



A TruHearing® White Paper for Benefit Administrators and Health Plans

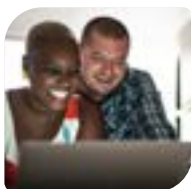
Focus on:

TruHearing Online Hearing Screening

Powered by SHOEBOX



Empower your
members to move
toward better hearing—
and better health



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Remove Barriers to Better Hearing

Support your members' journey toward better hearing health

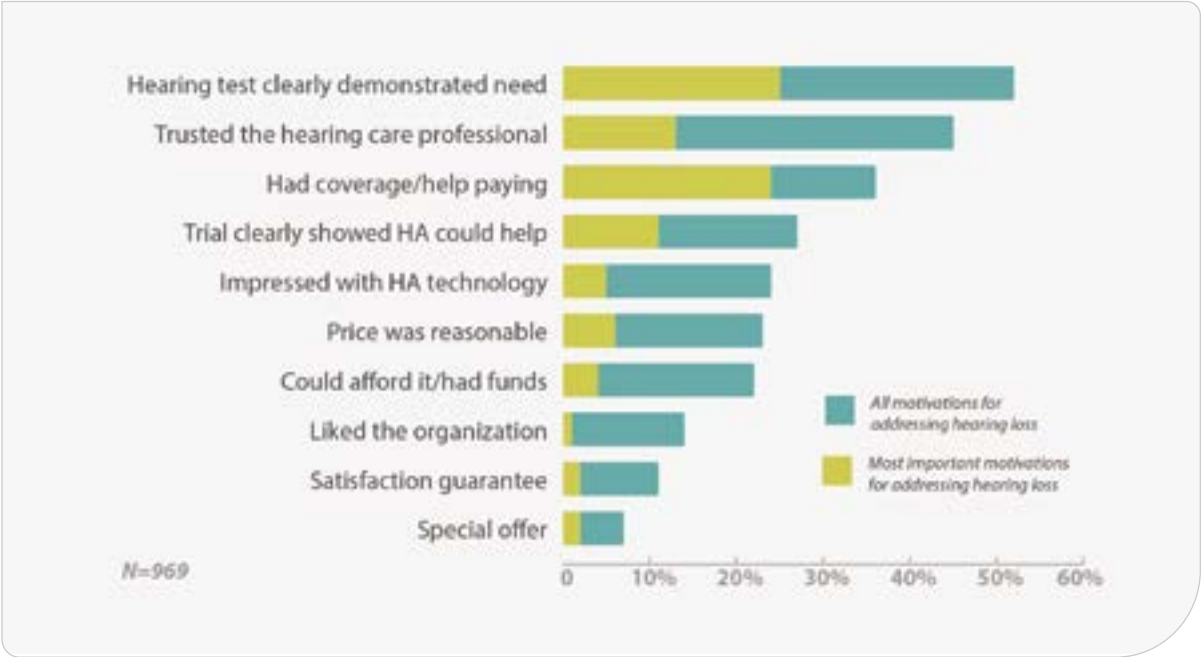
Hearing loss, especially untreated loss, stands out as both a national and global health issue. As the third most common chronic physical condition in the U.S., it affects more people than either diabetes or cancer.¹

Sobering estimates abound: 38 million Americans age 12 or older have some form of hearing loss,² and 21.6 million U.S. adults who could benefit from hearing aids have never used them.³ Of U.S. adults who could benefit from a hearing aid, just 30% of those 70 and older—and only 16% of those 20 to 69—have ever used a hearing aid.⁴

Additionally, studies show an individual takes an average of six years to go from acknowledging hearing loss to addressing it.⁵

What's preventing people with hearing issues from seeking care?

- Lack of awareness around early-stage loss
- Access to care (including geographic, logistical, and financial barriers)
- Missing knowledge about available resources
- Failure to talk to a health care provider about hearing health
- Lack of understanding that untreated hearing loss reduces quality of life and is associated with other health conditions
- Stigma, especially the fear of appearing "old"



To help change this story, we've partnered with the leading provider of mobile audiology solutions: The TruHearing online hearing screening is powered by SHOEBOX Online, their data-driven online hearing screener, creates a fast, free, and easy way for your members to check their hearing wherever and whenever they like.

In a 2019 industry study, nearly 1,000 patients listed hearing test results as their top driver for pursuing further care.⁶ In an article discussing the study findings, MarkeTrak 10 shared that patients cited "hearing test clearly demonstrated need" as their top driver for moving forward and

addressing hearing loss (see Figure 1, Motivations for Addressing Hearing Loss).

