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The Effect of Socioeconomic Status on Adult Access to Hearing Aids

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THE EFFECT OF SOCIOECONOMIC STATUS ON ADULT ACCESS TO HEARING AIDS

A Doctoral Scholarly Project Submitted in Partial Fulfillment
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ABSTRACT

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Approximately 430 million people worldwide suffer from hearing loss. With Americans over the age of 65 earning a mean annual salary of less than $60,000 and the cost of a pair of hearing aids exceeding $4000, attempting to pursue hearing aids can prove to be challenging, if not an impossible task. The purpose of this project was to assess how individuals with hearing loss, above the age of majority, are impacted by their socioeconomic status with regard to accessing properly fit amplification. Evidence has shown that access to hearing aids is strongly tied to one's socioeconomic status. In addition, there are detrimental effects on physical health (such as cognitive decline, disruption of balance, and symptoms of tinnitus) and psychosocial health being linked to untreated hearing loss. Recent studies have provided compelling evidence suggesting that hearing aids may serve to mitigate and reduce these negative effects. Benefits of treating hearing loss with amplification (hearing aids) include reduced rates of cognitive decline, reduced fall risk, and a 50% reduction in lost wages resultant from hearing loss. These findings suggest that access to hearing aids is important for everyone, regardless of socioeconomic status. Therefore, Chapter 2 provides a list of resources to assist health professionals and individuals in terms of accessing funding for hearing aids and hearing healthcare for underserved populations. It is important to expand access to hearing aids and hearing healthcare, whether by expanding insurance coverage or by allowing for the billing of a more comprehensive range of audiological

products and services for those government-supported healthcare. This could potentially reduce the costs to society and improve public health.

ACKNOWLEDGEMENTS

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ABBREVIATIONS

APA	American Psychological Association
ASHA	American Speech-Language-Hearing Association
dB	Decibels
dB HL	Decibels hearing level
dB SPL	Decibels sound pressure level
HIV	Human Immunodeficiency Virus
HL	Hearing level
ICD-10	International Classification of Disease, 10th Revision
LE	Left ear
NHANES	National Health and Nutrition Examination Survey
OTC	Over-the-counter
PTA	Pure Tone Average
RE	Right ear
U.S.	United States (of America)
VA	Veterans Affairs
WHO	World Health Organization

CHAPTER I

LITERATURE REVIEW

The financial burden of hearing loss is not minimal, neither to the individual nor to society. Hearing loss is a global health issue with compounding costs when left untreated. One's inability to procure amplification limits their productivity and by extension their earning power, which further limits their ability to procure amplification in a cyclical pattern. By allowing the propagation of this pattern, society suffers in turn. There is a need to understand the scope of the problem in the context of hearing aids and how an audiologist might support underserved adult patient populations.

Epidemiology of Hearing Loss in Adults

Global Prevalence

According to a report released by the *World Health Organization (WHO)* (2021a), an estimated 430 million people worldwide suffer from disabling bilateral hearing loss. This number is expected to increase to 509 million people by the year 2030. More specific estimates have been ascribed to six different geographic regions as defined by the WHO consisting of the Western Pacific, South-East Asia, Europe, Africa, Eastern Mediterranean, and the Americas. Of the estimated 430 million affected individuals, approximately 31.9 % reside in the Western Pacific Region, 25.6 % in the Southeast Asian Region, 13.4 % in the European Region, 9.3 % in the African Region, and 5.2 % in the Eastern Mediterranean Region. Those residing in the Americas make up approximately 14.7 % of individuals worldwide affected by hearing loss, equating to approximately 62.8 million people (World Health Organization [WHO], 2021b).

While specific details regarding hearing loss on a global scale are limited, one could reasonably assume that etiologies vary greatly between regions given evidence suggesting higher rates of otitis media in lower- and middle-income countries (Degenhardt et al., 2015; Monasta et al., 2012) as well as a lower prevalence of cochlear damage in Black populations (Helzner et al., 2005; F. R. Lin et al., 2011).

Prevalence in the United States

Although the WHO estimates that 62.8 million individuals affected by hearing loss reside in the Americas (World Health Organization [WHO], 2021a), data regarding populations specific to the *United States (U.S.)* are limited and requires extrapolation based on available datasets. Roughly 15-17% of all individuals over 18 years of age in the United States report suffering some level of hearing loss (National Center for Health Statistics, 2018). With an adult population of over 258 million people according to the 2020 census (Blakeslee et al., 2023), the number of adults in the United States who experience hearing loss could fall between 38 million and 44 million. In a study by the Centers for Disease Control and Prevention from 2014- 2016, West Virginia was found to have the highest proportion (24.7 %) of its residents suffering from hearing loss, followed by Oregon, Montana, Idaho, and Wyoming at 24.6 %, 23.8 %, 23.1 %, & 22.3 % respectively (Centers for Disease Control and Prevention, 2017). Conversely, the District of Columbia was found to have the lowest proportion of its residents suffering from hearing loss at 8.6 % followed by New Jersey, Connecticut, Maryland, California, and New York at 10.6 %, 11 %, 11 %, 12.3 %, & 12.6 % respectively. The prevalence of hearing loss increases as populations age, especially in the high frequencies as seen in Table 1.1.

Table 1.1

Prevalence of Hearing Loss Among U.S. Adults 20-69 Years of Age in the Context of Sex, Age, and Educational Level.

Factor	Hearing loss in speech frequencies [a] (95% Confidence Interval)	Hearing loss in high frequencies [b] (95% Confidence Interval)
Sex		
Male	18.6%	42.2%
Female	9.6%	19.9%
Age (in years)		
20-29	2.2%	7.1%
30-39	3.3%	10.8%
40-49	7.8%	26.0%
50-59	23.1%	50.2%
60-69	39.3%	68.0%
Level of Education		
Less than high school	19.2%	42.2%
High school	19.1%	39.7%
Some college/ associate degree	14.8%	27.1%
College graduate or higher	8.3%	25.3%

Note. Hearing loss is defined as a *pure tone average (PTA)* exceeding 25 decibels (dB) hearing level (HL). Data is from the National Health and Nutrition Examination Survey (NHANES) 2011-2012. See Appendix A for the full table.

[a] The "Speech-Frequency" PTAs are based on an individual's thresholds at 0.5, 1, 2, & 4 kHz.

[b] The "High-Frequency" PTAs are based on an individual's thresholds at 3, 4, & 6 kHz.

Evidence further points to differing rates of hearing loss based on race and ethnicity as summarized in Table 1,2 (H. J. Hoffman et al., 2017). In both the high-frequency hearing loss and speech-frequency hearing loss groups Non-Hispanic White individuals experienced the highest prevalence of hearing loss with Non-Hispanic Black individuals experiencing the lowest rates. Studies postulate that this may be due to a higher prevalence of melanin in the stria vascularis of the cochlea of darker-skinned individuals, acting as protection against the effects of noise-induced hearing loss and presbycusis, though evidence of this is limited (B. M. Lin et al., 2017; D. Q. Sun et al., 2014)

Table 2.2

Prevalence of Hearing Loss Among U.S. Adults 20-69 Years of Age in the Context of Race

Race	Speech-Frequency Hearing Loss [a] (95% confidence interval)	High-frequency hearing loss [b] (95% confidence interval)
Non-Hispanic White	15.9% (12.8-19.6)	33.8% (30.6-37.1)
Non-Hispanic Asian	10.8% (7.2-15.8)	24.7% (19.3-31.1)
Mexican American	9.2% (6.5-13.0)	27.9% (24.1-32.0)
Other Hispanic	9.1% (6.3-13.0)	25.8% (21.1-31.2)
Non-Hispanic Black	9.0% (7.5-10.9)	22.4% (19.0-26.3)
Other race/ethnicity	22.6% (10.3-42.6)	34.2% (18.5-54.4)

Note. Hearing loss is defined as a PTA exceeding 25 decibels (dB) hearing level (HL). Data is from the National Health and Nutrition Examination Survey (NHANES) 2011-2012. See Appendix A for the full table

[a] The "Speech-Frequency" PTAs are based on an individual's thresholds at 0.5, 1, 2, & 4 kHz.

[b] The "High-Frequency" PTAs are based on an individual's thresholds at 3, 4, & 6 kHz.

Descriptors of Hearing Loss

Hearing loss is more nuanced than it is often perceived to be. Rather than a binary of "you can hear, or you can't", hearing loss encompasses a spectrum of sensory abilities. Hearing loss is categorized by "type", severity (referred to as "degree"), and audiometric configuration of the loss across various test frequencies with regards to both laterality and symmetry.

Types of Hearing Loss

The type of hearing loss is determined according to the location of the pathological damage to the auditory system causing the hearing loss otherwise known as the "site of lesion" (Burkard, 2017; Margolis & Saly, 2007). The ear is separated into three sections: the outer, middle, and inner ear with auditory information being carried to the brainstem and cortex via the VIIIth cranial nerve. Conductive hearing losses originate in either the middle or outer ear, rarely causing more than a moderate hearing loss (Burkard, 2017), and can often be treated with medical or surgical intervention (Cunningham & Tucci, 2017). In cases where medical and surgical intervention are not possible or advisable, hearing aids can prove to be very effective at compensating for impaired hearing ability (Molinier et al., 2022). The term "sensorineural hearing loss" is often used due to difficulty assessing the exact location of physiological damage in an audiological setting (Eggermont, 2012). However, "sensorineural" can be further subdivided into "sensory" hearing loss and "neural" (or retrocochlear) hearing loss to differentiate which structures are damaged and better describe the origin of the hearing loss. Sensory losses occur in the inner ear, specifically within the cochlea. Retrocochlear losses include neural losses, damage to the auditory portion of the VIIIth cranial nerve (Burkard, 2017), as well as central hearing losses, caused by lesions to the central auditory nervous system (Musiek et al., 2019). House and Brackmann (1974) further suggest that retrocochlear losses

should include a category for brainstem loss which is the product of a neuronal deficit. In most cases of sensorineural hearing loss, amplification is prescribed as the best option for rehabilitating one's hearing ability (Eggermont, 2012).

Margolis and Saly (2007) estimate sensorineural hearing loss as the most prevalent site of lesion for individuals with hearing loss, accounting for 37% of the tested population. Mixed hearing loss (having both conductive and sensorineural components) was estimated to be the second most prevalent site of lesion, accounting for 31%, followed by conductive at 20%. Normal or inconclusive results accounted for the remaining 12% (Margolis & Saly, 2007). Therefore, the majority of individuals with hearing loss may be candidates for hearing aids.

Severity

The degree of hearing loss is measured at one's minimum threshold of audibility or *hearing level (HL).* Hearing thresholds are measured as the lowest amplitude at which a sound can be accurately detected 50% of the time (Gelfand, 1998). Conventional test frequencies generally range from 250 Hz to 8000 Hz (Saunders et al., 1990). The degree of hearing loss is determined according to an individual's hearing threshold levels as measured in decibels hearing level (dB HL) (Gelfand, 1998). *Decibel (dB)* is a logarithmic measure of intensity. The intensity of sound is measured in *decibels sound pressure level (dB SPL)*. The *sound pressure level (SPL)* is the amount of force exerted on air molecules by a sound vibration causing the particle to be temporarily displaced. *Decibels hearing level (dB HL)* accounts for frequency-specific amplitudes of the thresholds of normal hearing individuals, assigning frequency-specific dB SPL normative values as 0 dB HL. These values are based on Fletcher-Munson equal loudness contours (Fletcher & Munson, 1933) which were then analyzed by Dadson & King in 1952 to develop the standard minimum audible pressure by testing the thresholds of individuals wearing

headphones (a monaural measurement) and again by Robinson and Dadson in 1956 to develop the standard minimum audible field by testing the thresholds of individuals placed directly in front of a loudspeaker (Gelfand, 1998). These findings led to a standardized dB SPL for each respective frequency through Recommendation R389 by the International Organization for Standardization in 1964 (Gelfand, 1998). In so doing, dB HL accounts for variations in loudness perception across frequencies due to biological factors and equalizes sound perception levels for plotting the hearing examination results on a graph. As of 2022, the American Speech-Language-Hearing Association (ASHA) recognizes a range for normal hearing and six adjective descriptors of the degree of hearing loss according to one's thresholds (ASHA, n.d.-b) (see Table 1.2) derived from Clark's "Scale of Hearing Impairment (modified from Goodman, 1965)" (Clark, 1981). An individual's degree of hearing loss can be classified with specific designations given to specific frequencies or ranges of frequencies as identified by the clinician, or a general label of the degree of hearing loss can be applied based on a variable *pure tone average (PTA)*, which averages the three highest thresholds measured at 500, 1000, 2000, and 4000 Hz. While imperfect in its implementation, this method of classification is commonly accepted by clinicians with slight variation (Clark, 1981). Hearing ability decreases with age, while the prevalence and degree of hearing loss increase accordingly, with relatively stable proportions of affected individuals in each category, despite the rising prevalence of hearing loss (see Table 1.3) (Goman & Lin, 2016).

Table 1.3
Degrees of Hearing Loss: Referencing Hearing Threshold Levels in dB HL

Degree	Threshold in dB HL
Normal hearing	-10 to 15
Slight loss	16 to 25
Mild	26 to 40
Moderate	41 to 55
Moderately Severe	56 to 70
Severe	71 to 90
Profound	>91

Source: "Uses and Abuses of Hearing Loss Classification" by G. J. Clark, 1981, Uses and abuses of hearing loss classification. *ASHA, 23, 493–500.* Copyright 1981 American Speech-Language-Hearing Association.

Table 1.4

Prevalence of Hearing Loss in at Least One Ear for Individuals in the United States Categorized by Age and Severity.

Years of Age	Prevalence of Hearing Loss				
	Mild[a] (%)	Moderate[b] (%)	Severe[c] (%)	Profound[d] (%)	Overall Prevalence (%)
20-29	71.83	19.72	0.7	7.75	3.22
30-39	64.57	25.56	5.38	4.48	5.43
40-49	77.38	15.4	6.65	0.57	12.95
50-59	74.22	19.15	2.87	3.75	28.69
60-69	65.47	27.02	4.62	2.89	44.86
70+	46.29	37.15	12.83	3.73	76.24
Total	61.09	27.98	7.59	3.34	

Note. The numbers are based on data obtained from NHANES 2001-2010 by Goman and Lin (2016). The degree of hearing loss is based on pure-tone averages of thresholds at 0.5, 1, 2, & 4 kHz. HL=Hearing loss.

[a] "Mild" is defined as a PTA between >25-40 dB HL. [b] "Moderate" is defined as a PTA of >40-60 dB HL. [c] "Severe" is defined as a PTA of >60-80 dB HL. [d] "Profound" is defined as a PTA of >80 dB HL.

Adapted from "Prevalence of Hearing Loss by Severity in the United States." By A.M. Goman and F.R. Lin (2016). *American Journal of Public Health, 106*(10), p. 1820-1822. (https://doi.org/10.2105/AJPH.2016.303299) Copyright 2016 by the American Public Health Association

Audiometric Configuration

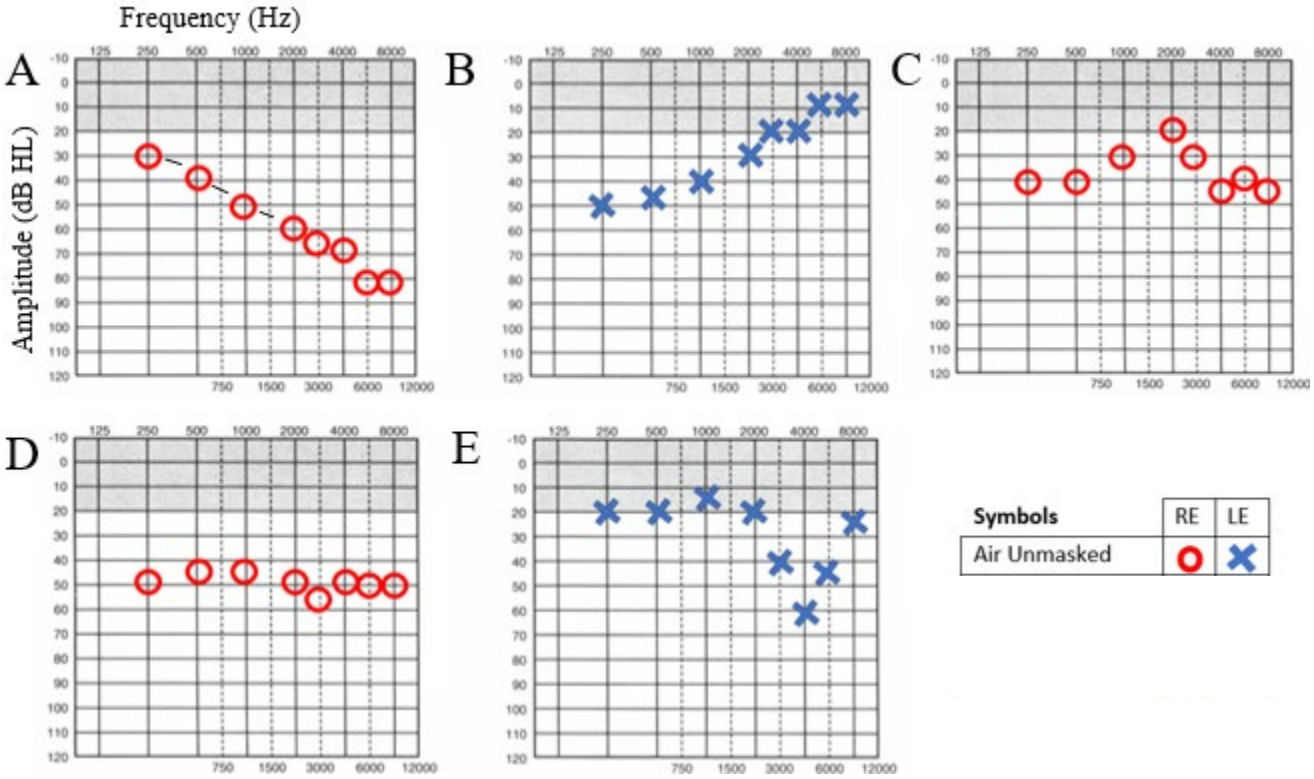
Pitch is the perception of the frequency of a sound. Frequencies are measured in Hertz (Hz) with a positive correlation between the value in Hz and the pitch. Audiologists will usually

test air conduction thresholds at octave intervals of 250 Hz, 500 Hz, 1000 Hz, 2000 Hz, 3000, 4000 Hz, 6000 Hz, and 8000 Hz as well as frequencies between octaves when thresholds vary by more than 20 dB from one frequency to the next during a diagnostic hearing evaluation in accordance with protocols set forth by the American National Standards Institute (2004) in ANSI S3.21-2004 (R2019) bone conduction thresholds are also to be conducted at octave intervals of 250 Hz, 500 Hz, 1000 Hz, 2000 Hz, 3000 and 4000 Hz as deemed necessary by test results according to the same standard.

The configuration of a hearing loss accounts for varying degrees of hearing loss between frequencies. Hearing losses can be relatively consistent across frequencies or vary from one frequency to the next. Configurations of hearing loss can be considered sloping, rising, flat, peaked, or trough (Margolis & Saly, 2007) (see Figure 1.1). Each configuration can lead to distorted speech perception and hinder speech comprehension in a different way (Hornsby et al., 2011).

Figure 1.1

Configurations of Hearing Loss Plotted on Air-Conduction Pure Tone Audiogram.



