

Protecting Your Hearing Health Every Day

Information and Recommendations from:

National Association of Schools of Music (NASM) and Performing Arts Medicine Association (PAMA)

Music and Noise

This paper addresses what is termed —noise-induced hearing loss. You may be wondering why we’re referring to music—this beautiful form of art and self-expression—as “**noise.**”

Here’s why: What we know about hearing health comes from medical research and practice. Both are based in science where —noise is a general term for sound. Music is simply one kind of sound.

Obviously, there are thousands of others. In science-based work, all types of sound, including music, are regularly categorized as different types of noise.

Terminology aside, it’s important to remember this fundamental point: **A sound that is too loud, or too loud for too long, is dangerous to hearing health, no matter what kind of sound it is or whether we call it noise, music, or something else.**

Music itself is not the issue. Loudness and its duration are the issues. Music plays an important part in hearing health, but hearing health is far larger than music. All of us, as musicians, are responsible for our art. We need to cultivate a positive relationship between music and our hearing health. Balance, as in so many things, is an important part of this relationship.

Noise-Induced Permanent Hearing Loss

Let’s first turn to what specialists refer to as —noise-induced permanent hearing loss. The ear is made up of three sections, the outer, middle, and inner ear. Sounds must pass through all three sections before signals are sent to the brain. Here’s the simple explanation of how we experience sound:

Sound, in the form of sound waves, enters the outer ear. These waves travel through the bones of the middle ear. When they arrive in the inner ear, they are converted into electrical signals that travel via neural passages to the brain. It is then that you experience —hearing the sound.

Now, when a loud noise enters the ear, it poses a risk to the ear’s inner workings. For instance, a very loud sound, an explosion, for example, or a shotgun going off at close range, can actually dislodge the tiny bones in the middle ear, causing conductive hearing loss, which involves a reduction in the sound level experienced by the listener and a reduction in the listener’s ability to hear faint sounds. In many cases, this damage can be repaired with surgery. But loud noises like this are also likely to send excessive sound levels into the inner ear, where permanent hearing damage occurs.

The inner ear, also known as the cochlea, is where most hearing-loss-related ear damage tends to occur. Inside the cochlea are tiny hair cells that are responsible for transmitting sound waves to the brain. When a loud noise enters the inner ear, it can damage the hair cells, thus impairing their ability to send neural impulses to the brain. The severity of a person’s noise-induced hearing loss depends on the severity of the damage to these hair cells. The extent of the damage to these cells is normally related to the length and frequency of a person’s exposure to loud sounds over long periods of time.

Because noise-induced hearing loss is painless, you may not realize that it’s happening at first. Then suddenly one day you will realize that you’re having more and more trouble hearing high frequency sounds – the ones that are the most high-pitched. If you don’t start to take precautions then, your hearing loss may eventually also affect your ability to perceive both speech sounds and music. It is very important to understand that these hair cells in your inner ear cannot regenerate. Any damage

done to them is permanent. At this time, there is simply no way to repair or undo the damage.

FACT: According to the American Academy of Audiology, approximately 36 million Americans have hearing loss. One in three developed their hearing loss as a result of exposure to noise.

Noise-Induced Temporary Hearing Loss

Now it's also important to note that not all noise-induced hearing loss is necessarily permanent. Sometimes, after continuous, prolonged exposure to a loud noise, we may experience what's called —noise-induced temporary hearing loss. During temporary hearing loss, known as Temporary Threshold Shift (TTS), hearing ability is reduced. Outside noises may sound fuzzy or muted. Normally, this lasts no more than 16 to 18 hours, at which point your hearing levels will return to normal. Often during this Temporary Threshold Shift, people will experience tinnitus, a medical condition characterized by a ringing, buzzing, or roaring in the ears. Tinnitus may last only a few minutes, but it can also span several hours, or, in extreme instances, last indefinitely. Also, if you experience a series of temporary hearing losses, you may be well on the way to permanent damage sometime in the future.

