

- » Discovering how hearing loss happens
- » Realizing how common hearing loss is and the many ways addressing it benefits your health and well-being
- » Looking at different strategies to hear and communicate better

Chapter **1**

Cheers to Your Ears!

Cheers, indeed! It's not often that we take a moment to appreciate what our ears — and more importantly our ability to hear — allow us to do!

From the clink of two wine glasses coming gently together to the word “Cheers” itself, your ability to hear allows you to process and understand the world around you. Enjoying a conversation over dinner, appreciating the melody and voices of a choir, pulling to the side of the road at the sound of a fire engine . . . it's all made possible by your hearing!

For all of us, though, our hearing will gradually and subtly decline over time. By the time we're in our 40s, 7% of us will experience some hearing loss. By our 60s, that number grows to 27%, and by our 80s and older, 82%. Hearing loss is inevitable even for those of us who didn't attend loud concerts or crank up the volume in our earbuds. Yet all too often, people perceive hearing loss as a relatively inconsequential aspect of aging.

Scientists now know that nothing could be further from the truth. Addressing hearing loss may be one of the most important things you can do to keep your body and brain healthy and to keep you engaged with life. This chapter takes you on a tour of why we all develop hearing loss, why it matters, and most importantly, what you can — and should — do about it. Hearing loss isn't about growing old. Rather, addressing hearing loss is one thing we can do to keep us engaged with our families, friends, and colleagues in our everyday lives. This book is all

about understanding hearing loss, what you can do about it, and the joys and benefits to health and well-being that hearing brings to your daily life.

Understanding Why Hearing Loss Happens

Knowledge is power! If you're reading this book, you may be concerned about what you should know about hearing loss and what can be done about it. This chapter gives you an overview of the information you need to understand what's happening and the steps you can take to hear better.

Hearing takes place over two steps

The sounds we hear every day — like someone's voice, a piece of music, or a fire engine — are complex and made up of a mosaic of thousands of individual sounds of different pitches and intensities. The first step in being able to hear is that your inner ear (the *cochlea*) converts this mishmash of different sounds with perfect precision into a signal that is transmitted to the brain. (For more on how your ears and hearing work, turn to Chapter 2.)

Imagine recording a symphony with a fancy microphone and a computer. The microphone picks up the complicated, rich music in the symphony hall and encodes it into a stream of data that can be analyzed and recorded on the computer. Your cochlea is basically doing the same thing as the microphone in picking up the sounds that come to your ear and encoding these sounds into electrical signals (data) that are transmitted to your brain.

The second step of hearing occurs when your brain receives the signal (or “data”) from the ear and decodes it into meaning. Your brain can nearly instantaneously decode the signal into whether the sound you just heard was someone saying your name, a melody in your favorite piece of music, the fire engine roaring down the street, or perhaps all three at the same time! To do this, your brain relies not only on the data sent from your ear but also additional cues as well. For example, when decoding speech sounds, your brain also relies on knowing the context of the conversation and seeing the movements of the speaker's lips.

Hearing loss happens as the inner ear wears out

There are many different types of and causes of hearing loss, but in this book, we're covering the most common type of hearing loss that all of us will develop to

some degree over time. This type of *sensorineural* hearing loss (see Chapter 2) develops over time as parts of the inner ear wear out gradually. The inner ear is made up of highly specialized cells responsible for converting sounds into a neural signal. Unfortunately, unlike other cells in the body, these specialized cells of the inner ear (called sensory hair cells) can't regenerate once they wear out and have become damaged. In contrast, cells in other parts of your body, like your brain, liver, and heart, can all gradually be replaced over time by new cells.

As these cells of the inner ear wear out over time and are lost, the inner ear becomes less effective at accurately encoding the sounds entering your ear into a precise neural signal. In this case, your brain still receives data from the ear, but instead of being crystal clear, the data comes across as garbled and unclear. That's why for anyone with hearing loss, it sounds as if other people aren't speaking clearly or are mumbling. You may not even notice that your hearing is getting worse over time, because it can happen very gradually and subtly. Certain sounds may just sound a little fuzzy or garbled, but you may not realize it's due to hearing loss.

