Minority Adolescent Perceptions of Perceived Risk of Hearing Loss and Hearing Conservation Measures

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MINORITY ADOLESCENT PERCEPTIONS OF PERCEIVED RISK OF HEARING LOSS AND HEARING CONSERVATION MEASURES

By

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A Thesis submitted to the School of Communication Science and Disorders in partial fulfillment of the requirements for graduation with Honors in the Major

Degree Awarded:
Spring, 2013
The members of the Defense Committee approve the thesis of Heather Mazzola defended on March 5, 2013.

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Abstract

Historically, hearing loss was a condition that only affected the elderly. Due to increasing technological advances, Noise Induced Hearing Loss is on the rise for all populations. Hearing conservation programs aim to educate the public about Noise Induced Hearing Loss and how to prevent it. Most of the current research on hearing conservation programs has concentrated on majority groups. Additional research was warranted to examine how minority groups perceive noise and respond to hearing conservation programs. A survey was used to assess adolescents hearing conservation behaviors pre and post delivery of a hearing conservation education. 48 sixth, seventh, and eighth graders participated in the study. First, the survey examined the student’s knowledge of the anatomy and functions of the ear. Second, the survey used hypothetical vignettes to examine the student’s behaviors in noise. This study found that knowledge of the hearing mechanism, hearing loss and conservation improved. This study also found that the majority of participants were not more likely after the hearing conservation education to change their behavior. More research needs to be facilitated on the effectiveness of hearing conservation education programs for this specific population.

Keywords: Noise Induced Hearing Loss, Hearing Conservation, Adolescents
Introduction

Hearing loss is considered by most people to be something that affects only the elderly population. However, multiple studies have shown that Noise Induced Hearing Loss in children is on the rise. Audiologists aren’t just seeing the elderly. They are seeing a client base that is made up of young children, preteens, teens, adults, and the elderly. Noise Induced Hearing Loss (NIHL) is becoming a universal epidemic affecting people across the life span.

Combine loud noise, i.e., noise that is over 85 dB, with exposure to that noise over a prolonged time period and the perfect equation for NIHL is created. Children, like adults, are not immune to this type of hearing loss. In order to prevent NIHL in children, programs that promote hearing protection should be implemented. Although, there is plenty of research on the occurrence of NIHL in children, there is little research available on children’s attitudes and perceptions of hearing loss and their use of hearing protection measures. Further, the research that has been done involving children and hearing loss has concentrated on children that are from majority groups. There is a lack of research on the attitudes and perceptions of hearing loss and hearing protection among minority adolescents.

The Hearing Mechanism

According to Sherbon (1978), “The hearing mechanism (ear) has long been described by scientists as one of the most complex, fragile, intricate and amazing parts of the body (pg. 35).” The way in which we hear is also a complex process. A noise source sends sound waves vibrating out into the air. The outer ear funnels the sound toward the ear drum, which in turn begins to vibrate. This vibration causes three tiny bones (ossicles) in the inner ear to also begin vibrating. Once the ossicles begin to vibrate, the sound is funneled to the cochlea. The cochlea is where the inner hair cells are located.
These inner hair cells are essential to hearing. Through mechanical, hydraulic, and neuro-electric actions, the sound wave is converted into an electric impulse that is understood by the brain. When any one part of this hearing mechanism is damaged, the whole system is altered. The most common part of the system to become damaged is the inner hair cells (Sherbon, 1978).

Noise Induced Hearing Loss

Noise Induced Hearing Loss can be caused by a number of different sound sources. NIHL occurs when the inner ear, specifically the hair cells, are exposed to sound that is too loud. According to Daniel (2007), these hair cells become damaged and they never fully recover from this damage. The human ear possesses close to 16,000 hair cells. For perceptible hearing loss to occur, thirty to fifty percent of these cells must be weakened. Once this occurs, the damage is permanent and cannot be reversed with medication, surgery, or any type of hearing aid device (Daniel, 2007).

There are two types of NIHL, one that is caused by an acoustic trauma and one that is caused by prolonged exposure. Acoustic trauma is the result of a sudden high intensity sound that causes instantaneous damage to the hearing mechanism. Examples of acoustic trauma include an explosion or gun fire at close range. The second type of NIHL occurs when the inner hair cells are damaged because of prolonged exposure to excessive noise. This type of hearing loss often occurs from everyday noises such as music, lawn mowers, and ambulance sirens. It can and often does occur due to excessive personal mp3 player volumes (Folmer et al., 2002).