Noise Levels and Risk

Now, how do you know when a noise or sound is too loud—when it's a threat to your hearing health? Most experts agree that prolonged exposure to any noise or sound over 85 decibels can cause hearing loss. You may have seen decibels abbreviated —dB. They are the units we use to measure the intensity of a sound.

Two important things to remember:

- 1. The longer you are exposed to a loud noise, the greater the potential for hearing loss.**
- 2. The closer you are to the source of a loud noise, the greater the risk that you'll experience some damage to your hearing mechanisms.**

Consider these common sounds, their corresponding decibel levels, and the recommended maximum exposure times established by the National Institute for Occupational Safety and Health (NIOSH), a branch of the Centers for Disease Control and Prevention (CDC).

You can listen to sounds under 85 dB for as long as you like. There is no risk involved, well, except for the risk of annoyance. But seriously, for sounds in this lower decibel range, listening to them for hours on end does not pose any real risk to your hearing health.

85 dB is the magic number. Sounds above the 85 dB threshold pose a potential threat to your hearing when you exceed the maximum recommended exposure time.

Sound	Intensity (dB)	Maximum Recommended Exposure (approx)*
A Whisper	30	Safe, No maximum
Rainfall (moderate)	50	Safe, No maximum
Conversation (average)	60	Safe, No maximum
Freeway Traffic	70	Safe, No maximum
Alarm Clock	80	Safe, No maximum
	85	Potential Damage Threshold
Blender, Blow-dryer	90	2 hours
MP3 players at full volume, lawnmower	100	15 minutes
Rock Concerts, Power Tools	110	2 minutes

Jet Plan at Takeoff	120	Unsafe, immediate risk
Sirens, Jackhammers	130	Unsafe, immediate risk
Gunshots, Fireworks	140	Unsafe, immediate risk

*NIOSH-recommended exposure limits

Musicians often find that hearing protectors are not comfortable or that they create perceptual changes, even causing users to increase sound-intensity levels to compensate. One solution is to reduce the “average” sound-level exposure in rehearsals by making balanced repertory choices and giving greater attention to dynamic levels, especially in large or amplified ensembles.

1. Protection also comes from regular behaviors such as:
 - Avoiding situations likely to pose a danger to hearing health.
 - Refraining from certain activities that can endanger hearing mechanisms.
 - Maintaining a safe distance from sources of loud noise.
 - At loud concerts, sitting or standing a “safe” distance from the stage and from speakers or other amplification devices.
 - Keeping MP3 players and other listening devices at “safe” volume levels. MP3 players need special attention. Normally, MP3 players generate about 85 dB at one-third of their maximum volume, 94 dB at half volume, and 100 dB or more at full volume. Translated into daily exposure time, according to NIOSH standards, 85 dB equals 8 hours; 94 dB, 1 hour; and 100 dB, 15 minutes. These numbers assume that an individual is not exposed to any other noise beyond 85 dB during the day.
 - Taking care with in-ear monitors, a device that has grown in popularity among musicians, especially in certain types of professional ensembles. These monitors can produce dangerously high sound levels. If you plan to use a device such as this, please see an audiologist or other qualified professional for a demonstration of safe practices before using an in-ear monitor for the first time and use the device in a manner that protects their hearing health.
2. Developing a sense of the extent to which daily exposure has exceeded safe volume levels and durations.
3. Taking breaks from exposure to elevated noise levels. (Enjoying quiet time.)

Mindful Listening

Now, let’s talk about how you can be proactive when it comes to music and hearing loss. It’s important to think about the impact noise can have on your hearing health when you:

1. Attend concerts;
2. Play your instrument;
3. Adjust the volume of your car stereo;
4. Listen to your radio, CD player, and MP3 player.

