

Auditory Insight®

Apple's Hearing Health Strategy



Introduction from Nancy M. Williams, Auditory Insight President

For Auditory Insight's Q2 2021 Research Note, the choice was clear, to focus on Apple's foray into hearing health.

In the past 12 months, Apple has launched the capability for AirPods Pro to provide customized amplification. Recently, Apple shared data on noise exposure from its hearing study.

Apple's first-generation hearing health offering, not without its limitations, won't replace traditional hearing aids, at least not in the next couple of years, particularly for consumers with hearing loss on the severe end of moderate.



Nonetheless, Apple's offering creates value for those of its 113 million US iPhone users¹ who have mild to moderate hearing loss with two fundamental aspects:

- **expanding awareness of hearing loss in unprecedented ways**
- **providing protection and customized amplification in a single device.**

Our findings include implications for how the traditional hearing aid manufacturers need to change to remain competitive, and for how Apple could enhance its offering to further adoption of hearing healthcare.

We look forward to discussing this Auditory Insight research note with our valued clients.

Customized amplification = increases in audibility for a specific set of frequencies, according to the individual's hearing loss. The AirPods Pro are personal sound amplification devices (PSAPs).

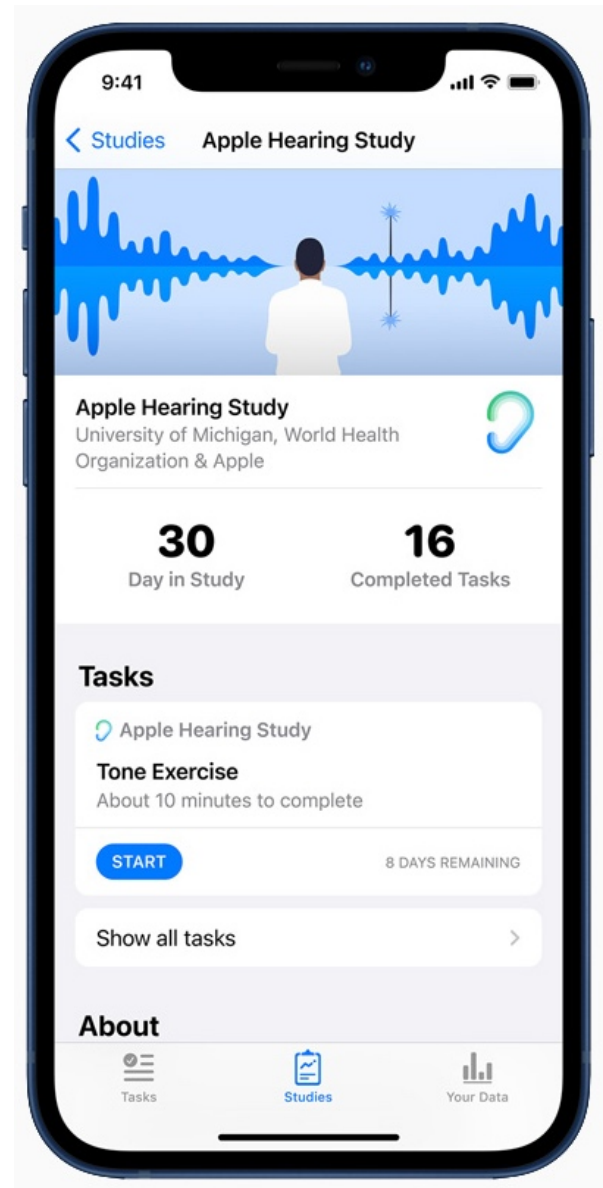
Apple Is Creating Awareness of the Noise Levels in Consumers' Lives in an Unprecedented Way

An important component of Apple's hearing health strategy that has emerged in the last 12 months is the Apple Hearing Study. In March 2020, Apple shared new study data from thousands across the US who participated via the Apple Research app.