Factors that affect your hearing over time

Lots of different factors can affect your hearing over time (we detail these in greater depth in Chapter 3), and they can generally be divided into those that are non-modifiable (those you can't control) versus those that are modifiable (ones you *can* control).

Here are some key non-modifiable risk factors:

- » **Age:** This is the strongest risk factor for hearing loss. The cells in your ears responsible for hearing degrade over time.
- » **Sex:** Compared to men, women in general have better hearing. This may be related to women having increased estrogen that scientists think could protect the inner ear. Women may also have less exposure on average to loud sounds than men.
- » **Skin color:** Individuals with darker skin on average are at a lower risk of hearing loss. The amount of melanin in your skin determines your skin color (the more melanin you have, the darker your skin color is), and there's a corresponding amount of melanin in your inner ear. Scientists believe this inner ear melanin helps protect the inner ear over time.

The most important modifiable risk factors for hearing loss include these:

- » **Noise:** This is by far the most important risk factor you can control. As a general rule of thumb, if you're in an environment or situation where you

consistently have to raise your voice to be heard, you should move away from the noise if you can or consider using some form of ear protection such as earplugs or over-the-ear noise-canceling headphones or earmuffs. You'll also want to avoid listening to music through headphones or earbuds for too long or too loud. See Chapter 3 for tips on how to use headphones safely and information on how noise affects hearing.

» **Cardiovascular risk factors:** There are myriad risk factors for cardiovascular disease such as smoking, hypertension, and diabetes, and all these can also increase your risk for hearing loss by damaging the small blood vessels that go to your ear. Head to Chapter 3 for more information.

Putting Hearing Loss in Context

Everyone loses some hearing with age. What we want to stress is just how common it is; how it can impact your physical, emotional, and cognitive health; and what you can do to hear better.

Hearing loss happens to everyone

If you're concerned about hearing loss, you are most certainly not alone!

The number of people who experience hearing loss is staggering, as Figure 1-1 shows.

In this figure you can see that the percentage of people with hearing loss nearly doubles with every decade of aging. The figure also gives an indication of the relative severity of the hearing loss divided into those with mild and moderate or worse hearing loss. These concepts are covered in more detail in Chapter 7.

How hearing loss impacts our health and well-being

Scientists didn't always understand much about the consequences of hearing loss for adults. The general impression among even doctors was that since everyone developed some hearing problems over time, it couldn't possibly be that bad for health.

That period has now passed.

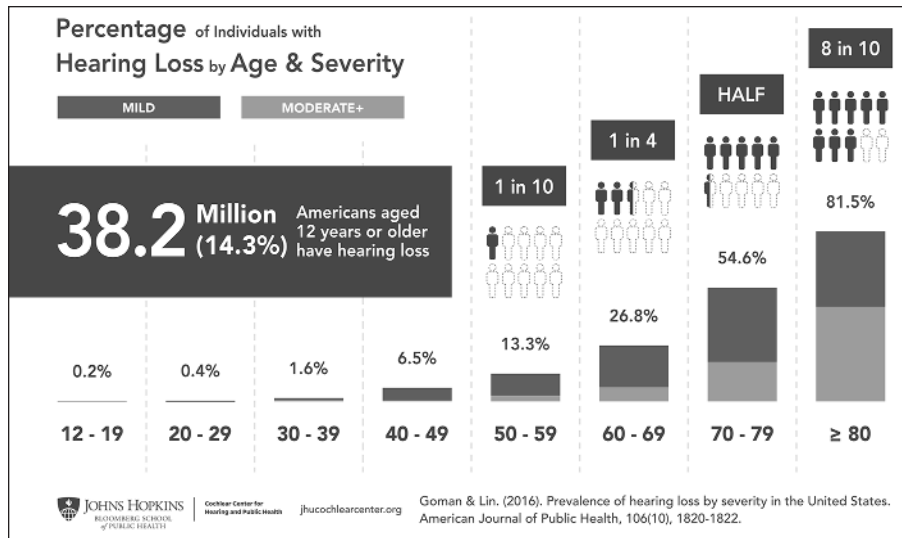


FIGURE 1-1: Prevalence of hearing loss in the United States.

