Can Playing My Instrument Harm My Hearing?

A lecture for University of Michigan Wellness Initiative and students in the SMTD

Feb 7, 2019

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potentially
Remember these three characteristics:

Loudness
Length of time (mins v hours)
Repetitive (how often)
Repetitive exposures to loud sound can ‘simply’ evoke stress or it can result in longer-lasting physiologic conditions.

- Working shifts in loud industrial settings produces feelings of anxiety, perspiration, shortness of breath, dizziness, insomnia

- Repeated exposures result in hyperacusis, tinnitus, temporary and permanent hearing loss!
How does the ear work? Four key parts:

Sound waves enter the **outer ear**. Vibrations impact the ear drum and are transmitted to the middle and inner ear. In the **middle ear** three small bones called the malleus (hammer), the incus (anvil), and the stapes (stirrup) amplify and transmit the vibrations generated by the sound to the inner ear. The **inner ear** contains a snail-like structure called the cochlea which is filled with fluid and lined with microscopic hair cells. The microscopic hair cells move with the vibrations and convert the sound waves into nerve impulses. The impulses travel to the **brain** via the auditory nerve, and results in the sounds we hear and enjoy.

Exposure to loud noise can destroy these hair cells and cause hearing loss!
The primary auditory cortex is located in the temporal lobe.
Let’s ask a few **key questions** about music loudness and length of time of exposure

**What is the output of my instrument?**

<table>
<thead>
<tr>
<th>Sound (dB)</th>
<th>Description</th>
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<tbody>
<tr>
<td>60 dB</td>
<td>Regular piano practice</td>
</tr>
<tr>
<td>70 dB</td>
<td>Fortissimo singer at 3ft. (1m)</td>
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<tr>
<td>75-85 dB</td>
<td>Chamber music in small auditorium</td>
</tr>
<tr>
<td>84-103 dB</td>
<td>Violin</td>
</tr>
<tr>
<td>85-111 dB</td>
<td>Flute</td>
</tr>
<tr>
<td>106 dB</td>
<td>Timpani &amp; bass drum rolls</td>
</tr>
<tr>
<td>120-137 dB</td>
<td>Symphonic music peak</td>
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<tr>
<td>120 dB</td>
<td>Amplified rock music 5ft. (1.5m)</td>
</tr>
<tr>
<td>150 dB</td>
<td>Rock music peak close to speakers</td>
</tr>
</tbody>
</table>

- Answers are available from many sources, all are estimates.
- Look for info online and share, but remember...anyone can put pretty much put anything on a website, be thoughtful about what you read.
- *See the references at the end of this slide set for websites.*
Key question:

What is the length of my exposure?

- How many hours in a day do you practice, rehearse, and perform?

www.nonoise.org/hearing/criteria/criteria.html/
Key question:

Is noise exposure cumulative?

- Yes, it can be.
- There is ‘protective’ effect of quiet time, ie, time between music exposures.
- Listen to your body and then consider
  - a) the source of the symptoms you experience, and
  - b) how you could mitigate the symptoms
    - Example: musician’s earplugs
Key question:

What is my body telling me?

- **Somatic / psychological effects**
  - Anxiety
  - Stress
  - Nervousness
  - Aggression

- **Physiological effects**
  - Tinnitus
  - Hyperacusis (sensitivity to sound)
  - Hearing loss
  - Processing of sound

https://www.noisequest.psu.edu/index.html

Key question: Can I minimize the effects of exposure?

• Yes you can!
  • Limit sound exposure levels with sound reduction (ear plugs; sound shields)
  • Limit amount of time of practice(s)
    • More than one/day?
    • Days that include rehearsal & performance
  • Limit recreational sound exposure
    • Sound levels at dance clubs
    • Working out in noisy locations
    • Recreational exposure
      • Mp3 (85 v 100 warnings)
      • Certain outdoor activities
Key question:

- What do music industry standards say about sound exposure levels?

- **Nothing**....standards do not exist & none are proposed.
- That is why we have begun this program of education about exposure effects, so that YOU can be aware and mindful of your own situation.
- Very important to remember that people have different tolerances so, you must monitor your own situation!
Hearing is a precious faculty. Hearing damage due to excessive noise cannot be reversed. Quality of life can decline among affected people, while health care costs for society can increase. Noise-induced hearing loss is preventable – so look after your hearing.
References - the first and last are very helpful.

- [https://headphonesaddict.com/safe-headphone-use/](https://headphonesaddict.com/safe-headphone-use/)
- [www.sciencedaily.com/releases/2014/04/140430192647.htm](http://www.sciencedaily.com/releases/2014/04/140430192647.htm)
- [www.google.com/search?q=musician+ear+plugs&sa=X&ved=2ahUKEwjztdKu7azfAhXqj4MKHRTaDwEQ1QIoBHoECAQQBQ&biw=1536&bih=810](http://www.google.com/search?q=musician+ear+plugs&sa=X&ved=2ahUKEwjztdKu7azfAhXqj4MKHRTaDwEQ1QIoBHoECAQQBQ&biw=1536&bih=810)
- [www.who.int/pbd/deafness/activities/MLS_Brochure_English_lowres_for_web.pdf](http://www.who.int/pbd/deafness/activities/MLS_Brochure_English_lowres_for_web.pdf)