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Musicians and Hearing Health

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ABSTRACT

Musicians face a significant risk of developing noise induced hearing loss (NIHL), tinnitus, and hyperacusis, due to the environments in which they perform and practice. This pilot study focused on educating the students involved in music performance and education at Penn State University on their increased risk of developing hearing-related issues based on their exposure levels to sound. The purpose of this study was to design and test an educational model made to educate the School of Music students on relevant information regarding their hearing health and safety. Participants were asked to complete a brief preliminary survey on different topics regarding hearing health and safety. After completing this survey, students were given access through Canvas to a series of educational modules that provided information regarding hearing loss, specifically in musicians. A questionnaire was then distributed to all participants who completed the educational module. This was a tool we used to measure the effectiveness of our materials by monitoring a change in their level of understanding for each topic. The results of this pilot study show evidence of increased understanding of different areas of hearing health and safety following the completion of the educational modules. The aim of the project was to supply relevant information to music students and to provide them an opportunity to make informed decisions about their hearing health and safety. This study should serve as preliminary research to implement more specialized education for music students regarding their hearing health and safety.

TABLE OF CONTENTS

| | |
|----------------------------------|----|
| LIST OF TABLES | iv |
| ACKNOWLEDGEMENTS | v |
| Chapter 1 Introduction..... | 1 |
| Chapter 2 Methods | 6 |
| Chapter 3 Results..... | 10 |
| Chapter 4 Discussion..... | 13 |
| Chapter 5 Conclusion | 18 |
| Appendix A Research Script | 20 |
| Appendix B Interest Sheet..... | 26 |
| Appendix Canvas Modules..... | 27 |

LIST OF TABLES

| | |
|---|----|
| Table 1. Findings from survey one..... | 11 |
| Table 2. Findings from survey two..... | 12 |
| Table 3. Changes in surveys one and two | 12 |

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Chapter 1

Introduction

Due to the high intensity of the music they are performing and listening to, musicians are four times more likely to develop noise induced hearing loss (NIHL) (Schink et al., 2014). It was found that when researching NIHL in musicians, hearing loss that can be attributed to music induced noise exposure was seen in up to 58% of classical musicians, and up to 49% in rock/pop musicians (Schink et al., 2014). Along with NIHL, there is also an increased risk of developing tinnitus as compared to the public (Schmidt et al., 2019). In a study including all musicians in 5 different Danish symphony orchestras, 35% of all musicians measured recorded they had at least one experience with a tinnitus episode lasting more than 5 minutes, and 19% reported they had severe tinnitus that had a significant impact on their daily life (Schmidt et al., 2019). Therefore, individuals who are more likely to develop a NIHL should be well educated about their potential risks. For these individuals, a loss of hearing can lead to a difficulty in their future careers or passions, which makes it even more essential to ensure they are taking the right actions now to protect themselves for their future.

Sensorineural hearing loss is damage occurring in the inner ear, mainly inside the cochlea or nerve pathways from the inner ear to the brain [American Speech Hearing Association (ASHA), n.d]. While NIHL is a major component to sensorineural hearing loss, some other causes might be illness, aging, drugs, or other factors (ASHA, n.d.). When loud sounds are presented, it overworks the inner hair cells causing them to die off, which can also occur long after a loud sound is presented (Kardous et al., 2015).

In a study conducted with 241 professional musicians, it was found that most musicians could be seen as having relatively normal hearing, with notches around 6 kHz (Jansen et al., 2008). This notch is significant because it is a frequency most often related to NIHL (McBride & Williams, 2001). In addition to these findings, there were also reports of tinnitus (often characterized by ringing in the ears because of hearing loss), along with hyperacusis (a disorder in the ability to distinguish how loud a sound is, often resulting in noises being found to be painfully too loud) (Jansen et al., 2008).

Although musicians face a much higher risk of developing hearing problems within the ears, they have been found to have stronger speech on speech reception, pitch perception, stream segregation, and higher level auditory cognitive functioning skills such as attention (Baskent & Gaudrain, 2016). These benefits can be seen because of better processing of different acoustic features which is commonly needed in music, as well as the possibility of enhanced auditory cognitive abilities (e.g., working memory and attention) particularly in the auditory modality (Straight et al., 2010; Carey et al., 2015). However, to protect these enhanced skills as well as their overall hearing, it is essential that musicians are aware of the risks they face, and the outcome that extended exposure to loud sounds can cause.

