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Effectiveness Of The Dangerous Decibels Program In Children When Delivered With Parental Involvement

Amanda D. Clark

UNIVERSITY OF NORTHERN COLORADO

Greeley, Colorado

The Graduate School

EFFECTIVENESS OF THE DANGEROUS DECIBELS PROGRAM® IN CHILDREN WHEN DELIVERED WITH PARENTAL INVOLVEMENT

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Amanda Clark

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Accepted by the Capstone Research Committee

_____
Deanna K. Meinke, Ph.D, Chair

_____
Kathryn Bright, Ph.D, Committee Member

_____
Tina M. Stoody, Ph.D, Committee Member

Accepted by the Graduate School

_____
Linda L. Black, Ed.D., LPC
Acting Dean of the Graduate School and International Admissions

ABSTRACT

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Hearing loss prevention programs targeting children have been implemented in an effort to prevent noise-induced hearing loss and tinnitus in this age group. The purpose of this study was to investigate the effectiveness of parental involvement in the Dangerous Decibels® hearing loss prevention program taught to children as well as the parents in the study group. Through the use of pre, post and follow-up questionnaires, the effectiveness of the Dangerous Decibels program for children with parental involvement was compared to the effectiveness of the Dangerous Decibels program for children without parental involvement in the training session.

A total of 23 child/parent pairs were included in the control group and 22 child/parent pairs in the experimental group. Child participants were eight to twelve years of age. For this study, a baseline, post, and three-month follow-up questionnaire was utilized to assess the knowledge, attitudes, and intended behaviors of children and parents regarding NIHL and the prevention of NIHL.

Improvements in the knowledge, attitudes, and intended behaviors were evident at post and three-month follow-up for those participants who received the Dangerous Decibels program. There were significant differences in the knowledge, attitudes, and intended behaviors of children and their parents who attended the Dangerous Decibels

program simultaneously, compared to those children and their parents that did not participate together. The Dangerous Decibels program can be successfully delivered simultaneously to both children and adults.

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ABBREVIATIONS

NIDCD: National Institute on Deafness and Other Communication Disorders

NIHL: Noise-Induced Hearing Loss

EPA: Environmental Protection Agency

NIOSH: National Institute for Occupational Safety and Health

NHANES III: Third National Health and Nutrition Examination Survey

NITS: Noise-induced Threshold Shift

OFFHHS: Ohio Farm Family Health and Hazard Study

dBHL: Hearing Level Decibel

dBA: A-weighted Decibel

kHz: Kilohertz

HBM: Health Belief Model

SCM: Stages of Change Model

TRA: Theory of Reasoned Action

TPB: Theory of Planned Behavior

SCT: Social Cognitive Theory

WHO: World Health Organization

BMI: Body Mass Index

HH: School-based Hearty Heart

HT: Home-based Home Team

HH/HT: School-based Hearty Heart/Home-based Home Team

LAFFIP+HI: Louisiana Farm Family Injury Prevention and Health Initiative

ASHA: American Speech-Language-Hearing Association

DRF: Deafness Research Foundation

NHCA: National Hearing Conservation Association

OHSU: Oregon Health & Science University

OHRC: Oregon Hearing Research Center

OMSI: Oregon Museum of Science & Industry

PSU: Portland State University

NCRAR: National Center for Rehabilitative Auditory Research

ATA: American Tinnitus Association

CHAPTER I

NEED FOR THE STUDY

Dangerous Decibels®, which is a school-based hearing loss prevention program, has the objective to increase children's knowledge about the sense of hearing and hearing loss prevention and to positively change their attitudes and intended behaviors regarding hearing and hearing loss prevention (Griest, Folmer, & Martin, 2007). The program has been shown to be effective at increasing children's knowledge regarding noise, hearing loss, and hearing loss prevention. Although there was an increase in the seventh grade students' knowledge three months after the program, there was not an increase in the positively changed attitudes or intended behaviors. From these results, one can conclude that an adjustment needs to be made in order to increase a positive change in the attitudes and intended behaviors of children that extends months after the program.

Stigler, Perry, Komro, Cudeck, & Williams (2006) conducted a study to compare the effectiveness of several intervention strategies to prevent and reduce alcohol usage among students in rural Minnesota. These strategies included a classroom curriculum, peer leadership, extra-curricular activities, parent programs, and community activism. From the results of the study, the authors concluded that parental involvement was very effective in preventing and reducing alcohol usage by the children. To successfully prevent or reduce alcohol usage by children, the authors suggest using a classroom curriculum and involving the parents. Since parental involvement has been shown to be

effective in children's health promotion concerning alcohol usage and healthy eating habits (Stigler, et al. 2006; Perry, et al 1988), involving parents in his/her child's hearing health promotion might also be effective.

The purpose of this study was to investigate the effectiveness of parental involvement in the Dangerous Decibels hearing loss prevention program taught to children from a farming community. Through the use of pre and post questionnaires, the effectiveness of the Dangerous Decibels program with parental involvement was compared to the effectiveness of the Dangerous Decibels program without parental involvement. From evidence of related health promotion research favoring the success of parental involvement, the following research questions can be asked and hypothesized:

Q1 Is there a difference in the knowledge, attitudes, and intended behaviors of children whose parents participated in the Dangerous Decibels program simultaneously, compared to those children whose parents did not participate?

H1 Children, whose parents participated in the Dangerous Decibels program simultaneously, will have increased knowledge, attitudes, and intended behaviors immediately following and 3 months after the program, compared to those children whose parents did not participate.

Q2 Is there a difference in the knowledge, attitudes, and intended behaviors of parents who simultaneously participated in the Dangerous Decibels program with their child, compared to those parents who did not participate?

H2 Parents who participated in the program simultaneously with their child will have increased knowledge, attitudes, and intended behaviors immediately following and 3 months after the program, compared to those parents who did not participate.

CHAPTER II

REVIEW OF THE LITERATURE

According to the National Institute on Deafness and Other Communication Disorders (NIDCD, 2008), approximately 15 percent of Americans between the ages of 20 and 69–or 26 million Americans-have a noise-induced hearing loss (NIHL) that might have been caused by exposure to loud noises during work or leisure activities. Noise-induced hearing loss can also affect people of all ages including, children, adolescents, adults and the elderly population. According to the Environmental Protection Agency (EPA) in 1981, it was estimated that more than 9 million U.S. workers were occupationally exposed to daily noise levels that exceeded 85 dBA (NIOSH, 1998). Among these 9 million, 323,000 of the individuals work in the agricultural industry (NIOSH, 1998).

Noise-Induced Hearing Loss in Children

Niskar, et al. (2001) evaluated the audiometric thresholds, middle ear compliance testing, and household interview data collected from the third National Health and Nutrition Examination Survey (NHANES III) to determine the prevalence of noise-induced threshold shifts (NITS) in children. The survey was conducted from 1988 to 1994 on children between the ages of 6 and 19 in the United States. A total of 5249 children were included in the final analysis. In order for the child to be classified as having a NITS, the following three audiometric criteria had to be met in at least one ear;

1) threshold values at .5 and 1 kHz were better than 15 dB HL, 2) the poorest threshold value at 3, 4, or 6 kHz was at least 15 dB poorer than the best threshold value for .5 and 1 kHz and 3) the threshold at 8 kHz had to be at least 10 dB lower than the poorest threshold value for 3, 4, or 6 kHz. These authors concluded that 12.5% (approximately 5.2 million) of U.S. children are estimated to have NITS in one or both ears. Boys were found to have a higher prevalence estimate of NITS than girls, with 14.8% and 10.1% respectively. The authors assumed this difference between genders is due to the fact that boys often participate in noisier activities than girls. Older children who were between the ages of 12 and 19 years had a prevalence estimate of 15.5% and younger children between the ages of 6 and 11 years had a prevalence estimate of 8.5%. The higher prevalence estimate in the older age group was expected since those children have had more years of noise exposure than the younger age group of children.

Henderson, Testa, and Hartnick (2011), conducted a similar analysis comparing the audiometric test results from NHANES III 1988-1994 with results from NHANES 2005-2006 to evaluate the prevalence of NITS in older children between the ages of 12 and 19 years. Henderson et al. used the same NITS criteria that were described by Niskar et al in 2001. In this study, 16.8% of children had NITS in one or both ears, which is not a significant increase from the Niskar et al (2001) results. In 1998-1994 the prevalence of NITS was estimated at 20.2% for males and 11.6% for females. Interestingly, the 2005-2006 prevalence was generally similar between males (17.0%) and females (16.7%) and suggests an increase in the prevalence among females.

A study conducted by Brookhouser, Worthington, and Kelly (1992), classified 114 children, out of 2284 children with sensorineural hearing loss from the Boys Town

National Research Hospital, as having probable noise-induced hearing losses. The thresholds for each child had to be worse than 25 dBHL for at least one audiometric frequency in order be in the NIHL study group. The age ranges at the time of identification of the hearing loss were between 14 months and 19.8 years. Detailed case histories were taken for each child to help identify specific noise exposure and to exclude any child from the study if any of the following history factors were present: familial hearing loss, prenatal infections, stressful delivery or NICU admission, mumps, head trauma, meningitis, recurrent otitis media or treatment with ototoxic drugs. Seventy-two of the children had bilateral hearing losses and positive noise exposure history, 22 children had a unilateral hearing loss and positive noise exposure history, and 20 children had a unilateral hearing loss, but no noise exposure case history could be filled out due to the children's changes in home placements. Even though a positive noise exposure history could not be identified on these children, audiometric testing revealed the classic 4- to 6-kHz noise notch. Of the 94 children whose parents or guardians identified noise exposure as a possible etiology, only 70 (74%) could identify specific noise exposure instances. In 21 (36%) of the 58 children with bilateral hearing losses and 8 (67%) of the 12 children with a unilateral hearing loss, fireworks or firearms were identified as the main noise source. Males were also found to have a higher prevalence of NIHL (90.3%) than females (9.7%) which is consistent with the findings from Niskar, et al. (2001).

Noise-Induced Hearing Loss in Farm Youth

There are numerous studies that have found hearing loss to be prevalent among the adult farming population (Thelin, Joseph, Davis, Baker, & Hosokawa, 1983; Karlovich, Wiley, Tweed, & Jensen, 1988; Plakke & Dare, 1992). In a study conducted

by Plakke & Dare (1992), 10% of farmers in the thirty-year- old age group, 30% in the forty-year-old age group, and 50% in the fifty-year-old age group were considered to have a hearing handicap according to the criteria proposed by Suter (19 dB or greater average for 1 kHz, 2 kHz, and 3 kHz). With this amount of evidence supporting NIHL among adult farmers, children raised or working on farms are also at risk for NIHL. Broste, Hansen, Strand, and Stueland (1989) were interested in finding the prevalence of hearing loss among high school farm students. During 1985 and 1988, audiometric thresholds were collected on vocational agriculture students between the ages of 12 and 19 years from 12 high schools within the area of Marshfield, Wisconsin. The students also answered a questionnaire on their health and hearing history, history of exposure to noisy farm and recreational equipment, and their amount of participation in farm work. From the questionnaire, the 870 students were categorized into the following groups: students who lived on farms and participated in all farm activities (group A, n=445), students who did not live on farms, but worked on a farm (group B, n=198), students who lived on farms, but did not participate or had minimal participation in farm activities (group C, n=50), and those students who did not live on farms and had no involvement with farm work (group D, n=177). Threshold values that were 10 dBHL or less were considered normal and those values that were greater than 10 dBHL were considered abnormal. The 10 dBHL criterion used in this study is more conservative than other recent studies. If a student had thresholds at 10 dBHL or less at .5 and 1 kHz, but thresholds greater than 10 dBHL at 4 or 6 kHz, the student was considered to have abnormal hearing which was suggestive of early noise-induced hearing loss. Evidence of a hearing loss in either the low or high frequencies was found in 71% of students in group

A, 74% of students in group B, 36% of students in group C and 46% of students in group D. A low frequency hearing loss was uncommon, but a high frequency hearing loss was much more common. Almost one-half of the students in groups A and B and almost one-fourth of the students in groups C and D had high frequency hearing losses. When comparing the groups for noise-induced hearing loss, groups A and B, which were involved the most in farm work, had the highest prevalence as compared to groups C and D, which were involved in little or no farm work.

A study by Renick, Crawford, and Wilkins III (2009) found similar results regarding the prevalence of hearing loss among farm youth. In this study, the researchers measured baseline hearing threshold levels on 212 children aged 4 to 21 years between March of 1994 and December of 1996. These children were from the farm families that participated in the Ohio Farm Family Health and Hazard Study (OFFHHS). From April of 2003 to May of 2004, contact was made again with these children and their families and follow-up audiometric thresholds were tested on 132 children who were then between the ages of 12 and 31 years. These 132 children represented 75 central Ohio farms. These researchers utilized the same NITS criteria as the Niskar et al. (2001) study to compare the prevalence of NIHL in the Ohio farm youth to the national prevalence estimate obtained from the NHANES III. Renick et al. (2009) found the prevalence of NITS to be 22.5% at baseline in the Ohio farm children. This is almost twice as high as the Niskar et al. (2001) findings. Prevalence of NITS was also higher in the male group at the follow-up testing (25.5%) as compared to the female group at follow-up testing (11.9%). The older children, ages 12-19 years, had a higher prevalence of NITS at baseline and follow-up testing (26.5% and 22.2%) than the younger children, ages 6-11

years, (17.1% and 17.3%). These general trends were consistent with the Niskar et al. (2001) results, except the prevalence of NITS was significantly higher in the Ohio farm youth.

Health Communication Theories

Theories are important to health promotion because they present a systematic way of understanding events or situations (National Cancer Institute, 2005). Before planning a health promotion program, it's beneficial to look at different types of health communication theories. Health communication theories help explain the processes of changing health behaviors and the social and physical environments that affect the health behaviors. Health programs that are planned, implemented and monitored based on theories, are more likely to be successful than those programs that do not involve a theoretical perspective (National Cancer Institute, 2005). In order for hearing loss prevention programs to be successful, they should be based upon a theoretical perspective.

Health Belief Model

The Health Belief Model (HBM) states that there are six main concepts that influence a person's decision to take action for prevention (Rosenstock, Strecher, & Becker, 1988). First, the person must believe he/she is susceptible to the condition (perceived susceptibility). Second, he/she must believe the condition has serious consequences (perceived severity). Third, the person must believe that by taking action, the susceptibility will be reduced (perceived benefit). Fourth, he/she must believe that the costs of taking action (perceived barriers) are outweighed by the benefits. Fifth, the person must be exposed to factors that will prompt an action (cue to action). Sixth, the

person must be confident in him/herself to successfully perform the action (self-efficacy). The main focus of this theory is on motivation.

Stages of Change Model

The Stages of Change Model (SCM) involves five stages that people progress through when they attempt to change a behavior (Prochaska & DiClemente, 1983). This model focuses on behavior change being a process, not an event. Precontemplation is the first stage and it involves an increase in the person's awareness of a need to make change, but the individual has no intention of taking action within six months. In the second stage, contemplation, the person has become motivated and intends to take action in the next six months. Preparation is the third stage and during this stage the person has taken some steps in developing and implementing an action plan. The individual plans to take action within the next thirty days. The fourth stage, action, is where the individual has taken action and makes a behavioral change for less than six months. In the fifth stage, maintenance, the person has changed the behavior for more than six months. An important aspect of the SCM is that people may not systematically progress from one stage to the next. An individual may enter the stage process at any stage and then regress or progress to another stage more than once.

Theory of Reasoned Action and
Theory of Planned Behavior

The Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB) look at the relationship between behavior and one's beliefs, attitudes, and intentions (Fishbein & Ajzen, 1975). In both of these models, the behavioral intention is the most important determinant of the behavior change. The person's attitude toward performing the behavior and his/her beliefs about whether or not individuals close to

them will approve or disapprove of the behavior change, influence the behavioral intention. If the person feels his/her family will disapprove of the behavior change, then the person is likely to not change the behavior. The TPB also involves the person's perceived behavioral control, which deals with the person's beliefs that he/she can control a certain behavior.

Social Cognitive Theory

Social Cognitive Theory (SCT) describes a continuing process in which personal factors, environmental factors and human behavior all influence each other (Bandura, 1986). SCT involves six concepts that affect behavior change. The first concept, reciprocal determinism, involves the interaction of person, behavior, and the environment in which the behavior is performed. Second is behavioral capability, which includes the individual's knowledge and skills to perform a certain behavior. The third concept is expectations, which involves the anticipated outcomes of the behavior. Self-efficacy is the fourth concept. If someone has strong self-efficacy, then he/she has confidence in one's ability to take action and overcome any obstacles. The, fifth concept is observational learning/modeling, which entails the individuals behavioral achievement that occurs from watching the actions and positive behaviors of other people. The last concept is reinforcements. This concept involves the responses to behavior that affect whether or not the person will repeat the positive behavior. Positive reinforcements increase the likelihood that the behavior will be repeated and negative reinforcements decrease the likelihood that the behavior will be repeated.

Health Promotion

According to the World Health Organization (WHO, 2010, para. 1), "health promotion is the process of enabling people to increase control over and to improve their health. It moves beyond a focus on individual behavior, towards a wide range of social and environmental interventions." Through the use of health promotion, people are aware of numerous health issues and the risks and benefits involved. These include tobacco use, alcohol abuse, obesity, physical exercise, etc. Promotion plays an important role in the education and awareness of health issues for adults as well as children.

Peer Involvement

In a health promotion program targeting prevention of obesity and eating disorders in children in two elementary schools in British Columbia, the older children were selected to teach the younger children (Stock et al., 2007). This study involved a control elementary school, where no intervention took place, and a target school, which involved the healthy buddies intervention. Students in the 4th through 7th grades were paired with students in the kindergarten through 3rd grade. The 4th through 7th grade students received a 45-minute healthy-living lesson each week that included topics on being physically active, eating healthy foods, and having a healthy body image. These lessons were taught by direct instruction from an intervention teacher. Following the direct instruction each week, each 4th through 7th grade student became a peer educator and taught a 30-minute healthy living session to their healthy buddy (a kindergarten through 3rd grade student). Also during the week, each pair of students spent two 30-minute structured physical activity sessions together in the gym. Before the intervention began in September, all students from both schools completed a nine minute run and a

pre-questionnaire that assessed the students' knowledge and behaviors towards various aspects of healthy living. Height, weight, blood pressure, body mass index (BMI), and heart rate measurements were also taken. The same evaluation measures were utilized following the10-month intervention program in June. When Stock et al. compared the pre and post evaluation measures, they found that height and weight increased for the kindergarten through 3rd grade group for both the intervention and control groups, which was expected (Stock et al., 2007). However, there was a greater increase in height for the intervention group than the control group. There was also less of an increase in systolic blood pressure for the intervention group compared to the control group. The changes in weight, BMI, and heart rate between the groups were not significantly affected by the intervention. Height and weight also increased for both groups in the 4th through 7th grade students. The students in the intervention group had a smaller increase in weight and BMI than the control group. Students in the control group had an increase of 4.0 mm Hg in their systolic blood pressure; whereas the intervention group's systolic blood pressure remained unchanged. Diastolic blood pressure did not change and was not affected by the intervention. The changes in height and heart rate were also not affected by the intervention. For both the intervention and control groups, there was an increase in the distance covered during the 9-minute run for both ages of students. The researchers think this increase is due to the maturation or training of the students over the 10-month period. The results from the questionnaires showed an increase in the health knowledge scores for the intervention group for all ages of students. There was a significant increase in positive health behavior for the intervention group of students in the 4th through 7th grades. The students in kindergarten through 3rd grade for both the

intervention group and control group all had an increase in health behavior. However, there was a higher increase in health behavior for the intervention group, but the increase was only seen in the female students. Positive health attitudes increased for the intervention group only, for both the older and younger students. Stock et al. (2007) concluded that older students can be effective teachers in promoting good health to younger students. Both the older and younger students benefited from the healthy buddies health promotion program. The authors suggest that peer-led teaching can be an effective tool in increasing health knowledge, health behaviors, and health attitudes in children as young as five years of age (Stock et al., 2007).

