

Recommendations from the National Association of Schools of Music Performing Arts Medicine Association

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, producing, 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 that issue will be addressed later in this document.) 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 are all directly connected to your hearing. Do yourself a favor: protect it. 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 or advice. 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.

As a student at IUP, you can obtain a complete hearing evaluation at the IUP Speech and Hearing Clinic in Davis Hall. Call 724-357-2451 to schedule an audiological evaluation with a licensed and certified audiologist. If a medical condition is revealed, the audiologist will refer you to a licensed physician.

At some point in your educational program here at IUP, we are hoping to have Dr. Cynthia Richburg, Professor and Audiologist at IUP, speak to you more in depth about the causes and treatments of hearing loss. She will also be able to answer your questions and help you plan a course of action for hearing protection that is right for you.

Purpose of this Presentation

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

At some point in your training, IUP's Music Department is hoping to establish a hearing health policy. As this policy is developed, you will be informed of the expectations and your role in implementing the policy.

Music and Noise

Throughout this handout, we'll be referring to "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 sending signals 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 high intensity (**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'll 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. Once they are damaged or destroyed, they are no longer able to send sounds to the brain. Any damage done to these hair cells is permanent. At this time, there is simply no way to repair or undo the damage.

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." Have you ever gone to a concert and walked out saying, "Gee, my ears are ringing!" or "Wow, things sound funny and my ears feel full"? But the next morning, the ringing is gone and your ears feel normal again. Well, you were experiencing a Temporary Threshold Shift (TTS) if this has ever happened to you.

During a Temporary Threshold Shift 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 threshold shifts, you may be well on the way to permanent damage (known as a Permanent Threshold Shift) 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 "little 'd,' big 'B.'" They are the units we use to measure the intensity of a sound (≥ 85 dBA).

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 mechanism.

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).

- A whisper is 30 dB. There's no risk involved at this level of sound intensity.
- Your average conversation is around 60dB. Again, there's no risk.
- An alarm clock is 80 dB. No real risk, but it would certainly be annoying if you listened to it for very long.
- 85 dB is the magic number. Sounds above the **85 dB threshold** pose a potential threat to your hearing.
- Blenders, food processors, blow-dryers, and the subway come in at 90 dB. The recommended maximum exposure time for 90 dB sounds is around 2 hours.
- 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 MP3player or personal audio device. Did you know that normally, MP3 players or iPods 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. If you have to raise the level of your voice to be heard in a conversation around anything that is producing loud sound, then you should be wearing hearing protection!

Here are some other figures for you:

- Rock concerts, certain sporting events, and power tools come in at 110 dB. At full volume, the recommended maximum exposure time is **2 minutes**. (Again, remember there are precautions you can take!)
- Jet planes at take-off – 120 dB
- Sirens, race cars, and jackhammers – 130 dB
- Gun shots and fireworks at close range – 140 dB

When you're dealing with sounds like these, those 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.

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 (just ask Phil Collins, Pete Townshend, or Eric Clapton). But now professional and college music ensembles are receiving attention.

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.

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/iPod 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, as 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 personal 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.

Hearing Protection for Musicians:

Hearing protectors made for industry have certain filtering capabilities that may not be what a musician needs in order to hear music clearly, but safely. Industry's hearing protection will filter out many of the middle and high frequencies needed for musicians to hear their compositions well. Hearing protectors for musicians, however, are vented and filtered using small diaphragms to allow attenuation evenly across the frequency spectrum; this reduces the volume but still allows musicians to hear relatively undistorted sound across the spectrum. Therefore, you will still hear all the notes clearly, without the high decibel level.

You've got a couple options.

Universal-Fit Options: Etymotic Research invented and manufactures the musician's hi-fi earplug. Their earplugs cost around \$15, marketed by Etymotic, Hearos, Mack's, or any number of other companies. This form of protection may be good for your university career, due to their low cost.

Custom-Molded Options: This is the best option for professionals in the music business -- a custom-molded, soft silicone shell with the Etymotic filter in place. These will run you around \$150, plus audiologist's fees for the ear impressions (a quick, painless process). They may have a high start-up cost, but this form of hearing protector will offer the best protection and durability. These earplugs can be obtained from companies like Sensaphonics, ACS, and Westone.

Look up information from the following web site to get more information about customized hearing protectors made specifically for musicians' unique needs: <http://www.etymotic.com/hp/erme.html>

Also, contact your local audiologist for more information on customized earplugs. She or he can walk you through the process.

Future Steps:

Now that we've shared with you some of the basics of hearing health and hearing loss prevention, we encourage you to keep learning. Do your own research. There's a wealth of information out there, and it's yours to discover. [Our Web site has a section on hearing health, and we recommend that you review it as soon as possible.]

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

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>)

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/>)