Source: Johns Hopkins Cochlear Center for Hearing and Public Health

Research over the past decade has increasingly demonstrated the adverse effects that hearing loss can have on our health. Key areas where scientists now believe that hearing loss increases our risk for adverse health events include cognitive, emotional, social, and physical areas of health:

- » **Cognitive impairment and dementia:** Research suggests that of all the known treatable risk factors for dementia, hearing loss may be the single largest contributor to dementia risk. Scientists think this is because hearing loss makes it harder for our brain to process sound, and individuals with hearing loss are less likely to remain engaged in social and other stimulating activities that are critical to cognitive health.
- » **Loneliness:** Feeling withdrawn and detached from others is strongly linked with poor health outcomes like early mortality, heart attacks, and cognitive decline. Hearing loss contributes to loneliness because it makes it harder for people to socially engage with others.
- » **Falls:** Hearing is one of several systems — including our vision, *vestibular* (balance), cardiovascular, pulmonary, and *proprioception* (sense of touch) systems — that allow our brain to maintain our body's balance.

Importantly, while scientists now understand that hearing loss likely contributes meaningfully to all these adverse outcomes, they don't know yet whether our current treatments for hearing loss (for example, using hearing aids) may lower this risk. Studies are ongoing, and scientists are hopeful.

The benefits of addressing hearing loss

The important thing to keep in mind about hearing loss is that it comes on so slowly that many people aren't even aware they're struggling to hear (despite everyone else noting the struggles the person is having!). The single most important reason to address your hearing loss — with the strategies and technologies detailed in this book — is so that you can fully engage with others and the world around you. Scientists and doctors have long known the positive benefits that addressing hearing loss can have on relationships and personal well-being. Importantly, researchers are also now just beginning to understand that these strategies to address hearing loss may have even bigger long-term implications for keeping our brains healthy and free of disease as well!

What You Can Do about Hearing Loss

Besides avoiding loud noises and protecting cardiovascular health, what can you do about hearing loss? It can't be cured, but it most certainly can be addressed with a range of strategies to allow individuals with hearing loss to communicate and hear optimally. When it comes to hearing loss and how it affects you, you are the master of your own destiny. You don't have to sit back and just let hearing loss adversely impact your life. There are strategies and technologies to combat these effects so you can remain fully engaged with the richness of the world around you (see Chapters 8 through 13 for details on these).

Know your hearing

This may seem obvious, but to address hearing loss, you first need to know whether in fact you have hearing loss! In many cases, as you can tell from Figure 1-1, you may have a pretty good idea already based purely on your age (nearly two-thirds of everyone over 70 has hearing loss) and the symptoms you may be experiencing. Subjective impressions of your hearing can be helpful, but in most cases, you'll be far better informed if you have an objective hearing test.

Get your hearing checked

Hearing tests are most commonly performed by an audiologist or a hearing instrument specialist. Ideally, you want to start with an audiologist since these are health professionals trained to diagnose and treat hearing loss, and health insurance will nearly always cover the exam. Depending on your insurance, you may need a medical referral. An audiologist can perform a comprehensive hearing exam and then discuss your evaluation and possible options to address any hearing or communication problems you may be experiencing.

Hearing instrument specialists can also assess your hearing. They are licensed by the state to sell hearing aids and to conduct hearing tests expressly for the purposes of possibly fitting a hearing aid. Hearing instrument specialists often offer these hearing tests for free, but their ultimate hope is that you'll then buy a hearing aid from them. There's nothing wrong with these tests, but just be forewarned that they may also come with a sales pitch.