Note. Panel A shows a sloping loss; Panel B shows a rising loss (sometimes referred to as a reverse slope); Panel C shows a peaked loss; Panel D shows a flat loss; and Panel E shows a notched hearing loss typical of noise-induced hearing loss. RE= right ear and LE= left ear.

Laterality and Symmetry

Hearing loss can further be either symmetrical between ears or asymmetrical, wherein hearing is worse in one ear when compared across multiple frequencies. If hearing loss is present in both ears, it is considered bilateral. If the hearing loss is only present in one ear, the loss is considered unilateral (ASHA, n.d.-a).

Based on NHANES data from 2005-2006 and 2009-2012, an estimated 7.2% of Americans suffer from *unilateral hearing loss* defined as audiometric thresholds better than or equal to 25 dB HL in one ear and poorer than 25 dB HL in the contralateral ear (Golub et al., 2018). Evidence further suggests that men are significantly more likely to experience unilateral hearing loss with a prevalence of 9.1% compared to that of women with a prevalence of 5.5%. When criteria were reassessed to exclude unilateral hearing losses with an interaural asymmetry of less than 10 dB, the prevalence was reduced to 3.7% of all Americans. Although more men experience unilateral hearing loss overall, NHANES data from 2011-2012 suggests that a higher proportion of women specifically affected by a high-frequency hearing loss will experience a unilateral hearing loss at a proportion of 46.7% as opposed to the 34.5% of men with a high-frequency hearing loss experiencing a unilateral loss (H. J. Hoffman et al., 2017).

To date, the definition of asymmetrical hearing loss has yet to be universally agreed upon by the hearing healthcare community, leading to varying reports on the prevalence of asymmetrical hearing loss. The American Academy of Otolaryngology–Head and Neck Surgery defines asymmetric hearing loss as an interaural difference in pure tone averages exceeding 15 dB, without specifying which frequency-specific thresholds are averaged to create the PTA (Suen et al., 2021). *The Department of Veteran Affairs (VA)* definition certainly overlaps but varies slightly in that an asymmetrical hearing loss is diagnosed based on an average interaural

difference of 10 dB across three contiguous test frequencies, or 20 dB across two contiguous test frequencies. When these criteria are applied to NHANES data from 2012, the prevalence of asymmetrical hearing loss can vary greatly depending on which definition is used. The American Academy of Otolaryngology-Head and Neck Surgery categorizes 2.77% of adults experiencing an asymmetrical hearing loss based on a pure tone average of the frequencies between 500 and 4000 Hz and 9.46% of individuals present with asymmetrical pure tone averages between 4000 and 8000 Hz. The VA conversely estimates that an average of 25.05% of U.S. adults present with asymmetrical thresholds between ears.

Among adults residing within the United States who experience hearing loss and would benefit from amplification, approximately 3% qualify for cochlear implantation (Huart, 2009) leaving hearing aids as the primary rehabilitative option for the majority of individuals with hearing loss. When faced with hearing loss, particularly hearing loss acquired in adulthood, numerous decisions must be made. Foremost amongst these decisions is whether to pursue obtaining amplification or not. Several factors can influence one's decision, most of which can be attributed to the individual's socioeconomic status.

General Health Impact

As of 2022, Healthy People 2030 lists the following groupings as social determinants of health: economic stability, education access and quality, healthcare access and quality, neighborhood and built environment, and social and community context. In the context of hearing loss, "economic stability" and "neighborhood and built environment" go hand in hand since income dictates where you live. As previously noted, individuals with hearing loss suffer from fewer job opportunities and lower average incomes when compared to their normal-hearing peers (Emmett & Francis, 2015). Evidence from the study points to individuals with hearing loss

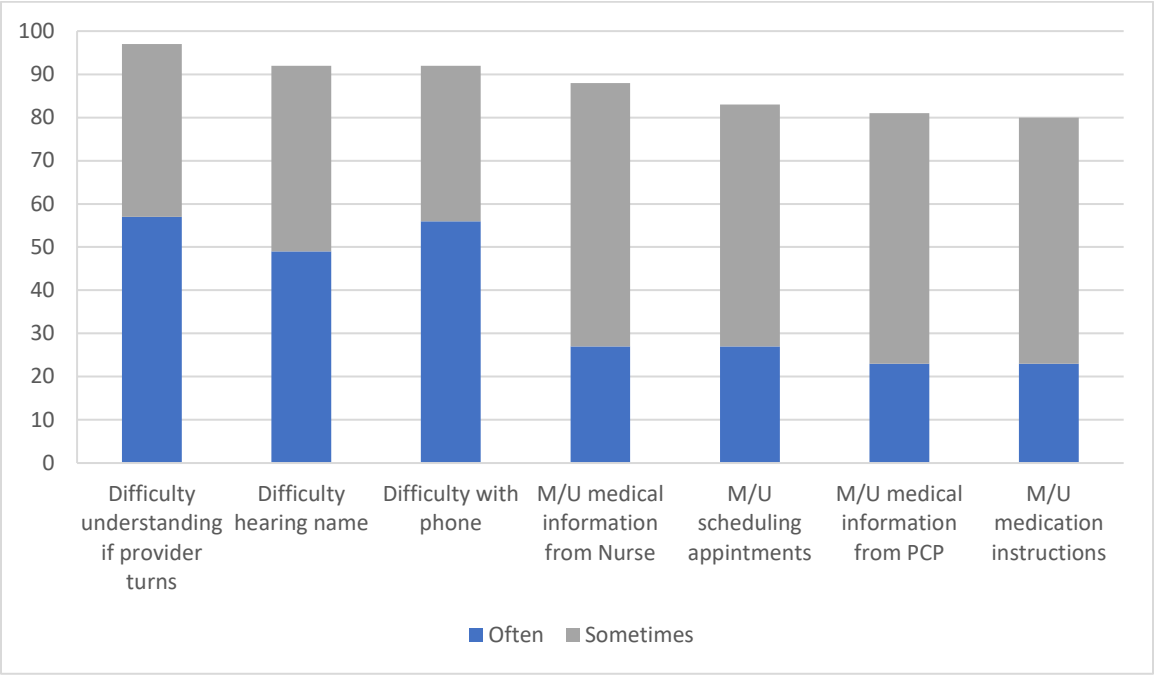
as being 1.98 times as likely to be unemployed or underemployed. Evidence further ties hearing loss to food insecurity with food insecurity potentially affecting health in a manner that increases the chances of hearing loss (Gopinath et al., 2023). In another study, Saccone and Steiger (2007) estimated that one-third of the homeless population report some level of difficulty hearing, nearly twice the national average reported by the National Center for Health Statistics (2018). More recent estimates of the prevalence of hearing difficulties for individuals experiencing homelessness are not readily available as representative population samples are difficult to come by. Factors influencing the higher prevalence may potentially stem from compounding risk factors experienced by individuals experiencing homelessness which may include noise overexposure and higher rates of Human Immunodeficiency Virus (commonly referred to as HIV) infection (Saccone & Steiger, 2007). If so, associated risk factors may further influence one's ability to access hearing-related care.

Educational attainment has also been shown to be lower in individuals with hearing loss (Emmett & Francis, 2015). Though the Individuals with Disabilities Education Act provides for accommodations to be made for students with hearing loss, these students continue to suffer academically, particularly where language skills are concerned (LeClair & Saunders, 2019). As the severity of hearing loss increases, so do the difficulties in language skills which follow the children throughout their schooling. Early language impairment can cause significant detriment to the academic achievement of children (Conti-Ramsden et al., 2009). As children transition into adulthood the burden of advocating for their well-being becomes their own responsibility, as fewer programs are in place to help them succeed (Danermark, 1995). This is further evidenced by a study performed in Canada, revealing lower average levels of educational achievement by adults experiencing hearing loss (Woodcock & Pole, 2008).

Though the social and community contexts have already been discussed in relation to hearing loss when addressing the psychosocial impacts of hearing loss, healthcare access and healthcare quality require further elaboration. In a study published in 2022, a correlation was found between hearing loss and a higher prevalence of hospitalizations in older adults (Thai et al., 2022). Results of the study revealed that individuals with a mild hearing loss demonstrated a 24% increase in overnight stays in a hospital in the last year, a 50% increase for individuals with a moderate hearing loss, and a 71% increase for individuals with a severe hearing loss. In these environments individuals with hearing loss report feeling that the quality of healthcare they receive is detrimentally affected by their hearing status and the resultant communication barriers they face when interacting with healthcare professionals, leading to a poorer understanding of their own health status (Stevens et al., 2019). Figure 1.2 reports the responses where individuals with hearing loss stated they experienced communication difficulties in healthcare environments. Furthermore, an analysis of data from the Medical Expenditure Panel Survey Household Component found that patients with hearing loss were approximately 6% less likely to be satisfied with the quality of care they received (Mick et al., 2014a).

Figure 1.1

How Often Patients Struggle with Hearing Loss in Different Healthcare Situations



Note: M/U=Misunderstood

Adapted with permission from "Communication and Healthcare: Self-Reports of People with Hearing Loss in Primary Care Settings" by M. N. Stevens, J. R. Dubno, M. I. Wallhagen, and D. L. Tucci ., 2019, *Clinical Gerontologist, 42*(5), 485-494. (https://doi.org/10.1080/07317115.2018.1453908). Copyright 2018 by the Taylor & Francis Group, LLC

Socioeconomic Status

In 1978, Coleman et al. proffered that one's class is made up of political, economic, and social components, with special consideration for the interplay of money, jobs, education, social identity, and lifestyle according to class as well as how ethnicity plays a part in class

determination. Parsons and Smelser (2003) build upon this early concept of socioeconomic status proposing a causal relationship between one's economic status and behaviors such as "goal attainment, adaptation, integration, and pattern maintenance" based on the understanding that an economic system is also inherently a social system with nuanced interplay of the two systems. As our understanding of socioeconomic status has improved, the definition has been revised. Currently, the American Psychological Association (APA) (2010) defines *socioeconomic status* as "social standing or class of an individual or group…often measured as a combination of education, income, and occupation." This in turn affects one's access to resources as well as one's "privilege, power, and control" or the lack thereof (APA, n.d.)

Factors Influencing Socioeconomic Status

One's socioeconomic status is composed of the intersectionality of financial well-being, housing, employment, and education with a positive correlation to one's health outcomes (Wheeler et al., 2017). As one increases, so do the others. Alternately, as one decreases, the others do as well, which in turn exacerbates and compounds negative issues affecting an individual. Children in lower socioeconomic households show lower levels of literacy due to the numerous intertwined compounding factors of socioeconomic influence (Buckingham et al., 2013; Green et al., 2009). While widespread data is limited, in 2006 Clotfelter et al. found that North Carolina schools in low-income areas are often assigned less qualified and less experienced teachers. Ahn (2017) suggests that the results from Clotfelter et al. (2006) are generalizable in schools that lack programs to attract more experienced teachers to lower-income schools due to a lack of incentive. Evidence also shows that parents with lower literacy levels, in turn, provide environments less conducive to cognitive development, perpetuating the cycle of low literacy levels requiring intervention to overcome (Green et al., 2009). The ability to read

and understand health-related concepts is directly tied to one's ability to make informed decisions regarding their health which in turn correlates with larger health disparities in low-income communities (Gazmararian et al., 2005).

Health Literacy

Health literacy, as defined in Healthy People 2030, can be divided into *personal health literacy* and *organizational health literacy* (Office of Disease Prevention and Health Promotion, n.d.). The former relates to the extent to which an individual can "find, understand, and use information and services to inform health-related decisions and actions for themselves and others". The latter refers to how an organization enables personal health literacy. Studies have found that health literacy parallels health outcomes and is directly correlated with socioeconomic status (Rikard et al., 2016; Svendsen et al., 2020). On average, individuals with lower health literacy also show more severe hearing loss (Tran et al., 2021) consistent with data from H. J. Hoffman et al. (2017) as previously shown in Table 1.1.

Economic Impact of Hearing Loss

Disparities

Individuals with hearing loss show lower levels of educational attainment, and lower income levels, and are more likely to be unemployed or underemployed (Emmett & Francis, 2015). Approximately 6 million individuals with hearing loss make less than $20,000 per year in the United States (Mamo et al., 2016). Another study found that the median annual income of those with a functional hearing loss was $43,200, well below the median annual income of $60,000 for those without a functional hearing loss (Jilla et al., 2023). With many hearing aids costing upwards of $2,000 per hearing aid (Jilla et al., 2023) many individuals are forced to choose between purchasing hearing aids or purchasing other necessities. Without accounting for

the cost of healthcare, special education, lost quality of life, and the potential need for caregivers, it is estimated that hearing loss was responsible for over $600 billion in lost productivity in the United States in 2013 (Neitzel et al., 2017). Neitzel et al., further proffers that a 10% decrease in the number of individuals with hearing impairment could reduce the deficit in productivity by at least $29 billion and by as much as $76 billion annually. Neitzel et al., primarily focus on preventative strategies to achieve this goal by reducing the occurrence of noise-induced hearing loss, however, this ignores populations already affected by hearing loss. For those already affected by hearing loss, the National Family Opinion panel collected data in 2004 therein finding a direct correlation between hearing loss and loss of income (Kochkin, 2007). The study reported the income of families wherein either the head of household or their spouse experienced hearing loss in at least one ear in comparison to the income of their normally hearing peers. A wage gap can be observed between individuals with hearing loss and those without, with families experiencing an average of $1,180 in lost wages annually per decile of hearing loss. Though the use of hearing aids does not completely negate the loss of income resulting from hearing loss, hearing aid use was found to mitigate the disparity and affected an approximated 50% reduction in the aforementioned wage gap. When data are taken in conjunction from Neitzel et al. (2017) and Kochkin (2007), it can be assumed that the use of amplification in only 10% of working-age individuals with hearing loss who currently do not utilize amplification could increase revenue by roughly $14.5 billion to $38 billion annually by applying the 50% wage gap reduction provided by hearing aids to the minimum estimate of $29 billion to the maximum estimate of $76 billion in revenue potentially recovered by the complete prevention of hearing loss in the 10% of individuals with hearing loss. With inflation and a changing economy, the numbers may

vary greatly, however, a more recent analysis of the impact of hearing loss on productivity was not located in the literature.

Job Opportunities and Earning Power

Job opportunities for individuals with sensory impairments, such as hearing loss, are limited in availability and breadth. Individuals with hearing loss are nearly twice as likely to be unemployed or underemployed than their normal-hearing counterparts (Emmett & Francis, 2015). Individuals with hearing loss are also approximately 17% more likely to work blue-collar jobs and 26% less likely to hold degrees in higher education. (Chou et al., 2015). Neitzel et al. (2017) estimate that in 2013, of those old enough to work in the United States, 69 percent of those with hearing loss were unemployed. This comes in stark contrast to their normal-hearing peers, of whom an estimated 27% were unemployed. When considering the estimated 31% of working-age individuals with hearing loss who were employed in 2013, their estimated wages amounted to $295 billion annually. If employment rates were on par with their normal hearing peers (73% employment) the annual wages would amount to approximately $695 billion annually. This disparity suggests an annual loss of $400 billion in wages, annually in the United States.

Professionals in the field of transportation provide one such example wherein individuals are required to pass hearing examinations prior to receiving or renewing their licensure. Airline pilots must be able to discern speech from 6 feet away with their backs turned as tested by a medical professional (Federal Aviation Administration, 1996). Failure to perform adequately in this task will result in a referral to an audiologist for pure tone testing where they must exhibit thresholds no worse than 35, 30, 30, and 40 dB at 500, 1000, 2000, and 3000 Hz respectively in the better ear and 35, 50, 50, and 60 dB at the same respective frequencies in the worse ear. To

pass an examination to obtain a commercial driver's license one must be able to repeat words forcibly whispered by a medical professional standing five feet away with one ear covered as stated in 49 CFR §391.41(b)(11) (American Association of Motor Vehicle Administrators, 2013). In both instances, individuals may pass the examinations if they meet the criteria with the assistance of hearing aids (American Association of Motor Vehicle Administrators, 2013; Federal Aviation Administration, n.d.). While the inclusion of these exemptions provides for more accessibility in these fields, success in examinations (and therefore potential income) may be reliant on one's ability to obtain properly fit amplification.

Cost of Healthcare

The costs associated with caring for individuals with hearing loss, specifically the cost of amplification, can often exceed the means of the individual and their families. Nearly one in ten individuals with hearing loss polled specifically cited the cost of hearing aids as a barrier to seeking help for their hearing loss (ASHA, 2021). Based on evidence from Los Angeles County, California, coupled with population data for the United States, it was estimated that in 2002, each individual with hearing loss paid on average $1,292 for the first year of care after being diagnosed with hearing loss including binaural amplification, hearing examinations and hearing aid fitting (Stucky et al., 2010). These same costs were estimated to rise to $4,027 by 2030. In retrospect, these estimations have proven to be optimistic, as the cost for a pair of hearing aids rose to $5,000 on average by 2016 (Jilla et al., 2023) though this number remains relatively stable as of 2022 (Bailey, 2024). The cost of hearing aids is exacerbated by the relatively sparse coverage by insurance companies. As of 2023, only 6 states mandate any sort of coverage for hearing aids by insurance companies despite long-standing support for the matter with 79-85% of individuals polled believing that insurance should cover the cost of hearing aids.

In a retroactive analysis using administrative claims data across a broad population of individuals residing in the United States, evidence showed healthcare-related costs increasing in excess of $22,000 on average for individuals with untreated hearing loss over the span of ten years when compared to their peers with either normal hearing or treated hearing loss (Reed et al., 2019). Costs included an increased risk of 30-day hospital readmission and emergency department visits, as well as an increased number of inpatient and outpatient stays, with longer stays in hospital settings at all tested intervals (2-, 5- and 10 years) after initially being diagnosed with hearing loss.

Hearing loss costs communities an estimated $262 billion United States dollars annually across the Americas. Conversely, the widespread treatment of hearing loss could potentially yield $32 of profit for each dollar invested (WHO, 2021a) by reducing the costs associated with educational support, loss of productivity, and quality-adjusted life years (WHO, 2017). Neitzel et al. (2017) estimated that a reduction in the occurrence of hearing loss of 10-20% through the reduction in cases of noise=induced hearing loss could increase wages across the nation by $58-$152 billion. Alas, the costs of hearing loss are not so superficial as to only affect one financially but can also have significant emotional and psychosocial impacts as well.

Psychosocial Impact of Hearing Loss

Poor Communication

Often individuals will suffer communicative difficulties for lengthy periods of time before seeking a way to improve their hearing. In a poll of 1,245 people reporting some level of hearing loss according to their own perceptions, only 22% of respondents sought out care within the first year of noticing difficulties (ASHA, 2021). Oftentimes this can be attributed to individuals downplaying their hearing loss with 60% of respondents stating that they would not

seek care unless they perceived their hearing loss as “severe” in the colloquial sense, as opposed to the audiological definition of a “severe hearing loss". Evidence further suggests that individuals with untreated hearing loss struggle more with discerning speech in background noise than experienced hearing aid wearers (Habicht et al., 2019). As one would expect, hearing loss and speech intelligibility go hand in hand. Evidence shows that there is a direct correlation between hearing loss and poorer word recognition scores (Grant et al., 2022; Margolis et al., 2023). The effect of hearing loss on word recognition scores, however, varies based on the site of lesion. Conductive losses leave one’s word recognition relatively intact, requiring only an increase in the amplitude of the stimulus to obtain optimal word recognition scores. Sensory losses, such as age-related hearing loss, reveal word recognition scores that are improved, yet still reduced even with adequate amplification of the stimulus due to transduction through a damaged cochlea. In instances where the hearing loss is the result of retrocochlear damage along the neural pathways, word recognition scores will be impaired more drastically than pure tone audiometry would predict. With degraded speech understanding comes difficulty in communication which can lead individuals to seek out fewer social interactions or be excluded from social interactions resulting in isolation of the individual (Jayakody et al., 2022).

