. The teachers recommended using short courses, training, seminars, and training for use of equipment and sign language to improve the knowledge levels. In a study by Eriks-Brophy et al. [24], 76 % of teachers were knowledgeable about hearing aids and assistive listening devices for CWHI.

The positive and negative attitudes of teachers towards inclusive education have been tabulated in Table 2.

The findings of the quality appraisal using the Mixed Methods appraisal tool (MMAT) are tabulated in Table 3.

4. Discussion

The present review highlights the varied knowledge levels and attitudes of teachers towards the inclusion of CWHI in mainstream education. Studies have reported both positive and negative attitudes and perceptions. The negative attitudes and perceptions have been attributed to the lack of adequate training and availability of resources. Such mixed attitudes could act as a substantial barrier towards the successful implementation of inclusive education.

Inclusive access to mainstream education for CWHI is important to foster equal learning opportunities and enable better integration in society. This would give these children equal access to education, better peer interactions, and more opportunities. Such opportunities would encourage more inclusion in society and create a platform for every child to reach their true potential [9,25]. Teachers play a vital role in schools by creating a positive and supportive environment. Their attitude should foster a sense of belonging among the students and make them feel included rather than a separate entity. This attitude of the teachers is largely dependent on their knowledge towards the educational needs of CWHI [15].

The inclusion of CWHI in the regular classrooms led to positive outcomes as it promoted participation in the class along with their peers and helped minimize negative attitudes among teachers [26]. Most of the studies have shown positive attitudes of teachers towards the inclusion of CWHI [18,20,21,24]. This was supported by the study by Diebold and Trentham [27], where they highlighted how a positive attitude helped in attaining a successful program. Teachers working in regular schools and special educators of CWHI agreed that it brings a new working environment and challenging tasks to teachers and

hearing-impaired children.

Moreover, a few studies also found negative attitudes of teachers towards inclusion [18,23]. Prakash [20] found that Indian male teachers working in regular schools under government and non-government organizations were not accepting towards the inclusion of CWHI into regular classrooms. The study among school teachers in the Canary Islands also reported negative attitudes towards mainstreaming [22]. Most of the teachers working in regular schools claimed that they lacked proper training, education, and strategies to deal with hearing-impaired students and had false opinions about the program. There is a need for regular school teachers to be trained to teach, interact, and communicate using special techniques such as sign language to make CWHI effortlessly participate in the classes along with their peers [18]. Studies among other stakeholders such as hearing peers, parents of CWHI have revealed mixed attitudes. While overall the experience has been reported to be rewarding and positive, there were conflicts, bullying, and infrequency of interactions [28,29].

Few modifications have been suggested by the teachers for better working situations while dealing with CWHI in the classrooms, such as installing assistive listening systems in the schools so the children can grasp the information more accurately [19]. The findings of this review also highlight the need to foster a collaborative network between the teachers and other team members, such as parents and the community.

4.1. Future recommendations and limitations

Based on the findings from the present review, the future recommendations include the need to have more studies aimed at improving the existing knowledge of teachers towards inclusive education of CWHI. The availability of updated resources, teacher training programs and support will ensure that the teachers and educators are well-equipped with the required skills. Further, policy makers can take steps towards better schemes and policies to ensure that CWHI are included in mainstream education. The review highlights the need for more focused teacher training programs which include the importance of inclusive education, strategies to ensure effective student involvement and culturally appropriate inclusive education strategies. Such a supportive and holistic approach will ensure that CWHI have better educational outcomes.

The present review has some limitations as follows: only studies published in English language were included which could have missed out on unpublished literature and studies in other languages. The heterogeneity of studies, such as studies from diverse socio-economic statuses, cultural backgrounds and settings, could make comparability of results difficult. The review focuses on only teachers; however, inclusive education is a team effort, and the knowledge and attitude studies of other stakeholders, such as school principals, can provide further information on governance barriers to implementation. There needs to be more comprehensive longitudinal data on the long-term effect of inclusive mainstream education on CWHI and needs to be explored.

Further reviews should focus on exploring the knowledge and attitude of parents of CWHI as well as CWHI themselves towards mainstream education.

5. Conclusion

The review findings suggest that teachers have positive and negative attitudes towards inclusive education for children with hearing loss. Although there is overwhelming support for the inclusion of a CWHI in mainstream classrooms, the reluctance by teachers is often the result of insufficient training and access to resources to meet the needs of these children.

CRedit authorship contribution statement

Sai Keerthan K: Writing – review & editing, Writing – original draft, Methodology, Investigation, Conceptualization. **Dhanshree R. Gunjawate:** Writing – review & editing, Visualization, Validation, Supervision, Methodology, Formal analysis, Conceptualization. **Rohit Ravi:** Writing – review & editing, Writing – original draft, Supervision, Resources, Methodology, Investigation, Formal analysis, Conceptualization. **Kaushlendra Kumar:** Writing – review & editing, Supervision, Methodology, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix 1

Search: (((Teacher* OR Educator*) AND (View* OR Perception* OR attitude* OR opinion* OR belief* or knowledge)) AND (inclusive education OR mainstream* OR inclusi* education OR special educational need*)) AND (Hearing impair* OR Hearing handicap* OR Hearing disable* OR Hearing disabilit* OR Pediatric hearing loss OR child* with hearing loss).

