

Protecting Your Hearing Health

Student Information Sheet on Noise-Induced Hearing Loss

Standard Version

**National Association of Schools of Music
Performing Arts Medicine Association**

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Protecting Your Hearing Health

An NASM – PAMA

Student Information Sheet on Noise-Induced Hearing Loss

- **Hearing health is essential to your lifelong success as a musician.**
- **Your hearing can be permanently damaged by loud sounds**, including music. Technically, this is called Noise-Induced Hearing Loss (NIHL). Such danger is constant.
- **Noise-induced hearing loss is generally preventable.** You must avoid overexposure to loud sounds, especially for long periods of time.
- The closer you are to the source of a loud sound, the greater the risk of damage to your hearing mechanisms.
- Sounds over 85 dB (your typical vacuum cleaner) in intensity pose the greatest risk to your hearing.
- Risk of hearing loss is based on a combination of sound or loudness intensity and duration.
- Recommended maximum daily exposure times (NIOSH) to sounds at or above 85 dB are as follows:
 - 85 dB (vacuum cleaner, MP3 player at 1/3 volume) – 8 hours
 - 90 dB (blender, hair dryer) – 2 hours
 - 94 dB (MP3 player at 1/2 volume) – 1 hour
 - 100 dB (MP3 player at full volume, lawnmower) – 15 minutes
 - 110 dB (rock concert, power tools) – 2 minutes
 - 120 dB (jet planes at take-off) – without ear protection, sound damage is almost immediate
- Certain behaviors (controlling volume levels in practice and rehearsal, avoiding noisy environments, turning down the volume) reduce your risk of hearing loss. Be mindful of those MP3 earbuds. See chart above.
- The use of earplugs and earmuffs helps to protect your hearing health.
- Day-to-day decisions can impact your hearing health, both now and in the future. Since sound exposure occurs in and out of school, you also need to learn more and take care of your own hearing health on a daily, even hourly basis.
- It is important to follow basic hearing health guidelines.
- It is also important to study this issue and learn more.
- If you are concerned about your personal hearing health, talk with a medical professional.
- If you are concerned about your hearing health in relationship to your program of study, consult the appropriate contact person at your institution.
- This information is provided by the National Association of Schools of Music (NASM) and the Performing Arts Medicine Association (PAMA). For more information, check out the other NASM-PAMA hearing health documents, located on the NASM Web site at the URL linked below.
<https://nasm.arts-accredit.org/publications/brochures-advisories/nasm-pama-hearing-health/>

Protect Your Hearing Every Day

Information and Recommendations for Student Musicians

Standard Version

**National Association of Schools of Music
Performing Arts Medicine Association**

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Protect Your Hearing Every Day

Introduction

In working toward a degree in music, you are joining a profession with a long and honored history. Part of the role of any professional is to remain in the best condition to practice the profession.

For all of you, as aspiring musicians, this involves safeguarding your hearing health. Whatever your plans after graduation – whether they involve playing, teaching, engineering, or simply enjoying music – you owe it to yourself and your fellow musicians to do all you can to protect your hearing.

As you may know, certain behaviors and your exposure to certain sounds can, over time, damage your hearing.

You may be young now, but you're never too young for the onset of hearing loss. In fact, in most cases, noise-related hearing loss doesn't develop overnight. (Well, some does, but we'll address that issue later in this document.) But the majority of noise-induced hearing loss happens gradually.

So the next time you find yourself blasting music through those tiny earbuds of your iPod or turning up the volume on your amp, ask yourself, "Am I going to regret this someday?" You never know; you just might. And as a musician, you cannot afford to risk it.

The bottom line is this: If you're serious about pursuing a career in music, you need to protect your hearing. The way you hear music, the way you recognize and differentiate pitch, the way you play music; all are directly connected to your hearing. Do yourself a favor: protect it. I promise you won't regret it.

Disclaimer

The information in this document is generic and advisory in nature. It is not a substitute for professional, medical judgments. It should not be used as a basis for medical treatment. If you are concerned about your hearing or think you may have suffered hearing loss, consult a licensed medical professional.

Purpose of this Resource Document

The purpose of this document is to share with you some information on hearing health and hearing loss and let you know about the precautionary measures that all of us should practice daily.

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.

At this point, it helps to have some frame of reference. How loud are certain noises?

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).

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 Player (full volume), Lawnmower	100	15 minutes
Rock Concerts, Power Tools	110	2 minutes
Jet Plane at Takeoff	120	Unsafe, Immediate risk
Sirens, Jackhammers	130	Unsafe, Immediate risk
Gunshots, Fireworks (close range)	140	Unsafe, Immediate risk

*NIOSH-recommended exposure limits

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.

MP3 players at full volume, lawnmowers, and snowblowers come in at 100 dB. The recommended maximum exposure time for these items is 15 minutes.

Now, before you get too worried and give up mowing the lawn, remember, there are ways to reduce your exposure.

For instance, turn down the volume on your MP3 player. Did you know that 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 equals 1 hour, and 100 dB equals 15 minutes. Do yourself a favor, and be mindful of your volume.

Also, remember to wear a pair of earplugs or earmuffs when you mow the lawn or when you use a snowblower.

When you're dealing with sounds that produce between 120 and 140 dB, you're putting yourself at risk for almost immediate damage. At these levels, it is imperative that you utilize protective ear-coverings. Better yet, if it's appropriate, avoid your exposure to these sounds altogether.

FACT: *More than 30 million Americans expose themselves to hazardous sound levels on a regular basis.*

Musicians and Noise-Induced Hearing Loss

Nowadays, more and more is being written about the sound levels of certain musical groups. It's no secret that many rock concerts expose performers and audiences to dangerously high levels of noise. The ringing in your ears after a blaring rock concert can tell you that. But now professional and college music ensembles are under similar scrutiny.

It's true that musicians are exposed to elevated levels of sound when they rehearse and perform music. But that doesn't equal automatic risk for hearing loss.

Take for instance a typical practice session on the piano. When taken at close range to the instrument over a limited period of time, a sound level meter fluctuates between a reading of 60 and 70 decibels. That's similar in intensity to your average conversation (60dB). There will, of course, be moments when the music peaks and this level rises. But these moments are not sustained over several hours. At least not under normal practice conditions.

While the same is true for most instruments, it is important to understand that certain instrumental sections tend to produce higher sound levels. Sometimes these levels relate to the piece of music being performed and to notational requirements (*pianissimo*, *fortissimo*); other times, these levels are what naturally resonate from the instrument.

For example, string sections tend to produce decibel levels on the lower end of the spectrum, while brass, percussion, and woodwind sections generally produce decibel levels at the higher end of the spectrum.

What's important is that you are mindful of the overall volume of your instrument and of those around you. If you're concerned about volume levels, share your concerns with your instructor.

***FACT:** Approximately 50% of musicians have experienced some degree of hearing loss.*

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
[\(http://acousticalsociety.org/\)](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)
[\(http://www.ansi.org/\)](http://www.ansi.org/)

The National Institute for Occupational Safety and Health (NIOSH)
[\(http://www.cdc.gov/niosh/\)](http://www.cdc.gov/niosh/)

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

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/>)