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Reality check on mobile music, hearing loss

Mobile music may damage hearing

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If recent reports are to be believed, those sleek iPod earbuds may carry risks beyond marking wearers as mugger-bait.

As if to rain on Apple's holiday parade - the company reported sales of 14 million iPods in the last quarter of 2005, bringing total sales for the product to more than 42 million - audiologists and other hearing experts have been issuing warnings in recent weeks that improper use of iPods and other personal stereo systems can dramatically heighten risk of hearing loss, particularly in young people.

Is this just a case of advocacy groups seizing upon a teachable moment to fly their banners - or is there really a chance that being able to hold your entire music library in your palm can come at the cost of your hearing? Time for a reality check.

Audiology experts agree that hearing loss is increasing in the United States. According to widely cited figures from the American Speech-Language-Hearing Association (ASHA), the number of Americans age 3 and older with some form of auditory disorder has more than doubled since 1971, from 13.2 million to about 30 million today. Of those, one-third are said to be people with noise-induced hearing loss.

The trend clearly predates the iPod; in fact, it traces its roots to the dawn of the industrial age, according to Pam Mason, ASHA's director of audiology professional practices. These new devices merely add to a daily din of environmental noise that includes traffic, construction, jets, nightclubs, leaf blowers and surround sound home theater systems.

"A certain percentage of people are going to experience hearing loss because of genetic predisposition, and by age 65 about a third of the population will experience some age-related hearing loss," or presbycusis, said Brenda Lonsbury-Martin, ASHA's director of research and science. "Old-age hearing is an accumulation of exposure to loud noise over the years, exposure to ototoxic drugs (more than 130 medications, including some commonly used drugs, can cause or contribute to hearing loss, according to ASHA), smoking and a number of things that accumulate over time. Once this loss starts to occur, if you continue to add noise insult, you're more at risk."

Hearing damage occurs when loud sound destroys tiny hair cells in the inner ear. These cells are responsible for converting sound waves into electrical impulses, which are then sent to the brain. Once 25 to 30 percent of these cells disappear, Lonsbury-Martin said, you begin to experience hearing loss.

Researchers looking at users of personal cassette players and Walkman-type portable compact disc players have found increased risk of hearing loss among people who listen to loud music through headphones for extended periods of time. And there are anecdotal reports of hearing damage complaints associated with newer devices.

But essentially, iPods are too new, and noise-induced hearing loss too gradual, to be reflected in the latest statistics.

"Noise-induced hearing loss is something that develops slowly and insidiously. . . . Even in those people who are rather susceptible, it would be unexpected for them to develop any significant hearing loss for a while, meaning years and maybe a decade," said Brian J. Fligor, director of diagnostic audiology at Children's Hospital in Boston.

Many recent warnings about hearing loss and personal music devices cite Fligor's research on portable CD players. In the case of one brand of player matched with a particular brand of earphone, he found that listeners could get a sound dose as high as 120 decibels. This is comparable to the sound level at a loud rock concert or sandblasting; it could lead to risk of hearing damage after 7.5 minutes of exposure.

Preliminary data on iPods and similar devices have found lower maximum levels - above 100 decibels (the noise volume of a chainsaw; risk of hearing damage after two hours), but not higher than 115 decibels (a football game in a loud stadium; risk of hearing damage after 15 minutes), Fligor said. To fully understand the potential impact of these devices, it is important to know that the sound is traveling a tiny distance from your earbud to your eardrum rather than being diffused in a football stadium or concert arena.

Apple declined to provide information on the maximum output level for its devices, and noted that the federal government does not require manufacturers to provide such information to consumers.

Of course, some criticism of these newer devices stems from the very technological advances that have helped to make them so popular. Digital technology has made it possible to play music in these devices at loud volumes without the signal distortion produced by, say, a transistor radio. And Apple touts its newest iPods as being capable of holding up to 15,000 songs and being able to play for up to 20 hours on a fully charged battery. Therein lies potential for trouble.

"If you use them at high volume for eight hours there's no doubt - you could have steel ears and you would still have some damage," Lonsbury-Martin said. "There's a point where even resistant ears will break down."

But hearing damage isn't the same thing as hearing loss, and the effects of temporary exposure to loud sound don't have to be

lasting "if you pay attention to your ear health," said Lonsbury-Martin.

She said the advice to a personal stereo user who experiences muffled or dulled hearing after listening would be the same as for any person coming out of a loud environment: Don't go back into the loud environment, be it a noisy club or a set of ear buds, until the symptoms pass. And consider protecting yourself against similar exposure in the future.