Social Isolation

If hearing loss is left untreated, naturally communication becomes more taxing on both communicative partners. When considering the burden placed on the individual suffering from hearing loss, as well as that placed on those they care about, it is little wonder that some individuals may isolate themselves socially. Though often disregarded in favor of more primal needs, socialization is of vital importance to our health as human beings.

Social isolation has proven to be extremely detrimental to one's health, both physiologically and psychologically. Some physiological effects associated with social isolation include cardiovascular issues (Cacioppo et al., 2015) as well as cardiopulmonary, metabolic, musculoskeletal, and gastrointestinal issues with a positive correlation between the prevalence of the issues and the degree of social isolation one experiences (Svensson et al., 2022). Social isolation is further associated with higher mortality rates (Cacioppo et al., 2015; Moieni & Eisenberger, 2020) regardless of whether measures of isolation were subjective or objective (Holt-Lunstad et al., 2015). Depression and cognitive decline are also common psychological effects of social isolation (Cacioppo et al., 2015; Moieni & Eisenberger, 2020; Svensson et al., 2022). The emergence of these symptoms may be influenced by the alteration of serotonergic pathways (Keesom & Hurley, 2020)

Mick et al. (2014b) found that social isolation, as determined via the Social Support Questionnaire, was more prevalent in individuals with hearing loss, with women between the ages of 60 and 70 years showing the greatest tendency to self-isolate due to hearing loss in American populations. While the association between social isolation and hearing loss is less pronounced than with other psychosocial impacts, it is believed that instances wherein social isolation is observed, are the byproducts of an overall decrease in the size of social networks (Wu & Bentler, 2012) and an increase in the time spent in isolation (Kannan & Veazie, 2023) as one ages.

Ramage-Morin (2016) found a similar proclivity for women with uncorrected hearing loss to perceive social isolation significantly more often than their normal hearing peers, though the prevalence was highest among those 45-59 years of age. It is of note that none of the studies showed a significant difference in the perceived social isolation between men with and without

hearing loss. Mick et al. (2014b) and Ramage-Morin (2016) suggest that societal gender norms regarding communication and emotional support systems may explain the sex-dependent difference in perceived social isolation. However, Keesom and Hurley (2020) note that in mice models, though serotonergic pathways affect both males and females, female mice in specific, exhibited altered SERT+ (a serotonin transporter) pathways when placed in isolated housing. The SERT+ neuronal fibers of the isolated female mice exhibited lower densities and different distributions across subregions of the inferior colliculus when compared to female mice placed in social housing which may affect their auditory processing capabilities.

Monzani et al. (2008) identified higher rates of phobic anxiety, hostility, depression, anxiety, and interpersonal sensitivity in individuals with hearing loss. It is suggested that phobic anxiety, interpersonal sensitivity, and hostility are products of the communicative difficulties imposed by hearing loss. This in turn leads to retreating from social situations thereby fostering anxiety and depression.

Depression

While depressive symptoms alone serve as evidence of undue hardship as the result of hearing loss, the symptoms are neither inert nor benign. Depression is associated not only with poorer psychological and emotional health, but also with poorer physiological health (American Psychiatric Association, 2013; Stubbs et al., 2017). As such, depression related to hearing loss must not be underestimated when evaluating contributing factors to an individual's health.

Major Depressive Disorder with a prevalence of twelve months, broadly referred to as "depression", is a mental disorder that affects approximately 7% of all adults in the United States, with the highest rate being observed in women in their 20's, as reported in the *Diagnostic and Statistical Manual of Mental Disorders* 5th ed. (DSM-5) (American Psychiatric Association,

2013). Depression is characterized by emotional distress and can negatively affect motivation, cognitive function, energy, appetite, and psychomotor agitation.

Depressive symptoms are especially common amongst individuals with chronic health conditions and have been linked to poorer prognoses for those affected (Richards & Cohen, 2020). Depression rarely exists in a vacuum and is often concomitant with poor health habits and/or other physiological disorders (Gilman et al., 2017; Vythilingam et al., 2003). A positive correlation exists between the severity of depression and mortality rates (Vythilingam et al., 2003) with diminishing detrimental effects of a depressive episode lasting up to twenty years after remission (Christensen et al., 2017).

By using self-reported hearing difficulty and the severity of depression based on results from the "PHQ-9", it was found that individuals with hearing loss experience depression nearly twice as often (11.4%) as those with normal hearing (5.9%) (Li et al., 2014). The prevalence of depression was highest in women and increased with the worsening severity of the hearing loss with the exception of individuals identifying as deaf. These results are consistent with the Jayakody et al. (2018) study wherein depressive symptoms occurred more commonly in those with hearing loss regardless of whether the loss affected high-frequency thresholds or speech frequency thresholds.

Quality of Life

"Quality of life" can vary in definition depending on the perspective from which it is assessed. "*Health-related quality of life*" considers the positive and negative qualitative factors related to one's health that affect the perception of one's physical and mental and the factors related to those perceptions (Centers for Disease Control and Prevention, n.d.). When evaluating elderly populations such factors can include social, cultural, and spiritual functioning; loneliness;

depression; and cognition (Talarska et al., 2018). Current evidence points to detrimental effects on almost all aspects of health-related quality of life including physical activity and, by extension, physical health (Gispen et al., 2014), social interaction (Mick et al., 2018; Ramage-Morin, 2016) (which can include symptoms of loneliness as well as cultural and spiritual functioning), depression (Li et al., 2014; Richards & Cohen, 2020), and cognition (Bucholc et al., 2022; Livingston et al., 2017). Though individual qualify of life effects can exist in isolation without affecting one's perceived quality of life, evidence supports the claim that untreated hearing loss has a negative effect on the perceived quality of life of individuals (Chia et al., 2007; Dalton et al., 2003; Kitterick & Ferguson, 2018; Sanhueza et al., 2019). With so many compounding variables affected by hearing loss, paired with demonstrable evidence of the detrimental effects of hearing loss on quality of life, negative impacts on health are likely inevitable.

Health Impact of Hearing Loss

Physical Activity

Moderate to profound hearing loss can be associated with lower levels of activity in older adults when compared to their normal hearing peers (Gispen et al., 2014). In a group of 291 individuals, 70 of whom experienced at least a mild hearing loss, with an average age of 64.53 years, were compared to their normal hearing peers. The individuals experiencing hearing loss showed an average decrease of 5.53 minutes in daily moderate to vigorous physical activity equating to 7.28 years of accelerated age effects. An average decrease of 28.55 minutes was observed in light-intensity physical activity equating to 5.84 years of accelerated age. Lastly, an increase of 0.38 in the standard deviations was observed in fragmented physical activity patterns, equating to 10.53 years of accelerated age (Kuo et al., 2021).

Hearing loss has further been associated with increased fall risk. Individuals experiencing hearing loss have an average 2.4 times increased likelihood of experiencing a fall (Jiam et al., 2016) with each 10 dB increase in pure tone averaged thresholds above 25 dB HL equating to a 1.4 times increased likelihood of experiencing a fall (F. R. Lin & Ferrucci, 2012). The increased risk of falling is particularly dangerous for elderly individuals, with a study by Lohman et al. (2019) estimating that 34% of individuals in the U.S. over the age of 65 who sustained injuries from falls eventually died from the injuries based on International Classification of Disease, 10th revision (ICD-10) cause of death codes, specifically W00-W10 as well as W18 & W19 (see Table 1.5). While problematic in isolation, the effects of hearing loss on one's physical activity may further prove to be detrimental to one's psychological health, particularly in cases wherein lower levels of physical activity are experienced in conjunction with tinnitus symptoms.

Table 1.5

International Classification of Disease, 10th Revision (ICD-10) codes for fall-related deaths

ICD-10 Code	Cause of Death
W00	Fall due to ice and snow.
W01	Fall on same level from slipping, tripping, and stumbling.
W03	Other fall on same level due to collision with another person
W04	Fall while being carried or supported by other persons
W05	Fall from non-moving wheelchair, nonmotorized scooter, and motorized mobility scooter
W06	Fall from bed
W07	Fall from chair
W08	Fall from other furniture
W09	Fall on and from playground equipment
W10	Fall on and from stairs and steps
W18	Other slipping, tripping stumbling, and falls
W19	Unspecified fall

Adapted from National Center for Health Statistics, 2023, "International Classification of Diseases, Tenth Revision, Clinical Modification," (https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Publications/ICD10CM/April-1-2023-Update/).

Symptoms of Tinnitus

Tinnitus can be described as a ringing in the ears and can be either objective (audible to third parties with specialized equipment) or subjective (audible only to the sufferer) (Eggermont, 2012). In the case of subjective tinnitus, hearing loss cannot solely be to blame in all circumstances. However, tinnitus can often be found in conjunction with hearing loss. The suspected reason for this is that "hearing loss causes an overall reduction in central tonic inhibition in the frequency region of the loss" which in turn causes a perceived ringing in the ears. A higher occurrence of tinnitus has been observed as the severity of hearing loss increases within a study of 4,942 individuals (Hackenberg et al., 2023). Of the individuals with normal hearing, 21.6% reported experiencing tinnitus. As the severity of the hearing loss increased to mild, moderate, moderately severe, and severe the prevalence of tinnitus increased to 31.2%, 34.2%, 38.5%, and 78.6% respectively. Evidence suggests that tinnitus can affect an individual's sleep thereby hindering their attentiveness and productivity (Henry et al., 2005). Comorbidity of depressive symptoms is also common among tinnitus sufferers (Durai & Searchfield, 2016; Stegeman et al., 2021). Research regarding costs associated with tinnitus is limited within the literature. Goldstein et al. (2015) estimate an annual average cost of $2,110 per person resulting from tinnitus-related health care with Grundfast and Jamil (2023) reporting the national annual cost of tinnitus diagnosis and treatment to be approximately $26 billion per year. Though tinnitus may initially appear to be a psychological impairment, the physical effects cannot be denied, much like impaired cognitive function.

Cognition

Cognitive abilities tend to decline with age, exacerbated by factors including hypertension, lower academic achievement, smoking tobacco, and hearing loss. Cognitive

decline is further positively correlated with depression, social isolation, and hearing loss (Livingston et al., 2017). It is estimated that the risk of developing dementia could be reduced by 9% if hearing loss were eliminated. Cognitive decline, specifically Alzheimer's disease, can be predicted according to socioeconomic markers wherein lower socioeconomic status coincides with the development of Alzheimer's disease (Evans et al., 1997). Black and Hispanic populations in particular exhibit higher prevalences of dementia when compared to White populations (Chen & Zissimopoulos, 2018), despite a higher prevalence of hearing loss in White populations (H. J. Hoffman et al., 2017). Currently, studies assessing the relationship between hearing loss and cognitive decline lack diversity in their populations and more research is needed to determine the effect of hearing loss on cognitive decline in People of color (Deal et al., 2022).

While research regarding the cause-and-effect relationship between hearing loss and dementia was limited until recently, numerous studies have yielded data showing higher rates of dementia in individuals with untreated hearing loss when compared to their normal hearing peers (Amieva et al., 2015; Bucholc et al., 2022; Deal et al., 2015; Maharani et al., 2018). In the population of individuals with hearing loss who used amplification, the data showed no significant difference in rates of dementia from that of their normal hearing peers. Evidence further points to cognitive decline as the result of degraded word recognition with declining word recognition scores being linked to cognitive decline. However, those with cognitive decline did not inherently show declining word recognition scores, thereby pointing to declining word recognition scores as a contributing factor of cognitive decline rather than a symptom (Grant et al., 2022). It is hypothesized that sensory deprivation can potentially be the cause of cognitive decline or alternately that the increased cognitive effort required to process speech with a hearing loss depletes the brain of a cognitive reserve, thereby starving other parts of the brain associated

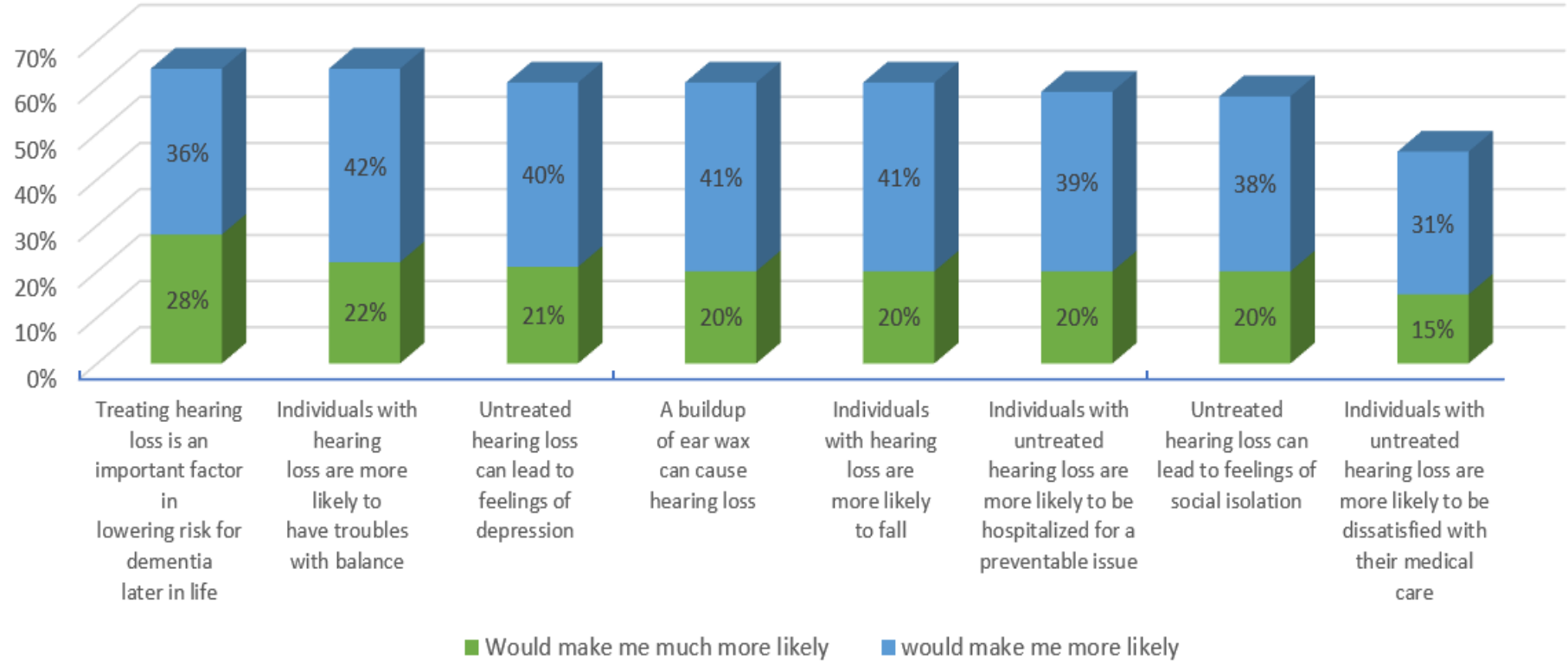
with cognitive processes such as working memory (Chern & Golub, 2019; Griffiths et al., 2020; Slade et al., 2020). If one is unaware of the cognitive effects of hearing loss, they may potentially be less likely to seek treatment.

Motivation to Seek Hearing Healthcare

Many individuals simply lack adequate knowledge of how hearing loss can affect them in their lives. Figure 1.5 shows factors wherein individuals stated they would be more likely to pursue hearing healthcare if they were aware of the listed circumstances.

Figure 1.3

Factors That Would Increase Individuals' Likelihood to Pursue Hearing Aids if Known.



From "Barriers to Seeking Help for Hearing Difficulties," by the American Speech-Language-Hearing Association, 2021*, the American Speech-Language-Hearing Association, (*https://www-asha-org.unco.idm.oclc.org/siteassets/bhsm/2021/asha-bhsm-2021-report.pdf). Copyright 2021 by the American Speech-Language-Hearing Association.

Potential Benefits of Amplification

Economic Benefit

As previously mentioned, a direct correlation between hearing loss and loss of income was observed wherein families with either the head of household or their spouse experiencing hearing loss in at least one ear earned lower wages on average than their normally hearing peers with a linear increase in disparity according to the severity of one's hearing loss (Kochkin, 2007). Kochin (2007) did not include median wage data. Numerous other studies emphasize the significant reduction in wages of those affected by hearing loss showing a consistent reduction in wages regardless of age, sex, nationality, or race (Mossman et al., 2023). Though a wage gap remains persistent, even with the use of hearing aids, the average annual wage gap experienced by those with hearing loss was shown to be reduced by approximately half when properly fit hearing aids were used as compared to those who did not use hearing aids. The recovery of wages through the use of hearing aids equates to an approximate 50% reduction in lost wages from $2250 lost per decile of hearing loss severity in populations wherein hearing loss was left untreated, to $1130 per family (Kochkin, 2007). Evidence for the use of hearing aids to minimize the reduction in median household income experienced by those with hearing loss is further supported in Spreckley et al. (2020) wherein the median household incomes of individuals with disabling hearing loss who were fit with hearing aids showed a significantly larger increase in wages that their normal hearing peers, thereby reducing the wage disparity that they had previously been experiencing. When taken in conjunction with the economic benefit resulting from the reduction of hearing loss mentioned in Neitzel et al. (2017), an assumption can be

reasonably made that the use of amplification in only 10% of working-age individuals with hearing loss who currently do not utilize amplification could increase U.S. revenue by roughly $14.5 to $38 billion annually.

Livingston et al. (2017) estimate that the global cost of dementia is $818 billion annually, with the largest modifiable risk factor for dementia being hearing loss at 9%. As of 2019 the global cost of dementia rose to $1.3 trillion U.S. dollars per year and is expected to increase to $2.8 trillion U.S. dollars annually by 2030 (Long et al., 2023). As of 2013, it is estimated that the cost of dementia in the U.S. is between $159 billion and $215 billion annually with an out-of-pocket cost of $6,200 annually per person (Hurd et al., 2013). For individuals over the age of 70 living in the United States, the lifetime cost of care of those with acquired dementia is estimated to be around $700,000, $450,000 more than the estimated costs for those without acquired dementia (Aranda et al., 2021). Given the evidence supporting the use of hearing aids to reduce the rate of cognitive decline, (Bucholc et al., 2022; Dawes et al., 2015b; Mahmoudi et al., 2019; Sarant et al., 2020) the postponement of the onset of dementia could amount to substantive savings to both individuals and organizations such as Medicare. Further research is needed to calculate a definitive estimate of the reduced cost of dementia-related care as a product of hearing aid use, but the evidence is promising.

