



**Faculty of Cognitive Sciences and Human Development**

**EARLY LANGUAGE INTERVENTION FOR YOUNG CHILDREN  
WITH HEARING IMPAIRMENT: A COMPREHENSIVE REVIEW**

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**Bachelor of Science with Honours  
(Cognitive Science)  
2022**



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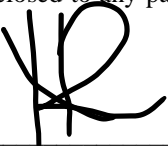
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**EARLY LANGUAGE INTERVENTION FOR YOUNG CHILDREN WITH  
HEARING IMPAIRMENT: A COMPREHENSIVE REVIEW**

**NURBALQIS BINTI MOHD KUSNI**

**This project is submitted  
in partial fulfillment of the requirements for a  
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Sufficient for us is Allah, and [He is] the best Disposer of affairs.

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## **ABSTRACT**

Hearing problems can occur in 2 classifications, namely from birth or hearing problems that occur after birth at any time for certain reasons. These hearing problems will affect the effects in the long run if left untreated from the beginning of exposure to the diagnosis of hearing problems. Among the effects experienced by individuals with hearing problems are language development delays, learning difficulties and social difficulties. Nevertheless, if early intervention is carried out between age 0 and 3 years old, this hearing problem can be overcome well in the future. Various early interventions can be done to improve hearing for children with these hearing problems. Researchers have gathered information that involves appropriate early interventions practiced by children with hearing problems. more effective between parent and child. Therefore, this study is to focus on a comprehensive survey which examines the problems faced by infants with hearing problems and looks at the impact of early interventions conducted in the development of audiology, speech, and language.

**Keywords:** *hearing impairment, early intervention, language development, sign language, maternal education, audiology, newborn screening, speech-language development, social behavior, emotional behavior, cochlear implants, hearing aids*

## **ABSTRAK**

Masalah pendengaran boleh berlaku kepada 2 klasifikasi iaitu sejak daripada lahir ataupun masalah pendengaran yang berlaku selepas waktu kelahiran pada bila-bila masa atas sebab-sebab tertentu. Masalah pendengaran ini akan mempengaruhi kesan pada jangka masa yang panjang sekiranya tidak dirawat daripada awal pendedahan diagnoses masalah pendegaran. Antara kesan yang dialami oleh individy yang mempunyai masalah pendengaran adalah kelewatan perkembangan bahasa, menghadapi masalah pembelajaran dan kesukaran bersosial. Namun begitu, sekiranya intervensi awal dijalankan seawall usia 0-3 tahun, masalah pendengaran ini dapat diatasi baik pada masa akan datang. Pelbagai intervensi awal yang dapat dilakukan untuk menambahbaikkan pendengaran bagi kanak-kanak masalah pendengaran ini. Pengkaji telah mengumpul maklumat yang melibatkan kebersanan intervensi awal yang sesuai dipraktikkan oleh kanak-kanak yang mempunyai masalah pendengaran. Walaubagaimanapun, ibu bapa dalam membangunkan kemahiran-kemahiran daripada intervensi awal diberikan juga perlu melibatkan usaha daripada hasil didikan ibubapa agar dapat membentuk perkembangan bahasa dan komunikasi yang lebih berkesan antara ibubapa dan anak. Oleh hal demikian, kajian ini adalah untuk memfokuskan dalam tinjauan secara menyeluruh dimana untuk mengkaji masalah yang dihadapi oleh bayi yang mempunyai masalah pendengaran dan mengkaji kesan perkembangan intervensi awal yang dijalankan dalam membentuk perkembangan audiologi, percakapan dan bahasa.

***Kata kunci:*** *Masalah pendengaran, Intervensi Awal, Perkembangan Bahasa, Bahasa Isyarat, Pendidikan Ibu, Audiologi, Pemeriksaan Bayi Baru Lahir, Perkembangan Bahasa pertuturan, Tingkahlaku Sosial, Tingkahlaku Emosi, Koklea Implan, Alat Bantu Pendengaran*

## CHAPTER 1: INTRODUCTION

Hearing impairment is one of the most common types of disability, and it can be risky in everyday life because it makes it hard to recognise voices, communicate, and learn languages. Hearing impairment impairs the internal representation of sound stimuli (Humes & Roberts, 1990). Children with hearing impairment are part of a small group of people with disabilities, and many of them have trouble learning language skills on par with their typically developing peers (Barker et al., 2009; Niparko et al., 2010); These delays in language development can cause several problems in other areas of development (Antia et al. 2009; Dammeyer, 2010; Hintermair, 2006).