According to the National Institute on Deafness and Other Communication Disorders (NIDCD), an exposure to sounds for extended periods of time above 85 decibels (dB) could cause damage to the hair cells in the cochlear, leading to symptoms such as noise induced hearing loss, hyperacusis, and tinnitus (NIDCD, 2022). Average levels of concert and symphonic bands were found to be around 89-90 decibels, proving a significant risk to those who play instruments and spend long hours in rehearsals exposed to this level of noise [Centers for Disease Control and Prevention (CDC), 2020]. In a study involving 44 pop, rock, and jazz

musicians, weekly hours of playing were found to have a greater effect on hearing loss in comparison to years of playing (Halevi-Katz, Yaakobi, Putter-Katz, 2015). Music students at Penn State spend their average class day filled with music ensembles, listening to other music ensembles, and practicing at home (Noah Bauer, personal communication, February 28, 2023). Due to this extended exposure in these loud environments, the risk of hearing loss and other hearing problems that could accompany it are serious.

The National Institute for Occupational Safety and Health (NOISH) recommends different strategies to help people protect their hearing while also performing and practicing with their instruments (Kardous et al., 2015). They advise taking breaks, conducting sound level assessments, using hearing protection, and getting educated on music induced hearing loss, which was the inspiration and spark for my thesis project (Kardous et al., 2015).

There is a lack of education surrounding hearing loss in all young adults, but there is a more immediate risk to those exposing their ears consistently during rehearsals and performances. When speaking to Dr. Maegan Mapes, she had informed me that after a presentation she had given on musicians and hearing health, an alarming number of students vocalized their concerns that this was the first time they were learning about their potential risks and requested they be given more information (personal communication, January 2022). The educational modules were not only made with the intention to describe NIHL, but to additionally include the specific risks pertaining to musicians. This project was the result of wanting to provide the information these students felt they were missing and to give them an opportunity to have resources to help them make knowledgeable decisions about their hearing health.

In addition to trying to help those asking for help, I also wanted to deliver help to those who were not requesting it. When speaking to Noah Bauer, he had informed me that he knew he

was at risk, but nevertheless refused to wear protective equipment as he was afraid it would affect his perception of the tonality and loudness of his sound (personal communication, February, 2022). As a musician myself, I am aware that many musicians avoid playing with protective equipment because it not only dampens the sound, but makes it hard to blend with other parts, recognize the tonality of the instrument, or to notice significant dynamic contrasts. When researching for this study, I discovered many cost-efficient options of different brands of hearing protective equipment made for musicians to be able to protect their ears while also saving the quality of music they are hearing. This is done through a filter which works to save the quality of the original sound to make it sound as natural as possible, while also lowering the dB level which in turn helps protect your ears from damage.

Education of hearing health and safety for musicians is essential information they need to know to ensure they can protect their future hearing and careers. I found many resources and options available online, but there was nothing with all the facts in one place. Additionally, these facts online used an abundance of medical jargon that would most likely be unknown to someone without a background in hearing sciences, such as an audiologist. Knowing this, I set out to design a set of educational modules in which students would be able to read and find relevant information pertaining to young musicians with hearing loss. This would provide information on the risks as well as the solutions to ensure they have all the knowledge necessary to make well-informed decisions regarding their hearing health and safety. Each module consisted of a PowerPoint with information organized in a manageable way with no medical jargon and only included relevant information for musicians (for example, there was no information on age-related hearing loss or conductive loss). Additionally, there was supplemental information they

could access which provided additional resources and links to different cost-effective protective options for them to purchase online.

My project addressed the research questions of 1) is there a change in understanding of hearing health in music students after being presented with online training about the effects of exposure to sound, and, 2) which topics presented in the training were most effective, and which should be adjusted for future research? This training could open the door to the creation of other educational modules that could be more effective and would help educate the population of young musicians on their hearing health.

Chapter 2

Methods

The objective of this pilot study was to design and test an educational module in hopes to provide information to students at The Pennsylvania State University interested in pursuing music on their hearing health and safety. An educational module in the form of a Canvas course was made and progress was tracked by a pre- and post-training questionnaire. This questionnaire was given at the beginning and end of the training course to measure if the students learned new information. Additionally, it measured which topics covered by the educational modules were most effective, and which should be adjusted for future research.