Psychosocial Benefits

Communication Improvement

Arguably the most well-accepted benefit imparted by the use of hearing aids on individuals with sensorineural hearing loss is the improvement in communicative ability, specifically improving speech perception. While quiet environments usually provide the greatest communicative advantage when using hearing aids, evidence suggests that with acclimatization,

hearing aids can improve communication in both noisy and quiet environments as well as communication over the telephone based on subjective measures obtained using the Hearing Aid Benefit Questionnaire (Verma et al., 2017). With more experience wearing hearing aids, significant improvement in the wearers' perceived benefit were observed at each six-month interval up to 2 years. Objective evidence of hearing aid benefit has been observed with a significant improvement of speech-in-noise scores by naïve hearing aid users after two months of use while no significant improvement was observed in those who did not use amplification (Megha & Maruthy, 2020). Objective electrophysiological evidence from the study further revealed decreased peak latency in P1 and N1 with acclimatization to the use of hearing aids when discernment of the syllable "da" was tested with the auditory late-latency response, an auditory evoked electrophysiological response. These findings are in line with findings by Cox and Alexander (1992) and the results of an experiment by Gatehouse (1992) wherein unilateral improvement in speech identification was observed in individuals with symmetrical, bilateral, sloping sensorineural hearing loss in the monaurally fitted ear after six weeks of use. Conversely, a decline in the speech identification abilities in the unaided ear was simultaneously observed, highlighting the importance of binaural fittings when appropriate.

Improved Social Interaction

As a function of improved speech understanding, studies have found an improvement in social interaction when naïve hearing aid wearers are properly fit with hearing aids. Using the De Jong Gierveld Loneliness Scale to assess the perceived loneliness of 40 adults between the ages of 62 and 92, hearing aid usage was associated with a decreased sense of loneliness regardless of the degree of hearing loss (Weinstein et al., 2016). After 4-6 weeks of wearing hearing aids, the percentage of individuals reporting as "feeling lonely" dropped from 45% to 27.5%. In a study of

quality-of-life measures for elderly adults, including sensory ability and social participation measured before and after the fitting of hearing aids, a positive correlation between hearing aid usage and quality of life was observed (Yamada et al., 2017). The largest improvement in quality of life was seen in those who were more socially active and fit with hearing aids. While studies isolating the relationship between the use of hearing aids and social interaction are limited, given the strong association between loneliness and the onset of dementia (Kim et al., 2021; W. Sun et al., 2021; Sundström et al., 2020; Zhou et al., 2018) paired with evidence that hearing aids help prevent cognitive decline in elderly users (Dawes et al., 2015a; Mahmoudi et al., 2019; Sarant et al., 2020), a reductive effect on loneliness as a function of hearing aid use can likely be assumed.

Reduction of Depressive Symptoms

Studies suggest that hearing aid use significantly reduces the depressive symptoms of individuals with hearing loss (Acar et al., 2011; Boi et al., 2012; Nkyekyer et al., 2019). A study of 34 individuals over the age of 65 observed a decrease in the mean average score on the 15-question geriatric depression scale-short form from 6.8 to 4.9 after three months of hearing aid use (Acar et al., 2011). Another study, consisting of 15 adults with hearing loss over the age of 70 with moderate to severe hearing loss, observed a decrease in the mean average score on the Center for Epidemiological Studies-Depression Scale from 23.27 at baseline to 14.2 after three months of hearing aid use and even further to 11.33 after six months of use (Boi et al., 2012).

Nkyekyer et al., (2019) performed a study on the effect of the use of hearing aids on the cognition and psychological health of individuals with hearing loss. The results of the study showed evidence that after a 3-month period of hearing aid usage, rates of depression fell among participants. Evidence of the benefits of amplification is further supported by the results of the Blue Mountains Study wherein 1,328 individuals over the age of 60 showed the occurrence of

depressive symptoms decreasing significantly with as little as 1 hour of daily hearing aid wear-time based on Center for Epidemiological Studies-Depression Scale scores (Gopinath et al., 2009).

Improved Quality of life

In a study by Cox et al. (2016) the perceived benefit of amplification was measured using a 15-point scale to determine one's quality of life. The study found that 96% of participants perceived a significant improvement in quality of life (more than two points) regardless of technology level or brand. The beneficial effect of hearing aid use on quality of life was mirrored in a study by Kitterick and Ferguson (2018) wherein hearing-specific health-related quality of life as well as general health-related quality of life improved with the use of hearing aids. Another study by Tsimpida et al. (2022) found that the improvement in Quality of Life was experienced throughout the tested population but was more profound in those with lower socioeconomic status.

Benefits to General Health

As previously discussed, access to hearing aids improves economic stability (Kochkin, 2007) and provides potential benefits regarding access to education, interactions with healthcare professionals, and social interaction by way of improving communicative ability (Megha & Maruthy, 2020; Verma et al., 2017). Research further supports evidence that hearing aid use can significantly reduce the risk of falls for elderly adults (F. R. Lin & Ferrucci, 2012). Furthermore, access to hearing aids can improve the earning power of individuals with hearing loss which can in turn improve the neighborhood and built environment of the affected individual. With improvements in numerous "Social Determinants of Health" categories, individuals are afforded

better opportunities to flourish without the compounding obstacles created by untreated hearing loss.

Tinnitus Management

Tinnitus can pose a significant hindrance to affected individuals throughout their daily lives (Durai & Searchfield, 2016; Henry et al., 2005; Stegeman et al., 2021). Estimates of the prevalence of tinnitus generally range from around 10-15% of the population (Bhatt et al., 2016; Tunkel et al., 2014) with isolated studies ranging as low as 5.1% and as high as 42.7% (McCormack et al., 2016). Different treatments with the intent of reducing tinnitus symptoms exist including counseling and sound therapy (Scherer et al., 2019) as well as cognitive behavioral therapy (Brüggemann et al., 2018; Fuller et al., 2020). Evidence has further identified the use of hearing aids as a potential method of tinnitus relief in individuals with sensorineural hearing loss (Moffat et al., 2009; Searchfield et al., 2010; Trotter & Donaldson, 2008). While some reports fail to find a correlation between hearing aids and perceived tinnitus relief, reports affirming the correlation are numerous with research dating back to 1947 as described in "A hearing aid for the relief of tinnitus aurium" by Saltzman & Ersner (Shekhawat et al., 2013). Hearing aid treatment has been found to be most effective when low to middle frequencies are amplified (Moffat et al., 2009). Hearing aids work incredibly well ipsilateral to the affected ear(s) both unilaterally and bilaterally when tinnitus is present along with hearing loss (Trotter & Donaldson, 2008). Hearing aid use, when paired with cognitive behavioral therapy, more effectively provides relief of tinnitus symptoms than cognitive behavioral therapy alone (Searchfield et al., 2010). The potential benefits of neurological stimulation to damaged regions of the auditory pathway through the use of hearing aids are not limited to tinnitus relief but have further shown evidence of cognitive benefits as well (Sarant et al., 2020).

Cognition

While untreated hearing loss is associated with cognitive decline, the use of hearing aids has been associated with a lower prevalence of dementia among individuals with hearing loss. Some studies observed a decrease in cognitive decline amongst hearing aid users when compared to non-users but not to an extent that was found to be statistically significant (F. R. Lin et al., 2013; Valentijn et al., 2005). Additionally, a statistically significant difference in the rate of mental decline was not observed when comparing hearing aid users to non-users with significantly less hearing loss and comparable hearing handicap inventory scores (Dawes et al., 2015a.). When assessing global cognition in a sample of 3574 individuals of whom 1163 experience hearing loss, lower scores on cognitive tests (including the auditory verbal learning test, digit symbol substitution test, trail making test, and the verbal fluency test) were associated with hearing loss (Dillard et al., 2022). However, the study found that cognitive function was depressed significantly less in individuals with hearing loss who wore hearing aids when compared to their peers who did not when stratified by degree of hearing loss in all tests except the auditory verbal learning test wherein no significant difference was observed. In a longitudinal study comprised of 4358 individuals without cognitive impairment at baseline, with 450 of the individuals self-reported experiencing hearing loss without data on the degree of loss, the rate of cognitive decline was observed to be higher for the individuals with hearing loss (Bucholc et al., 2022). When comparing the individuals with hearing loss, the increased rate of cognitive decline was reduced by 50%. Similar findings of better cognitive function being observed in individuals with hearing loss who wore hearing aids when compared to those who do not have been reported by Dawes et al. (2015b.), Fernandes et al. (2020), and Mahmoudi et al. (2019). Various other studies support these claims, providing evidence of an association between hearing aid use and a

slowed rate of cognitive decline (Amieva et al., 2015; Deal et al., 2015; Maharani et al., 2018). One study goes so far as to suggest a potential stabilization of cognitive decline following the treatment of hearing loss through the use of hearing aids (Sarant et al., 2020). Though evidence suggests that hearing aid use may slow cognitive decline in those experiencing hearing loss, other studies have failed to associate cognitive recovery in those starting the use of hearing aids following the onset of cognitive decline and long-term longitudinal studies are lacking (Nkyekyer et al., 2019; Sarant et al., 2020).

Trends in the Use of Amplification

International Perspective

Studies estimate the global adoption rate of hearing aids among individuals who could benefit from properly fit amplification at around 10% (Bisgaard et al., 2022). However, the 10% estimate is not representative of most regions due to the averaging of adoption rates from both high and low-income countries. In high-income regions, coverage has been observed as high as 57%. In the United States and Canada, it is estimated that 22.9% of individuals who could benefit from hearing aids receive them. In Europe, it is estimated that the percentage of individuals receiving care is 33.5% with the western European nations raising the average. It is believed that the higher rates in Europe are due to wider coverage of hearing aids under government-funded health care plans. Conversely, coverage in the African and Southeast Asian regions both fall below 3%.

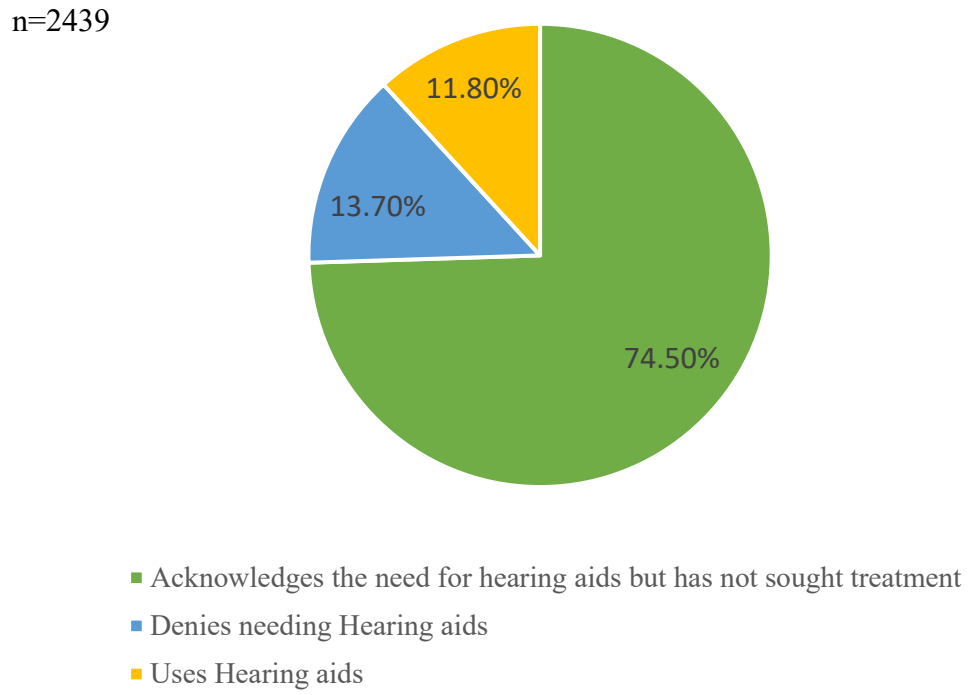
Perspectives in the United States

Despite the high prevalence of hearing loss among adults in the U.S. adoption rates of properly fit amplification remain low. Less than a quarter of those who admit to having some level of difficulty hearing pursue the potential benefits of amplification (ASHA, 2021; Chien &

Lin, 2012; Mamo et al., 2016). Of the 51% of respondents to a survey by ASHA (2021) self-reporting some level of hearing difficulty, only 11.8% of individuals reported using hearing aids as seen in Figure 1.3. In another study, it was estimated that 16% of Americans who could potentially benefit from the use of hearing aids (National Institute on Deafness and Other Communication Disorders, 2021). Regardless of the higher estimate of the 16% adoption rate of hearing aids in the United States comes in stark contrast to that of European nations wherein the average rate of adoption is 33.5% (Bisgaard et al., 2022). In 2022 in the Netherlands, a country wherein hearing aids are largely subsidized by insurances, the adoption rate of hearing aids by those with self-reported hearing loss was 44.9% (EuroTrak, 2022). With hearing aid adoption rates ranging from as low as 2.1% in the WHO African region to as high as 57% in some European nations, evidence suggests that affordability and access to hearing healthcare improves hearing aid adoption rates.

Figure 1.4

Hearing Aid Use Among Adults in the United States who Report Having Difficulty Hearing



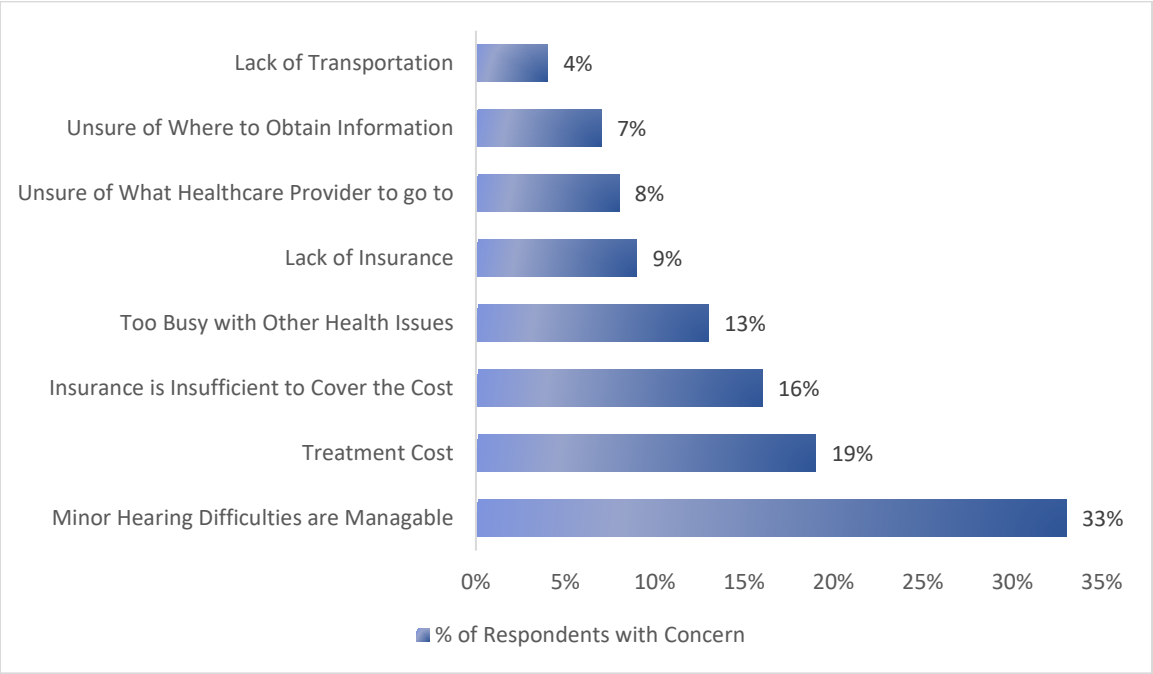
From "Barriers to Seeking Help for Hearing Difficulties," by the American Speech-Language-Hearing Association, 2021*, the American Speech-Language-Hearing Association, (*https://www-asha-org.unco.idm.oclc.org/siteassets/bhsm/2021/asha-bhsm-2021-report.pdf) Copyright 2021 by the American Speech-Language-Hearing Association

Barriers Limiting Access to Amplification

It is important to understand why, despite the affluence of the United States government, hearing aid adoption rates by U.S. citizens remain low. A recent survey conducted by the ASHA identified recurrent reasons why individuals with hearing loss have not pursued amplification to remedy their hearing loss (Figure 1.4) wherein access to services is noted, with multiple concerns of cost and education regarding hearing health appear.

Figure 1.5

Barriers Preventing Individuals from Pursuing Hearing Aids



From "Barriers to Seeking Help for Hearing Difficulties," by the American Speech-Language-Hearing Association, 2021*, the American Speech-Language-Hearing Association, (*https://www-asha-org.unco.idm.oclc.org/siteassets/bhsm/2021/asha-bhsm-2021-report.pdf) Copyright 2021 by the American Speech-Language-Hearing Association._Lack of Access to Hearing Healthcare

As previously discussed, the prevalence rate of hearing loss increases with age, and thus the need for access to audiology services increases. However, it has been shown that the largest proportion of individuals over the age of 65 live in rural communities (Parker et al., 2018). For individuals in rural communities, the average travel time to an audiologist was 68 minutes as audiology practices tend to be primarily located in urban settings (Chan et al., 2017). While

relative distance to an audiologist may present a significant barrier to accessing care, the burden to the patient is compounded by federal and state mandates for insurance regarding audiology. As a “non-physician practitioner” insurance coverage, particularly that of Medicare and Medicaid, of audiology services is reliant upon the patient first receiving a referral from a physician, designating the services of the audiologist as “medically necessary”. This in turn increases the time commitment and costs, such as travel and copays, to increase by varying degrees, based on one’s access to a physician.

Currently, Medicare does not cover the cost of hearing aids and coverage of hearing aids for adults through Medicaid is restricted to but a few states (Bainbridge & Ramachandran, 2014). Patients with Medicare and the majority covered by Medicaid are therefore required to acquire funding for hearing aids on their own in most cases. According to a survey of over 4,000 retail price points the average cost for a pair of hearing aids is $4,672 with a range from $1,000 to $8,000 (Bailey, 2024). In 2022, the median household income in the United States was $74,580 annually (Guzman & Kollar, 2023). However, while fairly accurate in the representation of White households, wherein the median income was $77,250 annually; this number does not accurately reflect the household income of all families living in the United States when factors such as race and age are taken into consideration. The median household income of Asian families ($108,700) masks the lower median incomes of Black ($52,860) and Hispanic families ($62,800) to whom $4,672 represents a large portion of their annual income. Furthermore, the median annual household income for those over the age of 65 is only $50,290.

When hearing aid expenses are considered as a percentage of the annual income of an individual, $4,672 may seem relatively small to those with medium to high incomes. However, when one considers that in 2022, the cost of living, on average, consumed 81% of the mean net

annual income of Asian individuals, 87% for Black individuals, and 88% for all other races, a pair of hearing aids could potentially cost upwards of 69% of one's remaining disposable annual income. This point is reinforced by Jilla et al. (2023) wherein it is stated that the WHO has declared that hearing aids should not exceed 3% of an individual's annual income, lest it be considered a catastrophic medical expense. As it currently stands, Jilla et al. (2023) estimate that hearing aids constitute a catastrophic medical expense for 77% of the US population and move 4% of the population below the poverty line for the year.

Summary

Hearing loss is a public health crisis, detrimentally affecting the citizens of the United States. Hearing loss can negatively affect individuals in all aspects of life including socialization, mental and cognitive health, economic prosperity, physical health, and overall Quality of Life. However, by ignoring the barriers limiting access to hearing aids, the burden of hearing loss is also passed onto society by way of increased cost of care and billions of dollars lost due to lost productivity. For the betterment of our society, it is imperative that we attempt to meet the needs of even our most impoverished citizens when it comes to hearing healthcare access.