If NIHL results from prolonged exposure, the symptoms are at first very difficult to discern. This is because the symptoms increase gradually. First, sounds become muffled and subdued. It may also become difficult to understand what others are saying (Folmer et al., 2002).
Even with a slight hearing loss, some speech sounds such as /s/, /f/, and /v/ become difficult to distinguish.

Several studies (Folmer et al., 2002; Griest et al., 2007; Lang, 1994; Salvi, 1993) have shown that the range of frequencies that are most affected by loud noise are from 3000 Hz – 6000 Hz, or high frequencies. This is concerning, because this frequency range is where understandable speech occurs (Salvi, 1993).

With continued exposure to noise, the hearing loss will only become worse. With proper hearing protection, however, or by implementing hearing conservation measures, this type of hearing loss is completely preventable.

**NIHL and Children**

Many people wonder why hearing loss is on the rise. Most researchers believe that the answer is in our behaviors. Harmful noises are almost everywhere. Some household noises are even dangerous to the hearing mechanism. These include vacuum cleaners, garbage disposals, lawn mowers, leaf blowers, and certain tools. Hobbies can also be damaging to our hearing. Hunting, video games, snowmobiling, and riding go carts can produce sounds that are too loud (Folmer et al., 2002). These sounds are just a few examples from a very long list of noises that are harmful.

In 2001, a study was conducted by Griest, Folmer and Martin that aimed to investigate the pervasiveness of NIHL in children. The study screened 5,300 children’s hearing. These children were ages six to nineteen. Researchers concluded that 13 percent of the children had some degree of NIHL. If this study’s findings are accurate more than five million children in the United States have some degree of NIHL. The study also found that boys were more likely to have NIHL than girls. Only one in five of the children screened had hearing that was within
normal limits. In a different study reported by Blair, 97 percent of 273 third-graders, were exposed to hazardous levels of sound on a day to day basis (Blair et al., 1996).

Professor Ray Hull of Wichita State University reported a study (2006) in which he found that close to 75 percent of the high school seniors participating had a slight hearing loss. When examining their hearing behaviors, he stated that, “The volume of their headsets is over 115 dB, which can cause permanent hearing damage in as little as seven and a half minutes (pg. 35).” He also commented on the dangers of hearing loss in movie theatres. The sound levels can reach highs up to 118 dB. He also concluded that the likely source of the high schoolers’ compromised hearing was likely NIHL from prolonged exposure.

Even a mild NIHL can have serious negative consequences for a school aged child. Children with NIHL have difficulty paying attention, ask for frequent repetition of phrases, respond incorrectly to instruction, and usually talk too loudly or too softly (Lang, 1994). Learning problems and behavioral issues are just a few of the obstacles children with NIHL face. (Folmer et al., 2002). Learning in a classroom depends strongly on a child’s ability to understand speech. If this ability is taken away, the learning process will be much more difficult for children. Folmer found that even children with a moderate hearing loss performed considerably lower on the Comprehensive Test of Basic Skills. These children also had more behavioral issues and more self-esteem problems than their peers. Just a few of the ranging effects of NIHL include communication deficits, lower grades, social isolation, desolation, and lower achievement (Folmer et al, 2002).

Social Economic Status and NIHL

Several studies (Ferraro et al., 1991; Niskar, et al., 1994; Vogel et al., 2009) have shown correlation between race, socioeconomic status (SES) and NIHL. A study by Niskar identified
that adolescents from lower socioeconomic status families were more likely to have high frequency hearing loss than their peers from middle and higher SES families. The same study also found that African American adolescents correctly answered fewer questions concerned with hearing loss (Niskar, 2001).

Studies have also shown a correlation between gender and NIHL (Ferraro, 1991, Jokitulppo, 1997, Lewis, 1989; Crandell et al., 2004). Males were found to have behaviors that put them at a higher risk for NIHL. These behaviors include sports, tools, shooting and being in a band. They also reported using their personal music players for a longer duration and at a high volume, and had less concern about developing NIHL.

Hearing Conservation

The only successful way to prevent hearing loss is to avoid loud noise or protect the hearing mechanism. This can be accomplished several different ways. Avoidance of dangerous sound levels is the most effective option, but it is not always the most realistic option. Using hearing protection is a more realistic option for most people. Earplugs are beneficial and can provide up to 30 dB of protection. There are many different types of earplugs with many different functions.