The TruHearing online hearing screening sidesteps members' typical barriers to hearing health care by providing a private, accessible online screener. The quick, simple-to-use screener gives members immediate information about their hearing health with:

- no cost,
- no travel,
- no need to disclose their identity, and
- no interruption to daily family, work, or life responsibilities.

FIGURE 1: Motivations for Addressing Hearing Loss

Patients Cite Hearing Test Results as the Top Factor in Pursuing Hearing Aids (HA). Per MarkeTrak 10, patients had two top reasons for moving forward and addressing hearing loss: a hearing test clearly demonstrated the need, and trust in their hearing care professional.⁶

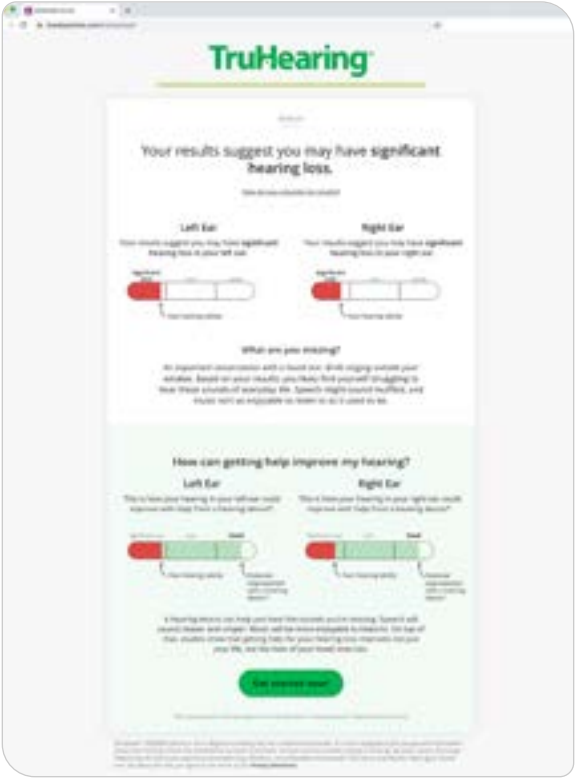


FIGURE 2: Sample TruHearing Online Hearing Screening Results

In just three minutes, your members can do a remote check of their hearing by pairing ordinary headphones or earbuds with their mobile phone, tablet, or computer. Our online screening uses multiple test methodologies including a patented Dynamic Range technology to categorize a member's hearing ability in each ear as Good, Loss, or Significant Loss.

If their results indicate a potential hearing loss, they'll see a prompt to take action; if they click, they'll go straight to your dedicated TruHearing landing page (see Figure 2, Sample TruHearing Online Hearing Screening Results). Because the screening is both private and anonymous, members can determine their next steps without feeling pressured.

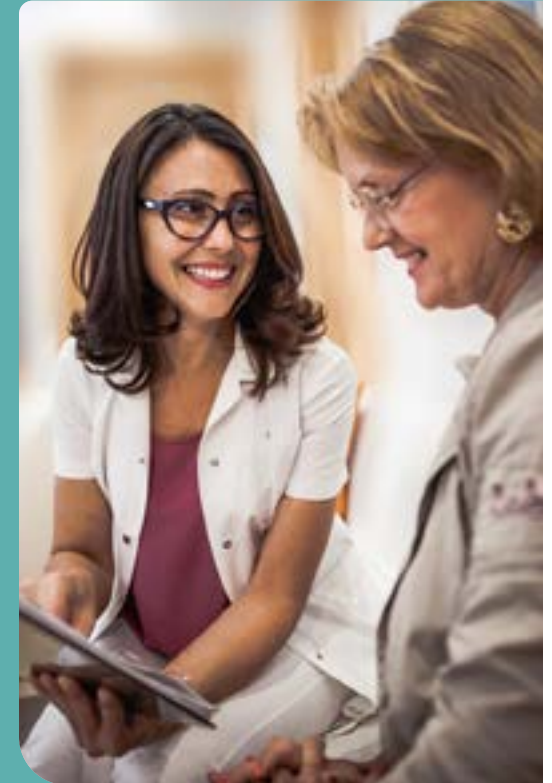


Engage and Empower Members

Studies show that an individual takes an average of six years to go from acknowledging hearing loss to addressing it.⁵

To help close this gap, organizations can look to a 2019 industry study that investigated patients' motivations for addressing hearing loss. Nearly 1,000 patients cited a hearing test result that indicated need as their number one driver for pursuing further care.⁶ (See Figure 1, Motivations for Addressing Hearing Loss.)