CHAPTER II

APPLICATION TO THE FIELD OF AUDIOLOGY

Access to Amplification for Adults

Adult access to hearing aids in the current state of American society is far from ideal. As such, it is critical that the needs of patients are properly addressed. By ensuring that patients are cared for by properly trained professionals, such as audiologists and social workers, who know how to work with insurance companies, third-party payers, and funding resources, we can ensure that access to hearing aids for adult patients is expanded and optimized to the best of our abilities.

Role of the Audiologist, social workers

Audiologists play an integral role in assisting patients who are pursuing amplification, not only in providing quality care, but also in advocating for the needs of the patients. Where the use of hearing aids is concerned, audiologists are highly trained in the assessment and treatment of hearing loss. As such, an audiologist's report regarding the type, configuration, and severity of hearing loss can prove vital in conveying the hardships facing individuals with hearing loss as well as the need for care. Third-party assistance in financing hearing aids may prove difficult to come by whether due to the limited resources of the organization or a lack of education for the case worker regarding the struggles experienced by deaf and hard-of-hearing individuals in their daily lives. With the average cost of hearing aids exceeding $1000 per hearing aid, (Jilla et al., 2023) assistive programs must carefully assess the needs of applicants to ensure resources are

apportioned to those most in need. As such, audiologist's reports are a vital resource to caseworkers in conveying the importance of the use of proper amplification for individuals with hearing loss along with the degree of handicap experienced by the individual.

Assistance with Obtaining Hearing Devices in the U.S.

Paying for hearing aids out-of-pocket is not always a feasible option, especially for those from lower-income households. To overcome this hurdle, third-party assistance may be sought out in the form of health insurance, government assistance programs, charitable organizations, or by seeking out cheaper options.

Private Health Insurance

Private Health insurance exists as a centralized private entity wherein individuals can choose to buy into a program which in return covers some, or all, of the costs associated with healthcare for a monthly premium (Brunner et al., 2012). In a private healthcare system, numerous different organizations exist to choose from with varying premiums and coverage of services. In general, these organizations pool together the premiums of all the subscribers to pay for the healthcare services used by its members. This method works on the principle that the premiums of those who utilize fewer healthcare services subsidize the costs of those who utilize more services. Often different companies will offer multiple coverage program options to choose from with varying associated premiums and varying coverage of specific services. It is therefore the responsibility of the customer to decide how much they are willing and able to pay to mitigate the risk of financial burden when it comes to seeing their healthcare providers or in the case of a medical emergency.

Private health insurance can be provided by their employer or purchased by the individual. With coverage varying between companies and programs, individuals may opt to

purchase additional insurance plans to cover additional services or to assist in covering the cost of services not paid for by their primary private health insurance or by a public program in which they are enrolled, such as Medicare or Medicaid (Brunner et al., 2012). As such private health insurance can be considered “primary”, “duplicate”, “complementary”, or “supplementary”. Primary health insurance, as the name implies, is the primary coverage for an individual regarding healthcare services. Duplicate health insurance is generally used when an individual is a part of a public program but wants to expand their access to services or providers beyond the confines of the public program. Complimentary health insurance refers to private health insurance used to cover part of the co-payment associated with the primary insurance. Lastly, supplementary health insurance is used to provide coverage of extra services not usually covered by the primary insurance, it is herein that hearing, dental, and vision services are often covered.

Medical flexible spending accounts

Medical flexible spending accounts exist as an alternative method for funding health-related products and services. Conceptually, pre-taxed income is set aside into a savings account to be used to cover co-payments and health-related goods and services (Manaloto, 2012). Medical flexible spending accounts can be sponsored by an employer or be funded completely by the individual. While invaluable in allowing more freedom for individuals to pursue health services that they deem necessary as well as mitigating the strain of paying for medical deductibles, as of 2024 employees are prohibited from contributing more than $3,200 per individual and $6,400 per couple to their medical flexible spending account per annum (Internal Revenue Service, 2024).

Military Coverage and Veterans

Health insurance is granted to those in the military and their families through Tricare (Defense Health Agency, 2023). Hearing aids are covered for active military and their dependents who exhibit a profound hearing loss (Siegel, 2022). Veterans maintain their eligibility for hearing aids and audiological services at no cost to the individual through the Department of Veterans Affairs. However, research regarding hearing aid use among U.S. veterans is limited and mixed, with one study finding that adoption rates do not significantly differ from the general population (Wilson et al., 2010), and another study finding that 68% of hearing aid recipients within the VA still used their hearing aids two years after being fitted (Saunders et al., 2021). Active-duty Air Force personnel who do not qualify for hearing aids under the VA guidelines, can apply for an interest-free loan through The Air Force Aid Society to fund their purchase of hearing aids. For more detailed information on military service members, please reference Appendix B (reprinted with permission from the Hearing Industries Association), under sections “Air Force Aid Society”, “TRICARE”, and “Veterans Benefits”.

Public Health Insurance

Medicare and Medicaid act as the public health insurance for the United States though coverage is not universal and are used to support specific populations (E. D. Hoffman et al., 2000). Both programs came into existence in 1965 in titles XVIII and XIX of the Social Security Act (Social Security Amendments, 1965). Medicare serves to provide coverage to elderly and disabled populations whereas Medicaid serves to provide coverage for low-income individuals and families.

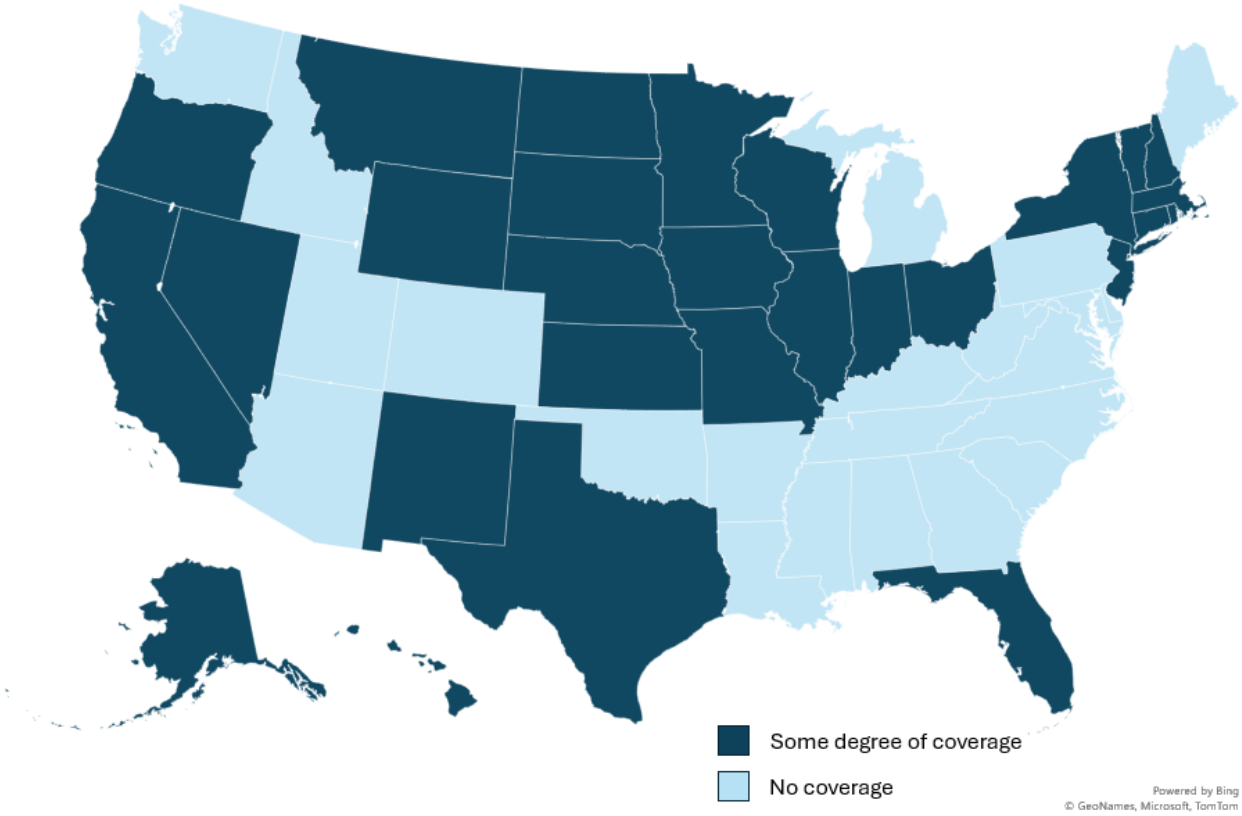
Medicare plans consist of three potential parts: Part A which covers inpatient services, Part B which covers outpatient services and durable medical devices, and Part C which works to expand coverage of parts A and B. Medicare only covers hearing tests if a physician has deemed

the test a medical necessity and coverage of hearing aids is limited and only available through a Medicare Advantage plan (U.S. Centers for Medicare and Medicaid Services, n.d.).

Medicaid operates as both a federal and state program (E. D. Hoffman et al., 2000). While the federal government assists in the funding of Medicaid, eligibility and coverage are determined by the individual states. As of 2017, only 28 states offer any sort of coverage for hearing aids for adults over the age of 21 (Arnold et al., 2017) (see Figure 2.1). Consequently, there are other resources available for adults without healthcare insurance, Medicare or Medicaid coverage.

Figure 2.1

States Wherein Medicaid Provides Any Coverage for Hearing Aids for Adults



Adapted with permission from "Medicaid Hearing Aid Coverage for Older Adult Beneficiaries: a State-by-State Comparison," by M. L. Arnold, K. Hyer, and T. Chisolm, 2017, *Health Affairs*, *36*(8), 1476-1484. Copyright 2017 by the People-to-People Health Foundation, Inc.

No Health Insurance Coverage

Vocational Rehabilitation

Vocational rehabilitation is a government-funded program intended to assist individuals with disabilities find and maintain gainful employment. Vocational rehabilitative services are offered to individuals with cognitive and mental disabilities as well as physical disabilities. Hearing loss is specifically outlined as a physical disability for which individuals may potentially

receive services. Services may include counseling and provisions for “advanced communication technology”. While a valuable resource, vocational rehabilitative services may require the intervention of an audiologist to procure adequate resources for the individual due to the lack of familiarity with obstacles affecting individuals with hearing loss by vocational rehabilitation case workers and substantiating needs (Jennings & Shaw, 2008).

Creditors

Individuals may choose to finance the acquisition of hearing aids through creditors or credit cards specifically designed to cover medical costs. One such company is CareCredit which allows customers to immediately finance procedures or medical devices and pay them off over time, thereby allowing for a payment plan on services without the healthcare provider having to take the chance of their patients not keeping up with payments. Creditors can prove to be a beneficial resource for individuals who may not have the available income to pay for healthcare services at the time of administration. However, potential risks are involved such as the accrual of interest if payments are missed, thereby costing the patient more than the original service (CareCredit, n.d.)

Organizational Resources

For individuals who can’t afford hearing aids on their own, there are numerous organizations that can help individuals gain access to hearing aids, either through providing funding for new hearing aids or by refurbishing used hearing aids for use by the individual. Some organizations include the Area Agency on Aging, Friends of Man, and Hearing the Call. The Area Agency on Aging is a national organization under USAging with local chapters across the United States that work to provide assistance to individuals over the age of 65, with accessing healthcare (USAging, n.d.). Friends of Man is a local Colorado organization that

works to assist low-income individuals in affording necessities for healthy living including clothing, eyeglasses, dental work, and hearing aids (Friends of Man, n.d.). Hearing the Call is an international organization that focuses on providing access to hearing healthcare to those in need across the globe (Hearing the Call, n.d.). Numerous other organizations such as Travelers Protective Association of America, Masonic organizations, the Fraternal Order of the Eagles, Alexander Graham Bell Association for the Deaf and Hard of Hearing, and Lions Club International can potentially help with funding and services, as well as service organizations such as the Benevolent Protective Order of the ELKS of the U.S.A, Kiwanis clubs, and the Knight of Columbus have been known to help community members in need. Ear Community helps provide financial aid specifically for individuals in need of an osseointegrated medical device. State or private assistive technology loan programs can often be found for those who need temporary assistance. Scholarships also exist for students with hearing loss through Sertoma which can be used to offset the financial burden for students while enrolled in school. More specific details along with resources for individuals under the age of 21 can be found in Appendix B.

Manufacturers: resources for uninsured adults, transfer of ownership

Of the five largest hearing aid manufacturers in the world: WS Audiology (which includes Signia and Widex), Oticon, Resound, Phonak, and Starkey, only Oticon, GN Resound, and Starkey have information readily available in regard to providing hearing aids to financially struggling individuals with hearing loss. Oticon has funded the Oticon Hearing Foundation to help provide hearing aids and hearing care to underserved populations in the United States and around the world. As of 2020, Resound has started the “Gift of Hearing” campaign which has donated 498 hearing aids as of June 2022 and is further affiliated with Miracle Ear which works to provide hearing aids and services to those with no other forms of assistance. In 2021, Starkey

launched “Starkey Cares” to provide humanitarian aid. As of 2022, 674 hearing aids have been delivered, free of cost, to individuals in need. Starkey further expanded to create the “Neighbors in Need” program to provide hearing aids to individuals with hearing loss free of charge, apart from an application fee, with eligibility based on household income. While WS Audiology participates in numerous humanitarian efforts, information regarding financial assistance is not readily available by the company. When one visits the Phonak website, the company advises individuals to seek help from their employer citing the Americans with Disabilities Act, or suggesting the patient talk to their healthcare provider regarding funding options. Beyond directing individuals to potential resources Phonak does not provide any readily available information regarding funding or humanitarian aid through their company.

Hearing Aid Recycling Options

In circumstances wherein the purchase of new hearing aids is not attainable, hearing aid banks can provide used hearing aids to those in need for a reduced price. In cases where an individual has inherited the hearing aids from a passed friend or relative, organizations exist wherein individuals can have the hearing aids refurbished and reprogrammed for their own personal use. While most hearing aid banks are highly specific to the locale in which they are situated, The Hearing Aid Project (https://hearingaiddonations.org/) is a national organization that works to provide hearing aids to low-income adults and provides resources to help individuals find local hearing aid banks.

Over-the-Counter Hearing Aids

Over-the-counter (OTC) hearing aids have recently become available for purchase following the passage of the Over-the-Counter Hearing Aid Act (2017) and can potentially lower the cost of hearing aids for individuals who cannot afford hearing aids and services provided by

an audiologist. Over-the-counter hearing aids are specifically designed to be fitted to adults with mild to moderate, age-related hearing loss (Urbanski et al., 2021). Over-the-counter hearing aids are only intended to be used by adults over the age of 18 and should not be used to treat hearing loss in children as it does not provide the care that is vital to ensuring the best developmental environment for the child (The Hearing Journal, 2023). When used by the correct populations, OTC hearing aids can provide amplification similar to that of hearing aids fit by an audiologist using Real Ear verification measures (Urbanski et al., 2021). However, for the safety of consumers, OTC hearing aids are limited in their ability to amplify sound, to ensure that no damage from high levels of sound occurs; and are therefore not an appropriate option for those with hearing thresholds higher than those falling within the mild-moderate range (Sheffield et al., 2022). While OTC hearing aids work to advance access to hearing aids, they lack the essential component of hearing healthcare and as such are not suited for all people or hearing losses. For those individuals who are not yet of age or have more challenging hearing losses, the care of an audiologist is vital.

As previously mentioned, OTC hearing aids are not recommended as a treatment for all types of hearing loss. However, it is important to consider the efficacy of OTC hearing aids to determine the appropriateness of using these devices to treat the hearing loss hearing loss for which it was designed. In a double-blind study conducted by Humes et al. (2017), enrolled 153 individuals with mild to moderate, high-frequency sensorineural hearing loss between the ages of 55 and 79 years of age, and tested the comparative efficacy of OTC hearing aids. The OTC hearing aids were pre-programmed according to the participant's audiogram according to NAL-NL2 prescriptive gain targets and then compared to prescriptive hearing aids identical in model, fit by an audiologist using best-fit practices to fit the hearing aids to NAL-NL2 targets. They also

evaluated outcomes in two placebo groups using identical hearing aids fit by an audiologist to provide no net gain or loss in the amplitude of sound reaching the tympanic membrane of the participant's ear. The placebo groups' hearing aids were programmed with one group using omnidirectional microphones and the other using directional microphones. All participants were fit bilaterally with ReSound Alera 9 mini-behind-the-ear, open-fit hearing aids, Efficacy was determined based on objective and subjective test measures. Objective measures were obtained by performing the Connected Speech Test, an analysis of speech perceptive ability without the use of hearing aids prior to a 6-week trial period and with the use of hearing aids after the 6-week trial. Subjective measures were reported based on responses to the Profile of Hearing Aid Benefit, an assessment of perceived hearing aid benefit, with scores obtained prior to the trial and after the trial being compared against one another. Both the group fit by audiologists to fit prescriptive targets and those using the OTC preprogrammed hearing aids showed similarly significant benefit when compared to the placebo groups based on the Continuous Speech Test, however, the OTC group showed significantly less satisfaction with the hearing aids than the group who were properly fit by audiologists based on the Profile of Hearing Aid Benefit scores as well as other subjective measure of satisfaction reported by participants. Those in the OTC group also reported that they would be less likely to continue to use their hearing aids in the future. It should be noted that the study required participants to be native English-speakers, with 98% of participants identifying as White and therefore these results are not necessarily representative of ethnic and racial minorities. Though the tested population lacks diversity, the evidence suggests that OTC hearing aids may provide adequate benefit to those unable to afford professionally fit hearing aids with the understanding that the lower price tag may come at the cost of satisfaction with the devices.

It is important that audiologists are aware of the many varied potential options that exist to assist individuals in funding hearing healthcare and the purchasing of hearing aids. Certainly, some options are better than others, affording newer devices, and more flexibility to the individual with fewer drawbacks. However, the currently available resources do not fully solve the problem at hand, and moving forward, improvements will need to be made within the healthcare insurance and delivery systems to advance hearing healthcare for underserved populations.

CHAPTER III

CRITICAL REVIEW OF THE LITERATURE

Assessment of Existing Literature

As evidenced by the literature, the detrimental effects of leaving hearing loss untreated are numerous and compounding. Links between untreated hearing loss and symptoms such as depression (Li et al., 2014), anxiety (Monzani et al., 2008), balance issues (Jiam et al., 2016), and cognitive decline (Livingston et al., 2017) are evident with overlapping effects causing exacerbation of the other symptoms. Furthermore, untreated hearing loss has been shown to affect the economic prosperity of the individual (Kochkin, 2007) as well as society as a whole due to lost productivity and the increased drain on resources caused by the mitigation of issues arising from untreated hearing loss (Neitzel et al., 2017). Conversely, treating hearing loss has been shown to reduce the symptoms of depression (Acar et al., 2011), reduce the frequency of falls in elderly adults (F. R. Lin & Ferrucci, 2012), improve communicative ability (Megha & Maruthy, 2020), and a reduction of the economic impact caused by hearing loss (Kochkin, 2007). Evidence further suggests a mitigating effect on cognitive decline (Dillard et al., 2022) and tinnitus symptoms (Moffat et al., 2009) through the use of hearing aids.