Most children don’t understand the need for hearing protection when engaging in noisy activities. Chermark and Peter-McCarthy (1990) reported that 43 percent of the children they studied admitted to listening to the television or a personal stereo system at a loud volume. These same children also admitted to sitting one to three feet away from the sound source. Thirty percent of the children surveyed also routinely participated in noisy activities such as shooting firearms or attending automobile races. Of all the children surveyed, only five percent wore hearing protection (Chermark, McCarthy, 1990).
Hearing conservation programs aim to educate the public about hearing loss and ways to prevent hearing loss. A typical hearing conservation program’s objective is to decrease the frequency and pervasiveness of NIHL by transforming behaviors, attitudes, and knowledge (Chesky et al., 2008). By educating adolescents, it is assumed that they will be more likely to use hearing protection when they are teenagers and adults. A further assumption is that if children are taught a behavior modification at a young age, they may be more likely to continue that behavior for the rest of their lives.

Hearing conservation programs have been demonstrated to be effective (Morata, 2007; Lukes et al., 1998). In these studies, the intervention group was twice as likely to practice hearing conservation than the group that was not informed of the dangers of loud noise. A different type of study conducted by Knobloch and Broste (1998) found that over 87 percent of students who participated in a hearing conservation program later used some type of hearing protection in noisy environments (Knobloch, Broste, 1998).

Acknowledging the increase in NIHL in children, experts have been recommending hearing conservation education programs be put in place in all schools. They have been making these recommendations for the last thirty years, and still today few schools have successful programs. Historically, teachers have not had enough knowledge of hearing loss and noise to have been expected to facilitate a hearing conservation program. Lass (1985) conducted a survey of 98 classroom teachers and 78 special education teachers and found that the overwhelming majority of these teachers had limited to no knowledge of hearing loss and noise. Further, a study done by Frager, Alan and Khan (1988) analyzed the content of 48 school health books. These books all had abundant information on hearing anatomy and function, but they lacked necessary information on how students should behave in loud noise to prevent hearing loss. Although these
studies were conducted almost 30 years ago, there is little evidence to suggest that school practices have changed despite ever-increasing exposure to risky hearing behaviors such as mp3 and video game use.

The National Institutes of Health held a conference in 1990 on noise and its adverse consequences. During this conference, a panel of professionals recommended, “In addition to existing hearing conservation programs, a comprehensive program of education regarding the causes and prevention of NIHL should be developed and disseminated, with specific attention direction toward educating school age children” (Griest et al., 2007).”

Again in 2007, the U.S Department of Health and Human Services stated that a public education program was needed to encourage healthy hearing practices to reduce NIHL (Griest at al., 2007). The Centers for Disease Control (CDC) also weighed in on this subject. The CDC placed all the responsibility within the school system, stating that they had a critical role in promoting the health and safety for young people. The CDC also stated that the school systems have a chance to educate students the dangers of loud noise every school day.

There are numerous reasons for the lack of hearing conservation programs in schools. A primary one being lack of awareness. The general public does not understand the risks of loud noise. Most teachers, parents, principles, and school administrators have no idea the negative consequences and far reaching effects of hearing loss. They take their ability to hear for granted, and assume that hearing loss is only something that happens to the elderly. The only way to prevent NIHL is to understand the dangers of NIHL and protect the hearing mechanism (Folmer et al., 2002).

The general public also does not fully understand the devastating effects of hearing loss. It is difficult to fully understand how debilitating communication difficulties can be. Most people
don’t understand that feelings such as isolation, frustration, and depression can come along with NIHL. There is also a lack of perpetuation of hearing conservation programs. If the audiologist, teacher, or nurse who is teaching the conservation program moves or retires, most of these programs are shut down. (Folmer et al., 2002).

In order to secure more hearing conservation programs, public awareness must be raised. The general public must understand how permanent and devastating NIHL can be. The public must also be aware of the fact that NIHL is completely preventable. No one has to be faced with the challenges of NIHL if the proper precautions are taken. Educators must also be informed of hearing education programs and how effective they are. Folmer (2002) went as far as to suggest that the largest but most necessary challenge will be national legislation. This may be the only way to be sure that the public is aware of the dangers of loud noise from a young age. An informed public will be able to make the most intelligent decisions when it comes to their hearing.