Here are some simple ways to test if the music is too loud:

It’s too loud (and too dangerous) when:

1. You have to raise your voice to be heard.
2. You can’t hear someone who’s 3 feet away from you.
3. The speech around you sounds muffled or dull after you leave a noisy area.
4. You experience tinnitus (pain, ringing, buzzing, or roaring in your ears) after you leave a noisy area.

Evaluating Your Risk for Hearing Loss

When evaluating your risk for hearing loss, ask yourself the following questions:

1. How frequently am I exposed to noises and sounds above 85 decibels?
2. What can I do to limit my exposure to such loud noises and sounds?
3. What personal behaviors and practices increase my risk of hearing loss?
4. How can I be proactive in protecting my hearing and the hearing of those around me?

Basic Protection for Musicians

As musicians, it's vital that you protect your hearing whenever possible. Here are some simple ways to reduce your risk of hearing loss:

1. When possible, avoid situations that put your hearing health at risk.
2. Refrain from behaviors which could compromise your hearing health and the health of others.
3. If you're planning to be in a noisy environment for any significant amount of time, try to maintain a reasonable distance from the source of the sound or noise. In other words, there's no harm in enjoying a fireworks display, so long as you're far away from the launch point.
4. When attending loud concerts, be mindful of the location of your seats. Try to avoid sitting or standing too close to the stage or to the speakers, and use earplugs.
5. Keep the volume of your music and your listening devices at a safe level.
6. Remember to take breaks during a rehearsal. Your ears will appreciate this quiet time.
7. Use earplugs or other protective devices in noisy environments and when using noisy equipment.

Future Steps

Now that you've learned about the basics of hearing health and hearing loss prevention, we encourage you to keep learning. Do your own research. Browse through the links provided at the end of this document. There's a wealth of information out there, and it's yours to discover.

Conclusion

We hope this resource document has made you think more carefully about your own hearing health. Just remember that all the knowledge in the world is no match for personal responsibility. We've given you the knowledge and the tools; now it's your turn. You are responsible for your exposure to all sorts of sounds, including music. Your day-to-day decisions have a great impact on your hearing health, both now and years from now.

Do yourself a favor. Be smart. Protect your precious commodity. Protect your hearing ability.

Resources – Information and Research Hearing Health Project Partners

National Association of School of Music (NASM)

<http://nasm.arts-accredit.org/>

Performing Arts Medicine Association (PAMA)

<http://www.artsmed.org/index.html>

PAMA Bibliography (search tool)

<http://www.artsmed.org/bibliography.html>

General Information on Acoustics

Acoustical Society of America (<http://acousticalsociety.org/>)

Acoustics.com (<http://www.acoustics.com>)

Acoustics for Performance, Rehearsal, and Practice Facilities Available through the NASM Web site (click here to purchase)

Health and Safety Standards Organizations

American National Standards Institute (ANSI) (<http://www.ansi.org/>)

The National Institute for Occupational Safety and Health (NIOSH) (<http://www.cdc.gov/niosh/>)

Occupational Safety and Health Administration (OSHA) (<http://www.osha.gov/>)

Medical Organizations Focused on Hearing Health

American Academy of Audiology (<http://www.audiology.org/Pages/default.aspx>)
American Academy of Otolaryngology – Head and Neck Surgery (<http://www.entnet.org/index.cfm>)
Protect Your Hearing Every Day: Information and Recommendations for Student Musicians
American Speech-Language-Hearing Association (ASHA) (<http://www.asha.org/>)
Athletes and the Arts (<http://athletesandthearts.com/>)
House Research Institute – Hearing Health (<http://www.hei.org/education/health/health.htm>)
National Institute on Deafness and Other Communication Disorders – Noise-Induced Hearing Loss
(<http://www.nidcd.nih.gov/health/hearing/noise.html>)
Other Organizations Focused on Hearing Health
Dangerous Decibels (<http://www.dangerousdecibels.org>)
National Hearing Conservation Association (<http://www.hearingconservation.org/>)