Data from the study showed that “25 percent of participants experience a daily average environmental sound exposure (which can include traffic, machinery, public transport, and so on) that is higher” than the limit recommended by the World Health Organization (WHO).²

In addition to participating in the study, consumers who wear an Apple watch—about one-third of iPhone users in the US³—may enable notifications when noise reaches unsafe levels. The Health app on the iPhone “keeps track of a user's history of exposure to sound levels and informs whether headphones or environmental levels have exceeded those recommended by WHO standards.”⁴

By creating dialogue on noise levels, Apple is nudging consumers to consider their hearing health far more often and comprehensively than ever before.



AirPods Pro Provide Customized Amplification with Some Limitations

The second new component of Apple's offering is the AirPods Pro providing customized amplification when worn in Transparency mode, effective with the iOS 14 release in September 2020.

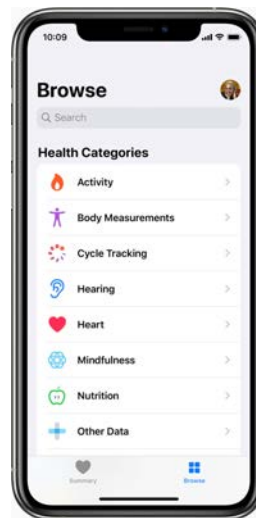
Consumers now have the option to program their AirPods Pro with their unique audiogram.⁵ Consumers take a pure-tone hearing test on apps such as Mimi and SonicCloud and load the resulting audiogram into the Apple Health app.

Requiring consumers to take a hearing test on a separate app is not a streamlined process, one drawback of Apple's offering.

Apple's solution has other limitations. The AirPods Pro's battery life is only 4.5 hours, insufficient for people who wear hearing aids all day. An independent evaluation by Hearing Tracker showed that the devices don't amplify high pitches as well as conventional hearing aids.⁶

AirPods Pro were released in October 2019, almost a full year before the iOS 14 release. Most likely, the earbuds were not designed for amplification, limiting the amplification possible without feedback.

Auditory Insight Assessment of Customized Amplification on Apple AirPods Pro



Health Application

- + Imported audiogram from online hearing test
- + History of audiograms
- No clinical support