Aims

This study sought to determine whether a hearing conservation program presented to adolescent minority children would affect their attitudes and awareness of NIHL. Specifically, the research questions addressed were: (1) What are minority adolescent children’s attitudes regarding noise and hearing protection? (2) What are minority adolescents’ knowledge regarding noise exposure? (3) After presenting a hearing conservation education, will knowledge change? (4) If knowledge change occurs, will behavioral change occur as well? (5) Will adolescents who have more exposure to hearing loss retain more knowledge of hearing loss than adolescents with little to no exposure to hearing loss?
Method

Recruitment

Participants were recruited from Steele Collins Middle School in Tallahassee, FL. The researcher distributed information about the study to sixth, seventh and eighth grade students and their guardians. Participation was voluntary and informed consent was required from the student and the student’s guardian.

Participants

Table 1 represents demographic information about the participants. Participants of this study included 48 students attending Steele Collins Middle School, ranging from 11-15 (σ = 13.12; SD = 1.12). The majority of the participants were male and African American. These participants got an average of 7.8 hours of sleep a night. Twelve participants did not report bed and waking time, so their average length of sleep was not included in this study. 30 of the 48 participants had their hearing testing at some point. The majority of the participants have never had any medical issues involving their ears. Ten participants did not report any hearing test or ear issue information. These participants had an average of 3.55 family members living in their household.

Table 1

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Table 2 represents information about the participant’s previous exposure to hearing loss. The majority of the participants had a composite score of five or six. This denotes that most of the participants had little to no exposure to hearing loss. Two participants didn’t report exposure to hearing loss information.

**Table 2**

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Material and Procedures

This descriptive study used a survey to obtain information regarding the perceptions and attitudes of middle school students towards hearing loss. The survey is presented in Appendix A. Questions were included to obtain demographic information, determine knowledge of hearing loss and related diseases, of the hearing mechanism, and determine proposed behavior in noise as an indicator of attitudes.

Demographics: Data collected included gender, age, grade level, and ethnic background. Additionally, they were asked to indicate their typical bedtimes and provide information on the family members who reside with them.

Exposure To Hearing Loss and Related Diseases: Students were asked three questions regarding prior exposure to hearing loss. Items included exposure to anyone with any type of communication deficits, exposure to their own hearing loss, and exposure to a hearing screening. If they identified that they had their hearing screened or tested at some point, they were asked to provide information regarding the results of that test. Answers were converted to a numeric score where yes was 1 and no was 2. A composite score was derived from the three questions by
summing the number of yes answers. A high score (6) denoted no exposure to hearing loss and a low score (0) denoted high exposure to hearing loss (See Table 2).

**Knowledge of the Hearing Mechanism:** Participants were asked to answer seven multiple choice questions identifying parts of the ear, ear functions, and behaviors in noise. Scores were determined by calculating the percentage of correct answers.

**Behaviors in Noise:** Hypothetical vignette questions were generated by the researcher to ascertain how individuals behave in noise. The questions were modeled after studies conducted by Hsiaochuan, et al (2009) and Lass (1987). The use of vignettes is a common research tool when using survey methodology (Alexander, 1978). These questions covered topics including personal mp3 use and volume, time spent in noisy environments, firearm use, and perception questions about noise in different environments.

**Development and Enactment of the Hearing Conservation Education:**

The hearing conservation program used in this study was modeled after several similar studies (Daniel, 2007; Martin, 2008; Rogers et al., 2009; Vogel et al., 2009). The hearing conservation education contained topics including: sound waves, anatomy and function of the outer, middle and inner ear, hair cell function and death, dB levels that could damage hearing, mp3 and noise induced hearing loss, and hearing protection.

The hearing conservation education was presented in a lecture style. At the end of the lecture the students were given handouts and hearing protection. They were shown how to use the hearing protection and given examples of different environments where wearing hearing protection would be appropriate.

The primary investigator, Dr. Snowden, Au.D., and a research assistant (Carly Colon) administered the hearing conservation education. The questionnaire was administered before the
hearing conservation education was implemented. The follow up survey was administered five
days after the hearing conservation program.

*Data Analysis*

Each survey’s responses were tallied with those of other surveys to create an aggregate
for each administration. Descriptive statistics and visual inspection of the data were used to
answer the study’s research questions.