A patient who consults a specialist in the hospital for ongoing hearing problems will have his/her hearing level evaluated based on the degree of hearing loss. The levels of hearing loss kinds are listed in the table below: -

Figure 1

Degree of hearing loss	Hearing loss range (dB HL)
Normal	-10 - 15
Slight	16 – 25
Mild	26 – 40
Moderate	41 – 50
Moderate severe	56-70
Severe	71-90
Profound	91+

Source: *Clark, J. G. (1981). Uses and abuses of hearing loss classification*

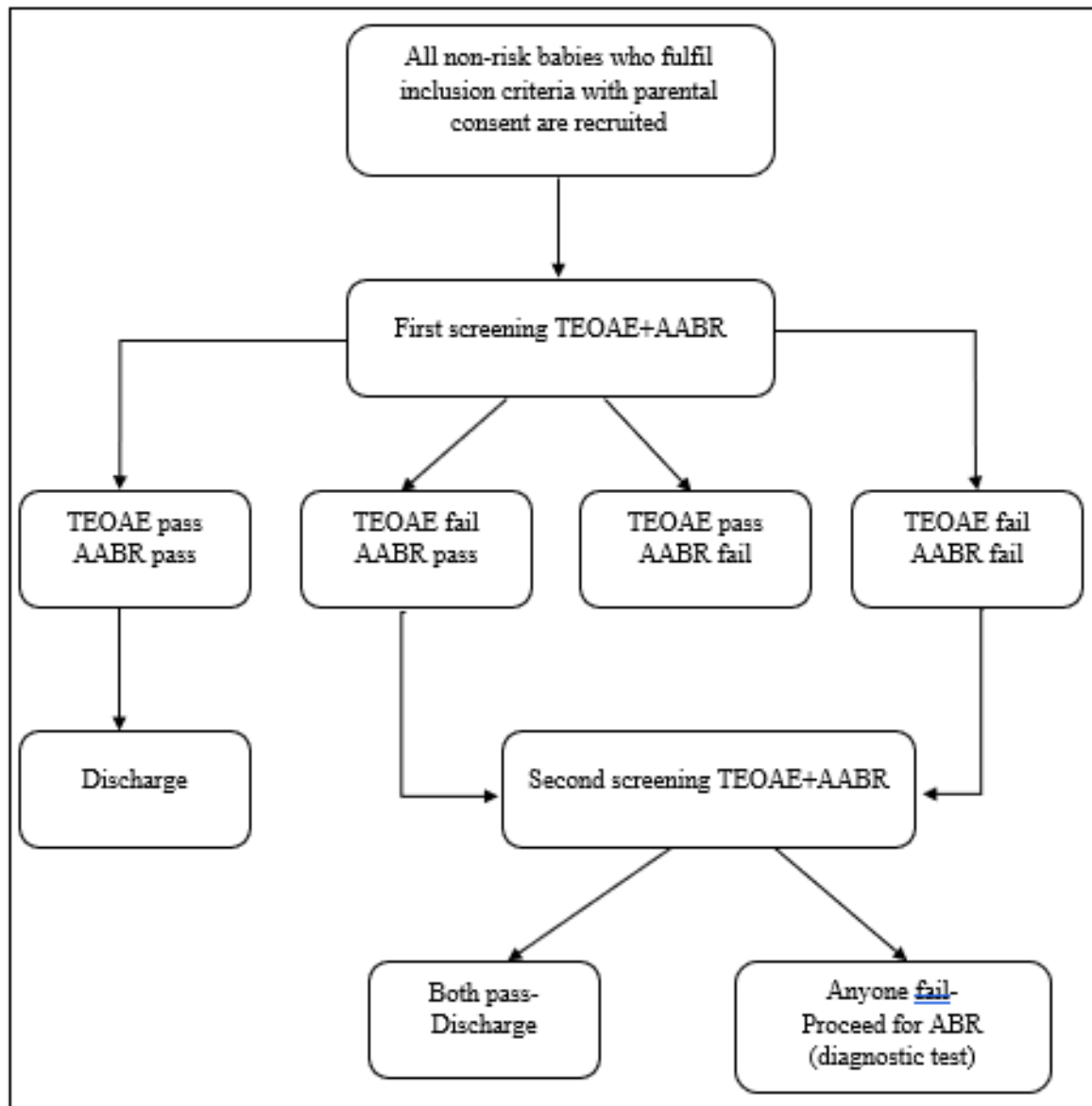
According to an explanation by Ropper et al. (2017), Peripheral hearing loss is typically classified as conductive (induced by outer or middle ear damage) or sensorineural (caused by

inner or middle ear damage) (caused by dysfunction in the cochlea or spiral ganglion). Thus, children born with severe to profound deafness, or those who experience it between the ages of 0 and 5 years, fail to master spoken language, impairing their communication and reading abilities (Kulkarni & Gathoo, 2017). Thus, hearing impairment in young children is a recognised cause of poor speech and language development because it makes it harder for a child to get information about speech and language (Tromblin et al. 2014).