The previous study showed the importance of health promotion to influence children to make a positive change in a health behavior. When promoting good health behavior for children it's important to not only target the children in the health promotion activities, but the parents as well.

Parental Involvement

Perry et al. (1988) conducted a study to compare a school-based health program to a home-based health program that was used to detect changes in dietary fat and sodium consumption. Thirty-one schools in Minnesota and North Dakota participated in the study. The schools were randomly assigned to one of the following programs: the school-based Hearty Heart (HH), the home-based Home Team (HT), both programs in sequence (HH/HT), or the no treatment control group. The school-based program was a five-week session which was taught by third grade teachers that involved modeling of healthful eating habits by slide-tape cartoon characters, food selection and preparation skills, and goal setting with direct reinforcement. The home-based program was also a

five week course that involved third graders and their parents. Each week, five packets were mailed to the children and their parents. These packets included descriptions for activities to be completed by the child and the parents, recipes to help incorporate healthier eating habits into the home, and a refrigerator tip sheet that included more detailed nutrition information. If the parents and children completed the activities, they received participation points which were written on a scorecard that was collected each week by Home Team coaches. Evaluation measures, which included height, weight, and skinfold thickness were taken before and after the programs. Pre-test and post-test questionnaires were also used to assess the child's knowledge and greater skills. Healthy behavior questions were also included, but only in the post-test questionnaire.

In comparing the scores between each of the four groups, the HH group and the HH/HT sequence group were equivalent for all the knowledge scores and label reading abilities. When comparing the HH and HH/HT group to the HT group, the HT group had lower scores in knowledge and label reading. However; for behavior, the HH/HT group was equivalent to the HT group, but higher than the HH group. Children in the HT group had lower intake from the fat nutrients, but higher intake from carbohydrates. During the food shelf inventory conducted by the survey team at the end of the program, the HT group had more "encouraged foods" on their shelves than the HH or control groups. The HH program was effective in educating children about healthy eating, but parental involvement is needed to reinforce and model those behavior changes in eating habits. From these results, Perry et al. (1988) suggest that parental involvement is necessary in order to see a greater dietary change in children.

Parental involvement, specifically maternal involvement, was also studied by Pryor, Carruth, and LaCour, (2005) as part of the Louisiana Farm Family Injury Prevention and Health Initiative (LAFFIP+HI). Postcards, with the university's research information and a brief summary of the study, were sent out to 4,808 farms to promote interest in the study. Phone calls were then made to each family in order to collect data on the number of household members and the age of each member. A total of 177 women were used in the analysis, because they reported having at least one child under the age of 18 years living in the home with them. The survey consisted of questions regarding lifestyle characteristics, demographic data, at-risk behaviors of children and prevention activities of the caregiver and child. The prevention activity questions were divided into groups depending on what type of risk was being prevented: occupational disease or illness/injury. The data collected showed that the age range of children was 3 months to 18 years of age. More than 50% of children under the age of 6 years had handled livestock and children between the ages of 3 and 10 years had driven a tractor alone. The caregivers and children were more likely to engage in preventative behaviors if the negative outcome was more immediate. For example, children and their mothers were more likely to wear gloves and sunscreen to prevent dermatitis and sunburns versus wearing a helmet while riding a horse or ATV. There was a consistent pattern between the preventative behaviors of the mothers and children that suggest children only engage in preventative behaviors when their mothers do. Also, when the mother did not participate in the preventative behavior, neither did the child. The findings from this study were consistent with the findings from the Perry et al., (1988) study, which

suggests that parental involvement is a key component in positive health behavior changes in children.

Hearing Loss Prevention Campaigns Targeting Children

The prevalence of NIHL in children demonstrates a need for educating children and parents about the negative effects of hazardous noise exposure. There are currently numerous educational resources available to the public that are designed to inform and educate parents and children about NIHL.

It's a Noisy Planet: Protect Their Hearing

In an effort to prevent NIHL in children, the NIDCD sponsors the public campaign; *It's a Noisy Planet, Protect Their Hearing.* The American Speech-Language-Hearing Association (ASHA), the Deafness Research Foundation (DRF) and the 4-H organization through the United States Department of Agriculture's Cooperative State Research, Education, and Extension Service have teamed up with the NIDCD to advocate for prevention of NIHL. Information about this campaign can be found on the following website: http://www.noisyplanet.nidcd.nih.gov/. The website includes the following information to educate children and parents: how do we hear, facts about NIHL, how loud is too loud, consequences of a hearing loss, and prevention of NIHL. The above information can be easily located on the website and online games and activities have been incorporated into the campaign to make NIHL education fun and interactive. Fact sheets, parent tips, and posters can also be ordered through the NIDCD.

Listen To Your Buds

The American Speech-Language-Hearing Association developed a public education campaign to prevent NIHL by helping parents teach their children how to

safely listen to personal audio listening devices (ASHA, 2006-2010). The "*Listen To Your Buds"* campaign website educates parents and children about NIHL, the consequences of NIHL, how to prevent NIHL by turning down the volume, warning signs of a hearing loss and how to locate an audiologist if they suspect a hearing loss.

Operation BANG

Operation BANG (Be Aware of Noise Generation) began in 1989 at McClellan Air Force Base in California (Military Audiology Association, 1968-2011). The program involves a three day (one hour per day) hearing loss prevention campaign that targets fifth graders. The program can be condensed into 45 minutes if need be. The program is designed to teach children about the anatomy and physiology of the ear, the physics of sound, and the importance of protecting their hearing. Children also experience different hazardous noise sources.

Crank It Down

"*Crank It Down"*, which evolved from Operation BANG, was an outreach campaign designed by the National Hearing Conservation Association (NHCA) to encourage local communities and schools to educate children and teens about the potential risks of high noise exposure. The campaign included activities and a curriculum that can be adapted for elementary, middle and high school students. National Hearing Conservation Association collaborated with AAA (American Academy of Audiology) to educate the public by creating a "*Crank It Down"* brochure to educate adults regarding the risk of NIHL for children. The brochure can be viewed at the following website: http://www.nhca.affiniscape.com /associations/10915/files/Sample%20Prac_Guide8.pdf. The NHCA also conducted "*Crank It Down"* student poster contests to expand awareness

of NIHL up until the year 2000. More recently, NHCA has partnered with the Dangerous Decibels® program to encourage dissemination of this NIHL and tinnitus intervention program.

Intervention Programs and Effectiveness

Due to the prevalence of NIHL in school-age children, there is a need for informing and educating children about the dangerous effects of hazardous noise and hearing loss prevention practices in order to intervene early and prevent NIHL and tinnitus. Several NIHL and tinnitus prevention programs have been evaluated to determine program efficacy.

Lecture and "Listen Up" Video

Chermak and Peters-McCarthy (1991) evaluated the effectiveness of a hearing conservation program (HCP) delivered to 22 third-grade students and 23 fourth-grade students in Kennewick, Washington. The HCP was presented in two one-hour sessions and covered the anatomy and physiology of the ear, nature of noise, hearing loss, causes of NIHL, early warning signs of NIHL, prevention of NIHL, and the importance of regular hearing check-ups. The program also included the showing of the "Listen Up With Norm Crosby" video, a demonstration of a hearing screening, a question and answer session, a discovery learning activity where children made a list of strategies to prevent NIHL, and the presenters distributed earplugs and the "NASHA Answers and Questions About Noise and Hearing Loss" pamphlet. To evaluate the program effectiveness, a pre-questionnaire was administered to the students before the HCP and a post-questionnaire two weeks following the program. The questionnaires were designed

to assess the student's exposure to noise, knowledge of NIHL, and attitudes towards the use of hearing protection.

The results showed an increase in the student's knowledge after attending the HCP presentation. There was an average increase of 23% in correct responses from the pre to post-questionnaire. The post-questionnaire also revealed that almost all children intended to use hearing protection when participating in any noisy activity. On the pre-questionnaire, no student correctly identified what part of the ear is hurt by noise, but on the post-questionnaire 73% of the students answered correctly. Ninety-one percent of the student's reported "learning something" from the HCP.

PROjectEAR

Weichbold and Zorowka (2003) investigated the effectiveness of a hearing protection program (PROjectEAR) that targeted teenagers in six high schools in South Tyrol, Italy and North Tyrol, Austria. The program was divided into four 45-minute sessions that included lectures, multimedia presentations, group activities, and role-play. Students were educated about the anatomy and physiology of the ear, the negative effects of continuous exposure to extreme sound levels, and the benefits of hearing protection. Before and after attending the program, students completed a questionnaire that assessed their experiences and attitudes towards listening to loud music (specifically at a discotheque) and their use of hearing protection.

Thirty-four percent of the students attended a discotheque frequently before the program and after the program, 24% of the students attended. Also, the rate for the students who occasionally attended increased from 28% before the program to 36% after the program. However, these increases were not statistically significant and the

researchers indicated that the changes observed could be due to random variation rather than the hearing protection program. Less than 4% of the students indicated they wore hearing protection while attending a discotheque after the program.

After reviewing the data, the researchers concluded that the PROjectEAR program did not increase the students' use of hearing protection while attending a discotheque. The investigators realized that utilizing a matched-pairs analysis (Wilcoxon or McNemar test) for the pre and post questionnaires and including a control group for comparison would have been more appropriate for the study.

Sound Sense™

Neufeld, Westerberg, Nabi, Bryce, and Bureau (2011) conducted a study to evaluate the efficacy of a hearing conservation program in changing behaviors of sixth grade students in 16 Vancouver schools. The hearing conservation program, Sound Sense™, is a 45-minute program that addresses the anatomy of the ear, the hearing mechanism, etiology, signs, and consequences of NIHL and hearing conservation strategies. A total of 439 sixth grade students were included in the control group and 351 students in the intervention group. All students completed a baseline behavioral questionnaire that included items regarding the student's personal music player habits, exposure to excessive noise during daily activities and earplug use during the following activities: school dances, rock concerts, car racing events power lawn mowers, power tool use, percussion musical instruments, and electric guitars. The children in the intervention group completed a 2-week and 6-month follow-up questionnaire after participating in the Sound Sense™ classroom program. Children in the control group

also completed a 2-week and 6-month questionnaire, but did not participate in the Sound Sense™ classroom program.

The intervention had a significant interaction effect for improved earplug use at school dances, rock concerts, car racing events, and for protection from other noises in those children who completed all three questionnaires. Children who completed the baseline and 2-week follow-up questionnaire also showed an improvement in earplug use at school dances, rock concerts, with percussion musical instruments, electric guitars, and other noises. A significant interaction effect was also seen for the intervention in children who completed the baseline and 6-month questionnaire for improved earplug use at school dances, rock concerts, with power lawn mowers, and other noises. Although, statistical outcomes were significant, the Sound Sense™ program outcomes were limited to a 1% to 6% rate of improvement for earplug use at 2 weeks and a 1% to 3% rate of improvement at 6 months. According to the researchers, this NIHL prevention program showed significant short- and long-term effectiveness in changing the hearing loss prevention intended behaviors in sixth grade students in Canada.

Dangerous Decibels®

Dangerous Decibels is a contemporary public outreach program that addresses the problem of NIHL and tinnitus which was developed by collaborators at the Oregon Health & Science University (OHSU), the Oregon Hearing Research Center (OHRC), the Oregon Museum of Science and Industry (OMSI), the Portland State University (PSU) School of Community Health, the Veterans Affairs National Center for Rehabilitative Auditory Research (NCRAR) and the American Tinnitus Association (ATA) (Martin, Sobel, Griest, Howarth & Yongbing, 2006). The Dangerous Decibels program contains

the following four components: A Dangerous Decibels exhibit at OMSI, a virtual online exhibit at the Dangerous Decibels website (http://www.dangerousdecibels.org/), an inquiry-based classroom and teacher training program that targets kindergarten through 12th graders and NIHL and tinnitus research collected from the Listen UP! hearing screening activity exhibit at OMSI.

Integrating the importance of health communication theories in health promotion programs, the Dangerous Decibels collaborators created the classroom program by utilizing multiple health communication theory models (Sobel, 2010). The Dangerous Decibels program has incorporated The Theory of Planned Behavior, the Theory of Reasoned Action, the Health Belief Model and the Social Cognitive Theory into the current classroom program curriculum (Sobel, 2010).

Inquiry-based learning. The Dangerous Decibels classroom program is based upon the inquiry-based learning model; "Tell me and I forget, show me and I remember, involve me and I understand." The last part of this statement is the essence of inquiry-based learning. Inquiry-based learning involves having the students observe, question, pose explanations, test ideas, analyze information, draw logical conclusions, and build models (Center for Inquiry-Based Learning, n.d.).

Dangerous Decibels Classroom Program. The Dangerous Decibels classroom intervention program is a 45-minute program that involves interactive activities for the children that address the physics of sound, mechanisms of hearing, how loud sounds damage hearing, consequences of hearing loss, and hearing loss prevention strategies (Griest, 2007). The children also learn about decibels, measure sound levels, and make models of their own inner ear through the use of scientific tools. The classroom program

is designed to address three educational messages: What are sources of dangerous sounds? What are consequences of exposure to dangerous sounds? How do I protect myself from dangerous sounds? The program also teaches the children the following three strategies that can be utilized in response to hazardous sounds: walk away, turn it down, and protect your ears.

Dangerous Decibels Curriculum Outline. The Dangerous Decibels curriculum has been designed to address the three educational messages discussed in the above paragraph. The following summarizes the general curriculum and outcomes for the classroom program (Dangerous Decibels, 2010).

1. Introduction

   Educational Objective: To familiarize the class with the educator, educator expectations, and what the purpose of the visit is.

2. What is Sound?

   Educational Objectives: Students will know the following: Sound is a result of vibrations, sound vibrations are called sound waves, you cannot have sound without vibrations, and the energy in sound is what can cause damage to our ears.

3. How Do We Hear?

   Educational Objective: Students will have a general understanding of how sound waves and vibrations travel through the parts of ear to enable hearing.

4. How Do We Damage Our Hearing?

   Educational Objective: Students will know loud sounds create strong vibrations that can permanently damage hair cells in the cochlea.

5. What's That Sound?

Educational Objective: Students will understand one of the consequences of being exposed to dangerous sound levels and will understand what it is like to try to identify sounds with a high frequency hearing loss.

6. How Loud Is Too Loud?

   Educational Objectives: Students begin to associate different sounds with decibel levels, identify which method of hearing protection is the best to practice when exposed to dangerous decibels from different sources, and identify and discuss the social norms and challenges associated with practicing hearing protection.

7. Measuring Decibels with Sound Level Meters

   Educational Objectives: Students measure sound intensities with a sound level meter and learn how effective walking away from dangerous sound levels can be to reduce their exposure to dangerous sound.

8. How to Use Earplugs

   Educational Objectives: Students will observe the proper technique and fitting of pre-formed earplugs and students will have the opportunity to practice fitting earplugs in their ears.

9. Rock Your World: Time to Act!

   Educational Objectives: To bring awareness to peer pressure that a person can encounter when practicing smart hearing and students can practice making personal decisions on individual behavior in social settings and discuss their answers with the class and educator.

Dangerous Decibels Educator Training and Certification. Dangerous Decibels offers a two-day educator training workshop that is designed to prepare

individuals to present the K-12 classroom program that has been shown to be effective at changing knowledge, attitudes, and intended behaviors in students regarding their hearing health (Dangerous Decibels, 2001-2011). The workshop is open to a variety of educators such as nurses, teachers, speech-language pathologists, health care workers, and audiologists. The two-day workshop was developed with National Institutes of Health (NIH) funding and is lead by a team of experts in hearing science, hearing loss prevention, public health, educational outreach, and health communication. During the first day of the workshop, attendees are given background information on the physics of sound, auditory function, hearing loss, sources and effects of dangerous sounds, and how to protect hearing. Attendees are also given instruction in classroom management. The second day of the workshop is devoted to giving the attendees an opportunity to deliver the program to the workshop instructors for critique and suggestions. After successful completion of the two-day workshop, the attendee is certified as a Dangerous Decibels educator.

Dangerous Decibels Program Effectiveness. To determine the effectiveness of the Dangerous Decibels classroom hearing loss prevention program, formative and summative evaluations were completed (Griest, 2008). A formative evaluation is designed to determine how well a program is performing and to investigate what changes need to be made in order to keep the program running smoothly. Summative evaluations are conducted to determine whether the program has achieved its goals.

For the formative evaluation, the Dangerous Decibels team and an external evaluation team worked together in collecting data from student and teacher focus groups, student and teacher surveys, and self-assessment questionnaires completed by the

presenters. There were a total of 304 students, 14 teachers and 3 presenters in this study. After reviewing the data from the formative evaluation, the Dangerous Decibels team made a few content changes to the program. One change included the elimination of the cartoon-style video clip that was designed to simulate the effects of a hearing loss. After these adjustments, a second formative evaluation was completed on a new group of students and was successful according to the researchers. The majority of the students and teachers who participated in the second formative evaluation enjoyed the program and responded with comments such as "The program was interesting," "I know more about how we lose our hearing after participating in the program," and "I liked the hearing program presented today" (Griest, 2008).

During the summative evaluation, study (n=507) and comparison groups (n=521) of fourth and seventh grade students completed baseline and post questionnaires to assess the children's knowledge, attitudes, and intended behaviors regarding NIHL, tinnitus and prevention (Griest, 2008). The baseline questionnaires included items about the student's current hearing health behavior, knowledge about how loud is too loud, how hearing can be damaged, and how to properly protect hearing. The baseline questionnaire also included items regarding the student's attitudes toward hearing and hearing loss prevention and their intended hearing health behaviors. Before the classroom program, each student participant completed a baseline questionnaire for both study and comparison groups. Immediately following the program, each student in the study groups completed a post questionnaire that included similar items to the baseline. All students in the study and comparison groups also completed a follow-up questionnaire three months after the program. After reviewing the data, the Dangerous Decibels

research team concluded that the program presentation significantly improved the knowledge, attitudes, and intended behaviors of students in the study groups compared to those students in the comparison groups. An increase of 10-to 52% in correct responses for the knowledge items was evident for all students who received the Dangerous Decibels classroom program. Items pertaining to attitudes also improved within a range of 13-to 23%. Before the program, 15% of seventh graders said they would use hearing protection at a loud concert, and this number increased to 44% after the program. Three months after the program, the fourth graders still retained these increases in intended behavior question. However, the seventh grade students maintained an increase in knowledge, but attitudes and intended behaviors returned to their baseline levels. These outcomes encouraged the research team to consider changes for this age group of older students. For example, the team wondered if a classroom program plus a booster activity (OMSI museum exhibit or website virtual exhibit) would be more effective than just the classroom program alone.

During 2004 and 2005 the Dangerous Decibels team performed another summative evaluation that involved four interventions divided into two categories (Griest, 2010). The first category (interpersonal communication) consisted of high school students and school nurses that were trained Dangerous Decibels educators. The second category (self-directed) included a 12-component OMSI museum exhibit and an 8-component web-based virtual exhibit. A total of 54 fourth grade classrooms (1,118 students) in Oregon participated in the study and were divided into the four interventions. Before presenting the classroom program to the fourth grade students, the high school students and school nurses completed the two-day training and delivered two-practice

presentations. The fourth grade students in the self-directed category visited the OMSI Dangerous Decibels exhibit or accessed the Dangerous Decibels virtual exhibit on the website. All students completed a baseline questionnaire similar to the one used in the previously described summative evaluation before attending the classroom program, OMSI exhibit or the virtual exhibit. Following the intervention, all students completed a post-questionnaire and a follow-up questionnaire three months later.