The TruHearing online hearing screening provides a free and easy on-ramp for connecting members in need to hearing care providers. Members whose results indicate possible hearing loss are invited to click a link that connects them directly with us. From there, our Hearing Consultants schedule them with a qualified provider at one of TruHearing's 7,000 provider locations.



Within two weeks of rolling out the TruHearing online hearing screening, one of the nation's largest payors had thousands of members take the hearing assessment. Members whose results show loss are encouraged to contact TruHearing, where they're guided to a hearing care appointment.

SHOEBOX Online: The Latest Innovation from SHOEBOX Ltd.

A company determined to expand access
to hearing care

The SHOEBOX Ltd. journey began when founder and Chief Medical Officer Dr. Matthew Bromwich, a pediatric ENT physician and Associate Professor of Otolaryngology, sought a better way to serve patients in remote communities. With audiologists and their specialized booths sometimes a plane ride away, he set out to create a solution that was highly portable and easy to use, enabling more people to administer diagnostic hearing tests.

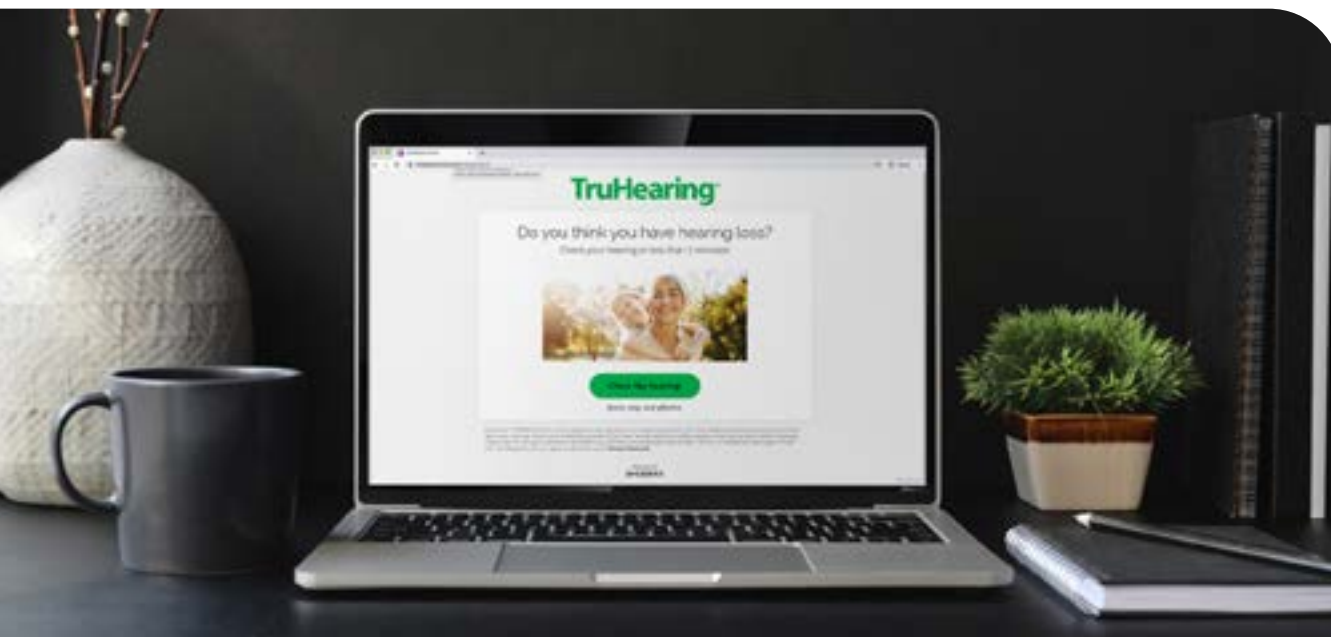
Working with his brother, Julian Bromwich—now SHOEBOX Chief Technology Officer and Chief Security Officer—Dr. Bromwich developed SHOEBOX Audiometry, an iPad®-based

audiometer. The company's pioneering solution is clinically validated for use as a diagnostic audiometer and is optimized for use outside of a sound booth.