*Data collection*

The students were given the pre survey and had approximately ten minutes to complete
it. They were given the same amount of time to complete the post survey.

**Results**

Five questions were addressed in this investigation.

*Question 1: Attitudes Toward Noise and Hearing Protection*

The first question in this study specifically addressed minority adolescents. 13 questions
were included on the pre and post survey that addressed this research question. Descriptive
statistics and visual inspection were used to analyze each question. Tables 2-16 represent each
question addressing attitudes and behaviors. Each table provides a visual representation of the
data. The most frequently chosen response for the pre and post survey was also shown on each
table.
Table 3

Questions 18

Table 4

Question 19
Table 5

![Bar chart for Question 20](chart1.png)

Table 6

![Bar chart for Question 21](chart2.png)
Table 7

Question 22

[Bar chart showing responses to Question 22 for S1 and S2 modes]

Table 8

Question 23

[Bar chart showing responses to Question 23 for S1 and S2 modes]
Table 9

![Bar chart showing Question 24 responses for S1 and S2 modes.]

Table 10

...
Table 13

Table 14
**Question 2:** The second question asked what knowledge minority adolescents’ possessed regarding noise exposure. The participants correctly answered less than half of the pre-survey questions. This knowledge can be described as an unsatisfactory amount of knowledge regarding hearing loss.

**Question 3:** The third question asked if knowledge would change following a hearing conservation education. The mean score for pre-survey was 0.488, with a standard deviation of 0.0295. The mean for the post-survey was .651, with a standard deviation of .057. A paired t-test was used to assess whether a meaningful difference in noise exposure knowledge would be observed. A significant difference was found: t(47)= -3.994, p=.0002.

**Question 4:** The fourth question asks how knowledge change will affect behavioral change. Will an increase in knowledge sway behaviors? Research question three demonstrates how knowledge changed from the pre to post survey. Knowledge of the hearing mechanism clearly increased. Tables 2-16 exhibit the vignette questions that attempted to obtain behavior information from the pre and post survey. Little behavior change was observed from the pre to the post survey.
Question 5: The fifth question asks if previous exposure to hearing loss affects how much knowledge is gained from the hearing conservation education. For this question, means were analyzed to find the answer. Participants with no exposure to hearing loss (composite score of 6) had a mean score of .47 on the pre-survey. These same participants had a mean score of .75 on the post survey. Participants with little exposure to hearing loss (composite score of 5) had a mean score of .49 on the pre-survey and a mean score of .64 of the post-survey. Participants with some exposure to hearing loss (composite score of 4) had a mean score of .45 of the pre-survey and a mean score of .65 on the post survey. Participants with high exposure to hearing loss (composite score of 1 and 3) had a mean score of .51 on the pre-survey and a mean score of .59 on the post-survey.

Discussion

The present study was conducted to revisit and build on previous research done on adolescents’ perceptions and attitudes toward hearing conservation. First, the study examined adolescent’s exposure to hearing loss and related diseases. Second, the study examined adolescent’s knowledge of the hearing mechanism and function. Third, the study used hypothetical vignettes to investigate adolescents’ attitudes and perceptions toward hearing loss, noise, and hearing protection.

Key Findings

Question 1:

The results of this section give information on the attitudes and perceptions of the participants toward noise and hearing conservation. The tables show limited change for the majority of the questions. The majority of the participants chose mostly the same answer choice on the pre and post survey (9 questions out of 13). The majority of the participants exhibited
positive behavior change for 2 of the 13 questions. They indicated that they would consider downloading an app for their ipod that would limit how loud the player could get. They also indicated that they would reduce the volume of the car stereo from 51-75% of the maximum volume to 26-50% of the max. The majority of the participants exhibited negative behavior change for 2 of the 13 questions. On the pre-survey the majority indicated that the noise level when hanging out with their friends was uncomfortable at times. On the post survey, the majority indicated that this noise level never reached an uncomfortable level. On the pre survey the majority indicated that they listened to music in the car with the windows down and on the post survey they indicated that they listen to the windows up. Since most of the findings of the current study indicate no behavior change, it will be important for future research to model hearing conservation education program that focus on producing behavior change. Researchers should look at other programs like AAA and MADD and find out how and if these programs are capable of motivating behavior change. The population studied should also be taken into consideration when modeling new hearing education programs. How much behavior change can we really expect from this age group?