Fligor's findings with CD players led him to prescribe as a safe portable stereo dosage one hour per day at 60 percent of maximum volume, a level that would fall below the 85 decibel mark at which the Occupational Safety and Health Administration says the risk of hearing damage begins. Fligor notes that this is meant more as a guide to self-regulation than a hard and fast rule.

Individual tolerances and preferred listening levels vary, said Fligor, who uses an iPod himself and sets his personal levels at two hours per day at about 89 decibels, which would be slightly above his 60 percent benchmark.

Even if iPod users were to limit listening to an hour per day, experts agree, ambient noise - on city streets or even in an office setting - could challenge efforts to keep the volume down to 60 percent of maximum.

"Many people try to use the iPod to try to override the background noise wherever they may be," said audiologist Dean Garstecki, professor and chairman of communication sciences and disorders at Northwestern University in Chicago. "Depending on the level of background noise, people have been known to crank up the volume to a level that could be damaging to their hearing."

In informal research, Wichita State University audiologist Ray Hull asked students to take off their headphones in the name of science. Taking readings with "a fairly sophisticated" sound level meter, Hull found typical listening levels approaching 120 decibels.

While it may be that some people just prefer to listen to their music as loud as possible, Hull said, another factor is at work as well.

"A person can be listening at 60 percent volume, but then as the auditory system adapts to the intensity of the sound, the perception of the intensity is that it is becoming less, so the response is to continue to turn the volume up," Hull said.

Audiologists agree that it is important to guard against this desensitization by minding the volume dial rather than simply trusting your ears.

A good measure for how loud is too loud: "If you're standing across an elevator cab - that's about three feet away - if you can hear someone else's music, that person is giving themselves a hearing loss," said ASHA's Mason.

The iPod's earbuds, the essential accessory that have become almost as much of a status symbol as the device itself, have been a particular focus for those expressing concern about the potential for hearing loss. No less an eminence than Pete Townshend of The Who warned fans in a post on the Internet earlier this month that long-term use of headphones at loud volumes can lead to the kind of hearing loss that he has experienced in recent years.

Experts generally dismiss Townshend's assertion that his hearing loss is due more to headphone use than with performing for four decades in a notoriously loud rock band. But there is reason to believe that listening to music through earbuds is less safe than, say, sitting across the room from a set of stereo speakers.

While listening to music on a home stereo system, Mason said, "I could be sitting several feet away from the sound source, so the sound dissipates in the environment and isn't directly funneled into my ear. With foam earphones there is still some dissipation of the sound. When you wear an earbud, it's fitting right down into your ear canal."

"It's basically a matter of physics," noted Fligor, that earphones that are smaller and closer to the ear produce higher sound levels. But he is quick to add that there is no evidence that earphones actually cause people to listen at louder volumes.

While earbuds fit over the outer ear canal, the basic models do so without blocking out background noise, meaning users often have to turn up the volume to hear music over ambient sound. Audiologists say those hoping to keep the volume down might want to upgrade from the earbuds that are packaged with personal stereo systems.

Of course, these headphones tend to be expensive: Eytmotic's product for iPods costs \$149, according to the company's Web site. Bose's widely advertised Quiet Comfort 2 noise-canceling headphones cost \$299.

By limiting the amount of background interference, noise-reducing earphones can help personal stereo system users enjoy the listening experience while keeping the device's volume down.

For those who can manage it, experts agree, there is a happy space at about 65 to 70 decibels, the level of normal conversation. At that level, a person could listen indefinitely without worrying about contributing to hearing loss.

Decibel levels

Mobile digital music players are believed to produce sound measuring up to 100 to 120 decibels. Some other sound sources and their output levels:

Lawnmower, 90 decibels

Motorcycle, 95 decibels

Chainsaw, 100 decibels

Helicopter, 105 decibels

Snowmobile, 110 decibels

Baby's cry, 115 decibels

Rock concert, 120 decibels

Firecracker, 125 decibels

Gunshot, 140 decibels

FACTOIDS

7.8 - Percentage growth in U.S. household spending for health care in 2003

3.0 - Percentage growth in personal income in 2003

- *From a report by the Centers for Medicare & Medicaid Services published in the journal Health Affairs and reported by The Washington Post*

IN THE NEWS

Researchers at the National Institute of Standards and Technology have previously reported that acetaminophen, the most widely used pain reliever in the United States, is among the most frequently detected man-made chemicals in freshwater streams. A follow-up report finds that when acetaminophen-laced water undergoes wastewater treatment, it forms new chemicals, at least two of them toxic.

-*The Washington Post*