Hearing Experience

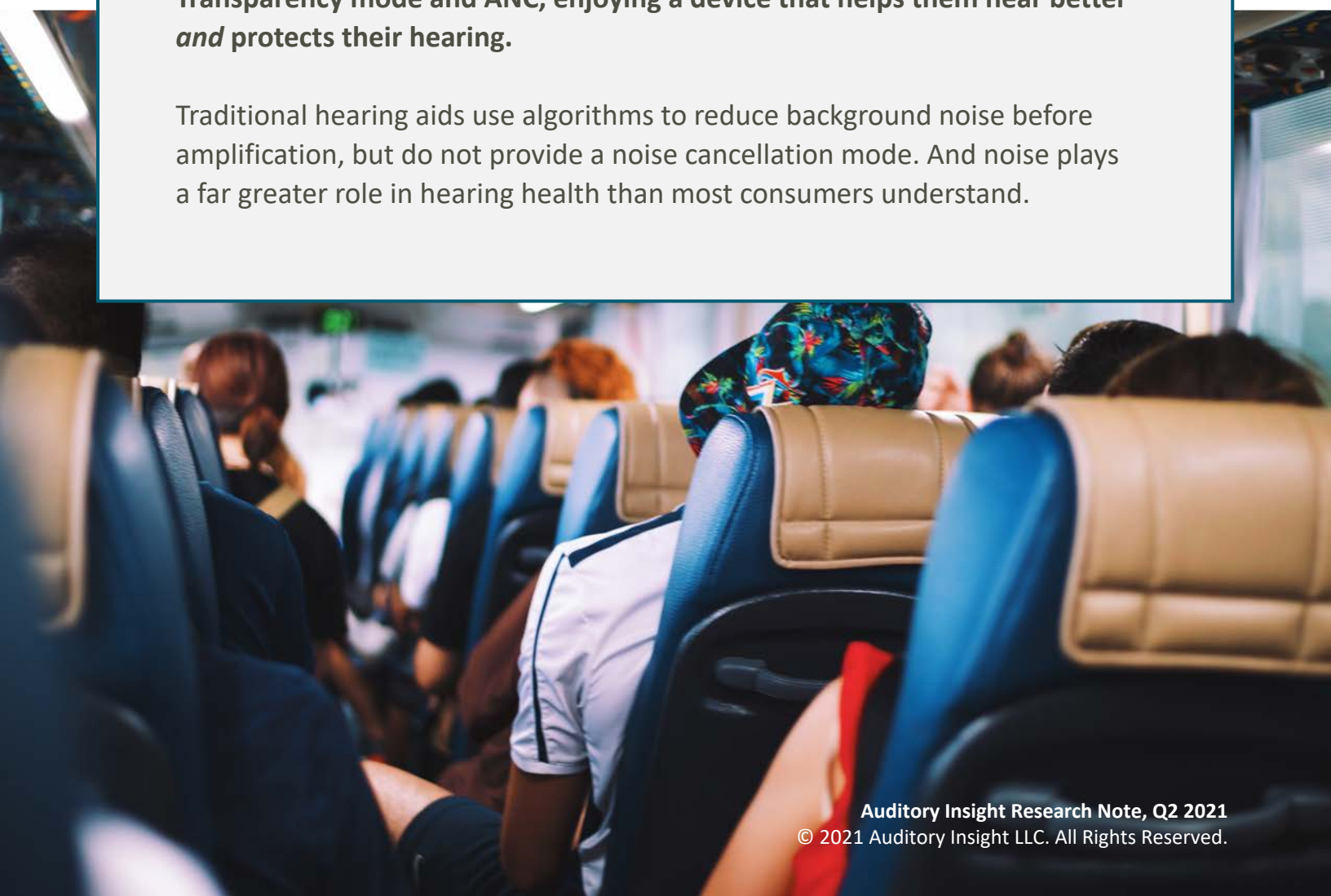
- + Three preset hearing programs
- + Customizable amplification with audiogram
- + Active noise cancellation (ANC)
- Low pitches too loud, high pitches too soft
- Same profile for both ears
- 4.5 hours battery life
- ? Earbuds form factor

The AirPods Pro Integrate Protection with Customized Amplification

Despite these limitations, the Apple solution empowers consumers to access a history of audiograms on their iPhone. Moreover, the earbuds form factor may encourage people who shy away from the stigma associated with traditional hearing aids to give customized amplification a try.

Most importantly, Apple's hearing health offering has a fundamental aspect that is highly important for people with hearing loss: AirPods Pro integrate customized amplification with noise protection. Active Noise Cancellation (ANC) detects and cancels unwanted environmental noise before the consumer hears it. **Consumers can switch the AirPods Pro between Transparency mode and ANC, enjoying a device that helps them hear better *and* protects their hearing.**

Traditional hearing aids use algorithms to reduce background noise before amplification, but do not provide a noise cancellation mode. And noise plays a far greater role in hearing health than most consumers understand.



Prevailing Clinical Literature Suggests a Frequent Etiology of Hearing Loss is Exposure to Noise

Noise exposure accounts for hearing loss across environmental differences. A comparative study evaluated hearing differences between people who lived in the United States, and those who lived in a relatively remote and noise-free area of Sudan. The researchers found that of same-aged adults, urban and suburban dwellers were far likelier to have hearing loss compared to those who lived in the relatively noise-free setting. The study's authors argue that the critical difference in hearing outcomes is the result of the loudness and frequency of sounds to which one is exposed in an industrialized living environment.⁷

There is no clear division between age-related and noise-induced hearing loss. By exposing the cochlea to relatively loud sounds that are not known to immediately damage the inner ear at short durations, researchers recently found that "both age-related hearing loss and noise-induced hearing loss may share pathophysiological mechanisms."⁸ Even short exposure to noise that temporarily shifts the hearing threshold can slowly damage the cochlea by accelerating its aging.