The most important effect of a child's hearing impairment is on how well they learn language to speak and communicate. (Davis,2009). If hearing problems are identified early and intervention is started right away, hard of hearing children can learn to speak and understand language just like their peers with normal hearing (Meyer,2014). However, early intervention is the provision of services and support to young children and their families when the child has or is at risk of developing a disability. (Odom, Hanson, Blackman, & Kaul, 2003).

However, technologies nowadays that babies can now be given hearing screening tests from birth. According to Lochowska et al. (2014), the high neonatal incidence of congenital hearing loss is attracting the attention of national health management organisations across the country, with one in every three thousand healthy newborns and two in every four hundred neonates at high risk of causing hearing loss. Among the newborns' hearing screening tests that may be performed are the Automated Auditory Brainstem Response (AABR) and Transient Evoked Otoacoustic Emissions (TEOAE). The process by which the hearing nerve and brain react to sound is AABR. Clicks or tones are played into the baby's ears through tiny earphones. Three electrodes are put into the babies to measure how the hearing nerve and brain respond. OAE is also a way to measure the sound waves that are made in the inner ear. A small probe is inserted into the baby's ear canal. When clicks or tones are played in the baby's ears, this is what he or she does (echo). While the baby slept, both tests were done in 5 to 10 minutes.

Figure 2

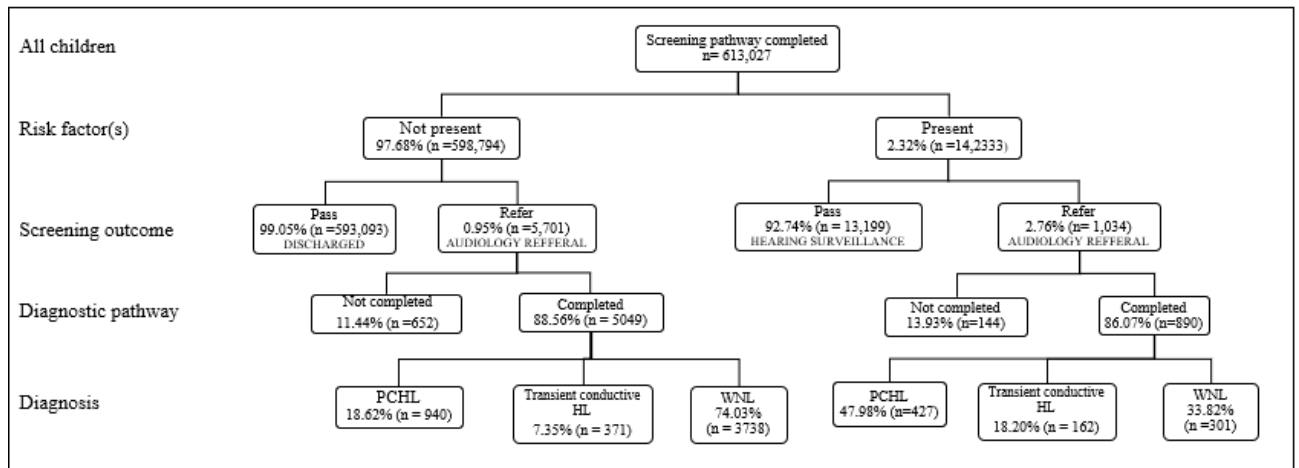


Source: *Comparison of Two-Step Transient Evoked Otoacoustic Emissions and One-Step Automated Auditory Brainstem Response for Universal Newborn Hearing Screening Programs in Remote Areas of China* (Sheng et al., 2021)

Referring to Figure 2, it is a protocol process that must be followed to undergo the test hearing process on both methods. According to Sheng et al. (2021), to experience the process of hearing rescreening screening tests and hearing diagnostic tests were performed by professional audiologists and otolaryngologists. According to the figure in Figure 3, it has

undergone research on hearing screening tests on 613,027 babies in Queensland, Australia. This demonstrates the necessity of having infants undergo hearing screening tests to ensure that they can receive the intervention after being identified with hearing loss, which eventually numbered 6735 out of 613,027 babies born between 2007 and 2006 (Fitzgibbons et al., 2021).