**Question 2:**

The results of this section go along with much of the previous research (Knobloch et al., 1998; Lukes et al., 1998; Morata et al., 2007) on hearing conservation. The majority of the participants included in this study had very limited knowledge of the hearing mechanism, hearing loss, noise, and hearing conservation before the hearing conservation education. This is the main reason why many researchers feel that these programs need be taught in schools nationwide. However, after performing this study, the results show that these programs need to be changed if behavior change is the ultimate goal in preventing NIHL.
Question 3:

The results of this section go along with most of the previous research done on hearing conservation education programs. The majority of the current research (Crandell et al., 2004; Knobloch et al., 1998; Lass et al., 1987; Lukes et al, 1998; Martin, 2008; Morata et al., 2007) found that knowledge of the hearing mechanism and hearing loss increased. This study had the same findings. After a hearing conservation education, the participants’ knowledge increased.

Question 4:

The results of this section show that increasing an adolescents’ knowledge of hearing loss does not necessarily change their behavior. The majority of the participants identified the same behavior on the pre and post survey. The participants didn’t seem to be motivated by the hearing conservation education enough to change behaviors. The findings of this research question go along with the finding of a study done by Frager, Alan, and Kahn. These researchers found that while textbooks increased student’s knowledge of hearing anatomy and hearing loss, they did little to motivate students to protect their hearing.

These findings, however, do not go along with other research done about this age group and hearing conservation education. Other studies (Knobloch et al., 1998; Morata, 2007) found that participants that took part in a hearing conservation education were more likely to wear hearing protection in the future. Based on the questions asked in the pre and post survey about wearing hearing protection, these participants were not any more likely to wear hearing protection in noisy environments.

The researcher realized while performing this study that there may be a lack of effectiveness in hearing conservation education programs. It seems like the results show that the participants understood the content and information provided in the program. The participant’s
knowledge of the hearing mechanism and its function definitely increased. However, it seemed as if the program lacked the necessary parts to motivate the participants to change their behavior.

There is a surprising lack of research being done on how to create a successful hearing conservation education program for children and adolescents. Researchers (Chesky, 2008; Morata, 2007) have identified that teaching hearing conservation education to children is paramount due to their impressionability. It seems as if more research needs to be done into what makes a hearing conservation education appropriate for this specific population.

When creating these hearing conservation education programs, researchers need to keep in mind their audience. Researchers need to come up with a way to make these conservation programs “cool”. It is difficult for young people to imagine having any type of disease of handicap. Researchers need to also keep this “it will never happen to me” type of attitude in mind when creating these programs. Maybe these programs could recruit individuals who have NIHL to talk to students. This would make the program more relatable and real to the students.

*Question 5:* It seems as if very few studies have investigated the correlation between performance on a hearing loss knowledge survey and previous exposure to hearing loss. When looking at the data, it looks as if the students who had less previous hearing loss exposure ultimately did better on the post survey. When interpreting the data, it should be noted that it is much easier to improve when you start with a lower score and much more difficult to get closer to a perfect score from an already high score.

*Limitations*

There are a number of limitations to the present study. First, the hearing conservation education was very minimal. The effect of intervention may not have been large enough to lead to behavior
change. Second, the timing between the administration of the pre and post survey was very short. Meaningful behavior change may not have had a chance to develop.

Third, while hypothetical vignettes are an established research tool, participants might not answer honestly. The students may tend to give the answer they think the researcher is looking for. The students might also choose the behavior they know is correct, but it may not be the behavior they would actually exhibit. This type of change is called the Hawthorne effect and is a threat to the validity of the study.

Fourth, the results of this study can’t be generalized to the entire population. Fifth, the population that participated in this study was not a diverse group. Further research should concentrate on the development of the actual hearing conservation program and not the audience. Developing better programs that reach all population and are effective motivators will lessen the prevalence of NIHL across the age range.

Future Directions

If the present study was repeated, several changes should be made. More participants should be included to represent a large proportion of the population. The hearing conservation education should be changed in a way that makes it more motivating to adolescents. The goal of a hearing conservation education should be to not only change knowledge, but to more importantly alter behavior.