Recruitment

To recruit participants, I went in person to both the symphonic wind ensemble rehearsal and the freshman orientation class for music students to discuss the objective of my study (see appendix A). I had additionally contacted the Penn State Blue Band but was unable to present the material to them. After a brief description of the study, students were given a form to supply their emails to the investigators if they wanted more information on the study. This form gave a basic outline of the study and provided a line to write their email for more information. Those who did not want more information were given the option to leave the sheet blank (see appendix B). This form did not indicate consent to take part in the study, but rather allowed for the students to gain more information on the study. Around 70 sheets were distributed and a total of 42 were signed (18 in the freshman orientation class and 24 in the symphonic wind ensemble). They were then emailed a consent document with a detailed description of the entire study.

Participants

If the digital consent form was signed, the participant was then sent a questionnaire to test their preliminary knowledge on hearing health and safety. Fifteen participants completed this initial questionnaire. This questionnaire was five questions long, and each question focused on a different topic regarding risk in hearing health for musicians. Access to the training course on Canvas was given to those who had filled out the questionnaire and consent form. We were able to monitor completion of the training using their names and email addresses under the “People” tab in Canvas. Other students participating in the training course were not able to see who else was participating in the study. The professors teaching the freshman seminar class and the symphonic wind ensemble had no access to any of the study information. The students who did not complete the training course were not given access to the final questionnaire. Data was only collected if all questionnaire questions were answered, and the Canvas module had shown there was activity on the page. Participants who completed the training course (six participants) were notified by email to complete the final questionnaire. The completion of the second questionnaire marked the end of the study (five participants completed).

Materials

The Canvas modules consisted of a series of six PowerPoint presentations along with supplemental and summarizing information. The six topics I highlighted included “How Does Hearing Loss Impact Me”, “Signs of Hearing Loss in Musicians”, “Tinnitus”, “Hearing Screenings at Home”, “Exposure to Sound” and “Hearing Protection” (see appendix C). The summarizing and supplemental information consisted of a series of links to certain apps and hearing protective equipment that could be useful for the population of the study. My outcome data regarding the participants’ understanding in hearing health and safety in musicians was

measured by a pre- and post-training survey distributed through Qualtrics anonymously. Using a Likert scale, I was able to assess their results and if knowledge on this topic was achieved following the completion of the Canvas modules.

Procedure

Students were emailed a pre-training questionnaire before beginning the training course on Canvas to assess their initial knowledge regarding the materials in the study. In each of the five questions in the survey, a different topic in hearing health and safety was addressed. The last question in this pre-training questionnaire left a space for the students PSU ID. If they had completed all questions in the pre-training questionnaire, I then added their PSU ID to the Canvas page which gave them access to the materials. Participants were not able to see the other participants taking part in the study since the “People” tab in Canvas was hidden from view. After access was given, they were able to view each module which consisted of a PowerPoint on each topic and some supplemental information such as links to hearing protective devices. These modules provided relevant information regarding musicians and hearing health. After this had been completed (which was shown through the “People” tab on Canvas based on the amount of time spent), they were sent a post-training questionnaire to their email. The pre- and post-training questionnaires were identical in form to measure how much they learned from the course. Each question asked about a different topic area we were looking to assess, so it also gave us insight into which topics were mastered more than others. Those who did not complete the last questionnaire in full were not used in the final data summary. This data was summarized by looking at the change in mean, median and mode between the pre-training questionnaire survey and the post-training questionnaire survey. Information regarding one participant’s individual change in understanding was not measured. After this was collected, we began assessing the

effectiveness of the educational modules and any changes between the pre- and post-training questionnaires.

Chapter 3

Results

Participants

The participants for this study were limited to students at the Pennsylvania State University studying or interested in studying music (either education or performance). The first group recruited were students enrolled in a freshman orientation class in the School of Music. Eighteen participants signed up for more information from this group. The next group was from the symphonic wind ensemble. Twenty-four more participants signed up to gain more information. Of these 42 participants, 15 had completed the survey in full and qualified to be added to the Canvas page. These participants were monitored based on if they had opened the Canvas page. Six participants of the 15 added had completed the Canvas page. These same six participants all completed the final survey; however, one participant left the post-training questionnaire blank, not counting toward any data collected.