Children in all four intervention groups showed a significant ($p <. 05$) increase in mean scores for knowledge from the baseline to post questionnaire, compared to the control group children who did not receive any intervention. There was also a significant increase in knowledge three months after the classroom program, in those children who were taught by either the high school students or nurses. Children who received the classroom program from the high school students or nurses, showed an increase in attitudes immediately after the intervention. Three months following the intervention, the children taught by the nurses still showed a significant increase in attitudes. A significant increase was also seen in the intended behaviors of children in all four intervention groups at the post questionnaire. At the three month follow-up questionnaire, a significant increase was only found in the children who received the classroom program taught by the high school students or nurses. After reviewing the questionnaires, the Dangerous Decibels team concluded that all four educational interventions are effective at improving knowledge, attitudes, and intended behaviors in children. They also concluded that interpersonal interventions are more effective than the self-directed interventions. However, single interventions tend to lose their effectiveness overtime, especially for intended behaviors

In 2005 and 2006, the Dangerous Decibels research team investigated the effectiveness of the classroom program paired with the addition of either the OMSI exhibit or the virtual exhibit as a booster activity rather than a "replacement" activity (Griest, 2010). A total of 846 fourth grade students participated in this study. The classroom program was presented to the students by trained high school student educators. Questionnaires were administered at baseline, post-classroom presentation, one month after the classroom presentation, which was immediately before the booster activity, immediately after the booster, and three months after the booster (four months after the classroom presentation). Mean score values were reported for the knowledge, attitude, and intended behavior questions at baseline, post-classroom, post-booster, and three months post-booster. There was a significant ($p < .05$) increase in knowledge and attitudes at the post-classroom, post-booster, and three month post-booster questionnaire for children in both intervention groups. The mean scores for intended behaviors, showed a significant increase at the post-classroom, post-booster, and three month post-booster for children in the classroom plus virtual exhibit booster. Children in the classroom plus OMSI exhibit booster showed a significant increase in intended behaviors at the post-classroom and post-booster questionnaires. This study suggests that paired interventions separated in time are essential for acquiring the long-term effectiveness of improving knowledge, attitudes, and intended behaviors in children.

Dissemination of Hearing Loss Prevention Programs for Children

NIHL in children has been a concern for many years and yet there is still no required school curriculum regarding the prevention of NIHL in children. According to Folmer (2008), the lack of NIHL prevention being taught in the schools can be due to the

following five reasons: 1. There is a lack of public awareness about NIHL and the consequences of hearing loss. 2. Schools already have a full curriculum regarding health education (smoking, drugs, sex, alcohol, etc.) so administrators and teachers are hesitant to add another topic. 3. The existing hearing loss prevention programs are not being effectively disseminated throughout the schools. 4. Those hearing loss prevention programs that are being taught in the school are lacking continuation when the teacher or administrator relocates or retires. 5. There are no policies requiring hearing loss prevention programs be taught in schools. Folmer (2008) suggests several approaches to address the problem of NIHL not being taught in schools. First, health care providers can raise public awareness about NIHL and prevention. Second, teachers and school administrators can be informed about the hearing loss prevention programs that already exist. Third, school personnel can invite health care professionals, who are knowledgeable in the area of hearing loss prevention, into the classroom to provide a presentation on NIHL and prevention. Fourth, health care professionals should join together and insist that hearing loss prevention programs be taught in schools. Fifth, parents should be informed about NIHL and hearing loss prevention and should be encouraged to practice healthy hearing at home with their children.

Gill (2008) conducted a study to assess parental knowledge, attitudes, and beliefs regarding NIHL in children. Surveys were distributed to 577 parents at various public locations. From the 305 surveys that were returned and filled out completely, 97% of parents felt that it was their responsibility to educate their children about the risks of NIHL. Eighty-eight percent of parents felt that NIHL would negatively affect their child's ability to understand speech and 70% of parents reported having talked with their

child about the dangers of listening to sound that can damage their hearing. From these high percentages it is clear that parents recognize the danger of NIHL in children. These same parents reported that 71% of their children participated in one or more activities with hazardous noise levels in the last year; however, only 30% of parents reported wearing hearing protection around their children and only 22% reported that their children wear hearing protection. Fifty percent of parents did not know that NIHL cannot be medically corrected.

Using a health communication model construct, Gill concluded that a parent's knowledge, attitudes, and beliefs affect their hearing loss prevention behaviors by performing a factor analyses. The results indicated that parents with a greater perceived susceptibility to NIHL report practicing hearing loss prevention behaviors to a greater extent than those parents with less perceived susceptibility. The parents who understand hearing loss prevention strategies report participating in them more often, compared to those parents with less understanding. Parents also reported less participation in hazardous noise situations when they felt there were negative consequences, compared to parents who did not feel there were negative consequences. The final finding showed that parents who understood the early warning signs of NIHL participated in hearing loss prevention behaviors to a greater extent than those parents who did not understand. The researcher suggests educating parents on how the ear works, what hazardous noise levels are, and the appropriate use of hearing protection. These findings indicate the potential importance of parental knowledge, attitudes and beliefs in NIHL prevention education for children and is the focus of this research study.

CHAPTER III

METHODOLOGY

The purpose of this study was to investigate whether or not parental involvement enhances the effectiveness of a hearing loss prevention program that targets rural children. Specifically, was there an improvement in the knowledge, attitudes, and intended behaviors of children immediately afterwards and/or three months after the Dangerous Decibels hearing loss prevention program was delivered? This research was conducted under an approved University of Northern Colorado Institutional Review Board (IRB) protocol (Appendix A). The study was designed to include an experimental group in which the parent and child received the Dangerous Decibels program simultaneously, and a control group in which the parent did not attend the Dangerous Decibels® program, but the child did.

Participants and Recruitment

Children and parents were contacted to participate in the study through regional youth organizations such as 4-H and Boy Scouts. Youth organization leaders were contacted upon referral from personal social contacts of the student researcher. Contact was also made with an elementary teacher and a neighbor who helped organize a group of children and parents to participate. This constituted a convenience sample and was not a controlled randomized sample for this initial inquiry into the research questions.

The child participants for each group were between 8 and 12 years of age and were enrolled in an age-appropriate classroom grade level in order to participate in the study. The adult participants were a parent or legal guardian of a child participant who shared household daily living arrangements at least 50% of the time. A single child from each family was enrolled in the study; however siblings were allowed to attend the presentation.

Before each Dangerous Decibels program delivery, consent forms were completed by each parent giving permission for their child, as well as themselves, to participate in the study. Children ages 8 and 9 years completed an assent form that was verbally read aloud to each child by the researcher or the researcher's assistant. Children ages 10 to 12 years completed a written assent form. Program sessions alternated between experimental (parent and child pairs) and control group (children only) and an effort was made to balance the numbers of subjects between the two groups when scheduling.

Program Delivery

The Dangerous Decibels program was delivered to the control and study groups following the same Dangerous Decibels curriculum described in chapter two. The program was delivered by the researcher, who is a certified Dangerous Decibels and experienced classroom educator. The program was scheduled at a time convenient to the participating youth group in a familiar physical location such as a community center or school. Because the parents were not allowed to attend the program presentation in the control group, the parents gathered in the adjacent room to socialize. The 45-minute inquiry-based intervention program involved interactive activities for the participants that address the physics of sound, mechanisms of hearing, how loud sounds damage hearing,

consequences of hearing loss, and hearing loss prevention strategies. The following are the three educational messages: What are sources of dangerous sounds? What are consequences of exposure to dangerous sounds? How do I protect myself from dangerous sounds? The program also taught the participants the following three strategies that can be used in response to hazardous sound risks: Walk away, turn it down, and use earplugs or earmuffs. A standardized script was followed to ensure consistent program delivery for each presentation.

Instrumentation

For this study, a baseline, post, and three-month follow-up questionnaire was utilized to assess the knowledge, attitudes, and intended behaviors of children and parents regarding NIHL and prevention. The questionnaires included items regarding the participants' current hearing health behavior, current loud noise exposure experiences, knowledge in the area of the hearing mechanism, attitudes towards hearing and hearing loss prevention and their intended hearing health behavior. The first question on each questionnaire inquires about the frequency the subject has participated in various noisy activities in the past year. Some items on the questionnaire were written using a Likert scale format and others in a multiple choice format which could have multiple correct answers (Trochim, 2006). The questionnaire also included a demographics section. The questionnaires were a slightly modified version of the questionnaires created by the Dangerous Decibels program/research team at Oregon Health and Science University. The questionnaires have been used previously in research with the Dangerous Decibels hearing loss prevention program and are at age-appropriate reading level (Griest, 2008). The parent and youth questionnaires contained the same topic items, worded

appropriately for the reader. Appendix B provides an example of the baseline child questionnaire and Appendix C an example of the baseline parent questionnaire. The questionnaires were completed in approximately 15 minutes. The post-training and 3-month follow-up questionnaires contained the same questions as the baseline questionnaire but sequenced differently.

Data Collection Procedure

No identifying participant information was collected on the questionnaires. A unique numerical identifier was assigned to each participant in order to link the baseline, post, and follow-up questionnaires to the same participants. The identifiers also were coded for linkage between child and parent pairs. Following the delivery of the final follow-up questionnaire, the tracking/contact link between the participant and numerical identifier were destroyed.

Control Group

Before the Dangerous Decibels program was delivered; the children and parents completed a baseline questionnaire separate from each other. To ensure that all children clearly understood the items on the questionnaire, the researcher read each item out loud to the children as a group in a room without the parents present. The parents completed the questionnaire in the adjacent room. After all questionnaires were completed, the 45-minute Dangerous Decibels program was presented to the children only in the control group. The control parents socialized in a nearby room. Following the program, a post questionnaire was completed by the children following the same administration procedure as the baseline questionnaire. Three months after the program, the researcher scheduled and attended a subsequent gathering of the participants at their respective

youth organizational meetings or events. Each parent and child was again asked to complete a 3-month follow-up questionnaire at that time using the same administration protocol. If participants were unable to attend the follow-up youth group meeting or event, individual contact was made to meet with the participant in order to complete the follow-up questionnaire. In this instance, the child and parent completed the questionnaire separately as before.

Experimental Group

Before the delivery of the Dangerous Decibels program, the children and parents completed a baseline questionnaire separate from each other. As with the control group, the parents went into a separate room to complete the questionnaire. The same administrative procedures were followed to ensure that the children understood all items on the questionnaire. Once the parents and children completed the baseline questionnaire, the Dangerous Decibels program was delivered to the parent/child pairs together. Following the program, a post questionnaire was completed by the children and parents following the same administration as the baseline questionnaire. Three months after the program delivery, the researcher contacted the youth organization again and the children and parents completed a follow-up questionnaire. The same procedures performed with the control group were followed if the children and parents were unable to attend the organizational meeting or event.

Data Analysis Procedures

The items on the questionnaires were designed to assess the knowledge, attitudes, and intended behaviors of the participants. All de-identified questionnaires were copied and mailed to TC Data Service in Vancouver, Washington along with the coding

documents. The data service reviewed each item on all questionnaires and entered the code into an Excel spreadsheet. The data entry service double entered the data to help eliminate random data entry errors. Data were summarized for each group in an Excel spreadsheet and returned for further quality assurance, descriptive and statistical analysis. Once the data summary was received, the researcher reviewed the original questionnaires and verified that each response was coded correctly into the spreadsheet. Appropriate changes were made as necessary and only minor coding/data entry issues were identified. The corrected Excel spreadsheet was then converted into an SPSS data set using the IBM SPSS Statistics package version 20.

A crosstabs analysis was completed to show the total correct responses for each item on the questionnaires for the experimental and control groups. Questions that involved responses on a Likert scale were collapsed into dichotomous correct and incorrect responses (Trochim, 2006). This adjustment in the analysis was utilized to increase the statistical power due to the small number of subjects in this limited-scope research study.

To determine the effectiveness of the program for both the experimental and control groups, the questionnaires were reviewed and percentages of correct responses on the baseline questionnaires were compared to percentages of correct responses on the post questionnaires using Fisher's exact test (McDonald, 2009). Fisher's exact test was selected as the most appropriate non-parametric statistic due to the low number of subjects in the research project and resultant small cell counts. Percentages of correct responses on the baseline questionnaires were also compared to percentages of correct responses on the follow-up questionnaires using the same statistical approaches in order

to evaluate the three month program effectiveness for both the control and experimental groups. Significant statistical outcomes from the Fisher's exact test were reported using an alpha of $p < .05$. Descriptive analysis was also utilized to compare the control and experimental group responses and to determine if changes occurred following the program were influenced by parental involvement.

CHAPTER IV

RESULTS

Study Participants

A total of twenty-three child/parent pairs were enrolled in the control group and twenty-two child/parent pairs were enrolled in the study group. The control group consisted of two separate program presentations. Fifteen child/parent pairs participated from the Boy Scouts Troop and eight child/parent pairs were from the 4-H group. The experimental group had four separate program presentations. Twelve parent/child pairs received the intervention program at the elementary school group, three pairs from the 4-H group, four pairs from youth acquaintances, and three pairs from a different 4-H group. Baseline and post questionnaires were completed by all participants in the control (n=23) and study (n=22) groups. Only 21 children and parent participants completed the three month follow-up questionnaires in the control group. Two parent/child pairs in the control group were unable to be contacted at the time of completion of the follow-up questionnaires.

Study participants age, gender, and ethnicity reported from the baseline questionnaires are summarized in Table 1.

Table 1

Demographics reported from baseline questionnaires

	Parent Control % n = (23)	Youth Control % n = (23)	Parent Study % n = (22)	Youth Study % n = (22)
Gender				
Male	17.4 (4)	69.6 (16)	22.7 (5)	45.5 (10)
Female	82.6 (19)	30.4 (7)	77.3 (17)	54.5 (12)
Ethnicity				
Hispanic/Latino	4.3 (1)	4.3 (1)	9.1 (2)	9.1 (2)
White	91.3 (21)	91.3 (21)	90.9 (20)	90.9 (20)
Black/African American	4.3 (1)	4.3 (1)	0.0 (0)	0.0 (0)
Age (years)				
Mean	36.50	9.70	39.0	9.90
Range	28.0-48.0	8.0-12.0	28.0-53.0	8.0-12.0
Standard Deviation	±4.70	±1.30	±5.50	±1.20

In the course of conducting the study, occasional questions were inadvertently skipped by the participants. The experimenter did not have a procedure in place to screen for this situation at the time of data collection. Throughout all three questionnaires in both the control and study groups, there were a few unanswered questions for both the youth and parent participants. Consequently, there were missing data for various questions and these occurrences are indicated in the appendices that contain the raw data for the knowledge (appendix E), attitude (appendix F), and intended behavior (appendix G) questions. There did not appear to be any systematic question omissions.

Appendix H (youth raw data) and I (parent raw data) contain the full questionnaires with the response frequencies provided to show how often each activity or

action was reported. The appendices also contain the responses for each knowledge, attitude and intended behavior questions.

Activities and Actions

The questionnaires included items relating to the participants noise-related activities or hearing protective actions performed. Table 2 summarizes the actions and activities that were reported on the baseline questionnaires for each group. Appendix D contains the summary for the activities/actions reported on the post and follow-up questionnaires for each parent and child group. The activities/actions reported on the post and three month follow-up questionnaires were very similar to those reported on the baseline questionnaires so they are not discussed here. For the majority of the questions on the baseline questionnaires, both the experimental and control group responses were generally similar. However, there were a few differences that will be highlighted. On the question about the use of a lawn mower, chain saw, or leaf blower the positive responses in the parent experimental group (90.9%) were 25.7% greater than the positive responses in the parent control group (65.2%). For the "ride on a tractor or are around other farm equipment" activity, the positive responses were 20.5% higher in the parent experimental group (72.7%) than the parent control group (52.2%). With regard to the activity "riding a jet ski, 4-wheeler, snowmobile or motorcycle", the parent control responses (39.1%) were ~24 -35% lower than the other three groups (parent experimental 72.7%; youth experimental 63.6%; youth control 73.9%). Both the parent experimental (81.8%) and youth experimental (95.5%) groups reported a higher attendance rate at a concert or loud sporting event when compared to the parent (60.9%) and youth (65.2%) control groups. The use of stereo earphones was more common for the youth experimental group (90.9%)

when compared to the parent control (60.9%) and youth control (65.2%) group, as well as the parent experimental (77.3%) group. Subjects in the youth control (43.5%) and youth experimental (54.5%) groups were more likely to play in a band than as compared to the parent control (17.4%) and parent experimental (0.0%) groups.

Turning the volume down was the most commonly reported hearing protective strategy that had been used in all groups (parent control 60.9%; youth control 56.5%; parent study 77.3% and youth study 50.0%). The parents were more likely to use this strategy than the youth. The youth control group (39.1%) reported wearing earmuffs more often than the youth study group (13.6%). The parent control group (17.4%) and the parent study group (13.6%) reported similar use patterns. The hearing protective strategy "walking away" was more typically used among the parent control group (65.2%) and the parent study group (59.1%) than the youth control (43.5%) and youth study (27.3%) groups at baseline. All of the youth participants reported being exposed to loud sound and only a small percentage of parent subjects reported "not around loud, sound", therefore, almost all subjects reported noisy activities which would be candidate situations for utilizing hearing loss preventive strategies. On the baseline inquiry, parents were less likely to have tried utilizing hearing protective strategies than the youth in both experimental and control groups.

Table 2

Percentage reporting participation in activities or performing hearing protective actions on baseline questionnaires

Activity/Action	Parent Control % (n=23)	Youth Control % (n=23)	Parent Study % (n=22)	Youth Study % (n=22)
Tractor pull, monster truck show, motorcycle /car/truck race	34.8 (8)	34.8 (8)	36.4 (8)	40.9 (9)
Lawn mower, chain saw, leaf blower	65.2 (15)	52.2 (12)	90.9 (20)	63.6 (14)
Power tools	65.5 (15)	69.6 (16)	68.2 (15)	54.5 (12)
Jet ski, 4-wheeler, snowmobile, motorcycle	39.1 (09)	73.9 (17)	71.4 (15)	72.7 (16)
Fire a gun or near someone firing a gun	56.5 (13)	65.2 (15)	68.2 (15)	68.2 (15)
Play in a band	17.4 (4)	43.5 (10)	00.0 (0)	54.5 (12)
Concert or loud sporting event	60.9 (14)	65.2 (15)	81.8 (18)	95.5 (21)
Set off fireworks	95.7 (22)	78.3 (18)	86.4 (19)	77.3 (17)
Stereo earphones	60.9 (14)	65.2 (15)	77.3 (17)	90.9 (20)
Tractor or other farm equipment	52.2 (12)	60.9 (14)	72.7 (16)	68.2 (15)
Loud sound that hurt or gave ringing in your ears	39.1 (9)	56.5 (13)	50.0 (11)	50.0 (11)
During the past year, did you try any of the following?				
Turning volume down	60.9 (14)	56.5 (13)	77.3 (17)	50.0 (11)
Wearing earmuffs	17.4 (4)	39.1 (9)	13.6 (3)	13.6 (3)
Wearing earplugs	47.8 (11)	39.1 (9)	45.5 (10)	45.5 (10)
Walking away	65.2 (15)	43.5 (10)	59.1 (13)	27.3 (6)
Did not try any of the listed strategies	17.4 (4)	34.8 (8)	4.5 (1)	4.5 (1)
Not around loud sound	13.0 (3)	17.4 (4)	0.0 (0)	0.0 (0)

Changes in Knowledge

The questionnaires included items that addressed the participant's knowledge about NIHL and prevention. Appendix E contains the detailed knowledge question summary along with the *p*-values and reports which items had missing data for all three questionnaires for each group. Table 3 summarizes the correct responses for the knowledge questions for each group and survey type. Significant statistical outcomes from the Fisher's exact test are also reported when comparing the post and follow-up surveys to the baseline responses (McDonald, 2009). From the Fisher's exact test, significant improvement ($p \leq .01$) in correct responses was evident when comparing the follow-up to baseline questionnaires for the youth control and youth experimental groups regarding the risk of fireworks to hearing.

A significant improvement ($p \leq .05$) in knowledge on the post-survey was evident for "hearing an extremely loud sound even one time can cause you to lose some of your hearing" (Table 3, row B) for all groups receiving the Dangerous Decibels training. All of the groups showed or maintained improvement on the topic on the 3-month follow-up survey, but only the experimental youth group retained statistical significance ($p \leq .01$). A similar, but more dramatic significant change ($p \leq .001$) was evident for "sound that is too loud can damage the tiny hair cells of the inner ear"; however the statistical significance was retained three months after the program delivery.