You may also want to consider having your hearing evaluated by an ear, nose, and throat (ENT) physician (also called an *otolaryngologist*), particularly if you have any medical concerns about your hearing. An ENT is trained in the medical and surgical management of hearing loss and often works with an audiologist in the office. The audiologist performs the hearing evaluation, and the ENT then examines your ears and evaluates whether you have any medically or surgically treatable issues related to your hearing loss. Consult an ENT if you notice any of the following:

- » Drainage from your ears
- » Ear pain
- » Asymmetrical hearing between your ears
- » Sudden or fluctuating hearing loss (see an ENT immediately if your hearing loss comes on suddenly)
- » Dizziness or vertigo
- » Hearing loss that has not been significantly helped by using hearing aids in the past

Turn to Chapter 6 for a full rundown on hearing professionals and tests.

Get your hearing number

One of the best ways to get a better grasp and understanding of your hearing is to know your hearing number. The hearing number — known clinically as the speech-frequency pure-tone average — indicates how loud on average speech sounds have to be for you to hear them. The larger your hearing number, the worse your hearing is.

You will get this number from your hearing test. You can also calculate it from a hearing test yourself using your own smartphone (see Chapter 7).

You can find more details about the hearing number — how it's calculated and what it means — in Chapter 7 and at www.hearingnumber.org, part of an effort by the Johns Hopkins Bloomberg School of Public Health, where both authors are based, to increase public awareness and knowledge around hearing loss.

In general, the greater your hearing number is, the more communication strategies and technologies you'll want to consider using to allow you to hear and communicate optimally.

Using communication strategies

The most important way for you or a loved one to optimize hearing and communication is with some basic communication strategies. These strategies can help with communication because they focus on getting a clearer sound to your ear.

“How does this help with hearing?” you may ask. The cells in the inner ear break down over time, as we mention earlier in the chapter, and the inner ear can no longer convert sound into the signal that goes to the brain as accurately as it once did. As a result, the signal that reaches the brain sounds garbled or fuzzy; you may complain that people are mumbling.

In a situation where the incoming sound was very clear to begin with, some slight garbling in the encoding process in the inner ear can still lead to a fairly clear signal reaching the brain that is easily understandable. In contrast, say the incoming sound was already fuzzy to begin with (imagine trying to hear someone over the din of a loud cocktail party). The inner ear with hearing loss then further garbles the sound during the encoding process, and the resulting signal to the brain may be completely unintelligible.

The communication strategies summarized here and covered in greater depth in Chapter 8 can enhance the quality of the incoming sound and/or provide the listener with additional cues to help their brain understand sound. Important communication strategies to keep in mind are

- » Get close to (within arm's length) and face-to-face with people you're talking to.
- » Turn down or move away from any background noise whenever possible when talking to others.
- » At restaurants or other indoor places, choose rooms that are smaller and have lower ceilings and lots of soft surfaces (such as curtains and rugs), which reduce the amount of reverberation that can markedly degrade sound quality.
- » Instead of saying “Huh?” or “What?” when you can't understand what someone has said, be specific about what you did and didn't hear. For example, “I heard you say something about meeting for dinner but missed the rest.” This takes a bit longer but cues the speaker into exactly what to repeat and shows that you were listening (so you aren't accused by your spouse of never paying attention!).

Hearing technologies

Yes, technology can indeed be a huge help when it comes to optimizing your ability to hear and communicate with hearing loss. But the *most important* thing is to manage your expectations. Hearing technology — such as hearing aids and cochlear implants — can improve your hearing, but no matter how much you pay, it can never completely fix your damaged inner ear and its degraded ability to accurately encode sounds.

That being said, when these technologies — such as hearing aids and cochlear implants — are appropriately used and programmed for your hearing loss, they can make a *huge* life-changing difference in your ability to navigate your day with ease. Keep in mind, though, that when using such technologies, the benefits aren't always noticeable immediately. It often takes a few months for your brain to get used to and benefit from the new sounds that a hearing aid or cochlear implant provides. Think of using a new set of hearing aids like learning to ride a bike for the first time. You may not like it at first, but over time as your brain gets used to the sounds from the hearing aids and learns how to use them, the benefits can be remarkable.