Survey One

Survey one consisted of five questions addressing different topics in hearing health and safety in musicians. The questions were asked on a Likert scale from one to five, with options being not knowledgeable at all (1), slightly knowledgeable (2), Moderately knowledgeable (3), very knowledgeable (4), and extremely knowledgeable (5). Each of these point values were calculated to find the mean, median, and mode of each question based on the 15 student responses (see table one). Outliers to this data collection included the fifth question since the options were yes (3), maybe (2), or no (1). Another difference in data collection were questions three and four that gave the additional option of saying you already had a hearing test, or you already owned

hearing protective equipment. In question three, two participants said they already had hearing protective equipment. In question four, three participants reported they have had a hearing test recently. The questions asked were as follows.

1. How knowledgeable are you currently about hearing health and safety in musicians?
2. How knowledgeable are you currently about tinnitus (ringing in the ears)?
3. Right now, how likely are you to get hearing protection?
4. Right now, how likely are you to get a hearing test?
5. Do you think you are at risk for hearing loss?

Table 1. Findings from survey one

| Question | Mean | Median | Mode |
|----------|------|--------|------|
| 1 | 2.5 | 3 | 3 |
| 2 | 2.3 | 2 | 1 |
| 3 | 3.1 | 2.5 | 2 |
| 4 | 3.0 | 3 | 4 |
| 5 | 2.3 | 2 | 3 |

Survey Two

Survey two was in the identical format to Survey One to be able to compare the results between the two. This survey was given after the completion of all the Canvas modules. The purpose of this survey was to track possible changes to understanding. In question three, one of the four participants indicated they already had hearing protective equipment. In question four, one of the four participants indicated they had a hearing test recently. The results were calculated the same

way as Survey one) (See table 2). For mode in question 4, no result could be calculated as no score was repeated more than once.

Table 2. Findings from survey two

| Question | Mean | Median | Mode |
|----------|------|--------|------|
| 1 | 4.25 | 4 | 4 |
| 2 | 3.5 | 3 | 3 |
| 3 | 4 | 4 | N/A |
| 4 | 4 | 4 | 4 |
| 5 | 2.5 | 2.5 | 2 |

Results

In almost every question there was an increase after the participants had finished the informational Canvas page on Hearing Health in Musicians (See table 3). Question four, how likely are you to get a hearing test, remained the same. It can be predicted that the increase in each of the four questions is partially due to the Canvas course instructing them on specific information regarding their hearing health and safety.

Table 3. Changes in surveys one and two

| Question | Mean 1 | Mean 2 | Median 1 | Median 2 | Mode 1 | Mode 2 |
|----------|--------|--------|----------|----------|--------|--------|
| 1 | 2.5 | 4.25 | 3 | 4 | 3 | 4 |
| 2 | 2.3 | 3.5 | 2 | 3 | 1 | 3 |
| 3 | 3.1 | 4 | 2.5 | 4 | 2 | N/A |
| 4 | 3.0 | 4 | 3 | 4 | 4 | 4 |
| 5 | 2.3 | 2.5 | 2 | 2.5 | 3 | 2 |

Chapter 4

Discussion

Through this pilot study, I have shown that the educational modules do suggest they are helpful in educating School of Music students at the college level on their potential risks regarding hearing health and safety. In turn, it is my hope that the findings of these studies encourage professors to educate their students about these topics or allow an audiologist to come in and present this material to ensure they are making the best decisions regarding their hearing health and safety. We have found through this research that education specific to musicians does increase learning on the topics, therefore we must continue to educate and teach to a larger public to make sure everyone has access to this vital information.

Limitations

There are many aspects to this study that would work better with some adjustments with a second trial. For example, only 5 participants completed the entirety of the study. This is a result of many things, perhaps the most obvious being that we needed to recruit more people. When preparing to recruit, it was advised to me to go in person and give a brief description of my study to make people want to participate. The idea was that we did not want an email about a study getting lost in a junk folder. I think for this initial recruitment, I would switch to online if this study were to be conducted again, because the instructors at the university did not want me taking up class time. This was something I neglected to consider in my initial proposal of the recruitment idea. I think sending the material digitally and having the participants complete it on their own time would be more beneficial since I would suspect more professors would be inclined to present my materials to the class.