A significant improvement in correct information for the statement "being around loud sounds a lot will help your ears get used to it and protect your hearing" was observed on

the three month follow-up questionnaire for the youth control ($p \leq .05$) and youth study ($p \leq .01$) groups.

Knowledge regarding the effective strategy of "walking away" also improved significantly in both the youth control ($p \leq .01$) and youth study ($p \leq .001$) groups following program delivery and three months later. Only the parent study group demonstrated significant change ($p \leq .01$) in knowledge related to the inadequate protection afforded by Kleenex or cotton. There was no change observed for correct responses in the parent control group at baseline (65.2%) compared to the three month follow-up (71.4%). Interestingly, the youth were generally better informed than adults on this topic and the margin for improvement in this knowledge area was more limited as a consequence.

The knowledge question regarding recognition that there are "specific hearing protection devices designed for children" showed a significant improvement ($p \leq .001$) in correct responses for the parent study group at post and the three month follow-up. Many of the knowledge questions registered high at baseline measures and a ceiling effect may have limited the ability to demonstrate statistical significance.

Table 3

Response summary for knowledge questions and statistical significance from baseline

Row	Knowledge Questions	Group	Baseline % correct	Post % correct	Follow-up % correct
A	Which types of sound can be loud enough to damage your hearing?				
A1	Stereo headphones	Parent Control	82.6	---	81.0
		Parent Study	90.9	86.4	100.0
		Youth Control	43.5	56.5	66.7
		Youth Study	45.4	54.5	54.5
A2	Fireworks	Parent Control	78.3	---	86.4
		Parent Study	100.0	90.9	100.0
		Youth Control	60.9	82.6	95.2**
		Youth Study	50.0	81.8	90.9**
A3	Dishwasher	Parent Control	87.0	---	85.7
		Parent Study	95.5	100.0	95.5
		Youth Control	95.7	82.6	95.2
		Youth Study	100.0	100.0	95.5
A4	Gunfire	Parent Control	100.0	---	100.0
		Parent Study	100.0	90.9	100.0
		Youth Control	82.6	95.7	100.0
		Youth Study	72.7	90.9	90.9
A5	Concert	Parent Control	87.0	---	90.5
		Parent Study	86.4	90.9	100.0
		Youth Control	52.2	65.2	81.0
		Youth Study	45.5	77.3	72.7
A6	Washing Machine	Parent Control	87.0	---	90.5
		Parent Study	95.5	100.0	95.5
		Youth Control	95.7	87.0	95.2
		Youth Study	100.0	100.0	95.5
B	Hearing an extremely loud sound even one time can cause you to lose some of your hearing	Parent Control	87.0	---	95.2
		Parent Study	77.3	100.0*	95.5
		Youth Control	60.9	91.3*	81.0
		Youth Study	57.1	90.9*	95.2**
C	Sound that is too loud can damage the tiny hair cells of the inner ear	Parent Control	52.2	---	76.2
		Parent Study	54.5	100.0***	100.0***
		Youth Control	39.1	91.3***	90.5***
		Youth Study	54.5	100.0***	100.0***
D	Being around loud sounds a lot will help your ears get used to it and protect your hearing	Parent Control	91.3	---	95.2
		Parent Study	95.5	90.0	90.9
		Youth Control	34.8	56.5	71.4*
		Youth Study	50.0	72.7	95.2**

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Table 3, continued:

Row	Knowledge Questions	Group	Baseline % correct	Post % correct	Follow-up % correct
E	Which are good ways to protect your hearing when around loud sound?				
E1	Walk away from loud sound	Parent Control	78.3	---	95.2
		Parent Study	86.4	100.0	95.5
		Youth Control	56.5	95.7**	100.0**
		Youth Study	31.8	100.0***	86.4***
E2	Turn down the volume	Parent Control	95.7	---	100.0
		Parent Study	95.5	100.0	100.0
		Youth Control	65.2	78.3	81.0
		Youth Study	90.9	90.9	81.8
E3	Spend less time around loud sound	Parent Control	87.0	---	85.7
		Parent Study	90.9	90.9	90.9
		Youth Control	56.5	47.8	57.1
		Youth Study	45.5	59.1	63.6
E4	Put cotton or Kleenex in ears	Parent Control	65.2	---	71.4
		Parent Study	50.0	95.5**	95.5**
		Youth Control	73.9	95.7	90.5
		Youth Study	77.3	95.5	95.5
E5	Use earplugs or earmuffs	Parent Control	100.0	---	100.0
		Parent Study	100.0	100.0	100.0
		Youth Control	69.6	78.3	90.5
		Youth Study	72.7	90.9	90.9
F	There are specific hearing protection devices designed for children	Parent Control	69.6	---	81.0
		Parent Study	45.5	95.5***	95.5***
		Youth Control	---	---	---
		Youth Study	---	---	---

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Changes in Attitudes

Questions pertaining to attitude are summarized in Table 4. Appendix F provides a summary of the attitude question correct responses, missing data and detailed statistical outcomes (*p*-values) for baseline vs. post and baseline vs. follow-up questionnaires. There was no improvement in correct responses for the parent control and youth control groups for the "earplugs are hard to put in my ears" question. However, a statistical significant improvement ($p \leq .01$) was evident for this attitude change at the post questionnaire for the youth study group. At the three month follow-up survey, the parent study group also showed a significant improvement ($p \leq .05$) from baseline. There was a decrease in correct responses for the youth study group at the three month follow-up compared to the post questionnaire and a loss of significant improvement from baseline. This could suggest the need for more reinforcement and practice with earplug insertion. The youth control group maintained relatively consistent responses across repeat questionnaires.

A statistical significant improvement ($p \leq .001$) in correct responses was evident at post and three month follow-up for the youth study group for the question "if my hearing is damaged I might hear ringing in my ears". There was also a statistical improvement ($p \leq .05$) at the three month follow-up for the parent study group compared to baseline. No statistical improvement was evident for the youth control and parent control groups. This suggests a potential benefit of parental involvement in the Dangerous Decibels program related to the topic of tinnitus.

Both the youth control and youth study groups showed a statistically significant increase ($p \leq .01$) in correct responses at post and three month follow-up for recognizing

that the “more time I spend around loud noise the worse my hearing will be” attitude question. There was no significant improvement seen in the parent groups because both groups had a high correct response rate at baseline (parent control 95.7%; parent study 95.5%).

The youth study group also showed a statistical increase ($p \leq .05$) in correct responses at the post questionnaire for the question “if my hearing is harmed, it will be hard to understand people talking to me”. The youth study group had a much lower correct response rate on baseline than the other three groups which could account for the statistical significance. The other three groups had little opportunity to show improvement due to the higher percent correct at baseline.

A statistical significant improvement ($p \leq .01$) at post and three month follow-up was evident for the parent study group on the attitude question “my hearing will stay healthy because I protect it”. Surprisingly both youth groups reported higher percent correct responses at baseline than did both parent groups.

There was no statistical significance evident for “wearing earplugs around your friends/co-workers would be embarrassing” question at post or the three month follow-up for any group. However, it is interesting to notice an increase in the parent control group from baseline (56.5%) to the three month follow-up (76.2%) even though the parents did not attend the Dangerous Decibels program.

For the attitude question “my friends/co-workers would tease me if I wore earplugs or earmuffs”, both the youth control (23.8%) and youth study (19.0%) reported being more likely to be teased if they did wear earplugs or earmuffs compared to both

parent control (80.0%) and parent study (68.2%) groups at follow-up. There was no statistically significant improvement evident for any group.

Table 4

Response summary for attitude questions and statistical significance from baseline

Row	Attitude Questions	Group	Baseline % correct	Post % correct	Follow-up % correct
A	Wearing earplugs around your friends/co-workers/others (if no one else is wearing them) would be embarrassing:	Parent Control	56.5	---	76.2
		Parent Study	63.6	65.0	68.2
		Youth Control	56.5	59.1	57.1
		Youth Study	18.2	33.3	38.1
B	My friends/co-workers/others would tease me if I wore earplugs or earmuffs	Parent Control	65.2	---	80.0
		Parent Study	72.7	72.7	68.2
		Youth Control	39.1	34.8	23.8
		Youth Study	18.2	36.4	19.0
C	Earplugs are hard to put in my ears	Parent Control	56.5	---	57.1
		Parent Study	68.2	85.0	95.5*
		Youth Control	43.5	56.5	52.4
		Youth Study	36.4	81.8**	57.1
D	If my hearing is damaged I might hear ringing in my ears all the time	Parent Control	47.8	---	60.0
		Parent Study	54.5	77.3	86.4*
		Youth Control	52.2	73.9	47.6
		Youth Study	18.2	72.7***	77.3***
E	My hearing will stay healthy because I protect it	Parent Control	68.2	---	70.0
		Parent Study	45.5	95.0**	90.5**
		Youth Control	78.3	86.4	95.0
		Youth Study	81.8	95.5	90.9
F	The more time I spend around loud sound, the worse my hearing will be	Parent Control	95.7	---	95.0
		Parent Study	95.5	95.0	100.0
		Youth Control	63.6	95.7**	100.0**
		Youth Study	68.2	100.0**	100.0**
G	I will always be able to enjoy listening to music if I protect my ears from loud sounds	Parent Control	87.0	---	95.0
		Parent Study	77.3	95.5	90.9
		Youth Control	59.1	82.6	85.7
		Youth Study	86.4	95.5	95.5
H	If my hearing is harmed, it will be hard to understand people talking to me	Parent Control	95.7	---	95.0
		Parent Study	100.0	90.9	100.0
		Youth Control	87.0	87.0	85.7
		Youth Study	63.6	95.5*	90.9

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

Changes in Intended Behaviors

Intended behavior questions were also probed. The correct response summary for the intended behavior questions are in Table 5. Appendix G contains the summary of the

intended behavior question correct responses, missing data and detailed statistical outcomes (*p*-values) for baseline vs. post and baseline vs. follow-u questionnaires.

There was a statistical significant increase ($p \leq .001$) in correct responses for the intended behavior "I will use hearing protection when I use a lawn mower", for both the parent study and youth study groups at the post questionnaire and significant improvement was maintained at the three month follow-up. Also, the youth control group had a statistical increase ($p \leq .05$) at the post questionnaire. All groups receiving the Dangerous Decibels program showed positive changes in this intended behavior.

A significant improvement ($p \leq .01$) at the three month follow-up was shown in the youth control group for the intended behavior "I know what I need to do to protect my hearing". The youth study group showed improvement ($p \leq .05$) at the post questionnaire and only slight (non-significant) regression at 3-month follow-up.

The intended behavior "have you ever talked with your child/parent about protecting their ears" showed a significant increase ($p \leq .01$) at three month follow-up for the youth control group. Even though the youth study group did not show statistical improvement, there was an increase in correct response from baseline (54.5%) to follow-up (76.2%). The Dangerous Decibels program presented to the youth could have stimulated some conversation at home that would explain this increase in correct responses three months following the program.

The parent study group demonstrated statistical improvement ($p \leq .05$) was shown for the intended behavior "if you were around loud machinery with a child/adult present, would you use hearing protection", at post and three month follow-up. The youth study group also showed improvement at the post ($p \leq .01$) and three month follow-up ($p \leq .05$) questionnaire. Even though not statistically significant, there was only slight improvement for

the youth control group from baseline (60.9%) to post (69.9%), but a greater improvement and the three month follow-up (81.0%). These changes suggest the Dangerous Decibels program has an impact on the intended behavior of both child and adult subjects who participate in the program.

Lastly, there was also a statistical significant improvement ($p \leq .05$) in correct responses for the parent study and youth control group for the intended behavior "I know how to use earplugs when I need them", at the post and three month follow-up questionnaire. At baseline, there was a difference in correct responses for the youth control (69.6%) and youth study (90.9%) groups. The higher number of correct responses at baseline for the youth study group did not allow for any significant improvement at post or three month follow-up. It's possible the youth in the study group received hearing protection training from school or an outside source that the youth in the control group did not receive. The control and study groups were from different towns, which might explain the differences.

Table 5

Response summary for intended behavior questions and statistical significance from baseline

Row	Intended Behaviors Questions	Group	Baseline % correct	Post % correct	Follow-up % correct
A	I will use hearing protection when I use a lawn mower	Parent Control	26.1	---	50.0
		Parent Study	18.2	72.7***	59.1*
		Youth Control	43.5	81.0*	57.1
		Youth Study	27.3	95.5***	66.7*
B	I know what I need to do to protect my hearing	Parent Control	82.6	---	95.0
		Parent Study	81.8	100.0	100.0
		Youth Control	69.6	91.3	100.0**
		Youth Study	77.3	100.0*	95.5
C	Have you ever talked to your child/parents about protecting their ears when they are around loud sound	Parent Control	90.5	---	85.7
		Parent Study	90.5	95.0	95.5
		Youth Control	34.8	56.5	76.2**
		Youth Study	54.5	52.4	76.2
D	Have you ever seen your child/parents use earplugs or earmuffs	Parent Control	65.2	---	76.2
		Parent Study	50.0	55.0	72.7
		Youth Control	78.3	66.7	76.2
		Youth Study	42.9	47.6	47.6
E	Do you wear earplugs or earmuffs when you are around loud sound	Parent Control	54.5	---	55.0
		Parent Study	36.4	40.0	47.6
		Youth Control	42.1	61.9	52.4
		Youth Study	63.6	68.2	63.6
F	If you were around loud machinery with a child/adult present, would you use hearing protection	Parent Control	60.9	---	81.0
		Parent Study	45.5	84.2*	81.8*
		Youth Control	60.9	69.9	81.0
		Youth Study	54.5	95.5**	85.7*
G	I know how to use earplugs when I need them	Parent Control	91.3	---	100.0
		Parent Study	72.7	100.0*	100.0*
		Youth Control	69.6	95.7*	95.2*
		Youth Study	90.9	100.0	86.4

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

Results Summary

There were differences in the knowledge, attitudes, and intended behaviors of children and parents who attended the Dangerous Decibels program simultaneously, compared to those children and parents that did not participate together on individual items. Although, there were no general trends within or across health communication

constructs, it is apparent that delivery of the Dangerous Decibels program proved beneficial to the experimental pairs. Statistical significance ($p \leq .05$) was evident for two of the intended behavior questions ("I will use hearing protection when I use a lawn mower" and "if you were around loud machinery") at post and follow-up for the experimental group pairs compared to the control group pairs. This data suggests that the parental involvement helped maintain the positive change in intended behaviors three months following the program. The experimental pairs also showed statistical significance ($p \leq .05$ for parent; $p \leq .001$ for youth) at the three month follow-up for the attitude question "If my hearing is damaged I might hear ringing," compared to the control group pairs, which also suggests the benefit of parental involvement.

Differences were also evident between the youth control and study groups, as well as the parent control and study groups for numerous knowledge, attitude, and intended behavior questions. Perhaps most interesting is the realization that the areas of improvement differ between the parent and child groups.

CHAPTER V

DISCUSSION AND CONCLUSION

Discussion

The purpose of this study was to investigate the effectiveness of parental involvement in the Dangerous Decibels hearing loss prevention program taught to children as well as the parents in the study group. Through the use of pre, post and follow-up questionnaires, the effectiveness of the Dangerous Decibels program with parental involvement was compared to the effectiveness of the Dangerous Decibels program without parental involvement in the training session.

Informal Observations

During all Dangerous Decibels presentations with the study groups, the children and parents were each actively engaged in the hands-on learning activities. In the study group presentations, the children sat in the front rows for better visualization of the posters and interactive activities, while the parents sat in the back rows. Therefore, there was no direct interaction between the child and parent during the program. However, there was significant interaction between participants that were seated side by side, regardless of whether they were adults or children

The youth in the control groups were also very actively engaged in the Dangerous Decibels program. After the program when the parents entered the room to pick up their

child, several children were eager to inform their parent about the program and showed them the earplugs and bookmark that displayed the appropriate hearing protective strategies.

Differences in Parent and Youth Knowledge, Attitudes and Behaviors

On several of the knowledge questions, there was a incongruence between the parent and youth correct baseline responses. These results are surprising because on some baseline questions the parents report having the knowledge about noise-induced hearing loss and hearing loss prevention, but the children do not report the same knowledge. The parents report knowing that stereo earphones can damage hearing, but their children were unaware of the damage of stereo earphones to hearing. It is possible the parents assume the children already know about noise-induced hearing loss and hearing loss prevention so they are not discussing the topic at home. Or maybe the children are not retaining this knowledge that has been taught to the children by the parents.

At times the results showed that the youth had more knowledge than the parents at baseline. For example, the youth reported that cotton or Kleenex is not an appropriate hearing protective strategy, but the parent's report cotton or Kleenex can be used effectively. This knowledge could be explained by hearing loss prevention strategies being taught in schools or youth activity groups outside of school and the content is unfamiliar to the parents.

Other questions showed an increase in correct responses for the parent control group on the three month follow-up, which could be explained by the children in the

control group informing their parents about noise-induced hearing loss and hearing loss prevention strategies at home following the program. Observation of the parents and children in the control group showed that several children quickly informed the parent about proper earplug use following the program presentation. It is also possible that parents in the study group shared their experiences with parents from the control group since the children were from rural group organizations that gathered for other unrelated activities during the interim period between questionnaire administrations.

The observation of self-efficacy with the use of earplugs by the children in the control group is a component of the Health Belief Model that was utilized when developing the Dangerous Decibels Hearing Loss Prevention program (Rosenstock, et al. 1988; Sobel, 2010).

On one of the intended behavior questions, the responses are surprising because the parents report discussing with their children how to protect their hearing, but the children report not discussing this topic with their parents (Table 5, row C). Perhaps the parents are talking to their children about this topic and the children are misunderstanding or forgetting the conversation or perhaps the topic is not even being addressed in the household and the parents feel obligated to report a positive response.

Occasional ceiling effects occurred at baseline for the youth and parent groups which prevented statistical significant improvement on the post and follow-up questionnaires. These ceiling effects were seen for knowledge, attitude, and intended behavior questions.

Differences in Control and Study Group Changes in Knowledge, Attitudes and Behaviors:

Several knowledge, attitude, and intended behavior questions showed a significant improvement for the parent study group at post and three month follow-up, but not the control group. This could be explained because the parent control group did not receive the direct Dangerous Decibels program presentation and content was not formally provided.

When comparing the youth study to youth control groups on a few intended behavior and attitude questions, there was an increase in correct responses at the post questionnaire for both groups, but at the three month follow-up the youth control group did not maintain the increase as did the youth study group. On the post questionnaire the youth in both groups reported "they will use hearing protection when using a lawn mower," but on the follow-up questionnaire the youth control correct responses decreased compared to post. This decrease in attitude, and intended behaviors three months following the program delivery does support the premise that parental involvement might facilitate maintenance of hearing loss prevention attitudes and intended behaviors. This decrease seen in attitudes and intended behaviors three months after the program for the control group is consistent with the results from Griest (2008).

Differences were also seen between the youth/parent study groups and the youth/parent control groups at post and follow-up. For example, the study groups showed increases in positive changes for knowledge, attitudes and intended behaviors, but the control groups did not. These increases in positive changes at post and follow-up suggest the benefit of parental involvement in the Dangerous Decibels Hearing Loss

Prevention program. These positive changes are consistent with results from the study by Perry, et al. (1988), which suggested that parental involvement was important for implementing a health program for children.

Study Limitations and Strengths

One of the limitations to this study was a small number of participants in both the parent and youth control groups (n=23) and the parent and youth experimental groups (n=22). A larger sample size would have increased statistical power, especially on those items trending toward improvement.

Another limitation to the study was the missing data from several questionnaires in both the parent and youth groups. This missing data could have possibly affected some items on the questionnaires and likely limited statistical analysis due to the lower response rate. The researcher did not implement a procedure for auditing for missing data during the data collection phase of the study. Scanning each questionnaire immediately after completion by the participant would have provided an opportunity to obtain responses and might have prevented unanswered items. Changing the print layout of the questionnaire may have also helped prevent skipped questions as some were positioned close to each other on the forms.