Noise-induced hearing loss has a genetic component.

Noise-induced hearing loss is a complex disease that results from gene-environment interactions. Advances in genotyping will enable "identification of new NIHL susceptibility genes. This in turn will contribute to the development of genetics tests that would allow for better protection of noise-exposed individuals and personalized treatment, if necessary."⁹

Consumers with Hearing Loss Need Customized Amplification and Protection

People who already have some hearing loss are a critical population for noise protection. An existing hearing loss indicates inner ears potentially at a higher risk for noise damage. In addition, a worsening of an existing loss can have devastating consequences for peoples' functionality.

Auditory Insight believes that as consumers with hearing loss become more engaged in their hearing health, they will view protection and customized amplification as equally important.

An ideal hearing device empowers consumers to switch—seamlessly and on-demand—between protection and customized amplification. Based on their lifestyle, consumers have hundreds of different use cases.

Two Example Use Cases of People with Hearing Loss

1. *Business executive.* On a cross-country flight, the executive needs long periods of uninterrupted protection (engine noise on a jet can exceed 90 decibels inside the cabin). For a day of video calls in a quiet office environment, however, the executive requires continuous amplification.
2. *Factory worker.* The worker requires protection throughout the day, punctuated by frequent, short conversations with coworkers, requiring customized amplification. The worker needs to switch rapidly between the two states.



Consumers with Hearing Loss Need to Choose Between Conventional Hearing Aids and Noise Protection Devices

The global hearing aid manufacturers generally approach hearing protection as a specialized application rather than a critical intervention for people with hearing loss.

The table below shows Auditory Insight's analysis of the top global hearing aid brands' activities in hearing protection. Phonak was the only premium brand whose home page main menu included a tab for hearing protection, which showcased its Serenity Choice earplugs. A Google search of each brand's name plus the term "hearing protection" yielded only one other product line, Starkey's SoundGear. Both Phonak and Starkey's products reduce noise for specific applications, such as hunting, while still permitting communication.

However, neither product line offers customized amplification. A cobbled solution of placing cushioned on-ear headphones over hearing aids is unwieldy. As a result, **people with hearing loss must choose between wearing noise reduction devices versus hearing aids**, or swap out one for the other depending upon their situation.

Auditory Insight Analysis of Global Hearing Aid Manufacturers' Activities in Hearing Protection, May 2021

Hearing Aid Brand	"Protection" in Home Page Copy	Tab for "Protection" in Main Menu	Hearing Protection Products Found with Incognito Google Search of Brand Name + "Protection"
Demant	No	No	None found
Phonak	No	Yes	Serenity Choice earplugs, some custom fit ¹⁰
ReSound	No	No	None found
Signia	No	No	None found
Starkey	No	No	SoundGear electronic and passive protection, some custom fit ¹¹