Although I could have recruited more initially, it is also true that I lost 37 of my participants along various steps of the process. To improve upon this, I would convert the three-step study into a one-step study. Therefore, the initial survey would be filled out which would then lead to the modules being briefly presented through Qualtrics. Then, the final survey would be completed at the end. To avoid the participants skipping through the material, I would prerecord a video of me giving a presentation on the material and until it has finished, the participant would not be able to progress in the study. Having everything easily accessible and completed all at once would be very helpful and would help to retain more participants.

We also noticed while analyzing data that questions four and five relating to getting your hearing tested or using hearing protective devices was low when compared to the average score of other questions. This can be understood as they comprehended the material, but they are not willing to take the action now to protect their hearing later. I think to improve upon this, a section should be added where they can sign up for a free screening at the clinic on campus, making it easily accessible to them. Knowing cost and time is often a major concern of college students, this would take that element out for them and, hopefully, we could see an increase in scores for this category. As for protective equipment, I tried to provide links to equipment and other resources, however, these scores will still low. I think a productive way to increase this score, since they were not interested in immediately purchasing them, would be to provide a free trial on campus. There could be an investment made where three different types of protective devices are purchased, and students have the option to rent them out for the day and return them at no charge. This might encourage them to buy them after the fact since they can see first-hand how well the sound is preserved.

As a new user to Qualtrics as well as conducting studies, I found a lot of useful information that I would now use to improve future studies. For example, I did not have any numbers assigned to participants, therefore I could not look at a direct change in the score between Survey One and Survey Two because they were not linked. This would have been extremely useful to have not only for the interest for the study, but as more information since I did not have a lot of participants complete the study. This is an additional benefit to having all three elements of the study grouped together since they would already be linked because it is all in one location.

In my questionnaire section, I would add an optional survey at the end to gauge what they liked about the modules, what they did not like, and what they would change. Something I neglected to include in my study was to obtain this information for future research. It is clear from my data that the participants successfully learned a basic understanding of musicians and hearing health, but maybe there was extra information they found not useful or maybe they wanted to learn more about a specific area. I would also allow a section for additional questions so they could reach out to a member of the research team if there were questions after the study was completed.

Implications

Based on this preliminary pilot research study I have conducted, it can be predicted that music students at Penn State had learned more after looking at materials regarding musicians and hearing health, and that the educational modules I had created were successful and increasing the participant's knowledge of hearing health and safety. This gives information for future studies that we need to inform these young adults on their risks, so they have all the necessary tools to make an informed decision on their hearing health and safety. There has been a substantial

amount of work in the field of audiology regarding musicians and their exposure, risks, and implications, however applying this plethora of information to the public and showing them the studies and research was the purpose of this study. The research previously conducted is only helpful if people are understanding and reading it, which is why I decided to break it up into digestible chunks of information that would be readily available to the people who need it most. This data regarding the increase in knowledge after using the educational models can be used now to expand to more individuals at our university, at other universities, or even into high schools.

This research also provides evidence to the faculty members at the School of Music that their students show they need more education on hearing health and safety. Perhaps this study could convince them to implement a unit in their freshman orientation classes to help them learn about the potential risks they face and how their risk is elevated compared to the public. Overall, this study has the potential to evoke change in the education system if expanded into a larger and more professional research study.

Future research

I continue to have a deep interest in hearing health in musicians even after this study has been completed because I find it is essential that people are made aware of the risks they face. Now, after knowing that many students are not educated on correct hearing health and safety, future research should push to educate more people in the most effective way possible. A future study I would like to conduct would have students come in and wear one of the suggested “musician friendly” hearing protective devices for a week. They would then report at the end of the week how many hours they wore the device, how it affected the sound, and how likely they were to use it. Gathering this information would be important to then recommending certain protective

devices over others. Additionally, it would convince those participating in the study to wear protective equipment and maybe convince them to continue wearing it outside of the study.

Another future study I would love to conduct would be a similar premise to the one I have just completed, but with high school students. I would need to change the material to more appropriate for their grade level, but I think educating as young as possible would have a significant benefit on their overall hearing health and safety.