References

- [1] World Health Organization, State of hearing ear care in the south-east asian region, Retrieved from, http://apps.who.int/pds_docs/B1466.pdf, 2012.
- [2] M.P. Moeller, J.B. Tomblin, OCHL collaboration. Epilogue: conclusions and implications for research and practice, *Ear Hear.* 36 (1) (2015), 92S–8S.
- [3] C. Yoshinaga-Itano, Early intervention after universal neonatal hearing screening: impact on outcomes, *Ment. Retard. Dev. Disabil. Res. Rev.* 9 (4) (2003) 252–266.
- [4] C. Yoshinaga-Itano, A.L. Sedey, D.K. Coulter, A.L. Mehl, Language of early-and later-identified children with hearing loss, *Pediatrics* 102 (5) (1998) 1161–1171.
- [5] Sustainable Development Goal 4 and its Targets, United Nations, New York, 2015. Available from: <https://www.un.org/sustainabledevelopment/education/>.
- [6] M. Marschark, P.E. Spencer, Epilogue: what We Know, what We Don't Know, and what We Should Know, vols. 1–7, Oxford Handbooks Online, 2011, pp. 513–520, <https://doi.org/10.1093/oxfordhb/9780199750986.013.0036>.
- [7] C. Yoshinaga-Itano, Levels of evidence: universal newborn hearing screening (UNHS) and early hearing detection and intervention systems (EHDI). *J comm disorder*, 37(5), 451–465. doi: 10.1016/j.jcomdis.2004.04.008.
- [8] M. Ainscow, R. Slee, M. Best, The Salamanca statement: 25 years on, *Int. J. Incl. Educ.* 23 (2019) 671–676.
- [9] United Nations, Convention on the Rights of Persons with Disabilities and Optional Protocol, UN, New York, NY, 2007.
- [10] World Health Organization, World report on hearing. <https://www.who.int/publications/i/item/9789240020481>, 2021.
- [11] United Nations Children's Emergency Fund (UNICEF), The right of children with disabilities to education: a rights-based approach to inclusive education. <https://www.unicef.org/media/126506/file/UNICEF-Right-to-Education-Children-Disabilities-ENG.pdf>, 2012.
- [12] B.A. Knight, Towards inclusion of students with special educational needs in the regular classroom, *Support Learn.* 14 (1999) 3–7, <https://doi.org/10.1111/1467-9604.00091>.
- [13] R.B. Lewis, *Teaching Special Students in General Education Classrooms*, sixth ed., Merrill Prentice Hall, New Jersey, 2003.
- [14] D. Simkiss, Education of children with hearing impairment, *Pediatrics and Child Health* 23 (10) (2013) 434–437.
- [15] E. Avramidis, B. Norwich, Teachers' attitudes towards integration/inclusion: a review of the literature, *Eur. J. Spec. Needs Educ.* 17 (2002) 129–147.
- [16] M.J. Page, J.E. McKenzie, P.M. Bossuyt, et al., The PRISMA 2020 statement: an updated guideline for reporting systematic reviews, *Br. Med. J.* 372 (2021). Available from: <https://www.bmj.com/content/372/bmj.n71>.
- [17] Q.N. Hong, S. Fàbregues, G. Bartlett, et al., The Mixed Methods Appraisal Tool (MMAT) version 2018 for information professionals and researchers, *Educ. Inf.* 34 (2018) 285–291.
- [18] K. Keith, E. Ross, Attitudes of a group of primary school teachers towards the education inclusion of hearing-impaired learners in regular classrooms, *S. Afr. J. Commun. Disord.* 45 (1998) 39–50.
- [19] M.R. Lissi, C. Iturriaga, C. Sebastián, et al., Deaf and hard of hearing students' opportunities for learning in a regular secondary school in Chile: teacher practices and beliefs, *J. Dev. Phys. Disabil.* 29 (2017) 55–75.
- [20] S.S. Prakash, Inclusion of children with hearing impairment in schools: a survey on teachers' attitudes, *DCIDJ [Internet]* 23 (2012) 90–111. Retrieved from: <http://dcidj.uog.edu.et/index.php/up-j-dcbrid/article/view/82>.
- [21] J. Charema, Inclusion of primary school children with hearing impairments in Zimbabwe, *Afr. Educ. Rev.* 7 (2010) 85–106.
- [22] D. Pérez-Jorge, M.C. Rodríguez-Jiménez, E. Ariño-Mateo, K.J. Sosa-Gutiérrez, Perception and attitude of teachers towards the inclusion of students with hearing disabilities, *Educ. Sci.* 11 (2021) 187.
- [23] S. Moberg, E. Muta, K. Korenaga, M. Kuorelahti, H. Savolainen, Struggling for inclusive education in Japan and Finland: teachers' attitudes towards inclusive education, *Eur. J. Spec. Needs Educ.* 35 (2020) 100–114.
- [24] A. Eriks-Brophy, J. Whittingham, Teachers' perceptions of the inclusion of children with hearing loss in general education settings, *Am. Ann. Deaf* 158 (2013) 63–97.
- [25] K.C. Pradhan, M.S. Naik, Inclusive education: a foundation for equality and empowerment at the elementary stage, *Int. J. Multidisciplin. Res.Arts, Sci. Technol.* 2 (2) (2024) 1–8.
- [26] J.M. Selesho, Inclusion of high school learners in the mainstream: ecological niche, *Anthropologist* 14 (2012) 539–543.
- [27] M.H. Diebold, L.L. Trentham, Special educator predictions of regular class teacher attitudes concerning mainstreaming, *Teach. Educ. Spec. Educ.* 10 (1) (1987) 19–25.
- [28] J. Stevenson, J. Kreppner, H. Pimperton, S. Worsfold, C. Kennedy, Emotional and behavioural difficulties in children and adolescents with hearing impairment: a systematic review and meta-analysis, *Eur. Child Adolesc. Psychiatr.* 24 (5) (2015) 477–496, <https://doi.org/10.1007/s00787-015-0697-1>.
- [29] R.N. Aktan, B. Uludağ, S. Terlemez, Review of peer bullying in children with hearing loss, *Egyptian J. Otolaryngol.* 40 (1) (2024) 77.