Despite the clear beneficial effects of hearing aid use, hearing aid adoption rates in the United States remain low (Mamo et al., 2016). With treatment costs and insufficient insurance being cited as some of the largest contributing factors to U.S. citizens failing to pursue hearing aids (Mamo et al., 2016), it is unsurprising that Western European nations wherein the

cost of hearing aids are mitigated by the governments through legislation and national healthcare coverage show higher rates of hearing aid adoption (Bisgaard et al., 2022). Though many of these nations still maintain large portions of individuals affected by hearing loss who decline to pursue hearing aids, the increase in adoption rates is not insignificant with around a 10% increase on average in adoption rates. In a few countries, adoption rates have risen high enough to be double that of the rate in the United States (Bisgaard et al., 2022) While the stigma surrounding the use of hearing aids and the culture of devaluing the importance of hearing ability still play a key role in preventing individuals from pursuing the use of hearing aids (Jilla et al., 2023), a clear improvement in adoption rates could be observed by simply making hearing aids more affordable.

Stigma, general health, and economic prosperity all contribute to the intersectionality of a person, that when analyzed, leads to the emergence of correlative patterns in hearing ability, socioeconomic status, race, and age, . These patterns point toward a cyclical effect in the relationship between the treatment of hearing loss (or lack thereof) and the effect it has on socioeconomic status and social mobility. When individuals are unable to afford hearing aids their income suffers, which in turn exacerbates the financial struggles of the individual, thereby enlarging the barrier to adoption of hearing aids created by the high cost and lack of disposable income. Untreated hearing loss is further associated with lower health literacy because of hindered communicative ability, particularly with healthcare providers (Stevens et al., 2019). As a result, these individuals are less aware of the potential negative effects of hearing loss on their health and less knowledgeable about how to seek treatment. These barriers not only create an undue burden for the individual but also on their progeny. If a child's elders suffer from low health literacy), the child is likely to also have lower health literacy and be less aware of high-

risk behavior, genetic predisposition, and methods to mitigate the detrimental effects of their hearing ability and socioeconomic status (Gazmararian et al., 2005; Green et al., 2009). As a result, successive generations continue the cycle of financial hardship, and detrimental physical and mental health conditions, thereby hindering their economic and social contributions to their communities.

As outlined in Chapter II, numerous resources exist to aid in the financing and procurement of hearing aids. However, one must first be made aware of these resources and be competent in navigating the application processes. This can prove to be an additional barrier to those already struggling to communicate and to those whose health literacy may already be low. Certainly, the charitable efforts of the listed organizations are a boon to those with hearing loss however, a more permanent, uniform, and overarching solution is needed to effectively improve the lives of those with hearing loss and the societies in which they participate.

Challenges and Gaps in Existing Literature

Due to the interconnected nature of the effects of hearing loss and lower socioeconomic status, specific causal relationships (or the lack thereof) are difficult to prove. Strained incomes can lead to poorer diet and life choices regarding one's health which can affect one's mental state. Diminished mental well-being can conversely affect one's activity in social, professional, and physical domains. Without eliminating connected barriers affecting one's overall well-being, specific contributing factors cannot be isolated to an extent necessary to prove a causal relationship. As it is unethical to withhold medical care, isolation of factors must primarily come by way of observational study. As such, for the moment, one must rely on correlated factors and draw conclusions from variables showing strong connections in numerous domains. Further research would be prudent if access to hearing aids is improved so that a statistically significant

population can be studied to identify causal relationships. Another major issue with the existing research is the lack of diversity of tested populations. Historically, racial minorities have largely been ignored in scientific studies, and audiology is no exception. A particularly large gap exists in the knowledge of how hearing loss affects the cognitive function of People of Color. Although Black communities show the lowest prevalence of hearing loss across racial groups (H. J. Hoffman et al., 2017), the rates of dementia are the highest (Chen & Zissimopoulos, 2018). Consideration should, however, be made for the attempt to isolate variables of various studies inherently excluding some minority groups due to the compounding effects of societal marginalization. Lastly, well-controlled longitudinal studies are needed to better understand the sequence of events and the effect of intervention timelines (e.g. early versus late adoption of hearing aids).

Proposed Solutions

A number of potential solutions exist to improve access to hearing aids and hearing healthcare. These solutions ultimately come down to systemic change in either how we care for our populace or in the legislation surrounding audiological care. To enact systemic change, more evidence is needed to emphasize the importance of promoting audiological care. More studies on the effects of hearing loss on the health of women and People of Color are needed to more fully realize the detrimental effects thrust upon the individuals, and by extension society through expanded research on the economic effects of hearing loss on various populations. To address financial barriers to obtaining audiological care, an obvious, if a bit controversial, solution would be the implementation of universal healthcare which would include hearing examinations, the purchase of nondurable medical devices such as hearing aids, and the fitting and maintenance of said hearing aids. Barring the implementation of universal healthcare, legislation could be passed

to require the coverage of hearing aids by insurance companies, limiting the financial responsibility of covered individuals as is seen in some European countries. At the very least, the expansion of Medicare and Medicaid to include coverage of hearing aids for adults could drastically improve the ability of low-income Americans to obtain hearing aids. A further reduction in the cost of hearing aids could be realized by changing the legislation surrounding services that audiologists can bill to one's insurance. With aural rehabilitation, counseling, and the maintenance of hearing aids not being considered a billable service, many audiologists opt to include the price of services bundled into the cost of the hearing aids, thereby further inflating the cost of the hearing aids. As such, it is of paramount importance that audiologists unite to promote these legislative changes to allow for improved care for a larger portion of the population. In the meantime, audiologists should work to improve access in their local communities. Audiologists can work toward this by becoming familiar with the practices of insurance companies, reaching out and building relationships with local charitable organizations, and working to educate their communities on the importance of hearing healthcare.

Future Directions

Certain events are currently in motion which could potentially lead to a drastic change in the way that Hearing healthcare is provided. Currently H.R 244: Medicare Hearing Aid Coverage Act (2023) has been proposed to provide hearing aid coverage to Medicare recipients by the year 2024, if nothing prevents the implementation, which could lead to many more elderly individuals being able to afford hearing aids. Medicaid coverage for adults remains at the discretion of the states. However, momentum from H.R. 244 could lead to more states adopting a policy of providing hearing aids to Medicaid recipients. On another front, the emergence of OTC hearing aids could drastically affect public perception of hearing aids. The lower cost of OTC

hearing aids could lead to more individuals with mild hearing difficulties pursuing amplification earlier. Furthermore, some audiologists have speculated that much like eyeglasses, designers may step in to brand OTC hearing aids, thereby attaching a fashionable component to hearing aids. As more individuals gain access to hearing aids and hearing healthcare, we will see more varied populations experiencing the effects of hearing aids and future research may be able to reflect a wider demographic of individuals.

As a greater emphasis is placed on the importance of hearing healthcare, the stigma surrounding the use of hearing aids will likely diminish as well and people will feel more comfortable seeking out solutions for their hearing loss. As adoption rates of hearing aids increase there is potential for compounding societal benefit as the result of improved economic prosperity, reduced communicative breakdown, reduction in the rate of cognitive decline, and potentially improved mental health of a significant portion of our population, for both the young and old.

Summary

Current literature provides extensive evidence supporting the use of hearing aids to benefit individuals with hearing loss, as well as the struggles exacerbated when individuals come from low-income circumstances. Though more research remains to be done to fully understand the complexities of how socioeconomic status affects one's access to hearing aids and hearing healthcare, or conversely, how access to hearing healthcare affects one's socioeconomic status, the future looks bright. New legislation is in the works and with the emergence of OTC hearing aids, our society may be reaching a pivotal point in the public perception of hearing aids. Perhaps in the near future, proper access to hearing healthcare and hearing aids will be available to all, regardless of their financial situation or station in life.

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Appendix A

Table 1. Prevalence of Speech-Frequency and High-Frequency HI, US Adults Aged 20 to 69 Years, NHANES, 2011-2012

Characteristic	Sample No. (Population-Weighted %)[a]	Speech-Frequency HI, % (95% CI)[b]			High-Frequency HI, % (95% CI)[c]		
		Overall[d]	Unilateral[e]	Bilateral[f]	Overall[d]	Unilateral[e]	Bilateral[f]
Total (2011-2012)	3831 (100)	14.1 (11.6-17.1)	6.6 (5.4-8.1)	7.5 (5.8-9.6)	31.1 (28.0-34.3)	11.9 (10.5-13.5)	19.1 (16.6-21.9)
Sex							
Male	1953 (50.0)	18.6 (14.8-23.1)	8.7 (6.6-11.4)	9.9 (7.2-13.3)	42.2 (36.6-48.1)	14.6 (12.2-17.5)	27.6 (23.0-32.8)
Female	1878 (50.0)	9.6 (7.2-12.7)	4.5 (3.3-6.1)	5.1 (3.6-7.3)	19.9 (17.5-22.6)	9.3 (7.6-11.3)	10.6 (8.6-13.0)
Age, y							
20-29	840 (21.6)	2.2 (1.3-3.7)	1.4 (0.7-2.6)	0.8 (0.3-2.3)	7.1 (4.8-10.2)	5.0 (3.2-7.6)	2.1 (1.0-4.2)
30-39	758 (19.0)	3.3 (2.1-5.2)	2.4 (1.3-4.2)	0.9 (0.4-2.1)	10.8 (8.7-13.5)	7.8 (6.2-9.9)	3.0 (1.7-5.3)
40-49	739 (21.5)	7.8 (5.5-11.0)	4.4 (3.2-5.9)	3.4 (2.1-5.6)	26.0 (20.8-32.1)	11.3 (8.7-14.6)	14.7 (11.0-19.4)
50-59	772 (22.1)	23.1 (18.7-28.1)	11.8 (8.7-15.9)	11.2 (7.5-16.6)	50.2 (44.5-55.8)	19.3 (15.5-23.8)	30.8 (25.2-37.1)
60-69	722 (15.9)	39.3 (30.7-48.7)	14.6 (9.6-21.6)	24.7 (20.2-29.9)	68.0 (59.0-75.8)	16.9 (13.5-20.9)	51.1 (43.7-58.5)
Race/ethnicity							
Non-Hispanic white	1334 (66.5)	15.9 (12.8-19.6)	6.9 (5.2-9.1)	9.0 (7.1-11.5)	33.8 (30.6-37.1)	12.4 (10.6-14.4)	21.4 (18.7-24.5)
Non-Hispanic black	1063 (11.6)	9.0 (7.5-10.9)	5.0 (4.1-5.9)	4.1 (2.7-6.2)	22.4 (19.0-26.3)	10.8 (8.8-13.1)	11.7 (9.3-14.6)
Mexican American	397 (7.9)	9.2 (6.5-13.0)	4.9 (2.7-8.7)	4.3 (3.3-5.7)	27.9 (24.1-32.0)	12.8 (10.5-15.5)	15.1 (12.5-18.0)
Non-Hispanic Asian	538 (4.9)	10.8 (7.2-15.8)	6.1 (3.9-9.2)	4.7 (2.8-7.8)	24.7 (19.3-31.1)	11.1 (8.8-13.8)	13.7 (10.0-18.4)
Other Hispanic	378 (6.3)	9.1 (6.3-13.0)	5.2 (2.8-9.5)	3.9 (1.9-7.7)	25.8 (21.1-31.2)	9.1 (6.7-12.2)	16.8 (11.9-23.2)
Other race/ethnicity	121 (2.8)	22.6 (10.3-42.6)	15.2 (6.9-30.1)	7.4 (2.3-21.2)	34.2 (18.5-54.4)	12.6 (5.5-26.3)	21.6 (13.1-33.5)
Educational level							
Less than high school	737 (13.8)	19.2 (15.6-23.3)	7.9 (6.1-10.1)	11.3 (8.5-14.8)	42.2 (39.0-45.5)	14.0 (11.1-17.5)	28.2 (24.2-32.6)
High school	805 (19.7)	19.1 (13.9-25.8)	9.7 (6.8-13.6)	9.5 (6.5-13.5)	39.7 (33.9-45.7)	14.5 (11.2-18.6)	25.1 (21.8-28.7)
Some college or associate degree	1246 (33.7)	14.8 (11.3-19.3)	6.6 (4.8-8.9)	8.3 (5.5-12.4)	27.1 (21.1-34.1)	10.8 (8.4-13.8)	16.3 (12.1-21.6)
College graduate or higher	1043 (32.9)	8.3 (6.0-11.3)	4.3 (2.4-7.6)	4.0 (2.6-6.0)	25.3 (21.1-30.0)	10.7 (8.3-13.8)	14.6 (11.4-18.4)
Smoking status							
Nonsmoker	2206 (55.8)	11.1 (8.9-13.7)	5.3 (4.3-6.4)	5.8 (4.2-7.9)	26.0 (22.4-29.8)	11.2 (9.3-13.4)	14.8 (11.9-18.3)
<20 pack-years	623 (17.2)	7.6 (5.1-11.0)	4.8 (3.1-7.5)	2.7 (1.6-4.6)	23.3 (18.8-28.4)	10.2 (6.8-15.0)	13.1 (8.7-19.1)
≥20 pack-years	874 (23.5)	26.4 (22.0-31.3)	11.8 (9.2-15.0)	14.6 (12.0-17.7)	49.8 (45.1-54.5)	15.1 (12.3-18.3)	34.8 (31.2-38.5)
Unknown	128 (3.4)	12.5 (5.6-25.7)	1.8 (0.7-4.4)	10.7 (4.2-24.9)	24.3 (16.9-33.5)	11.7 (5.6-22.7)	12.6 (7.1-21.4)
Hypertension							
No	2481 (68.3)	10.9 (8.5-13.7)	5.3 (4.1-6.7)	5.6 (4.1-7.6)	24.2 (21.1-27.6)	10.0 (8.5-11.7)	14.2 (11.9-12.0)
Yes	1350 (31.7)	21.1 (17.7-25.0)	9.6 (7.4-12.3)	11.6 (9.1-14.6)	45.8 (41.9-49.6)	16.2 (13.0-19.9)	29.6 (26.2-33.3)
Diabetes[g]							
No	3331 (90.5)	12.5 (10.1-15.3)	5.7 (4.6-7.1)	6.8 (5.1-8.9)	28.0 (25.2-31.0)	11.0 (9.6-12.6)	17.0 (15.0-19.2)
Yes	499 (9.5)	29.8 (22.6-38.2)	15.2 (9.0-24.5)	14.6 (12.0-17.6)	60.1 (52.8-67.0)	20.7 (16.5-25.6)	39.5 (30.2-49.6)

Table 1. Prevalence of Speech-Frequency and High-Frequency HI, US Adults Aged 20 to 69 Years, NHANES, 2011-2012 (continued)

Characteristic	Sample No. (Population-Weighted %)[a]	Speech-Frequency HI, % (95% CI)[b]			High-Frequency HI, % (95% CI)[c]		
		Overall[d]	Unilateral[e]	Bilateral[f]	Overall[d]	Unilateral[e]	Bilateral[f]
Occupational noise exposure[h]							
No	2477 (63.7)	11.3 (9.0-14.1)	5.8 (4.5-7.5)	5.5 (4.1-7.3)	25.0 (22.7-27.6)	10.9 (9.1-12.9)	14.2 (12.8-15.7)
Yes							
Loud only (<5 y)	234 (6.3)	8.9 (4.9-15.6)	3.5 (1.3-9.1)	5.0 (3.0-9.6)	28.8 (20.2-39.2)	12.5 (7.9-19.2)	16.3 (11.0-23.4)
Loud only (≥5 y)	233 (6.3)	19.2 (12.2-29.0)	9.2 (4.6-17.7)	10.0 (6.7-14.7)	44.6 (37.7-51.7)	16.3 (9.5-26.6)	28.3 (20.8-37.3)
Very loud (<5 y)	406 (11.5)	14.4 (8.1-24.4)	5.5 (3.1-9.8)	8.9 (4.5-16.7)	33.6 (27.0-40.9)	12.9 (7.5-21.4)	20.7 (14.8-28.2)
Very loud (≥5 y)	427 (11.2)	30.7 (25.1-36.8)	12.8 (8.8-18.4)	17.8 (11.9-25.7)	56.7 (45.6-67.1)	13.9 (10.0-18.9)	42.8 (34.5-51.4)
Unknown	54 (1.0)	6.9 (2.7-16.6)	4.6 (1.5-13.4)	2.3 (0.5-10.8)	27.2 (13.7-46.7)	16.9 (6.6-37.0)	10.3 (4.6-21.4)
Very loud noise exposure outside of work[i]							
No	3359 (87.3)	13.6 (10.7-17.1)	6.2 (4.7-8.2)	7.3 (5.8-9.3)	30.2 (27.2-33.3)	11.8 (10.1-13.8)	18.3 (16.0-20.9)
Yes	470 (12.7)	18.1 (11.3-27.8)	9.4 (5.7-15.3)	8.6 (4.2-17.0)	37.0 (28.4-46.4)	12.4 (8.6-17.6)	24.6 (18.1-32.5)
Firearms, including use for recreation, job, or military							
No	2433 (54.3)	11.4 (9.1-14.2)	6.0 (4.5-8.0)	5.4 (4.3-6.8)	25.9 (23.5-28.6)	11.6 (10.1-13.2)	14.4 (12.7-16.3)
Yes	1395 (45.7)	17.3 (13.6-21.9)	7.3 (5.7-9.5)	10.0 (7.3-13.6)	37.1 (31.9-42.6)	12.3 (9.4-15.9)	24.8 (20.6-29.5)
Lifetime rounds fired (firearms)							
None	2433 (54.3)	11.4 (9.1-14.2)	6.0 (4.5-8.0)	5.4 (4.3-6.8)	25.9 (23.5-28.6)	11.6 (10.1-13.2)	14.4 (12.7-16.3)
<1000	977 (32.6)	14.0 (10.6-18.2)	6.0 (4.2-8.4)	8.0 (5.8-10.9)	32.2 (26.8-38.2)	10.1 (6.3-15.9)	22.1 (17.6-27.4)
≥1000	401 (12.9)	26.0 (19.7-33.4)	10.8 (8.4-13.7)	15.2 (9.4-23.6)	49.7 (40.2-59.2)	18.0 (13.1-24.2)	31.7 (22.5-42.6)

Abbreviations: HI, hearing impairment; HL, hearing level; NHANES, National Health and Nutrition Examination Survey; PTA, pure-tone average.

[a] The total number of US civilian, noninstitutionalized adults aged 20 to 69 y in the 2011-2012 NHANES was 196.6 million.

[b] Speech-frequency HI is defined as PTA of thresholds at 0.5, 1, 2, and 4 kHz greater than 25 decibels (dB) HL.

[c] High-frequency HI is defined as PTA of thresholds at 3, 4, and 6 kHz greater than 25 dB HL.

[d] Overall HI sums unilateral and bilateral HI, which means HI in either or both ears (ie, a worse-ear definition of HI).

[e] Unilateral HI means the PTA in only 1 ear exceeds 25 dB HL.

[f] Bilateral HI means the PTAs in both ears exceed 25 dB HL (ie, a better-ear definition of HI).

[g] Diabetes was defined by a positive response to the following questions: "Have you ever been told by a doctor or other health professional that you have diabetes or sugar diabetes?" or "Are you now taking diabetic pills to lower blood sugar?", or a 2-h fasting glucose level of 126 mg/dL or more (to convert to millimoles per liter, multiply by 0.0555).

[h] Occupational noise exposure is defined as: "exposed at work to loud sounds or noise for 4 or more hours, several days a week". In addition, separate categories distinguish adults who had only loud noise exposure at work ("so loud that they had to raise their voice to be heard") vs those who also had very loud noise exposure at work ("so loud that they had to shout to be understood by someone standing 3 feet away"); see complete wording of the question in the Methods section.