Chapter 5

Conclusion

Potential risks to our health and safety surround us constantly in our everyday lives. However, we deserve the right to know what those risks are and what preventative measures we can take to make the best decisions for our health and wellness. For musicians, this potential risk is often misunderstood or unknown. As a practicing musician myself, I have spent 16 years of my life practicing in large symphony orchestras, singing in choirs with hundreds of people, or even performing onstage with a live rock band. Although I could make an educated guess that my hearing could possibly be at risk, it was never a thought for me. As I learned more in the field of audiology, I began educating my brother who is a student at Penn State studying trumpet performance. Knowing that his lack of knowledge on this subject could in turn effect the future of his health and career, I decided to act. I tested his hearing and began noticing a loss forming in his upper frequencies. Although shocked, he still explained to me how he was uninterested in wearing protective equipment as he was worried it would interfere with his ability to play in his ensembles. It was at this moment I realized I needed to act soon to provide students like my brother the resources they need to make an educated decision about their hearing health. It is hard to think of the long-term consequences when hearing loss seems so far away, but the actions that individuals take now to prevent issues from happening later is essential. Providing these educational modules gave a platform for young musicians to learn and make educated choices about their hearing health and safety.

Along with this project, Dr. Maegan Mapes and I have taken other actions to help preserve the hearing in the School of Music students. While my project was in its beginning

stages, I was additionally volunteering my help giving hearing screenings to the School of Music students at Penn State. Through this, I was able to give information I had found and educate the students in that moment while they were getting their hearing tested. There are so many ways to positively influence the hearing health of others and educate on what is best, and that has been my main take away from the entire project. I would love to continue this journey into graduate school and beyond and begin giving educational talks, conducting more studies, and finding more information to provide musicians with the best resources possible regarding their hearing health and safety.

I hope to continue in this area of research, specifically on hearing health and musicians and continue to find information and educate those who are affected. Since this is a pilot study, I would love to expand my research beyond what I found in this thesis and grow this into a much bigger project. In doing so, I hope I could reach many different audiences and continue to make a difference in the lives of others.

Appendix A
Research Script

Hello! My name is Lauren Bauer, a senior studying Communication Sciences and Disorders with a focus in Audiology. I am conducting a research project for my Schreyer's thesis entitled "Musicians and Hearing Health". The purpose of this study is to educate students at Penn state currently studying, or that are interested in studying, music related fields and how that might affect your hearing health. This study will give you important information regarding hearing health and safety. This is NOT required by the course or instructor, and you will NOT be graded. This study is completely voluntary. If you choose to participate, volunteers will be asked to answer a 5-question survey, followed by a Canvas course with a collection of PowerPoints. You will have one month to complete these Canvas modules; however, they will likely take around 30 minutes to complete in full. If this canvas course is completed, you will then be asked to finish another 5-question survey. I will now pass around a sheet where you may write your name and email address for more information regarding the study. If you wish to not participate, please leave this sheet blank. Only those over the age of 18 can participate in this study. I appreciate you all taking the time to let me present this information.

Appendix B**Interest sheet**

By writing my email on the line below, I consent to more information regarding the Musicians and Hearing Health Study being sent to my email. This does not mean I consent to participate in the study. A consent form will be sent out later for people that wish to participate and are over the age of 18.


Email _____

Appendix C

Canvas Modules

Signs of Hearing Loss

And how to seek help if you need it!




According to the CDC....

"Prevention and early detection of hearing loss is important and you should be examined regularly."

As school of music students, you have a chance of being at risk due to your high exposure levels in rehearsals.

We recommend you get your hearing checked regularly to ensure you are safe and healthy!



What are the signs of hearing loss?

These are some signs to look out for...

| | |
|--|---|
| Hearing speech is repeated | Speech or other sounds may sound muffled |
| Trouble hearing high pitched sounds | This can include things such as birds, doorbells, telephones, or alarm clocks |
| Trouble understanding or following conversation | Following conversation might be hard and require a lot of effort to remain engaged, you may need to ask people to speak slower or more clearly. This can be amplified in an environment where a lot of background noise is present. |
| Ringing in the Ears | Also known as tinnitus, can be a ringing or persistent buzzing in the ears |
| Beginning to play "off key" | Your fellow classmates might be noticing you are beginning to sound off key |
| Turning up the Volume | Volumes that might have been loud enough before now need to be adjusted and amplified |

(How Do I Know if I Have Hearing Loss Caused by Loud Noise? | NCEH | CDC, n.d.)

How many Musicians have hearing loss?

According to a study with 125 musicians with 5 or more years of experience...