- Efficacy study institutions include: The Ottawa Hospital, McGill Faculty of Medicine, and Children's Hospital of Eastern Ontario.
- Publications featuring efficacy and additional studies include Canada's Journal of Otolaryngology - Head & Neck Surgery, the International Journal of Pediatric Otorhinolaryngology, and the Indian Journal of Otology.

 [See the efficacy studies](#)





Why SHOEBOX Online Stands Out

A valid, device-agnostic online hearing screener that doesn't require calibrated headphones

Built by the same team who developed the clinically validated SHOEBOX Ltd. diagnostic audiometer, SHOEBOX Online is optimized for both mobile and desktop (iOS®, Android®, macOS®, and Windows®).

Those who use the hearing screener receive accurate screening results they can trust and that allow them to take action. When testing online, one of the hardest things to control is what device and headphone someone uses. SHOEBOX Online took on the challenge by implementing a multi-factor approach to checking someone's hearing ability. This includes tones test, device and headphone compensation, a predictive and dynamic questionnaire, and a patented dynamic range test methodology. A dynamic range test is more resilient with different hardware

In addition to holding a Class II medical device status with the FDA and Health Canada, the company's iPad audiometry is also CE marked Class IIa in Europe.

SHOEBOX Ltd. continued the evolution of hearing testing with the launch of SHOEBOX Online in April 2020. The team drew on its extensive experience with diagnostic hearing testing to create an online hearing screener which categorizes individuals based on their hearing ability.

In October 2020, SHOEBOX Online received a Silver Hearing Technology Innovator

Award at the inaugural Hearing Health & Technology Matters (HHTM) Innovator Awards.

The recognition moves the company closer to their goal of expanding access to hearing services by making testing available "to anyone from anywhere on the planet."

SHOEBOX Founder Dr. Matthew Bromwich balances his CMO role with his work as a full-time surgeon at Children's Hospital of Eastern Ontario and an Associate Professor of Otolaryngology at the University of Ottawa.

as it measures the relative difference between sounds presented at different levels of intensity to predict hearing level.

SHOEBOX Online offers participants a customized journey due to its predictive and dynamic questionnaire; the screener uses a member's responses to guide the questions they receive.

To validate the categorization of where a SHOEBOX Online user's hearing falls, the team compared SHOEBOX Online results to conventional clinical audiograms' sensitivity and specificity.* (See Figure 3, Effectiveness of SHOEBOX Online Hearing Screening.) They found the assessment has a 93% screening accuracy.

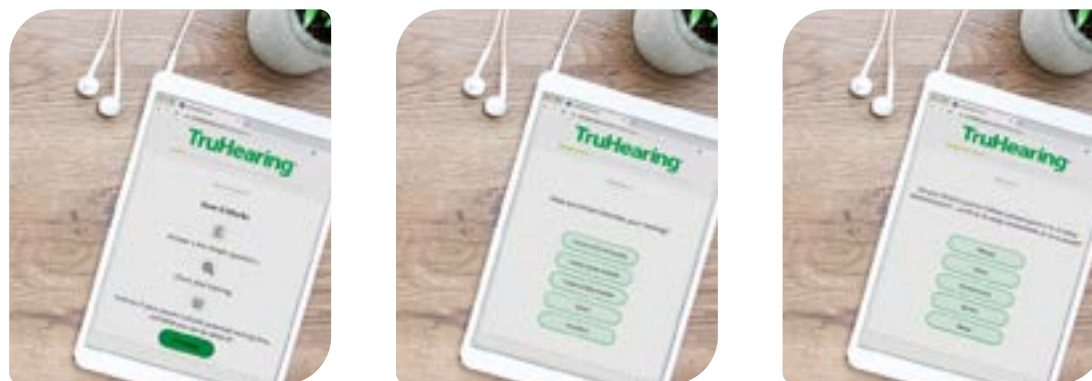
- Its sensitivity[†]—accuracy for those with hearing loss who are classified as “Loss” or “Significant Loss”—is 95%.
- Its specificity[‡]—accuracy for those without hearing loss who are classified as “Good”—is 91%.

When members take the SHOEBOX Online hearing assessment, they enjoy a customized journey due to the screener's predictive and dynamic questionnaire. The screener uses a member's responses to guide the questions they receive.



Figure 3: Effectiveness of SHOEBOX Online Hearing Assessment

Above accuracy results are for the person level evaluation; ear level was also conducted and was comparable. Overall hearing ability based on conventional audiometry. Loss equals at least one threshold (1, 2, 4 kHz) greater than or equal to 30 dB HL.