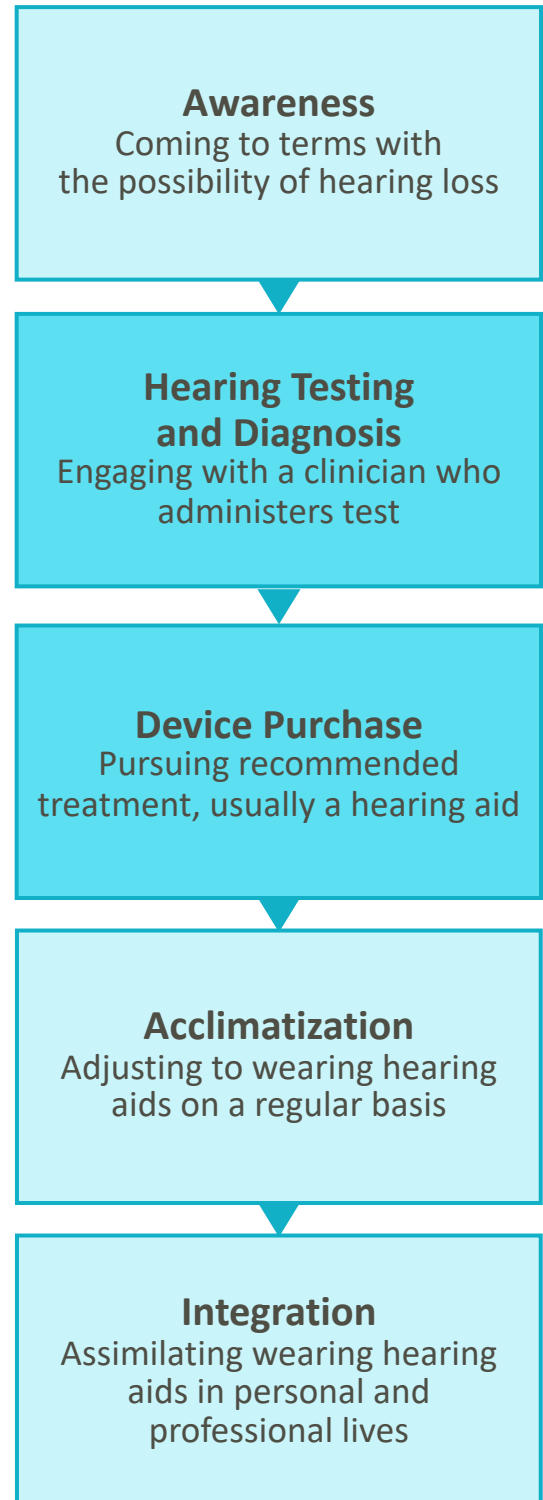
The Traditional Hearing Healthcare Industry Has Struggled to Create Awareness

Helping consumers come to terms with a hearing loss to the point that they seek testing is challenging. In addition to addressing consumer denial of a potential health problem—an obstacle throughout health care—the hearing health industry must contend with a deeply ingrained stigma against hearing loss and hearing aids.

Auditory Insight's proprietary framework on the consumer journey with hearing aids, shown at right, demonstrates the magnitude of the problem. The traditional hearing health industry currently focuses on the "Hearing Testing and Diagnosis" and "Device Purchase" stages, both shown in a darker blue.

However, Auditory Insight research shows that **the typical consumer spends about a decade in the Awareness stage before seeking help from a provider**, whether that be a primary care physician, a hearing care professional, or an ENT physician. **The Awareness stage balloons the time to treatment.**

Auditory Insight Proprietary Framework for Consumer Journey with Traditional Hearing Aids



Apple's Focus on Noise May Compress Time to Treatment

Apple's hearing health offering has the potential to create significant value for consumers throughout their journey, shown at right. We highlight two important aspects:

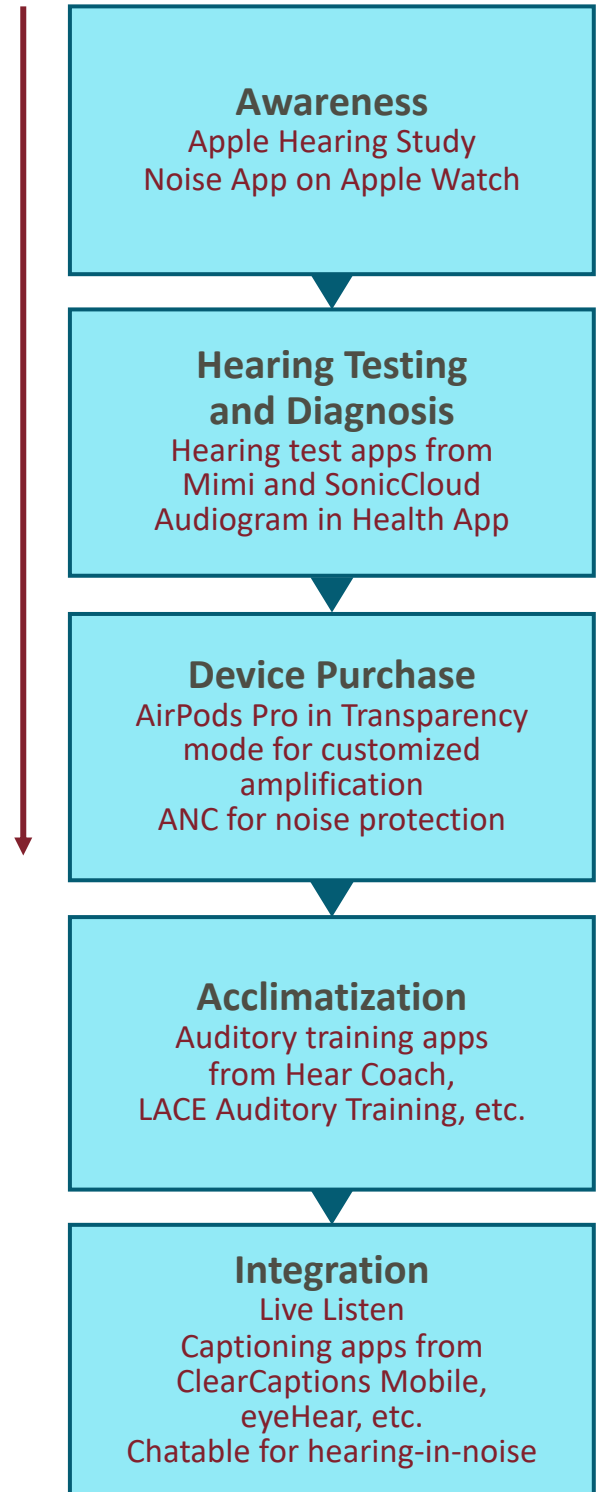
Awareness of Hearing Loss via Noise

Protection. The Apple Hearing Study, combined with noise notifications on the Apple Watch, is spotlighting the pervasiveness and implications of unsafe noise levels, an area not systematically addressed by traditional hearing healthcare. Apple's activities have the potential to generate awareness about hearing loss in a nonthreatening manner. From protection, it's a short leap for consumers to ask themselves, *how well am I hearing?*, and to examine the role that hearing plays in their lives. As a result, **the Apple offering may compress the "Awareness" stage.**

Device with Amplification and Protection.

Apple backs up its focus on noise by providing a device that not only enables customized amplification but also noise protection via ANC. Other earbud companies in the hearing space, such as Nuheara, have paired these capabilities for years, but these companies lack Apple's vast market penetration. For consumers who already own a pair of AirPods Pro, **the lines between "Hearing Testing" and "Device Purchase" blur**, also compressing the time to treatment.

Apple Activity by Stage in the Auditory Insight Proprietary Framework for Patient Journey



Implications for Global Hearing Aid Companies and Apple

In order to meet the needs of people with hearing loss and to respond to the Apple hearing health offering, the global hearing aid companies would benefit by:

1. Developing a line of hearing aids with meaningful noise protection
2. Creating awareness for the need for protection and amplification with innovative programs that interact with consumers in their daily lives

In order to meet the needs of people with hearing loss and to take its offering to the next level, Apple would benefit by:

1. Promoting the twin benefits of customized amplification and noise protection more explicitly to consumers
2. Blending protection and amplification into one mode: creating intelligent ANC allowing consumers to hear environmental sounds safely while also enhancing speech understanding in loud situations¹²



About the Authors

A strategic advisor and thought-leader on transforming hearing healthcare, Nancy M. Williams is Founder and President of Auditory Insight.

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Advising Leaders on Transforming Hearing Healthcare

Auditory Insight partners with senior leaders of device and pharma companies to develop successful commercialization strategies. The firm also advises growth equity and private equity firms to create portfolio value in hearing healthcare. Auditory Insight has deep insight into consumer needs and experience, a practical understanding of clinical behaviors of audiologists and ENTs, and unique viewpoints on how hearing healthcare is evolving.