- 19.2%** Had Bilateral hearing loss (loss in both ears)
- 28%** Reported pain in their ears
- 51%** Had ringing in their ears after performing (tinnitus)
- >2%** Wear protection

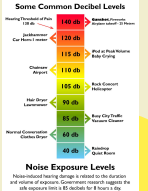
(Surgery, 2022)

Why are Musicians at risk?


A dangerous level to be exposed to for an extended period of time falls over 85dB

Immediate harm to hearing will occur around 120dB or above

Most music groups fall over this 85dB mark, and therefore have exposed themselves to the risk of having potential hearing loss over time.



I might have a hearing loss...What do I do now?



Penn State's Resources

Through our Audiology clinic, you have the ability to get one hearing screening for free, including a full evaluation to test your hearing

- This is on campus (Ford Building) and easy to sign up for!
- You can call (814) 865-5414 to schedule an appointment with the clinic on campus



Things you can do to protect your hearing NOW

Ear Plugs

These are perhaps the simplest. Just wear them anytime you are around high exposure sounds!

Turn the volume down

When you can, turn the volume down on things such as headphones!

Have your hearing checked

Knowing your baseline can be important for recognizing any future damage

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“Signs of Hearing Loss”

“How to Track Exposure to Sound”

How to track exposure to sound

STEPS FOR IPHONE



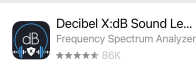
Click on Health App Go to Browse at the bottom

Click the "Headphone Audio Levels"

You can see your levels!

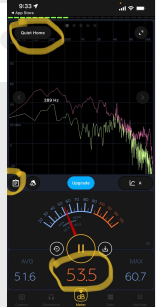
What about my everyday life?


APP - Decibel X



This app tracks your sound levels in real time

Remember ... anything over 120 dB can cause immediate harm!






WHY?

Gives us information to be aware of how our volume might be affecting our hearing health!

“Testing your Hearing at Home.”

Testing your Hearing at Home

APP - Mimi
 Mimi is a free app available to download on the app store to test your hearing.
[Mimi App](#)



How does Mimi Work?
 Let's go over how to use this app effectively...

Steps to using Mimi

- Find a quiet environment
 - this includes one away from fans or other loud background noises
- Open the app and choose between a pure tone or masked test (information on following slide)
- Put in headphones and connect to bluetooth
- Hit the button when you hear the beep and **HOLD** until the beep goes away
 - this might differ from a typical test an audiologist might do!

What is a pure tone and masked test?

| | |
|---|--|
| <p>Pure Tone</p> <p>The sounds coming through the headphones will only include the beep. No other background noise will be present. This tests your hearing when you are in silence.</p> | <p>Masked Test</p> <p>The beeps coming through might be muddled by other noises. This will test your ability to hear in background noise, such as listening to a friend speak in the middle of a crowded dining hall.</p> |
|---|--|

Hearing screenings done on your own can give you great insight, but seeing an audiologist is still **very important** for an accurate evaluation

Things an app might miss...

| | | |
|--|--|--|
| <p>Speech Perception Test</p> <p>An audiologist can do this to test your perception of speech in different environments by listening to your response verbally.</p> | <p>Response Time</p> <p>The app cannot accurately take your response time into account.</p> | <p>Controlled Environment</p> <p>An audiologist has a controlled and consistent environment to measure your hearing while the app does not.</p> |
| <p>Solutions and Advice</p> <p>An audiologist has the ability to review your test results with you, explain what they mean, and how you can get help if needed.</p> | <p>Tympanogram</p> <p>This measures the way the eardrum moves based on pressure in the ear canal. An audiologist can give this test and determine a specific type of loss you might have.</p> | <p>Accurate results</p> <p>An app is a great way to start observing your ears, but an audiologist is someone you can trust. Getting screened by an audiologist is the best way to get accurate results.</p> |

“Hearing Protection Options”



Hearing Protection Options

Why should we have hearing protective equipment?

- Ⓞ **Your ears are your instrument!**
- Ⓞ Louder groups or bands can fall over 100dB. It is NOT safe to be exposed to this for over 15 minutes without protection!
- Ⓞ You can't move backwards! We have to protect our ears before there's damage. Never to early to start protecting

(Poljansky, 2021)



Will this affect my ability to hear while I play music? Will it sound muffled?