One strength of this study related to the standardized Dangerous Decibels presentation given by the researcher. The researcher was very consistent and thorough when presenting the program at each data collection event. Each presentation utilized the same materials, hands-on activities, and verbal information from the researcher. In addition, the evaluation instrument was adopted from a previously developed questionnaire and data entry and coding was strictly controlled.

Future Directions

Future research should include reevaluating the addition of parental involvement in the Dangerous Decibels program with a larger number of participants. A larger scale research study with more participants will better help identify the more subtle benefits of parental involvement on the knowledge, attitudes, and intended behaviors on children. Future studies should also consider the difficulty level of the questions and perhaps have more well-developed questionnaires that differ between adults and children.

Parents should be included in the Dangerous Decibels program presentation when it's taught to children. There was evidence in this study to support parental involvement in the hearing loss prevention program, so parents should be included as much as possible in their child's hearing health education. It appears that Dangerous Decibels positively influences both adults and children and may contribute to the prevention of noise-induced hearing loss in both groups.

Summary

The Dangerous Decibels Hearing Loss Prevention Program has been shown to be effective in changing the knowledge, attitudes, and intended behaviors in children (Griest, Folmer, & Martin, 2007). This research study showed an improvement in the knowledge, attitudes, and intended behaviors at the post and three month follow-up questionnaires for both youth and parents. There is also evidence to show that there was a difference in the knowledge, attitude, and intended behaviors in the children whose parents attended the program simultaneously compared to those children whose parents did not attend the program. Positive improvement was also evident in the parent's knowledge, attitudes, and intended behaviors in the experimental group. The Dangerous

Decibels program can be successfully delivered simultaneously to both children and adults.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL

STUDENT'S COPY

UNIVERSITY of NORTHERN COLORADO
Institutional Review Board (IRB)

February 23, 2011

TO: Spencer Weiler
ELPS

FROM: Maria Lahman, Co-Chair
UNC Institutional Review Board

RE: Expedited Review of Proposal *Effectiveness of the Dangerous Decibels® Program in Children when Delivered with Parental Involvement,* submitted by Amanda Clark (Research Advisor: Deanna Meinke)

First Consultant: The above proposal is being submitted to you for an expedited review. Please review the proposal in light of the Committee's charge and direct requests for changes directly to the researcher or researcher's advisor. If you have any unresolved concerns, please contact Maria Lahman, Applied Statistics and Research Methods, Campus Box 124, (x1603). When you are ready to recommend approval, sign this form and return to me.

I recommend approval as is. Spencer Weiler 3/7/11
Signature of First Consultant Date
with attached communication and revised documentation.

The above referenced prospectus has been reviewed for compliance with HHS guidelines for ethical principles in human subjects research. The decision of the Institutional Review Board is that the project is approved as proposed for a period of one year: 3/10/11 to 3/10/12.

3/10/11
Maria Lahman, Co-Chair Date

Comments:

APPENDIX B

YOUTH QUESTIONNAIRES

Dangerous Decibels®: UNC Baseline Youth Questionnaire

1. During the **past year**, approximately how often did you do each of the following activities?
(check the box that best describes your experience)

	Never	1-3 times a year	1-3 times a month	1-3 times a week	nearly every day
a. Go to a tractor pull, monster truck show, or a motorcycle/car/truck race	☐	☐	☐	☐	☐
b. Use a gas-powered lawn mower/chain saw/ leaf blower	☐	☐	☐	☐	☐
c. Use power tools	☐	☐	☐	☐	☐
d. Ride on a jet ski, 4- wheeler, snowmobile, or motorcycle	☐	☐	☐	☐	☐
e. Fire a gun or near someone firing a gun (such as **hunting or target shooting**)	☐	☐	☐	☐	☐
f. Play in a band	☐	☐	☐	☐	☐
g. Go to a concert or loud sporting event	☐	☐	☐	☐	☐
h. Set off fireworks	☐	☐	☐	☐	☐
i. Use stereo earphones (**Ipod, MP3 player**)	☐	☐	☐	☐	☐
j. Ride on a tractor or other farm equipment	☐	☐	☐	☐	☐

2. During the **past year**, have you been around loud sound that made your ears hurt or gave you "ringing" sounds in your ears. ☐ Yes ☐ No ☐ Not Sure

3. How often do you wear earplugs or ear muffs when you are around loud sound?
☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never ☐ Not around loud sound

4. Which of the following types of sound can be loud enough to damage your hearing?
(check all that apply)
☐ Stereo Headphones or Walkman ☐ Dishwasher ☐ Concert
☐ Fireworks ☐ Gunfire ☐ Washing machine

Modified from Dangerous Decibels® at OHSU

5. Which of the following are good ways to protect your hearing when you are around loud sound? (*check all that apply*):

☐ Walk away from the loud sound
☐ Turn down the volume
☐ Spend less time around loud sounds whenever possible
☐ Put cotton or Kleenex in your ears
☐ Use earplugs or ear muffs

6. Hearing an extremely loud sound even one time can cause you to lose some of your hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

7. Sound that is too loud can damage the tiny hair cells of the inner ear.

strongly agree	Agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

8. Being around loud sounds a lot will help your ears get used to it and protect your hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

9. Wearing earplugs around your friends (if no one else is wearing them) would be:

☐ Very embarrassing
☐ Somewhat embarrassing
☐ A Little embarrassing
☐ Not at all embarrassing

10. If you were around loud machinery with an adult present, would you use hearing protection?

☐ Definitely Yes ☐ Probably Yes ☐ Don't Know ☐ Probably No ☐ Definitely No

11. During the past year, if you were around loud sound did you try any of the following:

☐ Turn down the volume
☐ Use Ear Muffs
☐ Use Ear Plugs
☐ None of the above
☐ Walk away from loud sound
☐ Not around loud sound

12. Have you ever talked to your parents about protecting your ears when you are around loud sounds?

☐ Yes, more than once ☐ Yes, one time only ☐ Never

13. Have you ever seen your parents/grandparents use earplugs or ear muffs?

☐ Yes ☐ No ☐ Not Sure

14. Earplugs are hard to put in my ears.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

15. I know what I need to do to protect my hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

16. If my hearing is damaged, I might hear ringing in my ears all the time.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

17. My hearing will stay healthy because I protect it.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

18. The more time I spend around loud sound, the worse my hearing will be.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

19. My friends would tease me if I wore earplugs or earmuffs.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

20. I will use hearing protection when I use a lawn mower.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

21. I know how to use earplugs when I need them.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

22. I will always be able to enjoy listening to music if I protect my ears from loud sounds.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

23. If my hearing is harmed, it will be hard to understand people talking to me.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

---

24. Are you: ☐ Male or ☐ Female?

25. Are you:
☐ Hispanic/Latino ☐ American Indian, Eskimo, or Aleutian
☐ White ☐ Asian or Pacific Island
☐ Black, African American ☐ Other_____ ☐ Not Sure

Modified from Dangerous Decibels® at OHSU

Dangerous Decibels®: UNC Post Youth Questionnaire

1. During the **past year**, approximately how often did you do each of the following activities?
(check the box that best describes your experience)

	Never	1-3 times a year	1-3 times a month	1-3 times a week	nearly every day
a. Use power tools	☐	☐	☐	☐	☐
b. Ride on a jet ski, 4- wheeler, snowmobile, or motorcycle	☐	☐	☐	☐	☐
c. Play in a band	☐	☐	☐	☐	☐
d. Go to a tractor pull, monster truck show, or a motorcycle/car/truck race	☐	☐	☐	☐	☐
e. Use a gas-powered lawn mower/chain saw/ leaf blower	☐	☐	☐	☐	☐
f. Fire a gun or near someone firing a gun (such as **hunting or target shooting**)	☐	☐	☐	☐	☐
g. Ride on a tractor or other farm equipment	☐	☐	☐	☐	☐
h. Use stereo earphones (**Ipod, MP3 player**)	☐	☐	☐	☐	☐
i. Go to a concert or loud sporting event	☐	☐	☐	☐	☐
j. Set off fireworks	☐	☐	☐	☐	☐

2. How often do you wear earplugs or ear muffs when you are around loud sound?
☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never ☐ Not around loud sound

3. Which of the following types of sound can be loud enough to damage your hearing?
(check all that apply)
☐ Stereo Headphones or Walkman ☐ Dishwasher ☐ Concert
☐ Fireworks ☐ Gunfire ☐ Washing machine

4. During the **past year**, have you been around loud sound that made your ears hurt or gave you "ringing" sounds in your ears. ☐ Yes ☐ No ☐ Not Sure

Modified from Dangerous Decibels® at OHSU

5. Being around loud sounds a lot will help your ears get used to it and protect your hearing.
strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

6. During the past year, if you were around loud sound did you try any of the following:
☐ Turn down the volume ☐ Use Ear Plugs ☐ Walk away from loud sound
☐ Use Ear Muffs ☐ None of the above ☐ Not around loud sound

7. Have you ever seen your parents/grandparents use earplugs or ear muffs?
☐ Yes ☐ No ☐ Not Sure

8. Wearing earplugs around your friends (if no one else is wearing them) would be:
☐ Very embarrassing ☐ A Little embarrassing
☐ Somewhat embarrassing ☐ Not at all embarrassing

9. Earplugs are hard to put in my ears.
strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

10. Which of the following are good ways to protect your hearing when you are around loud sound? (*check all that apply*):
☐ Walk away from the loud sound ☐ Put cotton or Kleenex in your ears
☐ Turn down the volume ☐ Use earplugs or ear muffs
☐ Spend less time around loud sounds whenever possible

11. Have you ever talked to your parents about protecting your ears when you are around loud sounds?
☐ Yes, more than once ☐ Yes, one time only ☐ Never

12. Hearing an extremely loud sound even one time can cause you to lose some of your hearing.
strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

13. If you were around loud machinery with an adult present, would you use hearing protection?
☐ Definitely Yes ☐ Probably Yes ☐ Don't Know ☐ Probably No ☐ Definitely No

14. Sound that is too loud can damage the tiny hair cells of the inner ear.
strongly agree ☐ Agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

15. The more time I spend around loud sound, the worse my hearing will be.
strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

16. If my hearing is harmed, it will be hard to understand people talking to me.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

17. I will use hearing protection when I use a lawn mower.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

18. I know what I need to do to protect my hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

19. My hearing will stay healthy because I protect it.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

20. My friends would tease me if I wore earplugs or earmuffs.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

21. I will always be able to enjoy listening to music if I protect my ears from loud sounds.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

22. I know how to use earplugs when I need them.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

23. If my hearing is damaged, I might hear ringing in my ears all the time.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

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24. Are you: ☐ Male or ☐ Female?

25. Are you:
☐ Hispanic/Latino
☐ White
☐ Black, African American
☐ American Indian, Eskimo, or Aleutian
☐ Asian or Pacific Island
☐ Other_____
☐ Not Sure

Modified from Dangerous Decibels® at OHSU

Dangerous Decibels®: UNC Follow-up Youth Questionnaire

1. During the **past year**, approximately how often did you do each of the following activities?
(check the box that best describes your experience)

	Never	1-3 times a year	1-3 times a month	1-3 times a week	nearly every day
a. Go to a tractor pull, monster truck show, or a motorcycle/car/truck race	☐	☐	☐	☐	☐
b. Use a gas-powered lawn mower/chain saw/ leaf blower	☐	☐	☐	☐	☐
c. Use power tools	☐	☐	☐	☐	☐
d. Ride on a jet ski, 4- wheeler, snowmobile, or motorcycle	☐	☐	☐	☐	☐
e. Fire a gun or near someone firing a gun (such as **hunting or target shooting**)	☐	☐	☐	☐	☐
f. Play in a band	☐	☐	☐	☐	☐
g. Go to a concert or loud sporting event	☐	☐	☐	☐	☐
h. Set off fireworks	☐	☐	☐	☐	☐
i. Use stereo earphones (**Ipod, MP3 player**)	☐	☐	☐	☐	☐
j. Ride on a tractor or other farm equipment	☐	☐	☐	☐	☐

2. During the **past year**, have you been around loud sound that made your ears hurt or gave you "ringing" sounds in your ears.

☐ Yes ☐ No ☐ Not Sure

3. How often do you wear earplugs or ear muffs when you are around loud sound

☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never ☐ Not around loud sound

4. Which of the following types of sound can be loud enough to damage your hearing?
(check all that apply)

☐ Stereo Headphones or Walkman ☐ Dishwasher ☐ Concert
☐ Fireworks ☐ Gunfire ☐ Washing machine

Modified from Dangerous Decibels® at OHSU

5. Which of the following are good ways to protect your hearing when you are around loud sound? (*check all that apply*):

☐ Walk away from the loud sound
☐ Turn down the volume
☐ Spend less time around loud sounds whenever possible
☐ Put cotton or Kleenex in your ears
☐ Use earplugs or ear muffs

6. Hearing an extremely loud sound even one time can cause you to lose some of your hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

7. Sound that is too loud can damage the tiny hair cells of the inner ear.

strongly agree	Agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

8. Being around loud sounds a lot will help your ears get used to it and protect your hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

9. Wearing earplugs around your friends (if no one else is wearing them) would be:

☐ Very embarrassing
☐ Somewhat embarrassing
☐ A Little embarrassing
☐ Not at all embarrassing

10. If you were around loud machinery with an adult present, would you use hearing protection?

☐ Definitely Yes ☐ Probably Yes ☐ Don't Know ☐ Probably No ☐ Definitely No

11. During the past year, if you were around loud sound did you try any of the following:

☐ Turn down the volume
☐ Use Ear Muffs
☐ Use Ear Plugs
☐ None of the above
☐ Walk away from loud sound
☐ Not around loud sound

12. Have you ever talked to your parents about protecting your ears when you are around loud sounds?

☐ Yes, more than once ☐ Yes, one time only ☐ Never

13. Have you ever seen your parents/grandparents use earplugs or ear muffs?

☐ Yes ☐ No ☐ Not Sure

14. Earplugs are hard to put in my ears.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

15. I know what I need to do to protect my hearing.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

16. If my hearing is damaged, I might hear ringing in my ears all the time.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

17. My hearing will stay healthy because I protect it.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

18. The more time I spend around loud sound, the worse my hearing will be.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

19. My friends would tease me if I wore earplugs or earmuffs.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

20. I will use hearing protection when I use a lawn mower.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

21. I know how to use earplugs when I need them.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

22. I will always be able to enjoy listening to music if I protect my ears from loud sounds.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

23. If my hearing is harmed, it will be hard to understand people talking to me.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

Modified from Dangerous Decibels® at OHSU

☐ ☐ ☐ ☐ ☐

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24. Are you: ☐ Male or ☐ Female?

25. Did you and your mom or dad spend time together exploring the Dangerous Decibels® Virtual Exhibit (games) website in the last three months?

☐ Yes, Less than 15 minutes ☐ Yes, 15-30 minutes ☐ Yes, 30-60 minutes
☐ Yes, Longer than 1 hour ☐ No

26. Are you: ☐ Hispanic/Latino ☐ American Indian, Eskimo, or Aleutian
☐ White ☐ Asian or Pacific Island
☐ Black, African American ☐ Other_____ ☐ Not Sure

APPENDIX C

PARENT QUESTIONNAIRES

Dangerous Decibels®: UNC Baseline Parent Questionnaire

1. During the **past year**, approximately how often did you do each of the following activities?
(check the box that best describes your experience)

	Never	1-3 times a year	1-3 times a month	1-3 times a week	nearly every day
a. Go to a tractor pull, monster truck show, or a motorcycle/car/truck race	☐	☐	☐	☐	☐
b. Use a gas-powered lawn mower/chain saw/ leaf blower	☐	☐	☐	☐	☐
c. Use power tools	☐	☐	☐	☐	☐
d. Ride on a jet ski, 4- wheeler, snowmobile, or motorcycle	☐	☐	☐	☐	☐
e. Fire a gun or near someone firing a gun (such as **hunting or target shooting**)	☐	☐	☐	☐	☐
f. Play in a band	☐	☐	☐	☐	☐
g. Go to a concert or loud sporting event	☐	☐	☐	☐	☐
h. Set off fireworks	☐	☐	☐	☐	☐
i. Use stereo earphones (**Ipod, MP3 player**)	☐	☐	☐	☐	☐
j. Ride on a tractor or other farm equipment	☐	☐	☐	☐	☐

2. During the **past year**, have you been around loud sound that made your ears hurt or gave you "ringing" sounds in your ears. ☐ Yes ☐ No ☐ Not Sure

3. How often do you wear earplugs or ear muffs when you are around loud sound?
☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never ☐ Not around loud sound

4. Which of the following types of sound can be loud enough to damage your hearing?
(check all that apply)

☐ Stereo Headphones or Walkman	☐ Dishwasher	☐ Concert
☐ Fireworks	☐ Gunfire	☐ Washing machine

Modified from Dangerous Decibels® at OHSU

5. Which of the following are good ways to protect your hearing when you are around loud sound? (*check all that apply*):

☐ Walk away from the loud sound
☐ Turn down the volume
☐ Spend less time around loud sounds whenever possible
☐ Put cotton or Kleenex in your ears
☐ Use earplugs or ear muffs

6. Hearing an extremely loud sound even one time can cause you to lose some of your hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

7. Sound that is too loud can damage the tiny hair cells of the inner ear.

strongly agree	Agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

8. Being around loud sounds a lot will help your ears get used to it and protect your hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

9. Wearing earplugs around your friends/co-workers/others (if no one else is wearing them) would be:

☐ Very embarrassing
☐ Somewhat embarrassing
☐ A Little embarrassing
☐ Not at all embarrassing

10. If you were around loud machinery with your child present, would you use hearing protection?

☐ Definitely Yes ☐ Probably Yes ☐ Don't Know ☐ Probably No ☐ Definitely No

11. During the past year, if you were around loud sound did you try any of the following:

☐ Turn down the volume
☐ Use Ear Muffs
☐ Use Ear Plugs
☐ None of the above
☐ Walk away from loud sound
☐ Not around loud sound

12. Have you ever talked to your child about protecting their ears when they are around loud sounds?

☐ Yes, more than once ☐ Yes, one time only ☐ Never

13. Have you ever seen your child use earplugs or ear muffs?

☐ Yes ☐ No ☐ Not Sure

14. Earplugs are hard to put in my ears.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

15. I know what I need to do to protect my hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

16. If my hearing is damaged, I might hear ringing in my ears all the time.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

17. My hearing will stay healthy because I protect it.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

18. The more time I spend around loud sound, the worse my hearing will be.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

19. My friends/co-workers/others would tease me if I wore earplugs or earmuffs.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

20. I will use hearing protection when I use a lawn mower.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

21. I know how to use earplugs when I need them.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

22. I will always be able to enjoy listening to music if I protect my ears from loud sounds.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

23. If my hearing is harmed, it will be hard to understand people talking to me.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

24. There are specific hearing protection devices designed for children.

☐ Yes ☐ No ☐ Not Sure

---

25. Are you: ☐ Male or ☐ Female?

26. Are you:
☐ Hispanic/Latino ☐ American Indian, Eskimo, or Aleutian
☐ White ☐ Asian or Pacific Island
☐ Black, African American ☐ Other_____ ☐ Not Sure

Modified from Dangerous Decibels® at OHSU

Dangerous Decibels®: UNC Post Parent Questionnaire

1. During the **past year**, approximately how often did you do each of the following activities?
(check the box that best describes your experience)

	Never	1-3 times a year	1-3 times a month	1-3 times a week	nearly every day
a. Set off fireworks	☐	☐	☐	☐	☐
b. Go to a concert or loud sporting event	☐	☐	☐	☐	☐
c. Go to a tractor pull, monster truck show, or a motorcycle/car/truck race	☐	☐	☐	☐	☐
d. Use power tools	☐	☐	☐	☐	☐
e. Fire a gun or near someone firing a gun (such as **hunting or target shooting**)	☐	☐	☐	☐	☐
f. Use stereo earphones (**Ipod, MP3 player**)	☐	☐	☐	☐	☐
g. Use a gas-powered lawn mower/chain saw/ leaf blower	☐	☐	☐	☐	☐
h. Ride on a tractor or other farm equipment	☐	☐	☐	☐	☐
i. Play in a band	☐	☐	☐	☐	☐
j. Ride on a jet ski, 4- wheeler, snowmobile, or motorcycle	☐	☐	☐	☐	☐