*Number of study participants: 98 (41 classified with “Good” hearing; 57 with “Loss”).

[†]Sensitivity: the ability of a test to correctly identify patients with a condition.

[‡]Specificity: the ability of a test to correctly identify people without the condition.

At-a-Glance Wellness Watch



Top Risks of Untreated Hearing Loss^{I-VI}



Dementia



Injurious Falls



Depression



Poor Memory

Sources for “Top Risks of Untreated Hearing Loss”

^I Livingston G et al. Dementia prevention, intervention, and care: 2020 report of the Lancet Commission. Lancet 2020 Aug 8; 396:413. doi.org/10.1016/S0140-6736(20)30367-6.

^{II} Besser J, Stropahl M, Urry E, Launer S. Comorbidities of hearing loss and the implications of multimorbidity for audiological care. Hear Res. 2018 Nov;369:3-14. doi: 10.1016/j.heares.2018.06.008. Epub 2018 Jun 19. PMID: 29941312.

^{III} Mahmoudi E, Basu T, Langa K, McKee MM, Zazove P, Alexander N, Kamdar N. Can hearing aids delay time to diagnosis of dementia, depression, or falls in older adults? J Am Geriatr Soc. 2019 Nov;67(11):2362-2369. doi: 10.1111/jgs.16109. Epub 2019 Sep 4. PMID: 31486068.

^{IV} Deal JA, Reed NS, Kravetz AD, Weinreich H, Yeh C, Lin FR, Altan A. Incident hearing loss and comorbidity: A longitudinal administrative claims study. JAMA Otolaryngol Head Neck Surg. 2019 Jan 1;145(1):36-43. doi: 10.1001/jamaoto.2018.2876. PMID: 30419134; PMCID: PMC6439817.

^V Reed NS, Altan A, Deal JA, Yeh C, Kravetz AD, Wallhagen M, Lin FR. Trends in health care costs and utilization associated with untreated hearing loss over 10 years. JAMA Otolaryngol Head Neck Surg. 2019 Jan 1;145(1):27-34. doi: 10.1001/jamaoto.2018.2875. PMID: 30419131; PMCID: PMC6439810.

^{VI} Maharani A, Dawes P, Nazroo J, Tampubolon G, Pendleton N; SENSE-Cog WP1 group. Longitudinal relationship between hearing aid use and cognitive function in older americans. J Am Geriatr Soc. 2018 Jul;66(6):1130-1136. doi: 10.1

The 2020 Report of The Lancet Commission: Dementia Prevention, Intervention, and Care

Researchers found that modifying 12 risk factors could delay or prevent up to 40% of dementia cases—and midlife hearing loss is the top modifiable risk factor.^I

The Commission recommends encouraging the use of hearing aids for hearing loss as well as prevention education focused on protecting ears from excessive noise exposure.

Johns Hopkins Bloomberg School of Public Health

Companion 2019 studies identified more than 77,000 patients with likely age-related untreated hearing loss.* Over 10 years, those with untreated hearing loss had an estimated:

- 50% greater risk of dementia
- 40% greater risk of depression
- almost 30% higher risk for falls


compared to those without hearing loss.^{II} Additionally, untreated hearing loss was associated with 46% higher total health care costs compared with costs for those without hearing loss.^{III}