Hearing aids

Hearing aids are the foundational technology for many people with hearing loss, and prescription hearing aids are typically purchased through a hearing care professional who will provide you with support services to ensure you're able to benefit from the hearing aids. This model of hearing care delivery where you have to get your hearing aids through a hearing care provider works well for some people but is not necessarily ideal for everyone.

A new and exciting development is happening, though, as this book goes to press in 2022. Beginning in late 2022, hearing aids in the United States will soon be available not just as prescription but also as over-the-counter (OTC) devices.

OTC hearing aid regulations at the time of publication are just being finalized by the U.S. Food and Drug Administration (FDA). Once these regulations are enacted in late 2022, manufacturers will be able to develop and sell OTC hearing aids that meet specific acoustic performance criteria to ensure that these hearing aids are both safe and effective for consumers without the need for an audiologist or hearing instrument specialist. These OTC hearing aids will be specifically for adults with mild to moderate levels of hearing loss, which is what the vast majority — over 90 percent — of people with hearing loss have. (When purchasing OTC hearing aids, you may still want to consult with a professional to best understand which devices to consider and how to best use them.)

In contrast, prescription hearing aids will still continue to be available through an audiologist or hearing instrument specialist. People who have greater severity levels of hearing loss, who have other ear or audiological issues, and who need a much more customized hearing aid because of their listening needs will still need prescription devices.

Thriving with hearing aids means setting appropriate expectations for what hearing aids can and can't do (hint: they don't restore hearing to normal), practicing with your hearing aids to get used to them, and creating good care and maintenance routines. Your actions can make all the difference in whether or not you succeed with hearing aids. Understanding this is especially important when pursuing OTC hearing aids without the guidance and input of a professional.

To get more information and answers to your hearing aid questions and tips for thriving with hearing aids, check out Chapters 9 through 12.

Cochlear implants

Cochlear implants are indicated for adults who have hearing loss in the severe range and no longer find adequate benefit from using a hearing aid. A cochlear implant is a surgically implanted *neuroprosthesis* that converts sounds into electrical signals that are then directly sent by the cochlear implant to the brain via the hearing nerve (see Chapter 13 for more information). In this way, the cochlear implant takes the place of the cochlea, and thus, is a prosthesis.

Cochlear implants have been around for more than 30 years and are a routine outpatient day surgery for any ENT who specializes in ear surgeries. (Nearly all academic medical centers and large private-practice ENT groups offer this surgery.)

As a general rule of thumb, if you or a loved one still struggle with communication despite using hearing aids and have a moderately severe or greater hearing loss (with a hearing number somewhere in the 60s or worse — see Chapter 7), you may want to consider being evaluated to see if you're a candidate for a cochlear implant. This evaluation is routinely covered by insurance and is generally offered by any academic medical center or larger private-practice ENT group.

In the past, the FDA approved cochlear implants only for individuals with severe hearing loss in both ears. Recently, that changed. Cochlear implants are also now indicated for individuals with severe or greater hearing loss in just one ear (also called single-sided deafness, or SSD). Not all insurance plans, though, cover a cochlear implant for SSD.

Getting the Support You Need

Addressing hearing loss may at times may seem like it's solely the responsibility of the person with hearing loss, but nothing could be further from the truth! When a person struggles with communication, it's as much the individual's concern as well as the other people they're trying to speak with.

Surprisingly, most people never learn what to do to help others with hearing problems despite the vast number of people with hearing loss. Chapter 14 explains how a person's hearing loss can have cascading effects on others and the various strategies that can allow people to support them. Options for covering hearing care either through insurance or out-of-pocket (Chapter 15) and a person's legal rights under the Americans with Disabilities Act and other federal policies (Chapter 16) pertaining to hearing loss are also covered in Part 4 of the book.