- Ⓞ Not all hearing equipment is made equal
- Ⓞ Getting the right equipment will ensure your ability to hear accurately and not have a muffled sound.



What is a musicians filter?

Reduce volumes equally for a more natural listening experience

- Ⓞ Some more simple ear plugs just block sound where a filter will keep the sound sounding "normal" and not muffled
- Ⓞ This is what your favorite artists wear on stage to protect their ears!



Types of Hearing Protection that are ideal for musicians


| Eargasms | Alpine Musicsafe Pro | EarDial HIFI Earplugs |
|---|---|--|
| Highly effective at its price range, comfortable and discrete | Has different levels you can buy depending on how much exposure you typically have. Listed as the #1 used earplug in more than 50 countries | Most discreet! Recommended by many. Highly comfortable and comes with a mobile app to track your exposure. |




The Eargasm

Hear with clarity and keep performing! Trusted by major music festivals and easy to carry around.


- Ⓞ Cost on their website is 41.88
- Ⓞ Has an option for Smaller ears
- Ⓞ Comes with the plugs, filters, and a carrying case
- Ⓞ Reduction is expected as 21 dB (NRR 16dB)
- Ⓞ <https://eargasm.com/products/eargasm-high-fidelity-earplugs>



Eargasm




<https://eargasm.com/products/eargasm-high-fidelity-ear-plugs>




Alpine Musicsafe pro

Comes with THREE exchangeable filters, depending how much exposure you will have. They are comfortable and easy to take in an out!

- Ⓞ 29.95 for 3 filters from their website
- Ⓞ Comes with cleaning equipment, carrying case, carrying cord and spare earplug
- Ⓞ #1 in over 50 countries
- Ⓞ <https://www.alpinehearingprotection.com/earplugs/musicsafe-pro/>



Alpine Musicsafe Pro



www.alpinehearingprotection.com

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ACADEMIC VITA

Lauren Bauer

EDUCATION

The Pennsylvania State University

State College, PA

College of Health and Human Development

Schreyer's Honors College

Bachelor of Science in Communication Sciences and Disorders

May 2023

Minor in Theater Studies

Relevant Course Work

American Sign Language I, II, III, Honors in Research Principles in Communication Sciences and Disorders, Childhood Psychology in Education, Honors in Aural Rehabilitation, Honors in Acoustic Principles of Communication Sciences and Disorders, Audiology Practicum.

OBJECTIVE

Dedicated honors student looking to continue my education in graduate school to expand my knowledge in the field of audiology and to ensure the best quality of care for my future patients.

EXPERIENCE

Center for Better Hearing

Queensbury, NY

Internship

June 2022

- Clinical observations between two licensed audiologists
- Observed a total of 22 hours

Audiology Clinic

State College, PA

Observation Hours

- Clinical Observations with a licensed Audiologist
- Observed treatments and evaluations across various settings
- Experience using an audiometer, otoscope, otoacoustic emissions test, tympanometer, and real-ear

RESEARCH EXPERIENCE

Cognition and Language Learning Lab

State College, PA

Undergraduate Research Assistant

August 2021 - Present

- Learning information regarding memory and language processes in individuals with autism spectrum disorder
- Attended weekly meetings with presentations regarding current information about Speech and Hearing Sciences

Senior thesis*Undergraduate Research*State College, PA
August 2021 - Present

- Lead research project with two advisors in my department to improve the health and safety of musicians
- Conducted study by recruiting individuals and organizing materials
- Analyzed data into my thesis proposal for The Schreyer Honors College

LEADERSHIP

Audiology Club*Vice President*

- Organized event planning
- Participated in giving monthly presentations about audiology

The Coda Conduct – A Capella*President*

- Organized concerts and events
- Fostered professional relationship between alumni and production companies
- Promoted our values of diversity

Teaching Assistant*American Sign Language II, Aural Rehabilitation*

- Provided grading help and assistance in the classroom
- Attended class and took thorough notes for students to use as a resource
- Hosted study review sessions before exams
- Maintained a professional relationship with students and professors

Sign Language Organization*Member*

- Fostered messages of inclusivity and Deaf culture awareness
- Attended meetings to learn and maintain signing abilities

The Penn State Thespian Society*Member – Children's show co-chair*

- Participated in several shows
 - Organized performances as the Children's show chair
 - Volunteered at fundraising events
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