Figure 3



Source: *Predicting hearing loss from 10 years of universal newborn hearing screening results and risk factors (Fitzgibbons et al., 2021)*

Figure 4

Referral type	Permanent childhood hearing loss, n (%)	Normal hearing or transient conductive hearing loss, n (%)	No diagnostic outcome, n (%)
Bilateral refer (n = 1701)	644 (37.86)	881 (51.79)	176 (103.5)
Right refer (n = 1686)	268 (15.59)	1218 (72.24)	199 (11.80)
Left refer (n = 2978)	305 (10.24)	1336 (78.44)	337 (11.32)
Bypassed screening (n = 370)	149 (40.27)	137 (37.03)	84 (22.70)
Total (n = 6735)	1367 (20.30)	2572 (67.88)	796 (11.82)

Source: *Predicting hearing loss from 10 years of universal newborn hearing screening results and risk factors (Fitzgibbons et al., 2021)*

The findings of the diagnosis after undergoing hearing screening test may be shown via a statistic of the results of the data on 613,027 newborns should be referred to the hearing screening test department of 6735 babies, according to the statistical data in Figure 4 above. Finally, 20.20 percent of newborns with persistent childhood hearing loss and 67.88 percent of

infants with normal hearing or temporary conductive hearing loss were identified in the audiology department by referral type from bilateral refer, right refer, left refer, and avoided screening. There was no diagnosis of the result of the hearing test for the remaining 11.82 percent of babies.

According to Ahmad et al. (2011), in research done on neonates in Malaysia, 98 percent of infants were screened for hearing using the OAE method. The research included 16,100 newborns chosen at random. The first referral rate after screening was 25.5%. At the second and third screenings, the default frequencies were, respectively, 33.9% and 40.7%. The mean (SD) age at which hearing impairments were identified was 3.3 months (0.86). The average (standard deviation) age at hearing aid implantation was 13.6 (4.8) months. Hearing impairment is prevalent at a rate of 0.09 percent.

However, the primary purpose of newborn hearing screening is to avoid the negative effects of hearing loss on a child's linguistic, cognitive, social, emotional, and academic development by early diagnosis (Lochowska et al., 2014). Therefore, parents of infants with hearing impairments need not be concerned about the state of their children if they get early intervention for hearing impairments to minimise obstacles and develop in terms of linguistic, cognitive, emotional, social, and educational development.

Hearing loss is a tough condition to cure. Children with hearing problems will struggle in the future with language development and socialization. This is due to hearing difficulties making it difficult to participate and understand what is going on around them. However, if these children had a test to detect hearing problems at an early age, the issue may be resolved. As a result, children with hearing problems should begin therapy or early age interventions as soon as possible between the ages of 0 and 3 years to improve language abilities with other children.



Consequently, the purpose of this research is to look at early intervention for young children. The purpose of this study was to look at the hearing challenges that hearing children encounter, as well as the effectiveness of early interventions done as early as the age of 0-3 years. The study was carried out to parents establish an area for young children with hearing impairment who may be educated in early intervention to acquire specific abilities from the young children ages. This indirectly allows parents to understand and organize actions to give early assistance to children with hearing impairments based on their age.

## **RESEARCH OBJECTIVE**

The importance of conducting this study is to identify problems in terms of language development and understanding an early intervention for young children with hearing impairment. Based on the problem statement, the objectives of this study are:

Research objective 1: To identify language problems faced by young children with hearing impairment.

Research objective 2: To investigate whether an early language intervention is effective for young children with hearing impairment.

## **RESEARCH QUESTION**

The two primary research questions raised in this study are:

Research question 1: What are the language problems faced by young children with hearing impairment?

Research question 2: What is the effectiveness of early intervention for young children with hearing impairment?

## **CHAPTER 2:**

### **METHOD**

The articles mentioned in this paper are those which have been found through a few websites that can be found namely, Research Gate, Science Direct, National Centre for Biotechnology Information, BMC Paediatrics, and Pub Med. The keywords used for searching the articles such as “hearing impairment”, “language development faced”, “early intervention”, “early intervention program for hearing impairment children”, “hearing aid intervention”, “cochlear implant intervention”, and “language therapy intervention among hearing impairment children”, “type of early intervention”, “verbal auditory program”. Findings from these articles are published between 1999 and 2022. The information from the selected articles will be used to identify additional studies. The research that is related to the topic will be chosen as a trial.