[i] Noise exposure outside of work is defined as: "Outside of a job, have you ever been exposed to very loud noise or music for 10 or more hours a week?" Examples are noise from power tools, lawn mowers, farm machinery, cars, trucks, motorcycles, motor boats, or loud music.

APPENDIX A

(Reprinted with permission from the Hearing Industries Association)

Hearing Industries Association
1301 K Street NW
Suite 300W
Washington D.C. 20005
info@hearing.org

Contents

Introduction

Hearing loss is a significant medical issue in the U.S. with an estimated 38 to 48 million Americans - or more than one in ten - having some form of hearing loss. When left untreated, hearing loss can reduce earning power, disrupt relationships, and impact overall mental and physical wellbeing. However, research reveals that 83% of hearing aid wearers are satisfied with their device(s) due to advancements in technology that allow those with hearing loss to more fully engage with the people and activities that they love.

The Hearing Industries Association (HIA) has prepared this document as a resource guide for those seeking financial assistance for hearing aids. While HIA does not manage an assistance program, this guide will provide information on the charitable foundations, private organizations, insurance plans, and government programs that help people access the hearing healthcare they need.

The technology incorporated into hearing aids along with the services of a hearing care professional influence the overall cost. Over-the-Counter (OTC) hearing aids are available to adults 18 years of age and over with mild-to-moderate hearing loss and can be purchased online or in retail stores without a prescription or the services of a professional. The cost can range from $250 to more than $1,000. Prescription hearing aids are available to adults and children with any level of hearing loss and are only available from a licensed hearing care professional. The cost of the devices, testing, fitting services, warranties, and follow-up care can range from $1,300 to $4,000 or more.

For adults who are enrolled in Medicare Advantage (MA) plans, we recommend that you check your specific insurance plan to see if coverage is available. Most MA plans provide some type of hearing benefit.

We hope that by using this guide, you can find the resources needed to treat your – or a loved one's – hearing loss.

Organizations & Services

Air Force Aid Society

See also Tricare for active duty personnel and family benefits.

241 18th Street, Suite 202
Arlington, VA 22202
Tel: 703-972-2650
www.afas.org

Services

Financial assistance is given when a qualifying individual cannot otherwise pay for specific basic needs essential to continued personal effectiveness as an Air force member.

The Society believes that it is better to err on the side of generosity in assisting with need. Emergency Assistance can be given as an interest free loan. Most assistance provided through interest free loans come with a repayment schedule set according to budget surplus.

Eligibility

Active-duty Air Force personnel (including spouses with Power of Attorney when the service member is away from his/her duty station), Air National Guard or Air Force Reserve personnel on extended active duty over 15 days under Title 10 USC (assistance is limited to emergencies incidental to, or resulting from applicant's active duty tour), Service members with no existing outstanding loan balance to AFAS.

Alexander Graham Bell Association for the Deaf and Hard of Hearing

For children's financial aid programs, click here: **Alexander Graham Bell Association for the Deaf and Hard of Hearing.**

3417 Volta Place, NW
Washington, DC 20007
Tel: 202-337-5220 | TTY: 202-337-5221 | Fax: 202-337-8314
info@agbell.org | www.agbell.org

Mission Statement

The Alexander Graham Bell Association for the Deaf and Hard of Hearing helps families, health care providers and education professionals understand childhood hearing loss and the importance of early diagnosis and intervention. Through advocacy, education, research and financial aid, AG Bell helps to ensure that every child and adult with hearing loss has the opportunity to listen, talk and thrive in

mainstream society. With chapters located in the United States and a network of international affiliates, AG Bell supports its mission: *Advocating Independence through Listening and Talking!*

Membership organization, Life membership $2000, Professional Membership $100 (US & International), Student membership $50, Friends & Family membership $0. Has chapters in CA, CO, FL, GA, ID, IL, IN, KS, KE, LA, ME, MA, MI, MN, NE, NJ, NY, NC, OH, OK, OR, PA, RI, SC, TN, TE, UT, VA, WV, WI. Assistance forming chapters in other states will be given.

Financial Aid Offered

AG Bell lists multiple financial aid resources, including contact information to help find hearing aid assistance, college scholarship and graduate scholarship opportunities, Preschool Financial Aid, parent and infant financial aid, scholarships for Listening and Spoken Language (LSLS) professionals and educator certification scholarships.

You can find these resources and deadlines to apply here: https://www.agbell.org/Connect#financial-aid

Benevolent Protective Order of Elks of the USA

2750 N. Lakeview Avenue
Chicago, IL 60614-1889
Tel: 773-755-4700
www.elks.org

While there is no national program to help people with hearing loss, some local chapters will assist individuals. To locate local chapters visit: www.elks.org/lodges/default.cfm

CareCredit

GE Card Services
PO Box 960061
Orlando, FL 32896-0061
Tel: 800-677-0718
www.carecredit.com

Services and Eligibility

CareCredit gives people the buying power to purchase the highest quality hearing aid to correct their hearing loss with affordable monthly payment options (determined by creditworthiness of applicant). The biggest difference between CareCredit and Visa/MasterCard is that any transaction over $300 qualifies for a special financing promotion. Financing promotions vary in every healthcare practice, but they generally fall into these categories: convenient monthly payment, promotions (varying from provider to provider) and low monthly payment promotions with a fixed interest rate.

CareCredit offers a full range of payment plans.

To Apply

Not all providers accept CareCredit. Hearing aid professionals can provide applications, and submit the application by phone, fax, or internet to receive an immediate answer. Patients can apply online, but they should make sure their provider accepts CareCredit before applying. Visit www.carecredit.com/apply to learn more.

Corporate or Employee Assistance

Corporations and unions may offer financial assistance for hearing aids or audiological services either through reimbursement or as part of a hearing healthcare agreement entitling you to a discount on hearing aids from local hearing healthcare professionals.

Deaf and Hard of Hearing Services for State Employees

Some States offer adaptive communication equipment to deaf and hard of hearing employees. Usually, they help employers identify adaptive communication equipment that can help overcome on-the-job communication barriers between deaf or hard of hearing employees and their co-workers or supervisors.

Federal Employee Health Benefits (FEHB)

All plans cover routine hearing screening for children. Coverages vary widely, with some plans providing a hearing aid benefit based on differing qualifications such as age, frequency of device replacement, and big differences in the cost amount the plan will cover. Many plans will pay most of the cost of hearing-related medical procedures, such as cochlear implants. Check with your individual program for hearing health benefits.

Americans with Disabilities Act (ADA)

Under the Americans with Disabilities Act (ADA) you may be eligible for hearing aids or other assistive technology if it is needed to perform your job. For more information on your legal rights on the job see: https://www.ada.gov

Health Care Flexible Spending Accounts

Flexible Spending Accounts (FSAs) provide a way for individuals to set aside pre-tax income dollars to pay for certain eligible medical expenditures. According to the Internal Revenue Service (IRS), FSAs are employer-established benefit plans under which employees can contribute to the FSA by electing a voluntarily withheld amount from your paycheck. Taxes are not paid on the salary contributed nor, generally, for contributions made by an employer to an FSA.

There are limits on salary reduction contributions to an FSA. In 2023, contributions are limited to $3,050 per employer. Spouses can put the maximum amount in an FSA through their employer. FSAs generally do not "roll over" but an employer may offer a grace period of no more than 2.5 additional months to use expired FSA funds or may allow you to carry over up to $610 per year. Eligible FSA expenses include, but are not limited to, deductibles, out-of-network claims, expenses for special treatments, qualified prescription drugs, medical devices (including hearing aids), over-the-counter medications, dental and vision expenses, and more.

In order to receive the reimbursement, participants (1) submit a claim form after services are rendered and receive a reimbursement for all eligible expenses by mail, or (2) use of an FSA debit card to pay for covered expenses at the time of purchase or when services are rendered. Medical reimbursements may be obtained regardless of the accumulated amount in the participant's account. For example, a person with a hearing loss who is considering the purchase of a hearing aid can make the purchase in January and pay it off biweekly through pre-taxed payroll deductions.

Learn more about FSAs directly from your employer, including process for submitting claims or how to sign up. You can also visit healthcare.gov, which provides additional IRS materials on qualifying for an FSA, contributions to an FSA, eligible expenses, and more.

Ear Community

280 East 1st Ave., Unit 704 Broomfield, CO 80038
EarCommunity@gmail.com
www.EarCommunity.org

The Ear Community is a nonprofit organization that donates bone anchored hearing systems (BAHS) to those in need and who have been denied coverage by insurers for these hearing devices. Ear Community also helps reimburse audiologists through Pax's Ear Fund for the fitting and programming fee when patients are denied coverage by their insurers for this service for BAHS devices.

Thanks to our donors and contributors, the Ear Community Organization can help give back by making the gift of hearing possible for many. The Ear Community Organization has been proud to help children and adults hear their best since 2012, regardless of age!

Services and Eligibility

The Ear Community donates NEW BAHS devices to individuals who were born with microtia and aural atresia. To be eligible, applicants must have microtia and or aural atresia. Must be able to provide proof of lower income and a denial letter from insurance. Applicants must not have a BAHS previously as upgrades cannot be provided.

To Apply

Link to apply for bone anchored hearing device:
https://earcommunity.org/donate/application-for-a-bone-conductive-hearing-device/

Link for Pax's Ear Fund:
https://earcommunity.org/donate/application-for-help-with-travel-costs-for-surgery/

Easterseals

141 W Jackson Blvd, Suite 1400A, Chicago, IL 60606
Tel: 312-726-6200 | TTY: 312-726-4258 | Toll-Free: 800-221-6827
www.easterseals.com

Easterseals has been helping individuals with disabilities and special needs - and their families - live better lives for more than 90 years. From child development centers to physical rehabilitation and job training for people with disabilities, Easterseals offers a variety of services to help people with disabilities address life's challenges and achieve personal goals.

Services and support are provided through a network of more than 550 sites in the U.S. Each center provides exceptional services that are individualized, innovative, family-focused and tailored to meet specific needs of the community served.

Services

The organization may purchase adaptive devices and medical equipment for children ages 0-21, including hearing aids, cochlear implants, and speech therapy. They also offer hearing screening and pay for surgical procedures.

Eligibility

Aid is based on economic need, with sliding-scale services available. Age limit is up to 21 years old.

To Apply

To find an Easterseals nearest you, visit https://www.easterseals.com/ and enter your zip code in the "Find Your Easterseals" tab. Once on the local chapter's website, you can view chapter services and find contact information to inquire about eligibility.

Federal Employees Health Benefits Program

See Corporate and Employee Assistance (click Corporate or Employee Assistance to jump to section)

Fraternal Order of the Eagles

Fraternal Order of Eagles Grand Aerie
1623 Gateway Circle S.
Grove City, OH 43123
Tel: 614-883-2200 | Email: help@foe.com
www.foe.com

The Fraternal Order of Eagles is an international non-profit organization uniting fraternally in the spirit of liberty, truth, justice, and equality, to make human life more desirable by lessening its ills and promoting peace, prosperity, gladness and hope.

To Apply

Applications are not accepted from individuals. Eligible individuals can be referred by a hearing healthcare professional.

Kiwanis Clubs

3636 Woodview Trace
Indianapolis, IN 46268-3196
Tel: 800-549-2647 | Tel: 317-875-8755
www.kiwanis.org/clubs

Services and Eligibility

While there is no nationwide organization program for providing help for people with hearing loss, many individual chapters will help their friends and neighbors.

To Apply

Contact a local Kiwanis club to see if members might be of assistance: www.kiwanis.org/clubs

Knights of Columbus

Knights of Columbus Headquarters
1 Columbus Plaza
New Haven, CT 06510
Tel: 203-752-4000 | info@kofc.org
www.kofc.org

Services and Eligibility

The Knights of Columbus render financial aid to members and their families. Mutual aid and assistance are offered to sick, disabled, and needy members and their families. A few Councils have donated money to individuals for the purchase of hearing aids. It is not clear if membership in the Knights or having a family member as a member is always required to get help.

To Apply

Individuals should contact their local Knights of Columbus Council or inquire about a local council at the nearest Catholic church. Then they should find an advocate within the council that they wish to approach and learn what the specific requirements are. The groups are more inclined to assist those who have sought other financial assistance but have been turned down. Requests to help children are more favorably received than requests for adults, and people need to be ready to give financial details demonstrating their need. However, adult requests are more favorably received if the assistance will enable the recipient to become or remain self-sufficient.

Lions Club International

300 W. 22nd Street
Oak Brook, IL 60523-8842
www.lionsclubs.org

Services

Lions are an international network of 1.4 million men and women in 200+ countries and geographic areas who work together to answer the needs that challenge communities around the world.

Local Lions clubs may provide communication aids for deaf and hard of hearing persons in the community.

To Apply

Visit the website and enter your location in the "Find A Club" webpage. Contact your local Lions Club to inquire about hearing aid assistance.

Masonic Organizations

Overview and Missions

There are many organizations within the Masonic family. The basic Masonic Lodges are known as the "Blue Lodges," and are what you will most likely find within your community. They can put you in touch with other Masonic organizations that may be able to help you, as Blue Lodge membership or a family member is required for admission to the other groups.

The focus of these organizations is charity. The Shriners will help any child with congenital hearing loss due to bone conduction problems and maybe other conditions, as well as children with orthopedic issues, burn injuries, craniofacial conditions, and spinal cord injuries and spine care, colorectal and gastrointestinal care, and sports medicine. The Scottish Rite (Consistory) focuses on communication disorders. Blue Lodges have individual charity funds available to help members and community members and have a great deal of flexibility in how they award funds.

Contact Information

Search online for "Ancient Free and Accepted Masons" or "Free and Accepted Masons".

To Ask for Help

You must identify an advocate within the Lodge to submit your application for assistance. In some cases, it is required to identify a family member who is or was in a Masonic organization.

You need to have explored other financing options and been turned down. Requests to help children are more favorably received than requests for adults, and you need to be ready to give financial details demonstrating your need. However, adult requests are more favorably received if the assistance will enable the recipient to become or remain self-sufficient.

Medicaid and CHIP Programs

- For a listing of each state's Medicaid contacts: www.cms.hhs.gov/apps/contacts
- For more information on Medicaid: https://www.medicaid.gov
- For more information on CHIP: https://www.medicaid.gov/chip/index.html

Services and Eligibility

Medicaid is a public funded health insurance program for low-income individuals. CHIP is your State Children's Health Insurance Program. CHIP was designed to cover uninsured children in families with incomes that are modest but too high to qualify for Medicaid. The Federal government sets the minimum services that must be covered, but each state establishes its own criteria and coverage models.

Most states require that Medicaid beneficiaries receive an evaluation to determine what otologic disorders are associated with hearing loss. An audiological evaluation is conducted to determine that hearing services and treatment are "medically necessary". The Centers for Medicare and Medicaid Services (CMS) define "medically necessary" as "health care services or supplies needed to diagnose or treat an illness, injury, condition, disease or its symptoms and that meet accepted standards of medicine." However, states are free to define the term under state law and their respective Medicaid programs. State Medicaid programs vary on the minimum level of hearing loss required for hearing aid coverage, may impose frequency restrictions on how often individuals can obtain or replace a hearing aid, coverage for batteries or other accessories, and warranties, repairs, and replacements.

For children, the federal Early Periodic Screening, Diagnosis, and Treatment (EPSDT) program provides for regular hearing screening, further evaluation if issues are identified, and necessary treatment. If issues are identified, EPSDT requires coverage of necessary services and treatment, including hearing aids, replacement batteries, and cochlear implants.

To Apply

1. Reach out to your state Medicaid office to determine if you are eligible for services, preferably before an emergency arises.
2. If you are enrolled in Medicaid and a denial is made that you consider unreasonable, and you can make a case that coverage of hearing aids or cochlear implants, or bilateral cochlear implants would provide the beneficiary with greater functionality, you can appeal.
3. Find an advocate to work with you.

Whenever possible, produce research documenting the importance of amplification and/or bilateral amplification. Your hearing healthcare provider will probably be able to help you navigate these services.

Health Care Flexible Spending Accounts

See Corporate and Employee Assistance (click Corporate or Employee Assistance to jump to section)

Miracle-Ear Foundation

5th Street Towers, 150 South 5th Street, Suite 2300
Minneapolis, MN 55402
Tel: 800-234-5422
www.miracle-ear.com/foundation

Services

The Miracle-Ear Foundation® is designed to support underserved Americans with a limited income and no other resources for hearing aids, such as insurance, Medicaid, VA, or other state or federal programs.

Eligibility

- Applicants must have a hearing loss that requires amplification (hearing aids), children who have a mild or greater hearing loss, adults who have a moderate or greater hearing loss.
- Applicants are seeking help from the Miracle-Ear Foundation™ as there are no other resources available including but not limited to: insurance, state Medicaid program, VA or vocational rehab, state or local programs, and other charity sources.
- Applicants must complete an application form and provide a current audiogram. Children 18 years and younger must have medical clearance dated within the last 6 months signed by a physician (MD, ENT). While medical clearance is encouraged for adults, a signed medical waiver is acceptable.
- Applicants must have an income level which does not allow the family to receive public support – see specific income eligibility requirements. Total household income must be at or below the chart provided to qualify and demonstrate personal inability to financially provide for hearing health.
- Applicants must possess a family commitment to intervention, rehabilitation, and necessary follow-up services, which is especially important for a child applicant as they grow.
- Applicant must be a resident or citizen of the U.S. or Puerto Rico.

To Apply

If you fit within the eligibility requirements and have carefully reviewed the criteria for income, assets, and hearing loss, you may be eligible for services from the Miracle-Ear Foundation. Applicants must contact their local Miracle-Ear store to submit the application, supporting documents and application fee ($150 adults only). The Miracle-Ear store will make their referral and forward your application to the Miracle-Ear Foundation for approval. You will receive notification by mail within 3 weeks if your application has been approved or denied services. www.miracle-ear.com/foundation-eligibility

Sertoma

720 Main Street, FL 1
Kansas City, MO 64105
Tel: 816-333-8300 | infosertoma@sertoma.org
www.sertoma.org

Sertoma's primary service project is assisting the more than 50 million people with hearing health issues. Sertoma also sponsors community projects to promote freedom and democracy, to assist youth and to benefit a variety of other local community needs, as identified by the individual clubs.

Headquartered in Kansas City, Missouri, Sertoma is a 501(c)(3) not-for-profit civic organization with community-minded members in our service clubs across North America. Every year Sertoma clubs raise more than $20 million for local community service projects.

To find a club in your area, please go to "Find a Club". If there is no email, phone number, or website link listed, please email your request to infosertoma@sertomahq.org and a Sertoma representative will contact the club nearest you.

Sertoma Scholarships

Hard of Hearing or Deaf Scholarship: The leading scholarship for hard of hearing or deaf students since the program's inception in 1994. Students with clinically significant bilateral hearing loss, graduating from high school, or undergraduate students pursuing four-year college degrees in any discipline are eligible for the scholarship.

- Must have a minimum 40dB bilateral hearing loss, as evidenced on audiogram by an SRT & PTA of 40dB or greater in both ears.
- Must be a citizen of the United States of America
- Must be pursuing a bachelor's degree on a full-time basis at a college or university in the United States – graduate degrees, associate degrees, community colleges, and vocational programs do not qualify.
- Must have a minimum cumulative 3.2 GPA on a 4.0 un-weighted scale.
    - High School senior – Cumulative GPA is for grades 9-11 and first semester for grade 12.
    - College freshman – Cumulative GPA is all high school and first semester of college.
    - College sophomore or higher – Cumulative GPA for all college-level semesters completed.
- Deadline March 31st annually

Communicative Disorders Scholarship: Funded by the Sertoma Annual Fund, is for graduate students pursing advanced degrees in audiology or speech-language pathology from institutions in the U.S. These scholarships, worth $1,000 each, are awarded in the spring to help offset the cost of tuition, books and fees incurred during the following school year.