2. Sound that is too loud can damage the tiny hair cells of the inner ear.

strongly agree	Agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

3. During the **past year**, have you been around loud sound that made your ears hurt or gave you "ringing" sounds in your ears. ☐ Yes ☐ No ☐ Not Sure

4. Which of the following are good ways to protect your hearing when you are around loud sound? *(check all that apply)*:

☐ Walk away from the loud sound
☐ Turn down the volume
☐ Spend less time around loud sounds whenever possible
☐ Put cotton or Kleenex in your ears
☐ Use earplugs or ear muffs

Modified from Dangerous Decibels® at OHSU

5. Which of the following types of sound can be loud enough to damage your hearing?
(*check all that apply*)

☐ Stereo Headphones or Walkman ☐ Dishwasher ☐ Concert
☐ Fireworks ☐ Gunfire ☐ Washing machine

6. How often do you wear earplugs or ear muffs when you are around loud sound?

☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never ☐ Not around loud sound

7. Hearing an extremely loud sound even one time can cause you to lose some of your hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

8. If you were around loud machinery with your child present, would you use hearing protection?

☐ Definitely Yes ☐ Probably Yes ☐ Don't Know ☐ Probably No ☐ Definitely No

9. Have you ever talked to your child about protecting their ears when they are around loud sounds?

☐ Yes, more than once ☐ Yes, one time only ☐ Never

10. Have you ever seen your child use earplugs or ear muffs?

☐ Yes ☐ No ☐ Not Sure

11. Earplugs are hard to put in my ears.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

12. Being around loud sounds a lot will help your ears get used to it and protect your hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

13. My hearing will stay healthy because I protect it.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

14. The more time I spend around loud sound, the worse my hearing will be.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

15. Wearing earplugs around your friends/co-workers/others (if no one else is wearing them) would be:

☐ Very embarrassing ☐ A Little embarrassing
☐ Somewhat embarrassing ☐ Not at all embarrassing

16. During the past year, if you were around loud sound did you try any of the following:
☐ Turn down the volume ☐ Use Ear Plugs ☐ Walk away from loud sound
☐ Use Ear Muffs ☐ None of the above ☐ Not around loud sound

17. If my hearing is damaged, I might hear ringing in my ears all the time.
strongly agree agree don't know disagree strongly disagree
☐ ☐ ☐ ☐ ☐

18. I know what I need to do to protect my hearing.
strongly agree agree don't know disagree strongly disagree
☐ ☐ ☐ ☐ ☐

19. I know how to use earplugs when I need them.
strongly agree agree don't know disagree strongly disagree
☐ ☐ ☐ ☐ ☐

20. I will always be able to enjoy listening to music if I protect my ears from loud sounds.
rongly agree agree don't know agree strongly disagree
☐ ☐ ☐ ☐ ☐

21. My friends/co-workers/others would tease me if I wore earplugs or earmuffs.
strongly agree agree don't know disagree strongly disagree
☐ ☐ ☐ ☐ ☐

22. There are specific hearing protection devices designed for children.
☐ Yes ☐ No ☐ Not Sure

23. I will use hearing protection when I use a lawn mower.
strongly agree agree don't know disagree strongly disagree
☐ ☐ ☐ ☐ ☐

24. If my hearing is harmed, it will be hard to understand people talking to me.
strongly agree agree don't know disagree strongly disagree
☐ ☐ ☐ ☐ ☐

---

25. Are you: ☐ Male or ☐ Female?

26. Are you: ☐ Hispanic/Latino ☐ American Indian, Eskimo, or Aleutian
☐ White ☐ Asian or Pacific Island
☐ Black, African American ☐ Other_____ ☐ Not Sure

Modified from Dangerous Decibels® at OHSU

Dangerous Decibels®: UNC Follow-up Parent Questionnaire

1. During the **past year**, approximately how often did you do each of the following activities?
(check the box that best describes your experience)

	Never	1-3 times a year	1-3 times a month	1-3 times a week	nearly every day
a. Go to a tractor pull, monster truck show, or a motorcycle/car/truck race	☐	☐	☐	☐	☐
b. Use a gas-powered lawn mower/chain saw/ leaf blower	☐	☐	☐	☐	☐
c. Use power tools	☐	☐	☐	☐	☐
d. Ride on a jet ski, 4- wheeler, snowmobile, or motorcycle	☐	☐	☐	☐	☐
e. Fire a gun or near someone firing a gun (such as **hunting or target shooting**)	☐	☐	☐	☐	☐
f. Play in a band	☐	☐	☐	☐	☐
g. Go to a concert or loud sporting event	☐	☐	☐	☐	☐
h. Set off fireworks	☐	☐	☐	☐	☐
i. Use stereo earphones (**Ipod, MP3 player**)	☐	☐	☐	☐	☐
j. Ride on a tractor or other farm equipment	☐	☐	☐	☐	☐

2. During the **past year**, have you been around loud sound that made your ears hurt or gave you "ringing" sounds in your ears. ☐ Yes ☐ No ☐ Not Sure

3. How often do you wear earplugs or ear muffs when you are around loud sound?
☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never ☐ Not around loud sound

4. Which of the following types of sound can be loud enough to damage your hearing?
(check all that apply)

☐ Stereo Headphones or Walkman	☐ Dishwasher	☐ Concert
☐ Fireworks	☐ Gunfire	☐ Washing machine

Modified from Dangerous Decibels® at OHSU

5. Which of the following are good ways to protect your hearing when you are around loud sound? (*check all that apply*):

- ☐ Walk away from the loud sound
- ☐ Turn down the volume
- ☐ Spend less time around loud sounds whenever possible
- ☐ Put cotton or Kleenex in your ears
- ☐ Use earplugs or ear muffs

6. Hearing an extremely loud sound even one time can cause you to lose some of your hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

7. Sound that is too loud can damage the tiny hair cells of the inner ear.

strongly agree	Agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

8. Being around loud sounds a lot will help your ears get used to it and protect your hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

9. Wearing earplugs around your friends/co-workers/others (if no one else is wearing them) would be:

- ☐ Very embarrassing
- ☐ Somewhat embarrassing
- ☐ A Little embarrassing
- ☐ Not at all embarrassing

10. If you were around loud machinery with your child present, would you use hearing protection?

☐ Definitely Yes ☐ Probably Yes ☐ Don't Know ☐ Probably No ☐ Definitely No

11. During the past year, if you were around loud sound did you try any of the following:

- ☐ Turn down the volume
- ☐ Use Ear Muffs
- ☐ Use Ear Plugs
- ☐ None of the above
- ☐ Walk away from loud sound
- ☐ Not around loud sound

12. Have you ever talked to your child about protecting their ears when they are around loud sounds?

☐ Yes, more than once ☐ Yes, one time only ☐ Never

13. Have you ever seen your child use earplugs or ear muffs?

☐ Yes ☐ No ☐ Not Sure

14. Earplugs are hard to put in my ears.

strongly agree	agree	don't know	disagree	strongly disagree
☐	☐	☐	☐	☐

Modified from Dangerous Decibels® at OHSU

15. I know what I need to do to protect my hearing.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

16. If my hearing is damaged, I might hear ringing in my ears all the time.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

17. My hearing will stay healthy because I protect it.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

18. The more time I spend around loud sound, the worse my hearing will be.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

19. My friends/co-workers/others would tease me if I wore earplugs or earmuffs.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

20. I will use hearing protection when I use a lawn mower.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

21. I know how to use earplugs when I need them.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

22. I will always be able to enjoy listening to music if I protect my ears from loud sounds.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

23. If my hearing is harmed, it will be hard to understand people talking to me.

strongly agree ☐ agree ☐ don't know ☐ disagree ☐ strongly disagree ☐

Modified from Dangerous Decibels® at OHSU

24. There are specific hearing protection devices designed for children.

☐ Yes ☐ No ☐ Not Sure

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25. Are you: ☐ Male or ☐ Female?

26. What are the ages of your children that attended the Dangerous Decibels® presentation with you?

_____

27. Did you and your child spend time together exploring the Dangerous Decibels® Virtual Exhibit (games) website in the last three months? (note: "child" refers to the one taking the survey and participating in the research study).

☐ Yes, Less than 15 minutes ☐ Yes, 15-30 minutes ☐ Yes, 30-60 minutes

☐ Yes, Longer than 1 hour ☐ No

28. Are you:

☐ Hispanic/Latino ☐ American Indian, Eskimo, or Aleutian

☐ White ☐ Asian or Pacific Island

☐ Black, African American ☐ Other_____ ☐ Not Sure

Modified from Dangerous Decibels® at OHSU

APPENDIX D

POST AND FOLLOW-UP ACTIVITIES REPORTED

Percentage reporting participation in activities or performing hearing protective actions on post questionnaires

Activity/Action	Parent Control % (n=23)	Youth Control % (n=23)	Parent Study % (n=22)	Youth Study % (n=22)
Tractor pull, monster truck show, motorcycle /car/truck race	N/A	43.5 (10)	40.9 (9)	45.5 (10)
Lawn mower, chain saw, leaf blower	N/A	52.4 (12)	90.9 (20)	68.1 (15)
Power tools	N/A	56.5 (13)	72.7 (16)	54.5 (12)
Jet ski, 4-wheeler, snowmobile, motorcycle	N/A	69.5 (16)	63.6 (14)	77.2 (17)
Fire a gun or near someone firing a gun	N/A	56.5 (13)	68.2 (15)	65.0 (13)
Play in a band	N/A	45.4 (10)	00.0 (0)	57.9 (11)
Concert or loud sporting event	N/A	56.4 (13)	90.9 (20)	90.8 (20)
Set off fireworks	N/A	78.2 (18)	86.4 (19)	77.3 (17)
Stereo earphones	N/A	50.0 (11)	72.7 (16)	81.9 (18)
Tractor or other farm equipment	N/A	69.5 (16)	72.8 (16)	59.1 (13)
Loud sound that hurt or gave ringing in your ears	N/A	65.2 (13)	45.5 (10)	54.5 (12)
During the past year, did you try any of the following?				
Turning volume down	N/A	52.2 (12)	86.4 (19)	72.7 (16)
Wearing earmuffs	N/A	34.8 (8)	27.3 (6)	36.4 (8)
Wearing earplugs	N/A	56.5 (13)	50.0 (11)	45.5 (10)
Walking away	N/A	52.2 (12)	86.4 (19)	59.1 (13)
Did not try any of the listed strategies	N/A	13.0 (3)	0.0 (0)	13.6 (3)
Not around loud sound	N/A	13.0 (3)	0.0 (0)	4.5 (1)

Percentage reporting participation in activities or performing hearing protective actions on follow-up questionnaires

Activity/Action	Parent Control % (n=23)	Youth Control % (n=23)	Parent Study % (n=22)	Youth Study % (n=22)
Tractor pull, monster truck show, motorcycle /car/truck race	28.6 (6)	38.1 (8)	31.8 (7)	45.5 (10)
Lawn mower, chain saw, leaf blower	66.6 (14)	45.0 (9)	90.9 (20)	63.6 (14)
Power tools	62.0 (13)	66.7 (14)	77.2 (17)	54.5 (12)
Jet ski, 4-wheeler, snowmobile, motorcycle	33.3 (7)	66.6 (14)	59.0 (13)	77.3 (17)
Fire a gun or near someone firing a gun	47.6 (10)	52.4 (11)	68.2 (15)	77.3 (17)
Play in a band	9.6 (2)	23.8 (5)	00.0 (0)	52.5 (11)
Concert or loud sporting event	57.1 (12)	52.5 (11)	90.9 (20)	86.2 (19)
Set off fireworks	76.2 (16)	85.7 (18)	68.2 (15)	68.2 (15)
Stereo earphones	66.7 (14)	52.4 (11)	63.6 (14)	95.2 (20)
Tractor or other farm equipment	52.4 (11)	62.0 (13)	68.1 (15)	68.2 (15)
Loud sound that hurt or gave ringing in your ears	33.3 (7)	55.0 (11)	54.5 (12)	31.8 (7)
During the past year, did you try any of the following?				
Turning volume down	71.2 (15)	52.4 (11)	90.9 (20)	59.1 (13)
Wearing earmuffs	9.5 (2)	38.1 (8)	36.4 (8)	36.4 (8)
Wearing earplugs	52.4 (11)	47.6 (10)	68.2 (15)	50.0 (11)
Walking away	66.7 (14)	42.9 (9)	59.1 (18)	63.6 (14)
Did not try any of the listed strategies	4.8 (1)	4.8 (1)	4.5 (1)	4.5 (1)
Not around loud sound	9.5 (2)	4.8 (1)	0.0 (0)	9.1 (2)

APPENDIX E

KNOWLEDGE RESPONSE SUMMARY AND STATISTICAL COMPARISON

Knowledge response summary and statistical comparison for baseline vs. post and follow-up

	Knowledge Questions	Group	Baseline % correct	Post % correct	Post *p*-values	Follow-up % correct	Follow-up *p*-values
A	Which types of sound can be loud enough to damage your hearing?						
A1	Stereo headphones	PC	82.6	---		81.0	(1.000)
		PS	90.9	86.4	(1.000)	100.0	(0.488)
		YS	43.5	56.5	(0.556)	66.7	(0.143)
		YS	45.4	54.5	(0.763)	54.5	(0.763)
A2	Fireworks	PC	78.3	---		95.2	(0.188)
		PS	100.0	90.9	(0.488)	100.0	
		YC	60.9	82.6	(0.189)	95.2**	(0.010)
		YS	50.0	81.8	(0.055)	90.9**	(0.007)
A3	Dishwasher	PC	87.0	---		85.7	(1.000)
		PS	95.5	100.0	(1.000)	95.5	(1.000)
		YC	95.7	82.6	(0.346)	95.2	(1.000)
		YS	100.0	100.0		95.5	(1.000)
A4	Gunfire	PC	100.0	---		100.0	
		PS	100.0	90.9	(0.488)	100.0	
		YC	82.6	95.7	(0.346)	100.0	(0.109)
		YS	72.7	90.9	(0.240)	90.9	(0.240)
A5	Concert	PC	87.0	---		90.5	(1.000)
		PS	86.4	90.9	(1.000)	100.0	(0.233)
		YC	52.2	65.2	(0.550)	81.0	(0.060)
		YS	45.5	77.3	(0.062)	72.7	(0.124)
A6	Washing Machine	PC	87.0	---		90.5	(1.000)
		PS	95.5	100.0	(1.000)	95.5	(1.000)
		YC	95.7	87.0	(0.608)	95.2	(1.000)
		YS	100.0	100.0		95.5	(1.000)
B	Hearing an extremely loud sound even one time can cause you to lose some of your hearing	PC	87.0	---		95.2	(0.609)
		PS	77.3	100.0*α	(0.049)	95.5	(0.185)
		YC	60.9	91.3*	(0.035)	81.0	(0.194)
		YS	57.1ɵ	90.9*	(0.016)	95.2**ɵ	(0.009)
C	Sound that is too loud can damage the tiny hair cells of the inner ear	PC	52.2	---		76.2	(0.125)
		PS	54.5	100.0***	(0.001)	100.0***	(0.001)
		YC	39.1	91.3***	(0.000)	90.5***	(0.001)
		YS	54.5	100.0***	(0.001)	100.0***ɵ	(0.001)
D	Being around loud sounds a lot will help your ears get used to it and protect your hearing	PC	91.3	---		95.2	(1.000)
		PS	95.5	90.0α	(0.598)	90.9	(1.000)
		YC	34.8	56.5	(0.236)	71.4*	(0.019)
		YS	50.0	72.7	(0.215)	95.2**ɵ	(0.002)

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

ɵ = missing data from one subject, α = missing data for two subjects

Note: Experimental groups are indicated as PC=Parent Control, PS=Parent Study, YC=Youth Control, YS=Youth Study

	Knowledge Questions	Group	Baseline % correct	Post % correct	Post *p*-values	Follow-up % correct	Follow-up *p*-values
E	Which are good ways to protect your hearing when around loud sound?						
E1	Walk away from loud sound	PC	78.3	---		95.2	(0.188)
		PS	86.4	100.0	(0.233)	95.5	(0.607)
		YC	56.5	95.7**	(0.004)	100.0**	(0.001)
		YS	31.8	100.0***	(0.000)	86.4***	(0.001)
E2	Turn down the volume	PC	95.7	---		100.0	(1.000)
		PS	95.5	100.0	(1.000)	100.0	(1.000)
		YC	65.2	78.3	(0.514)	81.0	(0.318)
		YS	90.9	90.9	(1.000)	81.8	(0.664)
E3	Spend less time around loud sound	PC	87.0	---		85.7	(1.000)
		PS	90.9	90.9	(1.000)	90.9	(1.000)
		YC	56.5	47.8	(0.768)	57.1	(1.000)
		YS	45.5	59.1	(0.547)	63.6	(0.364)
E4	Put cotton or Kleenex in ears	PC	65.2	---		71.4	(0.752)
		PS	50.0	95.5**	(0.002)	95.5**	(0.002)
		YC	73.9	95.7	(0.096)	90.5	(0.245)
		YS	77.3	95.5	(0.185)	95.5	(0.185)
E5	Use earplugs or earmuffs	PC	100.0	---		100.0	
		PS	100.0	100.0		100.0	
		YC	69.6	78.3	(0.738)	90.5	(0.137)
		YS	72.7	90.9	(0.240)	90.9	(0.240)
F	There are specific hearing protection devices designed for children	PC	69.6	---		81.0	(0.494)
		PS	45.5	95.5***	(0.001)	95.5***	(0.001)
		YC	---	---		---	
		YS	---	---		---	

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

ɵ = missing data from one subject, α = missing data for two subjects

Note: Experimental groups are indicated as PC=Parent Control, PS=Parent Study, YC=Youth Control, YS=Youth Study

APPENDIX F

ATTITUDE RESPONSE SUMMARY AND STATISTICAL COMPARISON

Attitude response summary and statistical comparison for baseline vs. post and follow-up

	Attitude Questions	Group	Baseline % correct	Post % correct	Post *p*-values	Follow-up % correct	Follow-up *p*-values
A	Wearing earplugs around your friends/co-workers/others (if no one else is wearing them) would be embarrassing:	PC	56.5	---		76.2	(0.213)
		PS	63.6	65.0α	(1.000)	68.2	(1.000)
		YC	56.5	59.1ɵ	(1.000)	57.1	(1.000)
		YS	18.2	33.3	(0.310)	38.1ɵ	(0.185)
B	My friends/co-workers/others would tease me if I wore earplugs or earmuffs	PC	65.2	---		80.0ɵ	(0.327)
		PS	72.7	72.7	(1.000)	68.2	(1.000)
		YC	39.1	34.8	(1.000)	23.8	(0.342)
		YS	18.2	36.4	(0.310)	19.0ɵ	(1.000)
C	Earplugs are hard to put in my ears	PC	56.5	---		57.1	(1.000)
		PS	68.2	85.0α	(0.284)	95.5*	(0.046)
		YC	43.5	56.5	(0.556)	52.4	(0.763)
		YS	36.4	81.8**	(0.005)	57.1ɵ	(0.227)
D	If my hearing is damaged I might hear ringing in my ears all the time	PC	47.8	---		60.0ɵ	(0.544)
		PS	54.5	77.3	(0.203)	86.4*	(0.045)
		YC	52.2	73.9	(0.221)	47.6	(1.000)
		YS	18.2	72.7***	(0.001)	77.3***	(0.000)
E	My hearing will stay healthy because I protect it	PC	68.2ɵ	---		70.0ɵ	(1.000)
		PS	45.5	95.0***α	(0.001)	90.5**ɵ	(0.003)
		YC	78.3	86.4ɵ	(0.699)	95.0ɵ	(0.192)
		YS	81.8	95.5	(0.345)	90.9	(0.664)
F	The more time I spend around loud sound, the worse my hearing will be	PC	95.7	---		95.0ɵ	(1.000)
		PS	95.5	95.0α	(1.000)	100.0	(1.000)
		YC	63.6ɵ	95.7**	(0.010)	100.0**	(0.004)
		YS	68.2	100.0**	(0.009)	100.0**	(0.009)
G	I will always be able to enjoy listening to music if I protect my ears from loud sounds	PC	87.0	---		95.0ɵ	(0.610)
		PS	77.3	95.5	(0.185)	90.9	(0.412)
		YC	59.1ɵ	82.6	(0.108)	85.7	(0.088)
		YS	86.4	95.5	(0.607)	95.5	(0.067)
H	If my hearing is harmed, it will be hard to understand people talking to me	PC	95.7	---		95.0ɵ	(1.000)
		PS	100.0	90.9	(0.488)	100.0	
		YC	87.0	87.0	(1.000)	85.7	(1.000)
		YS	63.6	95.5*	(0.021)	90.9	(0.069)