Endnotes (1 of 2)

¹O'Dea, S. "Share of smartphone users that use an Apple iPhone in the United States from 2014 to 2021." *Statista*, 31 March 2021, www.statista.com/statistics/236550/percentage-of-us-population-that-own-a-iphone-smartphone/. Accessed 6 May 2021.

^{2, 4}"Apple Hearing Study shares new insights on hearing health." 2 March 2021, <https://www.apple.com/newsroom/2021/03/apple-hearing-study-shares-new-insights-on-hearing-health/> Accessed 6 May 2021.

³Cybart, N. "Apple Watch Is Now Worn on 100 Million Wrists." 11 Feb 2021, <https://www.aboveavalon.com/notes/2021/2/11/apple-watch-is-now-worn-on-100-million-wrists>. Accessed 6 May 2021.

⁵"Customize headphone audio levels on your iPhone or iPad." 18 Dec 2020, <https://support.apple.com/en-us/HT211218#manually-adjust> Accessed 6 May 2021.

⁶Bailey, A., AuD. "AirPods Pro Real Ear Measurements on My Ear." 25 Sept. 2020, <https://forum.hearingtracker.com/t/airpods-pro-real-ear-measurements-on-my-ear/54942>. Accessed 6 May 2021.

Note that the Hearing Tracker independent evaluation performed Real Ear Measurement on the Apple AirPods Pro in Transparency mode. The evaluation shows that the devices provide audiogram-personalized amplification. However, low pitches are too loud at soft and medium input levels, while high pitches are too soft at most input levels. The evaluation concludes that the speech intelligibility index could be better across the board, but the solution is better than no personalization with an audiogram.

⁷Rosen, S, et al. "Presbycusis Study of a Relatively Noise-Free Population in the Sudan." *Journal of Occupational and Environmental Medicine*, vol. 5, no. 5, 1963, p. 276. doi: 10.1177/000348946207100313.

Endnotes (2 of 2)

⁸Alvarado, Juan Carlos, et al. "Age-Related Hearing Loss Is Accelerated by Repeated Short-Duration Loud Sound Stimulation." 24 Jan. 2019, www.frontiersin.org/articles/10.3389/fnins.2019.00077/full Accessed 6 May 2021.

⁹Sliwinska-Kowalska, Mariola, and Malgorzata Pawelczyk. "Contribution of Genetic Factors to Noise-Induced Hearing Loss: A Human Studies Review." *Mutation Research/Reviews in Mutation Research*, Elsevier, 1 Dec. 2012, www.sciencedirect.com/science/article/abs/pii/S1383574212000646?via%3Dihub. Accessed 6 May 2021.

¹⁰"Phonak Serenity Choice." (n.d.). <https://www.phonak.com/us/en/hearing-protection/serenity-choice.html> Accessed 6 May 2021.

¹¹"Electronic hearing protection for shooting." (n.d.). <https://www.soundgearhearing.com/>. Accessed 6 May 2021.

¹²Bellavia, Andrew. "Hearing Loss and Earphones: Cause or Solution?" LinkedIn, 3 March 2021, <https://www.linkedin.com/pulse/hearing-loss-earphones-cause-solution-andrew-bellavia/>. Accessed 6 May 2021.

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Page 3: “Apple Hearing Study shares new insights on hearing health.” 2 March 2021, <https://www.apple.com/newsroom/2021/03/apple-hearing-study-shares-new-insights-on-hearing-health/> Accessed 6 May 2021.

Page 4: Auditory Insight proprietary graphic, “Auditory Insight Assessment of Customized Amplification on Apple AirPods Pro”

Page 5: Photo by [Annie Spratt](#) on [Unsplash](#)

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Page 9: Auditory Insight proprietary graphic, “Auditory Insight Proprietary Framework for Consumer Journey with Traditional Hearing Aids”

Page 10: Auditory Insight proprietary graphic, “Apple Activity by Stage in Auditory Insight Proprietary Framework for Patient Journey”

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