- Must be a citizen of the United States of America
- Must be pursuing a graduate level degree in speech language pathology and/or audiology at a college or university in the United States, accredited by ASHA's Council on Academic Accreditation
- Must have a minimum cumulative 3.5 GPA on a 4.0 scale for all undergraduate, graduate and doctoral level course work. This must include the Fall 2020 semester.
- Deadline March 31st Annually

Students can use the awards for any school-related expenses including tuition, books and supplies during any academic term, including summer term.

To Apply

Hard of Hearing or Deaf Scholarship

Communicative Disorders Scholarship Application

State Programs

To view state programs specific to children, visit page 18 or click **Early Intervention Services for Children.**

To determine eligibility and details about services in your state, you can check with your:

- State Department of Rehabilitation
- Department of Vocational Rehabilitation
- Department of Human Services (DHS)

State Insurance or Discounts

Minimum insurance coverage requirements for hearing services and treatment vary on a state-by-state basis and not all insurance plans may be included under a state mandate. Insurance mandates for children have been enacted in the following states as of this guide's publication date: AR, CT, CO, DE, GA, IL, KY, LA, ME, MD, MA, MN, MO, MT, NH, NJ, NM, NC, OK, OR, RI, TN, TX, VA, VT, WA, and WI. Eight states mandate some form of coverage for adults: AR, CT, IL, NH, RI, ME, WA, and MN. Coverage specifics vary by state; for example, Rhode Island mandates that insurance policies cover hearing aids for adults as well as children, although the minimum benefit for children is higher than the minimum benefit for adults. Arkansas requires insurance companies offer coverage to employers in the state. However, if the employer chooses to add this option, the health plan must provide hearing aid coverage of no less than $1,400 per ear every three years for individuals of all ages. Be sure to check your specific state law and health plan for coverage options.

Deaf and Hard of Hearing Services

Deaf and Hard of Hearing Services Division (DHHSD) is sometimes a division within the Department of Human Services. They can provide additional information about financial resources for hearing aids (including local hearing aid banks) and assistive listening devices.

Many local communities have hearing aid banks which serve individuals in financial need who do not qualify for other assistance programs. When needed, hearing aid banks can arrange for a hearing evaluation and/or hearing aid provision through volunteer audiologists and hearing aid dispensers in the area. Some banks will provide only one hearing aid where the purchase of a second hearing aid is possible at the client's expense or with private donations made to local hearing aid banks. Applicants may be asked to contribute a co-payment fee.

Applicants usually must reside in certain stipulated communities and income usually must be at the poverty level based on household size. In addition, there may be restrictions on assets that the individual may own (e.g., cash, stock, bonds, etc).

Micro Loan Program

Some States offer loaner hearing devices or hearing aids. This program provides low-interest loans to disabled individuals who do not have the money to pay for the assistive technology devices and services they need. After receipt of the loans, individuals can make payments through partner banks with an installment plan that fits their budget.

State and Private Assistive Technology Loan Programs

Services

Offered in nearly every state, these programs will loan recipients assistive listening technology to try, as well as backup equipment while theirs is being repaired, and/or financial loans to purchase technology, including hearing aids. State programs also may offer the ability to purchase used assistive technology or even receive it for free. The assistive technologies for loans vary from state to state, but may include a variety of assistive listening devices such as alarm, door, and baby announcers; FM and wired assistive

listening devices; telephone assistance and amplifiers; smoke detectors and alarm clocks; and other useful devices.

Eligibility
Criteria vary from state to state, but the programs are for low-income residents. Income documentation is required.

To Apply
People should contact their state Commission for the Deaf and Hard of Hearing or search online using the terms "State Telecommunications Equipment Distribution Program" and the name of their specific state.

- One great source of information is: https://catada.info/state.html
- Another excellent and usually current list: https://at3center.net/state-at-programs/

Travelers Protective Association of America

2041 Exchange Drive
Saint Charles, MO 63303
Toll Free: 877-872-2638 | Fax: 636-724-2457
www.tpahq.org

Services
The Travelers Protective Association Scholarship Trust for the Deaf and Near Deaf provides financial aid to children and adults who are deaf or have a hearing impairment. This program provides assistance for mechanical devices, medical or specialized treatment, or specialized education to those who demonstrate financial need. Grants may be used to purchase hearing aids, as well as assistive listening equipment, or they may help with the cost of a cochlear implant.

Eligibility
Applicants must demonstrate both deafness or hearing loss and financial need.

To Apply
A downloadable application is available online in the Scholarship Trust section of the website.

TRICARE

[U.S. Department of Defense Military Health System]

7700 Arlington Boulevard Suite 5101
Falls Church, VA 22041-3206
Tricare Regional Office East: 800-444-5445
Tricare Regional Office West: 844-866-9378
https://www.tricare.mil/CoveredServices/IsItCovered/HearingAids

Services

Eligible Tricare beneficiaries and their family members will receive all medically necessary and appropriate services and supplies, including hearing examinations administered by authorized providers required in connection with this benefit.

Eligibility

To review eligibility requirements, visit the Tricare Website, or call the appropriate regional office. Overseas beneficiaries may call 888-777-8343.

To Apply

Eligible beneficiaries who suspect that they or a family member may have a hearing loss should schedule an appointment with their primary care manager for an initial examination. The primary care manager will then refer the beneficiary to an audiologist for any necessary tests.

Veterans Benefits

Veterans Affairs (VA) will ensure access to audiology and eye care services including preventive health (care) services and routine vision testing for all enrolled veterans and those veterans exempt from enrollment. Eyeglasses and hearing aids will be provided to the following veterans:

- Those with any compensable service-connected disability.
- Those who are former Prisoners of War (POWs).
- Those who were awarded a Purple Heart.
- Those in receipt of benefits under Title 38 United States Code (U.S.C.) 1151.
- Those in receipt of an increased pension based on being permanently housebound and in need of regular aid and attendance.
- Those with vision or hearing impairment resulting from diseases or the existence of another medical condition for which the veteran is receiving care or services from VHA, or which resulted from treatment of that medical condition, e.g., stroke, polytrauma, traumatic brain injury, diabetes, multiple sclerosis, vascular disease, geriatric chronic illnesses, toxicity from drugs, ocular photosensitivity from drugs, cataract surgery, and/or other surgeries performed on the eye, ear, or brain resulting in vision or hearing impairment.
- Those with significant functional or cognitive impairment evidenced by deficiencies in the ability to perform activities of daily living.
- Those who have vision and/or hearing impairment severe enough that it interferes with their ability to participate actively in their own medical treatment and to reduce the impact of dual sensory impairment (combined hearing and vision loss).
- Those veterans who have service-connected vision disabilities rated zero percent or service-connected hearing disabilities rated zero percent if there is organic conductive, mixed, or sensory hearing impairment, and loss of pure tone hearing sensitivity in the low, mid, or high-frequency range or a combination of frequency ranges which contribute to a loss of communication ability; however, hearing aids are to be provided only as needed for the service-connected hearing disability.

Eligibility

Veterans meeting the eligibility requirements to receive health care are eligible for diagnostic audiology services and eye & vision care services. Eligibility rules are the same for both inpatient and outpatient medical services. Veterans will not be denied access to audiology services and/or eye & vision care services covered by the Medical Benefits Package (38 CFR §17.38) because they do not meet the

eligibility criteria for hearing aids and/or eyeglasses. For additional information, please view the following article: https://www.healthyhearing.com/help/hearing-aids/va

To find your local VA office, visit https://www.va.gov/find-locations/

Pediatric Services

Alexander Graham Bell Association for the Deaf and Hard of Hearing

3417 Volta Place, NW
Washington, DC 20007
Tel: 202-337-5220 | TTY: 202-337-5221 | Fax: 202-337-8314
info@agbell.org | www.agbell.org

Mission Statement

The Alexander Graham Bell Association for the Deaf and Hard of Hearing helps families, health care providers and education professionals understand childhood hearing loss and the importance of early diagnosis and intervention. Through advocacy, education, research and financial aid, AG Bell helps to ensure that every child and adult with hearing loss has the opportunity to listen, talk and thrive in mainstream society. With chapters located in the United States and a network of international affiliates, AG Bell supports its mission: *Advocating Independence through Listening and Talking!*

Membership organization, minimum dues $50 adults; $40 Senior; $30 Student. Has chapters in CA, CO, FL, GA, ID, IL, IN, KS, KE, LA, ME, MA, MI, MN, NE, NJ, NY, NC, OH, OK, OR, PA, RI, SC, TN, TE, UT, VA, WV, WI. Assistance forming chapters in other states will be given.

General Resources Offered

For Parents

The Parent Section (PS) is committed to extending emotional support and information to families with children who are deaf or hard of hearing. Any AG Bell member who is a parent, grandparent, great-grandparent or legal guardian of a child who is deaf or hard of hearing is encouraged to become a member of this section. AG Bell offers many programs for parents.

Financial Aid and Scholarships

Financial Aid and Scholarship funds are granted to people who meet the specific criteria for each award and may not be used for purposes other than what the award has stipulated. The AG Bell Financial Aid and Scholarship Program offers four awards to help with funding. Please review the specific eligibility requirements for each award before applying at their website, www.AGBell.org. Specific programs are:

Parent-Infant Financial Aid

The Parent & Infant Financial Aid Program provides financial aid to families of infants and toddlers ages birth through 3 who have been diagnosed with a moderately-severe to profound hearing loss, who are in pursuit of a spoken language outcome for their child. Grants are awarded to assist with expenses associated with obtaining services such as auditory support services, speech-language therapy, technology, pre-school fees/tuition, etc.

Families should be committed to a listening and spoken language approach for their child's listening, speech, oral communication and cognitive skills. These awards are made one time for the year, generally in the month of December. Award recipients may apply for this program again in future years. Award amounts vary; over the past three years, awards have ranged from $300 to $2,000.

Eligibility Criteria:

- The child's fourth birthday must be after December 31, 2023.
- The child must have a documented bilateral hearing loss or auditory neuropathy.
  ***Note**: Children with unilateral (one-sided) hearing loss or unilateral auditory neuropathy do not qualify.*
- Parents must be committed to and pursuing a listening and spoken language outcome for the child.
- The child and family must reside in the United States (including territories) or in Canada; if in the United States, parents must provide a Social Security or Tax ID number.
- Parents/guardians should be able to clearly outline their need for financial assistance and plans for using grant funds.
- The child's hearing loss must be within the moderately-severe to profound range. Children with cochlear implants meet this eligibility requirement. The child must have an unaided Pure-Tone Average (PTA) of 55dB or greater in the better hearing ear in the speech frequencies of 500, 1000, 2000 and 4000 Hz

School Age Financial Aid Awards

The Preschool-Age Financial Aid program was established to provide financial aid support to families of preschool-age children who have been diagnosed with a moderate to profound hearing loss and who are in pursuit of spoken language education for their child. Grants are awarded to assist with expenses associated with obtaining services such as auditory support services, speech-language therapy, preschool tuition, etc. Families who apply must be committed to a listening and spoken language approach for the education of their child's listening, speech and cognitive skills.

These are one-time awards made generally at the end of summer. Award amounts vary; over the past three years, awards have ranged from $350 to $2,000.

Eligibility Criteria
In order to be eligible for this program, applicants must meet **all** the following criteria:

- The child's bilateral hearing loss or Auditory Neuropathy must have been diagnosed before the child's fourth birthday. Children with unilateral (one-sided) hearing loss or unilateral Auditory Neuropathy do not qualify.
- The child's hearing loss must be in the moderately-severe to profound range. This means that applicants must have an unaided Pure-Tone Average (PTA) of 55 dB or greater in the better hearing ear, in the speech frequencies of 500, 1000, 2000 and 4000 Hz. * Children with cochlear implants meet this eligibility requirement.
  - **Formula for calculating the PTA:** On the unaided audiogram, look at the results for the better hearing ear at 500, 1000, 2000 and 4000 Hz and add those three numbers together, then divide that total by four. The result is the Pure Tone Average. To be eligible for this award, the child's PTA must be 55 dB or greater.

Additional Financial Aid & Scholarships
For additional information on child and adult financial assistance, please visit AG Bell's Financial Aid web page: www.agbell.org/connect

Early Intervention Services for Children

Most states' Departments of Human Services (or varying terminology) contain a Division for Developmental Disabilities that administer an Early Intervention Program providing support and services to infants, toddlers, and their families. Other names of this division may include Maternal and Child Health Services or the Youth Projects Division.

Services Offered

Speech-Language Pathology

- Assessment and intervention services to address the functional, developmental needs of an infant or toddler with a disability with an emphasis on communication skills, language and speech development, sign language and cued language services, and oral motor functioning, including the identification of specific communication disorders.
- Collaboration with the family, service coordinator and other early intervention service providers identified on an infant's or toddler's Individual Family Service Plan (IFSP).
- When necessary, referral for community services, as well as health or other professional services.
- Consultation to adapt the environment and activities to promote speech and language development and participation of an infant or toddler with a disability.
- Family training, education and support provided to assist the family of an infant or toddler with a disability in understanding his or her functional developmental needs and to enhance his or her development.

Audiology Services

- Identification and ongoing assessment of an infant or toddler with an auditory impairment and determination of the range, nature, and degree of hearing loss and communication function.
- Collaboration with the family, service coordinator and other early intervention service providers identified on an infant's or toddler's IFSP.
- When necessary, referral for community services, as well as health or other professional services.
- Auditory training, aural rehabilitation, sign language and cued language services, and other training to increase the functional communication skills of an infant or toddler with a significant hearing loss.
- Determination of an infant's or toddler's need for individual amplification, such as a hearing aid, and selecting, fitting, and dispensing appropriate amplification and then evaluating the effectiveness of the amplification.
- Training, education, and support provided to assist the family of an infant or toddler with a significant hearing loss in understanding his or her functional developmental needs related to the hearing loss and to enhance his or her development.

Transportation
Reimbursement for reasonable and most appropriate travel expenses, including mileage, taxis, common carriers, tolls or parking, necessary to enable an infant or toddler with a disability and the family to receive early intervention services.

Eligibility

Although there is no United States citizenship requirement for state and federal funds, the family and child must live within the state they are applying.

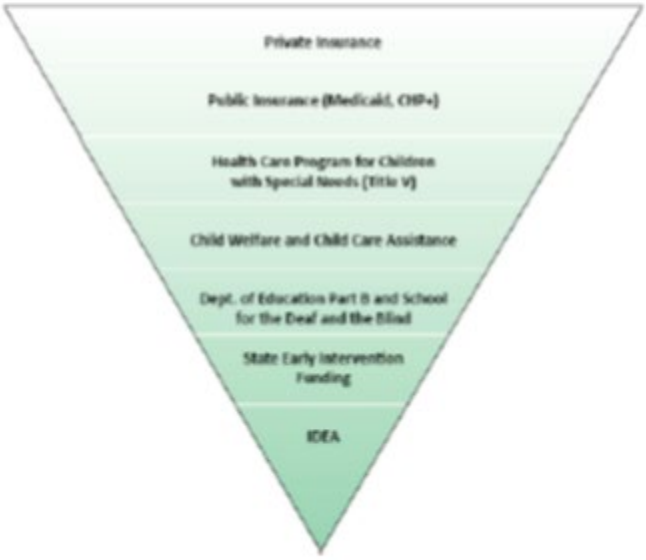
Generally, the child must be under two years of age and have either a developmental delay in hearing (and possibly other areas) or a medical diagnosis that has a high probability of resulting in a significant developmental delay or disability as the child gets older, even though the child may not currently have an observable delay or disability.

Financial Assistance Available

The state planning team will help the family identify funding sources for the early intervention services that are necessary and appropriate. A Funding Hierarchy (pictured below) represents the order in which funding sources must be considered from the top of the chart to the bottom. The IFSP always takes precedent over the requirements of the funding source. If the insurance plan or the plan's approved service provider(s) will not provide the service(s) as specified on the IFSP in the home or community settings identified by the family as being their natural environment, it is appropriate to complete the Insurance Exemption Form and move to another payment source on the funding hierarchy.

By law, the family must use private or public insurance coverage first, and other sources as indicated in the pyramid.

Only as a funder of last resort will IDEA Part C be used (see image below).



Hike Fund, Inc.

530 Elliott St,
Council Bluffs, IA 51503-0202
Tel: 712- 325-0812
www.thehikefund.org | thehikefund1985@gmail.com

Services

The HIKE fund is a not-for-profit charity that provides hearing devices for children with hearing impairments between birth and twenty years of age whose parents are unable to meet this special need financially.

Eligibility

Children under the age of twenty who are U.S. citizens and have not received a previous HIKE Award within the last four (4) years and who have been identified as 1) having a need for a hearing aid(s) or an assistive listening device and 2) having a financial need can benefit from HIKE. Applicants with a documented hearing loss are considered without regard to sex, race, religion, color, or creed. HIKE will not accept applications for services or devices already fitted.

With proper application, other hearing devices, as needed, on an individual basis may be considered for funding. Included may be enclosed caption converters for television, tactile units, FM units (into which a hearing aid is plugged for amplification), computers to assist deaf children in communicating, as well as other prescribed technical devices.

To Apply

Each application is weighed on its own merit, and the application requires an important letter from the applicant's family. Considerations include family income, size of household, and burdensome medical expenses.
Application Information

John Tracy Clinic

2160 West Adams Blvd
Los Angeles, California, USA 90018
Tel: 213-748-5481
www.jtc.org

Services

John Tracy Clinic, is a private, non-profit education center founded by Louise Tredwell Tracy in 1942, offers to families of infants and preschool children with hearing losses free, parent-centered services worldwide.

Hope for Hearing Foundation and Hearing Aid Bank

The Hope for Hearing Foundation Hearing Aid Loan Program is available only in the Southern California area at this time. The program collects used hearing aids of all kinds. The hearing aids are inspected and if still viable, they are put into working order and given away.

Eligibility and to Apply:

The hearing aids are intended for people who are hearing impaired but have no other resources for obtaining an instrument. The applicant must send a copy of a recent audiogram with his/her application. Call the above number to confirm the accurate email for applications.

Preschool for Children who are Deaf and Hard of Hearing

This program is for ages two through five and is offered to families free of charge Monday through Thursday, September through May. Parent education and parent participation are emphasized in a rich, English language environment. Social, emotional, cognitive, and physical growth opportunities are nurtured, and activities encourage children to use their amplified residual hearing and to develop speech as well as receptive and expressive language skills.

Every child meets daily with a speech and language teacher for individual training. Parents work in the preschool one day per week and observe the speech and language sessions to learn how to teach language effectively at home. Parents also schedule weekly conferences with their child's preschool teacher and biweekly meetings with their speech and language teacher.

Parent Class and Support Group are attended by all parents twice a month. In this way, parents are given the opportunity to gain the knowledge and skills they need to foster their child's overall development, and to share with others the feelings, triumphs, and obstacles their family is experiencing.

Eligibility and to Apply:

To enroll in the Preschool Program, parents must first attend the Parent/Infant Program on a consistent and regular basis. Contact: Angie Stokes, astokes@jtc.org