*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$

ɵ = missing data for one subject, α = missing data for two subjects

Note: Experimental groups are indicated as PC=Parent Control, PS=Parent Study, YC=Youth Control, YS=Youth Study

APPENDIX G

INTENDED BEHAVIOR SUMMARY AND STATISTICAL COMPARISON

Intended behavior response summary and statistical comparison for baseline vs. post and follow-up

	Intended Behavior Questions	Group	Baseline % correct	Post % correct	Post *p*-values	Follow-up % correct	Follow-up *p*-values
A	I will use hearing protection when I use a lawn mower	PC	26.1	---		50.0ɵ	(0.127)
		PS	18.2	72.7***	(0.001)	59.1*	(0.012)
		YC	43.5	81.0*ɵ	(0.015)	57.1	(0.547)
		YS	27.3	95.5***	(0.000)	66.7*ɵ	(0.015)
B	I know what I need to do to protect my hearing	PC	82.6	---		95.0ɵ	(0.351)
		PS	81.8	100.0	(0.108)	100.0	(0.108)
		YC	69.6	91.3	(0.135)	100.0**	(0.009)
		YS	77.3	100.0*	(0.048)	95.5	(0.185)
C	Have you ever talked to your child/parents about protecting their ears when they are around loud sound	PC	90.5α	---		85.7	(1.000)
		PS	90.5ɵ	95.0α	(1.000)	95.5	(0.607)
		YC	34.8	56.5	(0.236)	76.2**	(0.008)
		YS	54.5	52.4ɵ	(1.000)	76.2ɵ	(0.203)
D	Have you ever seen your child/parents use earplugs or earmuffs	PC	65.2	---		76.2	(0.518)
		PS	50.0	55.0α	(0.767)	72.7	(0.215)
		YC	78.3	66.7α	(0.504)	76.2	(1.000)
		YS	42.9ɵ	47.6ɵ	(1.000)	47.6ɵ	(1.000)
E	Do you wear earplugs or earmuffs when you are loud sound	PC	54.5	---		55.0	(1.000)
		PS	36.4	40.0	(1.000)	47.6	(0.543)
		YC	42.1	61.9	(0.342)	52.4	(0.545)
		YS	63.6	68.2	(1.000)	63.6	(1.000)
F	If you were around loud machinery with a child present, would you use hearing protection	PC	60.9	---		81.0	(0.194)
		PS	45.5	84.2*∞	(0.021)	81.8*	(0.027)
		YC	60.9	69.6	(0.758)	81.0	(0.194)
		YS	54.5	95.5**	(0.004)	85.7*ɵ	(0.045)
G	I know how to use earplugs when I need them	PC	91.3	---		100.0ɵ	(0.491)
		PS	72.7	100.0*	(0.021)	100.0*	(0.021)
		YC	69.6	95.7*	(0.047)	95.2*	(0.048)
		YS	90.9	100.0ɵ	(0.488)	86.4	(1.000)

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$,
ɵ = missing data for one subject, α = missing data for two subjects, ∞ = missing data for three subjects
Note: Experimental groups are indicated as PC=Parent Control, PS=Parent Study, YC=Youth Control, YS=Youth Study

APPENDIX H

RAW DATA FROM YOUTH QUESTIONNAIRES

Dangerous Decibels®: UNC Baseline Youth Questionnaire

Youth Control % (n)
Youth Study % (n)

1. During the **past year**, approximately how often did you do each of the following activities?
(check the box that best describes your experience)

	Never	1-3 times a year	1-3 times a month	1-3 times a week	nearly every day
a. Go to a tractor pull, monster truck show, or a motorcycle/car/truck race	YC 65.2(15) YS 59.1(13)	YC 30.4(7) YS 40.9(9)	YC 4.3(1) YS 0.0(0)	YC 0.0(0) YS 0.0(0)	YC 0.0(0) YS 0.0(0)
b. Use a gas-powered lawn mower/chain saw/ leaf blower	YC 47.8(11) YS 36.4(8)	YC 26.1(6) YS 45.5(10)	YC 17.4(4) YS 9.1(2)	YC 8.7(2) YS 9.1(2)	YC 0.0(0) YS 0.0(0)
c. Use power tools	YC 30.4(7) YS 45.5(10)	YC 30.4(7) YS 27.3(6)	YC 21.7(5) YS 22.7(5)	YC 8.7(2) YS 0.0(0)	YC 8.7(2) YS 4.5(1)
d. Ride on a jet ski, 4- wheeler, snowmobile, or motorcycle	YC 26.1(6) YS 27.3(6)	YC 30.4(7) YS 31.8(7)	YC 30.4(7) YS 22.7(5)	YC 0.0(0) YS 18.2(4)	YC 13.0(3) YS 0.0(0)
e. Fire a gun or near someone firing a gun (such as hunting or target shooting)	YC 34.8(8) YS 31.8(7)	YC 30.4(7) YS 40.9(9)	YC 26.1(6) YS 18.2(4)	YC 4.3(1) YS 4.5(1)	YC 4.3(1) YS 4.5(1)
f. Play in a band	YC 56.5(13) YS 45.5(10)	YC 0.0(0) YS 0.0(0)	YC 0.0(0) YS 0.0(0)	YC 8.7(2) YS 4.5(1)	YC 34.8(8) YS 50.0(11)
g. Go to a concert or loud sporting event	YC 34.8(8) YS 4.5(1)	YC 47.8(11) YS 40.9(9)	YC 13.0(3) YS 40.9(9)	YC 4.3(1) YS 13.6(3)	YC 0.0(0) YS 0.0(0)
h. Set off fireworks	YC 21.7(5) YS 22.7(5)	YC 69.9(16) YS 68.2(15)	YC 8.7(2) YS 4.5(1)	YC 0.0(0) YS 0.0(0)	YC 0.0(0) YS 4.5(1)
i. Use stereo earphones (Ipod, MP3 player)	YC 34.8(8) YS 9.1(2)	YC 4.3(1) YS 4.5(1)	YC 13.0(3) YS 18.2(4)	YC 17.4(4) YS 31.8(7)	YC 30.4(7) YS 36.4(8)
j. Ride on a tractor or other farm equipment	YC 39.1(9) YS 31.8(7)	YC 21.7(5) YS 36.4(8)	YC 26.1(6) YS 13.6(3)	YC 13.0(3) YS 13.6(3)	YC 0.0(0) YS 4.5(1)

2. During the **past year**, have you been around loud sound that made your ears hurt or gave you "ringing" sounds in your ears.

☐ Yes YC 56.5(13) YS 50.0(11)
☐ No YC 34.8(8) YS 13.6(3)
☐ Not Sure YC 8.7(2) YS 36.4(8)

3. How often do you wear earplugs or ear muffs when you are around loud sound?

☐ Always YC 0.0(0) YS 0.0(0)
☐ Often YC 13.0(3) YS 18.2(4)
☐ Sometimes YC 21.7(5) YS 45.5(10)
☐ Rarely YC 17.4(4) YS 18.2(4)
☐ Never YC 30.4(7) YS 18.2(4)
☐ Not around loud sound YC 0.0(0) YS 0.0(0)

4. Which of the following types of sound can be loud enough to damage your hearing?
(*check all that apply*)

☐ Stereo Headphones or Walkman YC 43.5(10) YS 45.5(10)
☐ Dishwasher YC 95.7(22) YS 100.0(22)
☐ Concert YC 52.2(12) YS 45.5(10)
☐ Fireworks YC 60.9(14) YS 50.0(11)
☐ Gunfire YC 82.6(19) YS 72.7(16)
☐ Washing machine YC 95.7(22) YS 100.0(22)

5. Which of the following are good ways to protect your hearing when you are around loud sound?
(*check all that apply*):

☐ Walk away from the loud sound YC 56.5(13) YS 31.8(7)
☐ Turn down the volume YC 65.2(15) YS 90.9(20)
☐ Spend less time around loud sounds whenever possible YC 56.5(13) YS 45.5(10)
☐ Put cotton or Kleenex in your ears YC 73.9(17) YS 77.3(17)
☐ Use earplugs or ear muffs YC 69.6(16) YS 72.7(16)

6. Hearing an extremely loud sound even one time can cause you to lose some of your hearing.

strongly agree ☐ YC 30.4(7) YS 14.3(3)
agree ☐ YC 30.4(7) YS 42.9(9)
don't know ☐ YC 30.4(7) YS 38.1(8)
disagree ☐ YC 4.3(1) YS 4.8(1)
strongly disagree ☐ YC 4.3(1) YS 0.0(0)

7. Sound that is too loud can damage the tiny hair cells of the inner ear.

strongly agree ☐ YC 21.7(5) YS 9.1(2)
Agree ☐ YC 17.4(4) YS 45.5(10)
don't know ☐ YC 39.1(9) YS 45.5(10)
disagree ☐ YC 8.7(2) YS 0.0(0)
strongly disagree ☐ YC 13.0(3) YS 0.0(0)

8. Being around loud sounds a lot will help your ears get used to it and protect your hearing.

strongly agree ☐ YC 8.7(2) YS 4.5(1)
agree ☐ YC 26.1(6) YS 45.5(10)
don't know ☐ YC 43.5(10) YS 31.8(7)
disagree ☐ YC 0.0(0) YS 18.2(4)
strongly disagree ☐ YC 21.7(5) YS 0.0(0)

9. Wearing earplugs around your friends (if no one else is wearing them) would be:

☐ Very embarrassing YC 26.1(6) YS 9.1(2)
☐ Somewhat embarrassing YC 13.0(3) YS 18.2(4)
☐ A Little embarrassing YC 4.3(1) YS 54.5(12)
☐ Not at all embarrassing YC 56.5(13) YS 18.2(4)

10. If you were around loud machinery with an adult present, would you use hearing protection?

☐ Definitely Yes YC 13.0(3) YS 22.7(5)
☐ Probably Yes YC 47.8(11) YS 31.8(7)
☐ Don't Know YC 17.4(4) YS 27.3(6)
☐ Probably No YC 8.7(2) YS 18.2(4)
☐ Definitely No YC 13.0(3) YS 0.0(0)

10. During the past year, if you were around loud sound did you try any of the following:

☐ Turn down the volume YC 56.5(13) YS 50.0(11)
☐ Use Ear Muffs YC 39.1(9) YS 13.6(3)
☐ Use Ear Plugs YC 39.1(9) YS 45.5(10)
☐ None of the above YC 65.2(15) YS 95.5(21
☐ Walk away from loud sound YC 43.5(10) YS 27.3(6)
☐ Not around loud sound YC 17.4(4) YS 0.0(0)

12. Have you ever talked to your parents about protecting your ears when you are around loud sounds?

☐ Yes, more than once YC 30.4(7) YS 27.3(6)
☐ Yes, one time only YC 4.3(1) YS 27.3(6)
☐ Never YC 65.2(15) YS 45.5(10)

13. Have you ever seen your parents/grandparents use earplugs or ear muffs?

☐ Yes YC 78.3(18) YS 42.9(9)
☐ No YC 21.7(5) YS 23.8(5)
☐ Not Sure YC 0.0(0) YS 33.3(7)

14. Earplugs are hard to put in my ears.

strongly agree	agree	don't know	disagree	strongly disagree
YC 21.7(5) YS 13.6(3)	YC 21.7(5) YS 22.7(5)	YC 13.0(3) YS 27.3(6)	YC 21.7(5) YS 22.7(5)	YC 21.7(5) YS 13.6(3)

15. I know what I need to do to protect my hearing.

strongly agree	agree	don't know	disagree	strongly disagree
YC 26.1(6) YS 9.1(2)	YC 43.5(10) YS 68.2(15)	YC 21.7(5) YS 22.7(5)	YC 4.3(1) YS 0.0(0)	YC 4.3(1) YS 0.0(0)

16. If my hearing is damaged, I might hear ringing in my ears all the time.

strongly agree	agree	don't know	disagree	strongly disagree
YC 26.1(6) YS 13.6(3)	YC 26.1(6) YS 4.5(1)	YC 43.5(10) YS 72.7(16)	YC 4.3(1) YS 9.1(2)	YC 0.0(0) YS 0.0(0)

17. My hearing will stay healthy because I protect it.

strongly agree	agree	don't know	disagree	strongly disagree
YC 34.8(8) YS 22.7(5)	YC 43.5(10) YS 59.1(13)	YC 8.7(2) YS 18.2(4)	YC 8.7(2) YS 0.0(0)	YC 4.3(1) YS 0.0(0)

18. The more time I spend around loud sound, the worse my hearing will be.

strongly agree	agree	don't know	disagree	strongly disagree
YC 31.8(7) YS 45.5(10)	YC 31.8(7) YS 22.7(5)	YC 27.3(6) YS 22.7(5)	YC 4.5(1) YS 9.1(2)	YC 4.5(1) YS 0.0(0)

19. My friends would tease me if I wore earplugs or earmuffs.

strongly agree	agree	don't know	disagree	strongly disagree
YC 21.7(5) YS 9.1(2)	YC 17.4(4) YS 9.1(2)	YC 30.4(7) YS 54.5(12)	YC 8.7(2) YS 22.7(5)	YC 21.7(5) YS 4.5(1)

20. I will use hearing protection when I use a lawn mower.

strongly agree	agree	don't know	disagree	strongly disagree
YC 13.0(3) YS 0.0)	YC 30.4(7) YS 27.3(6)	YC 13.0(3) YS 36.4(8)	YC 17.4(4) YS 31.8(7)	YC 26.1(6) YS 4.5(1)

21. I know how to use earplugs when I need them.

strongly agree	agree	don't know	disagree	strongly disagree
YC 39.1(9) YS 22.7(5)	YC 30.4(7) YS 68.2(15)	YC 26.1(6) YS 9.1(2)	YC 0.0(0) YS 0.0(0)	YC 4.3(1) YS 0.0(0)

22. I will always be able to enjoy listening to music if I protect my ears from loud sounds.

strongly agree	agree	don't know	disagree	strongly disagree
YC 22.7(5) YS 36.4(8)	YC 36.4(8) YS 50.0(11)	YC 27.3(6) YS 9.1(2)	YC 9.1(2) YS 4.5(1)	YC 4.5(1) YS 0.0(0)

23. If my hearing is harmed, it will be hard to understand people talking to me.

strongly agree	agree	don't know	disagree	strongly disagree
YC 43.5(10) YS 27.3(6)	YC 43.5(10) YS 36.4(8)	YC 8.7(2) YS 36.4(8)	YC 0.0(0) YS 0.0(0)	YC 4.3(1) YS 0.0(0)

24. Are you: ☐ Male (YC 69.6(16) YS 45.5(10)) or ☐ Female? (YC 30.4(7) YS 54.5(12))

25. Are you:

- ☐ Hispanic/Latino (YC 4.3(1) YS 9.1(2))
- ☐ White (YC 91.3(21) YS 90.9(20))
- ☐ Black, African American (YC 4.3(1) YS 0.0(0))
- ☐ Not Sure (YC 0.0(0) YS 0.0(0))
- ☐ American Indian, Eskimo, or Aleutian (YC 0.0(0) YS 0.0(0))
- ☐ Asian or Pacific Island (YC 0.0(0) YS 0.0(0))
- ☐ Other_____ (YC 0.0(0) YS 0.0(0))

Dangerous Decibels®: UNC Post Youth Questionnaire

Youth Control % (n)
Youth Study % (n)

1. During the **past year**, approximately how often did you do each of the following activities?
(check the box that best describes your experience)

	Never	1-3 times a year	1-3 times a month	1-3 times a week	nearly every day
a. Use power tools	YC 43.5(10) YS 45.5(10)	YC 17.4(4) YS 31.8(7)	YC 21.7(5) YS 13.6(3)	YC 8.7(2) YS 4.5(1)	YC 8.7(2) YS 4.5(1)
b. Ride on a jet ski, 4- wheeler, snowmobile, or motorcycle	YC 30.4(7) YS 22.7(5)	YC 47.8(11) YS 40.9(9)	YC 13.0(3) YS 27.3(6)	YC 0.0(0) YS 4.5(1)	YC 8.7(2) YS 4.5(1)
c. Play in a band	YC 54.5(12) YS 42.1(8)	YC 4.5(1) YS 0.0(0)	YC 0.0(0) YS 5.3(1)	YC 4.5(1) YS 0.0(0)	YC 36.4(8) YS 52.6(10)
d. Go to a tractor pull, monster truck show, or a motorcycle/car/truck race	YC 56.5(13) YS 54.5(12)	YC 43.5(10) YS 45.5(10)	YC 0.0(0) YS 0.0(0)	YC 0.0(0) YS 0.0(0)	YC 0.0(0) YS 0.0(0)
e. Use a gas-powered lawn mower/chain saw/ leaf blower	YC 47.8(11) YS 31.8(7)	YC 21.7(5) YS 40.9(9)	YC 21.7(5) YS 18.2(4)	YC 4.3(1) YS 4.5(1)	YC 4.3(1) YS 4.5(1)
f. Fire a gun or near someone firing a gun (such as hunting or target shooting)	YC 43.5(10) YS 35.0(7)	YC 34.8(8) YS 35.0(7)	YC 21.7(5) YS 20.0(4)	YC 0.0(0) YS 5.0(1)	YC 0.0(0) YS 5.0(1)
g. Ride on a tractor or other farm equipment	YC 30.4(7) YS 40.9(9)	YC 56.5(13) YS 45.5(10)	YC 8.7(2) YS 9.1(2)	YC 4.3(1) YS 4.5(1)	YC 0.0(0) YS 0.0(0)
h. Use stereo earphones (Ipod, MP3 player)	YC 50.0(11) YS 18.2(4)	YC 4.5(1) YS 18.2(4)	YC 0.0(0) YS 9.1(2)	YC 18.2(4) YS 27.3(6)	YC 27.3(6) YS 27.3(6)
i. Go to a concert or loud sporting event	YC 43.5(10) YS 9.1(2)	YC 39.1(9) YS 59.1(13)	YC 13.0(3) YS 13.6(3)	YC 4.3(1) YS 13.6(3)	YC 0.0(0) YS 4.5(1)
j. Set off fireworks	YC 21.7(5) YS 18.2(4)	YC 73.9(17) YS 68.2(15)	YC 4.3(1) YS 13.6(3)	YC 0.0(0) YS 0.0(0)	YC 0.0(0) YS 0.0(0)

2. How often do you wear earplugs or ear muffs when you are around loud sound?

☐ Always YC 4.3(1) YS 13.6(3) ☐ Often YC 26.1(6) YS 22.7(5) ☐ Sometimes YC 26.1(6) YS 31.8(7) ☐ Rarely YC 13.0(3) YS 22.7(5) ☐ Never YC 21.7(5) YS 9.1(2) ☐ Not around loud sound YC 8.7(2) YS 0.0(0)