Further research should also attempt to strategize a way to discontinue the use of vignette type questions to reduce the hawthorne effect. Further research should also extend the hearing conservation education. The education could be supplied over a semester to students. This way more information can be given to the students and they will have more time to internalize that information.
Appendix A: Survey

Section 1: Personal and Background Information

1. What is your gender? ________________

2. How old are you? ________________

3. What grade are you in? ________________

4. What is your ethnic background?
   - Asian/Pacific Islander
   - Hispanic/Latino
   - Native American
   - Black/African
   - White/Caucasian
   - Other ________________

5. Does anyone you know or have ever known had any type of communication deficits including hearing loss, cochlear implants, dizziness, ringing in the ears, the use of hearing aids, vertigo, etc. ____________________________

6. What time do you go to bed on the weekdays? ____________________________

7. What time do you wake up on the weekdays? ____________________________

8. Please list the family members that live in your house ____________________________

9. Have you ever had any medical issue involving your ears? ____________________________
10. Have you ever had your hearing tested? If you have, what were the results?

___________________________________________________________________

Section 2: Knowledge about noise, noise exposure, and hearing protection

11. What part of the ear is the main organ of hearing?
   a. Cochlea
   b. Ear drum
   c. Pinna
   d. Auricle

12. What part of the ear is damaged due to noise induced hearing loss?
   a. Auricle
   b. Ear drum
   c. Ear wax
   d. Inner hair cells

13. Hearing Loss
   a. Only happens to old people
   b. Never happens to kids
   c. Can be fixed
   d. Can happen to anyone at any age

14. Circle the following sounds that are considered loud enough to cause hearing loss.
   a. Talking to your friends (50-60 dB)
   b. Washing machine (50-75 dB)
   c. Traffic (85-95 dB)
   d. Marching band (110 dB)
15. How long can you safely listen to a chainsaw (112 dB) ?
   a. less than a minute
   b. 10 minutes
   c. 5 minutes
   d. 1 hour

16. Which of the following ways is a good way to prevent hearing loss?
   a. Wear hearing protection
   b. Get hearing aids
   c. Get closer to the noise
   d. Turn up the volume

Section 4: Behaviors in Noise

17. Its Sunday morning and the cartoons are on the TV. Your little brother has the TV set to a volume that is hurting your ears. What would you do?
   a. Nothing
   b. Cover your ears
   c. Move away from the TV
   d. Don’t know

18. When you listen to your ipod/mp3 player, how loud do you normally set the volume?
   a. 0-25% of maximum volume
   b. 26-50% of maximum volume
   c. 51-75% of maximum volume
d. 76-100% of maximum volume

19. How long do you usually listen to your ipod?
   a. less than 30 minutes
   b. 30 minutes to 1 hour
   c. 1-2 hours
   d. 3-4 hours
   e. more than 4 hours

20. Would you ever consider downloading an application for your ipod/mp3 player that limits how loud you can set the volume?
   a. yes
   b. no
   c. I don’t know

21. When talking with your friends/ hanging out, does the noise ever reach an uncomfortable level?
   a. yes
   b. no
   c. I don’t know
22. How many days a week do you listen to music in the car?

1  2  3  4  5  6  7

23. When riding in the car, do you normally listen to music with the windows up or down?

______________________________________________________________________

24. When playing music in the car, how loud do you set the volume?

   a. 0-25% of maximum volume

   b. 26-50% of maximum volume

   c. 51-75% of maximum volume

   d. 76-100% of maximum volume

25. How long do you spend at Funstation?

   a. 30 minutes to 1 hour

   b. 1-2 hours

   c. 3-4 hours

   d. more than 4 hours

   e. I don’t go to funstation

26. Would you ever consider wearing hearing protection at Funstation?

   a. yes

   b. no
c. I don’t know

27. Do you think the noise in the cafeteria at lunch ever gets too loud?

   a. yes
   
   b. no
   
   c. I don’t know

28. If the sound in the cafeteria was too loud, what would you do to make it quieter?

   a. nothing
   
   b. ask your friends to quiet down
   
   c. talk louder
   
   d. tell your parents

29. Do your ears ever feel full or fuzzy after leaving the cafeteria?

   a. never
   
   b. rarely
   
   c. frequently
   
   d. always

30. How many times have you used a firearm?

   a. once or twice
b. 2-3 times

c. more than 5 times

d. never

31. You are watching a movie in a crowded movie theatre. The previews start and they are very loud. They are so loud it is uncomfortable. What would you do?

a. nothing, continue to watch

b. complain

c. go talk to a manager at the movie theatre

d. cover your ears
References