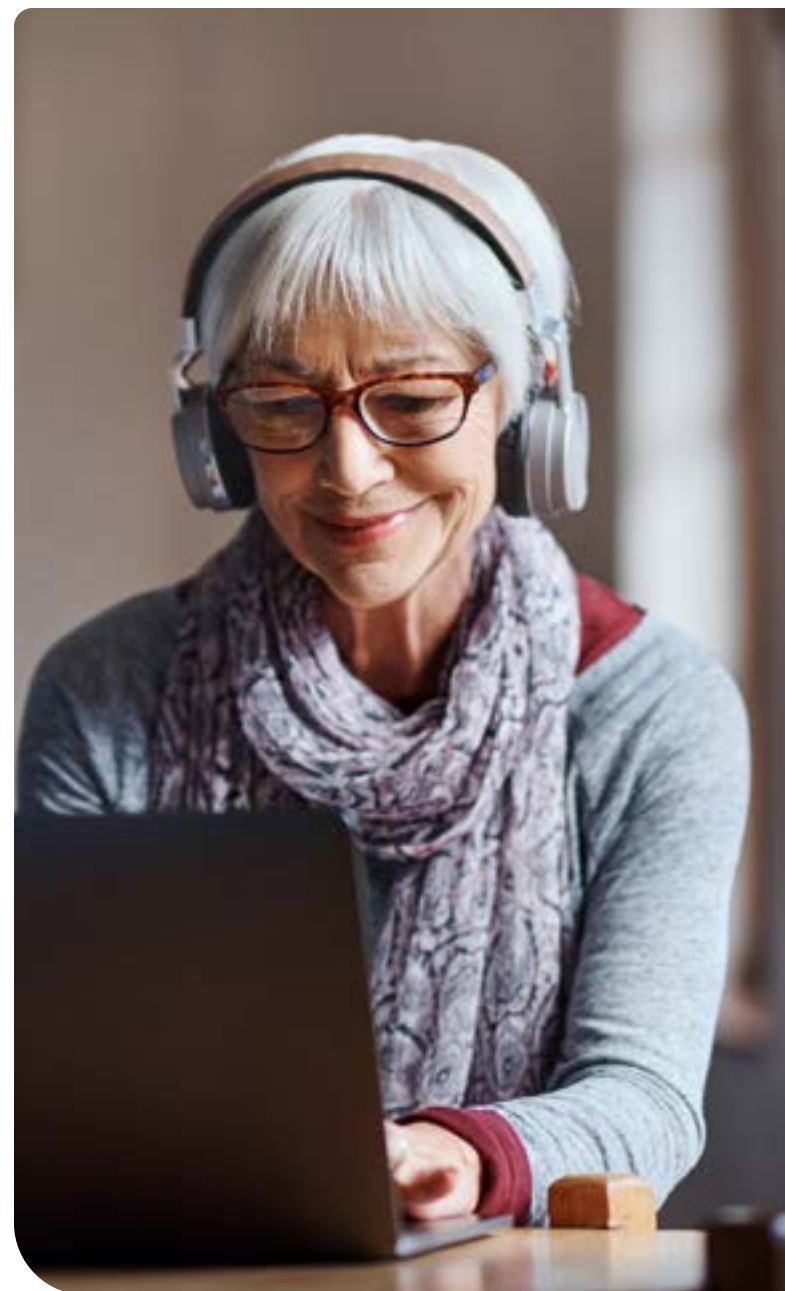
* Note: The studies excluded those where claims data indicated participants used a hearing aid and those including participants whose hearing loss was secondary to a medical condition or toxic agent such as chemotherapy.

Pooling Knowledge, Resources, and Strategies to Combat Untreated Hearing Loss

Recap: TruHearing Online Hearing Screening powered by SHOEBOX Online.

- 93% screening accuracy
 - Uses members' own device and ordinary headphones or earbuds
 - Patented dynamic range test methodology
 - Predictive, dynamic questions: member's input shifts assessment queries
 - Multi-frequency tone detection
 - Immediate results for your member, with prompt to contact TruHearing if screener detects loss
 - Supports member engagement efforts
 - Provides you with contextual information about members' hearing health
- TruHearing and SHOEBOX Online can give you granular demographic data that enhances understanding of your members' hearing health.

 [Contact us to learn more at Sales@TruHearing.com](mailto:Sales@TruHearing.com)



References

- ¹ Blackwell, D. L., J. W. Lucas, T. C. Clarke. Summary Health Statistics for U.S. Adults: National Health Interview Survey, 2012. Vital Health Statistics Series, vol. 10, no. 260. Atlanta, GA: National Center for Health Statistics, CDC, 2014. [cdc.gov/nchs/data/series/sr_10/sr10_260.pdf](https://www.cdc.gov/nchs/data/series/sr_10/sr10_260.pdf).
- ² Goman, Adele M., and Frank R. Lin, "Prevalence of Hearing Loss by Severity in the United States," *American Journal of Public Health* 106, no. 10 (October 1, 2016): 1820-1822. doi.org/10.2105/AJPH.2016.303299. PMID: 27552261
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- ⁵ National Academies of Sciences, Engineering, and Medicine. *Hearing Health Care for Adults: Priorities for Improving Access and Affordability*. Washington, DC: The National Academies Press, 2016.
- ⁶ Carr, Kate. "20Q: Consumer Insights on Hearing Aids, PSAPs, OTC Devices, and More from MarkeTrak 10. *AudiologyOnline*, Article 26648 (March 16, 2020). Retrieved from audiologyonline.com/articles/20q-understanding-today-s-consumers-26648.