**Table 1: Language problems faced by young hearing impairment children**

<b>Article</b>	<b>Methodology</b>	<b>Age</b>	<b>N</b>	<b>Finding</b>
Abdelmalek et al. (2022)	Quantitative study	2.5 years – 15 years old	80 children	Children with hearing impairments will suffer significant emotional, social, behavioural, and cognitive challenges throughout adults.
Geers et al. (2003)	Comparative study	8-9 years old	181 children	Once children were 8-9 years old, half of them effectively acquired language abilities and were able to listen.
Martinez-Cruz et al. (2009)	Cross-sectional study	Median age: 7 years	81 children	Compared to their peers with binaural normal hearing, children with unilateral hearing loss performed worse on examinations of receptive and expressive language.
Nicholas et al. (2006)	Correctional study	Children who had a cochlear implant for at least 7 months	76 children	The use of cochlear implants in deaf children as early as three years old has an influence on their

				accomplishments, especially in the identification of previously recognised spoken speech.
Psarommatis et al. (2001)	Retrospective study	12-16 months	726 children	Children with conductive hearing losses who participated in the research did not have any other problems; their expressive language delay may be ascribed to their hearing disability.
Werfel et al. (2021)	Qualitative study	4 years old	72 children	Children with hearing loss acquired difficult syntax and some complex structures more slowly than their peers of the same age, as well as later than younger children.
Yoshinaga-Itano et al. (2017)	Cross-sectional study	8-39 months	448 children	Children with hearing impairments fail to attain exponentially high vocabulary development after they reach 18 months of age, when they may produce between 9 and 40 new words each month on average.

**Table 2: The impact of early language intervention on young children with hearing impairment**

<b>Article</b>	<b>Methodology</b>	<b>Age</b>	<b>N</b>	<b>Findings</b>
Alkhamra & Abu Dahab (2020)	Quantitative study	3-10 years	90 children	Children with cochlear implants or hearing aids are more susceptible to auditory processing problems. Children with cochlear implants are more likely to have balance, multisensory processing, social-emotional, and fine motor difficulties. Greater age at implantation increased the probability of sensory processing issues.
Bruijnzeel et al. (2016)	Systematic review	Compared infants implanted before 12 months with children implanted between 12-24 months	N/A	A speech perception score indicates that cochlear implantation before the age of two is helpful. Before the age of 12 months, implantation enhanced voice production, auditory performance, and receptive language scores.
Bubbico et a. (2007)	Retrospective study	17 children aged 0-12 months were enrolled.	70 children 53	Early recognition of hearing loss at an early age, installation of hearing aids at an early age, and early intervention within the first 12 months of life may assist children with prelingual

			children joined after 12 months of age	hearing issues do well in terms of their perceptual language abilities.
Caselli et al. (2021)	Cross-sectional study	8 - 68 months	78 children	Children who are exposed to sign language by their parents during the first six months will have an age-appropriate and expressive vocabulary. Whereas children with late exposure to sign language will have a lesser expressive vocabulary, but not a smaller receptive vocabulary.
Downs & Yoshinaga-Itano (1999)	Experimental study	10 months-2 years	56 children	The most efficient approach for encouraging normal language development in infants and toddlers with hearing loss is early intervention implementation of effective care.
Fitzpatrick et al. (2013)	Systematic review	N/A	N/A	Early detected children with hearing loss who benefit from a combination of sign language and oral language treatment for the development of spoken language.

Geers A. E. (2004)	Longitudinal study	8 to 9 years in children that were implanted before the age of 5	181 children	Children who got implantation at the age of two were more likely than children who received implantation at the age of four to develop comprehensive speech and language skills relative to their age-matched peers with normal hearing.
Harris et al. (2013)	Longitudinal study	N/A	66 children	Cochlear implants may be as useful as a normal child, but it takes a long time to train memory growth in speech and language in terms of communication.
Havenga et al. (2017)	A comparative pilot study	30-79 months	10 children and parent	Tele-intervention is advantageous for communication intervention and may be a solution to typical obstacles such as distance and the lack of experienced interventionists.
Johnson et al. (2011)	Longitudinal study	18-24 months	31 children	Children that participate in an early intervention programme as early as 3 months will have significant language progress. Before 11 months, children who received early intervention. There have been reports of delays in speech-language, cognitive, vocabularies, linguistic, and reasoning skills for