3. Which of the following types of sound can be loud enough to damage your hearing?
(check all that apply)

☐ Stereo Headphones or Walkman YC 56.5(13) YS 54.5(12)
☐ Dishwasher YC 82.6(19) YS 100.0(22)
☐ Concert YC 65.2(15) YS 77.3(17)
☐ Fireworks YC 82.6(19) YS 81.8(18)
☐ Gunfire YC 95.7(22) YS 90.9(20)
☐ Washing machine YC 87.0(20) YS 100.0(22)

Modified from Dangerous Decibels® at CHCH

4. During the **past year**, have you been around loud sound that made your ears hurt or gave you "ringing" sounds in your ears. ☐ Yes (YC 65.2(13) YS 54.5(12)) ☐ No (YC 21.7(5) YS 36.4(8)) ☐ Not Sure (YC 13.0(3) YS 9.1(2))

5. Being around loud sounds a lot will help your ears get used to it and protect your hearing.
strongly agree (YC 43.5(10) YS 50.0(11)) ☐ agree (YC 13.0(3) YS 22.7(5)) ☐ don't know (YC 8.7(2) YS 18.2(4)) ☐ disagree (YC 17.4(4) YS 4.5(1)) ☐ strongly disagree (YC 17.4(4) YS 4.5(1)) ☐

6. During the past year, if you were around loud sound did you try any of the following:
☐ Turn down the volume (YC 52.2(12) YS 72.7(16)) ☐ Use Ear Plugs (YC 56.5(13) YS 45.5(10)) ☐ Walk away from loud sound (YC 52.2(12) YS 59.1(13))
☐ Use Ear Muffs (YC 34.8(8) YS 36.4(8)) ☐ None of the above (YC 13.0(3) YS 13.6(3)) ☐ Not around loud sound (YC 13.0(3) YS 4.5(1))

7. Have you ever seen your parents/grandparents use earplugs or ear muffs?
☐ Yes (YC 66.7(14) YS 47.6(10)) ☐ No (YC 28.6(6) YS 28.6(6)) ☐ Not Sure (YC 4.8(1) YS 23.8(5))

8. Wearing earplugs around your friends (if no one else is wearing them) would be:
☐ Very embarrassing (YC 27.3(6) YS 19.0(4)) ☐ A Little embarrassing (YC 4.5(1) YS 38.1(8))
☐ Somewhat embarrassing (YC 9.1(2) YS 9.5(2)) ☐ Not at all embarrassing (YC 59.1(13) YS 33.3(7))

9. Earplugs are hard to put in my ears.
strongly agree (YC 21.7(5) YS22.7(5)) ☐ agree (YC 34.8(8) YS 59.1(13)) ☐ don't know (YC 17.4(4) YS 9.1(2)) ☐ disagree (YC 13.0(3) YS 9.1(2)) ☐ strongly disagree (YC 13.0(3) YS 0.0(0)) ☐

10. Which of the following are good ways to protect your hearing when you are around loud sound? (*check all that apply*):
☐ Walk away from the loud sound (YC 95.7(22) YS 100.0(22)) ☐ Put cotton or Kleenex in your ears (YC 95.7(22) YS 95.5(21))
☐ Turn down the volume (YC 78.3(18) YS 90.9(20)) ☐ Use earplugs or ear muffs (YC 78.3(18) YS 90.9(20))
☐ Spend less time around loud sounds whenever possible (YC 47.8(11) YS 59.1(13))

11. Have you ever talked to your parents about protecting your ears when you are around loud sounds?
☐ Yes, more than once (YC 34.8(8) YS 23.8(5)) ☐ Yes, one time only (YC 21.7(5) YS 28.6(6)) ☐ Never (YC 43.5(10) YS 47.6(10))

12. Hearing an extremely loud sound even one time can cause you to lose some of your hearing.
strongly agree (YC 43.5(10) YS 59.1(13)) ☐ agree (YC 47.8(11) YS 31.8(7)) ☐ don't know (YC 8.7(2) YS 9.1(2)) ☐ disagree (YC 0.0(0) YS 0.0(0)) ☐ strongly disagree (YC 0.0(0) YS 0.0(0)) ☐

13. If you were around loud machinery with an adult present, would you use hearing protection?
☐ Definitely Yes (YC 30.4(7) YS 45.5(10)) ☐ Probably Yes (YC 39.1(9) YS 50.0(11)) ☐ Don't Know (YC 21.7(5) YS 4.5(1)) ☐ Probably No (YC 0.0(0) YS 0.0(0)) ☐ Definitely No (YC 8.7(2) YS 0.0(0))

14. Sound that is too loud can damage the tiny hair cells of the inner ear.

strongly agree	Agree	don't know	disagree	strongly disagree
☐ YC 60.9(14) YS 54.5(12)	☐ YC 30.4(7) YS 45.5(10)	☐ YC 8.7(2) YS 0.0(0)	☐ YC 0.0(0) YS 0.0(0)	☐ YC 0.0(0) YS 0.0(0)

15. The more time I spend around loud sound, the worse my hearing will be.

strongly agree	agree	don't know	disagree	strongly disagree
☐ YC 65.2(15) YS 59.1(13)	☐ YC 30.4(7) YS 40.9(9)	☐ YC 4.3(1) YS 0.0(0)	☐ YC 0.0(0) YS 0.0(0)	☐ YC 0.0(0) YS 0.0(0)

16. If my hearing is harmed, it will be hard to understand people talking to me.

strongly agree	agree	don't know	disagree	strongly disagree
☐ YC 60.9(14) YS 68.2(15)	☐ YC 26.1(6) YS 27.3(6)	☐ YC 8.7(2) YS 0.0(0)	☐ YC 4.3(1) YS 0.0(0)	☐ YC 0.0(0) YS 4.5(1)

17. I will use hearing protection when I use a lawn mower.

strongly agree	agree	don't know	disagree	strongly disagree
☐ YC 57.1(12) YS 36.4(8)	☐ YC 23.8(5) YS 59.1(13)	☐ YC 4.8(1) YS 4.5(1)	☐ YC 4.8(1) YS 0.0(0)	☐ YC 9.5(2) YS 0.0(0)

18. I know what I need to do to protect my hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐ YC 52.2(12) YS 45.5(10)	☐ YC 39.1(9) YS 54.5(12)	☐ YC 4.3(1) YS 0.0(0)	☐ YC 4.3(1) YS 0.0(0)	☐ YC 0.0(0) YS 0.0(0)

19. My hearing will stay healthy because I protect it.

strongly agree	agree	don't know	disagree	strongly disagree
☐ YC 50.0(11) YS 36.4(8)	☐ YC 36.4(8) YS 59.1(13)	☐ YC 4.5(1) YS 4.5(1)	☐ YC 4.5(1) YS 0.0(0)	☐ YC 4.5(1) YS 0.0(0)

20. My friends would tease me if I wore earplugs or earmuffs.

strongly agree	agree	don't know	disagree	strongly disagree
☐ YC 34.8(8) YS 22.7(5)	☐ YC 0.0(0) YS 13.6(3)	☐ YC 34.8(8) YS 36.4(8)	☐ YC 13.0(3) YS 22.7(5)	☐ YC 17.4(4) YS 4.5(1)

21. I will always be able to enjoy listening to music if I protect my ears from loud sounds.

strongly agree	agree	don't know	disagree	strongly disagree
☐ YC 56.5(13) YS 54.5(12)	☐ YC 26.1(6) YS 40.9(9)	☐ YC 13.0(3) YS 4.5(1)	☐ YC 4.3(1) YS 0.0(0)	☐ YC 0.0(0) YS 0.0(0)

22. I know how to use earplugs when I need them.

strongly agree	agree	don't know	disagree	strongly disagree
☐ YC 60.9(14) YS 57.1(12)	☐ YC 34.8(8) YS 42.9(9)	☐ YC 4.3(1) YS 0.0(0)	☐ YC 0.0(0) YS 0.0(0)	☐ YC 0.0(0) YS 0.0(0)

23. If my hearing is damaged, I might hear ringing in my ears all the time.

strongly agree	agree	don't know	disagree	strongly disagree
☐ YC 47.8(11) YS 27.3(6)	☐ YC 26.1(6) YS 45.5(10)	☐ YC 21.7(5) YS 18.2(4)	☐ YC 4.3(1) YS 9.1(2)	☐ YC 0.0(0) YS 0.0(0)

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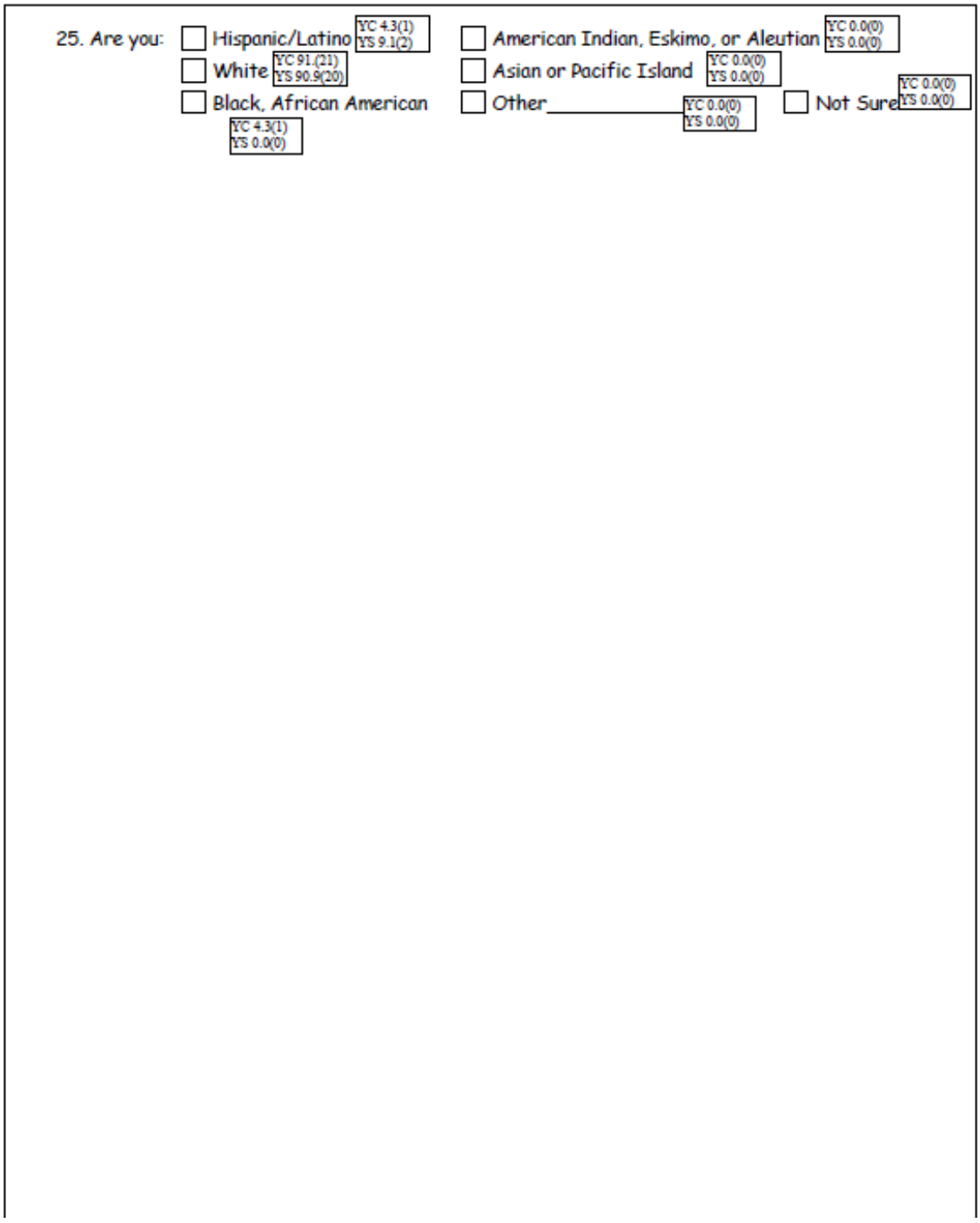
24. Are you: ☐ Male (YC 69.6(16) YS 45.5(10)) or ☐ Female? (YC 30.4(7) YS 54.5(12))

Modified from Dangerous Decibels® at OHSU


25. Are you:
Hispanic/Latino
YC 4.3(1)
YS 9.1(2)
White
YC 91.(21)
YS 90.9(20)
Black, African American
YC 4.3(1)
YS 0.0(0)
American Indian, Eskimo, or Aleutian
YC 0.0(0)
YS 0.0(0)
Asian or Pacific Island
YC 0.0(0)
YS 0.0(0)
Other
YC 0.0(0)
YS 0.0(0)
Not Sure
YC 0.0(0)
YS 0.0(0)

Dangerous Decibels®: UNC Follow-up Youth Questionnaire

Youth Control % (n)
Youth Study % (n)

1. During the **past year**, approximately how often did you do each of the following activities?
(check the box that best describes your experience)

	Never	1-3 times a year	1-3 times a month	1-3 times a week	nearly every day
a. Go to a tractor pull, monster truck show, or a motorcycle/car/truck race	YC 61.9(13) YS 50.0(11)	YC 38.1(8) YS 45.5(10)	YC 0.0(0) YS 0.0(0)	YC 0.0(0) YS 4.5(1)	YC 0.0(0) YS 0.0(0)
b. Use a gas-powered lawn mower/chain saw/ leaf blower	YC 55.0(11) YS 36.4(8)	YC 20.0(4) YS 18.2(4)	YC 20.0(4) YS 31.8(7)	YC 5.0(1) YS 13.6(3)	YC 0.0(0) YS 0.0(0)
c. Use power tools	YC 33.3(7) YS 45.5(10)	YC 38.1(8) YS 27.3(6)	YC 9.5(2) YS 22.7(5)	YC 4.8(1) YS 0.0(0)	YC 14.3(3) YS 4.5(1)
d. Ride on a jet ski, 4- wheeler, snowmobile, or motorcycle	YC 33.3(7) YS 22.7(5)	YC 33.3(7) YS 36.4(8)	YC 19.0(4) YS 18.2(4)	YC 4.8(1) YS 18.2(4)	YC 9.5(2) YS 4.5(1)
e. Fire a gun or near someone firing a gun (such as hunting or target shooting)	YC 47.6(10) YS 22.7(5)	YC 23.8(5) YS 50.0(11)	YC 23.8(5) YS 27.3(6)	YC 4.8(1) YS 0.0(0)	YC 0.0(0) YS 0.0(0)
f. Play in a band	YC 76.2(16) YS 47.6(10)	YC 4.8(1) YS 4.8(1)	YC 0.0(0) YS 0.0(0)	YC 9.5(2) YS 4.8(1)	YC 9.5(2) YS 42.9(9)
g. Go to a concert or loud sporting event	YC 47.6(10) YS 13.6(3)	YC 42.9(9) YS 63.6(14)	YC 4.8(1) YS 13.6(3)	YC 4.8(1) YS 4.5(1)	YC 0.0(0) YS 4.5(1)
h. Set off fireworks	YC 14.3(3) YS 31.8(7)	YC 85.7(18) YS 68.2(15)	YC 0.0(0) YS 0.0(0)	YC 0.0(0) YS 0.0(0)	YC 0.0(0) YS 0.0(0)
i. Use stereo earphones (Ipod, MP3 player)	YC 47.6(10) YS 4.8(1)	YC 9.5(2) YS 9.5(2)	YC 9.5(2) YS 42.9(9)	YC 4.8(1) YS 19.0(4)	YC 28.6(6) YS 23.8(5)
j. Ride on a tractor or other farm equipment	YC 38.1(8) YS 31.8(7)	YC 42.9(9) YS 27.3(6)	YC 9.5(2) YS 27.3(6)	YC 4.8(1) YS 9.1(2)	YC 4.8(1) YS 4.5(1)

2. During the **past year**, have you been around loud sound that made your ears hurt or gave you "ringing" sounds in your ears.

☐ Yes YC 55.0(11) YS 31.8(7) ☐ No YC 20.0(4) YS 36.4(8) ☐ Not Sure YC 25.0(5) YS 31.8(7)

3. How often do you wear earplugs or ear muffs when you are around loud sound

☐ Always YC 0.0(0) YS 0.0(0) ☐ Often YC 23.8(5) YS 31.8(7) ☐ Sometimes YC 28.6(6) YS 31.8(7) ☐ Rarely YC 33.3(7) YS 13.6(3) ☐ Never YC 14.3(3) YS 22.7(5) ☐ Not around loud sound YC 0.0(0) YS 0.0(0)

4. Which of the following types of sound can be loud enough to damage your hearing?
(*check all that apply*)

- ☐ Stereo Headphones or Walkman YC 66.7(14) YS 54.5(12)
- ☐ Dishwasher YC 95.2(20) YS 95.5(21)
- ☐ Concert YC 81.0(17) YS 72.7(16)
- ☐ Fireworks YC 95.2(20) YS 90.9(20)
- ☐ Gunfire YC 100.0(21) YS 90.9(20)
- ☐ Washing machine YC 95.2(20) YS 95.5(21)

5. Which of the following are good ways to protect your hearing when you are around loud sound?
(*check all that apply*):

- ☐ Walk away from the loud sound YC 100.0(0) YS 86.4(19)
- ☐ Turn down the volume YC 81.0(17) YS 81.8(18)
- ☐ Spend less time around loud sounds whenever possible YC 57.1(12) YS 63.6(14)
- ☐ Put cotton or Kleenex in your ears YC 90.5(19) YS 95.5(21)
- ☐ Use earplugs or ear muffs YC 90.5(19) YS 90.9(20)

6. Hearing an extremely loud sound even one time can cause you to lose some of your hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐ YC 52.4(11) YS 71.4(15)	☐ YC 28.6(6) YS 23.8(5)	☐ YC 19.0(4) YS 0.0(0)	☐ YC 0.0(0) YS 4.8(1)	☐ YC 0.0(0) YS 0.0(0)

7. Sound that is too loud can damage the tiny hair cells of the inner ear.

strongly agree	Agree	don't know	disagree	strongly disagree
☐ YC 66.7(14) YS 66.7(14)	☐ YC 23.8(5) YS 33.3(7)	☐ YC 9.5(2) YS 0.0(0)	☐ YC 0.0(0) YS 0.0(0)	☐ YC 0.0(0) YS 0.0(0)

8. Being around loud sounds a lot will help your ears get used to it and protect your hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐ YC 52.4(11) YS 66.7(14)	☐ YC 19.0(4) YS 28.6(6)	☐ YC 14.3(3) YS 0.0(0)	☐ YC 0.0(0) YS 4.8(1)	☐ YC 14.3(3) YS 0.0(0)

9. Wearing earplugs around your friends (if no one else is wearing them) would be:

- ☐ Very embarrassing YC 9.5(2) YS 4.8(1)
- ☐ Somewhat embarrassing YC 28.6(6) YS 28.6(6)
- ☐ A Little embarrassing YC 4.8(1) YS 28.6(6)
- ☐ Not at all embarrassing YC 57.1(12) YS 38.1(8)

10. If you were around loud machinery with an adult present, would you use hearing protection?

☐ Definitely Yes	☐ Probably Yes	☐ Don't Know	☐ Probably No	☐ Definitely No
YC 38.1(8) YS 33.3(7)	YC 42.9(9) YS 52.4(11)	YC 9.5(2) YS 14.3(3)	YC 4.8(1) YS 0.0(0)	YC 4.8(1) YS 0.0(0)

11. During the past year, if you were around loud sound did you try any of the following:

- ☐ Turn down the volume YC 52.4(11) YS 59.1(13)
- ☐ Use Ear Muffs YC 38.1(8) YS 36.4(8)
- ☐ Use Ear Plugs YC 47.6(10) YS 50.0(11)
- ☐ None of the above YC 4.8(1) YS 4.5(1)
- ☐ Walk away from loud sound YC 42.9(9) YS 63.6(14)
- ☐ Not around loud sound YC 4.8(1) YS 9.1(2)

12. Have you ever talked to your parents about protecting your ears when you are around loud sounds?

- ☐ Yes, more than once YC 33.3(7) YS 28.6(6)
- ☐ Yes, one time only YC 42.9(9) YS 47.6(10)
- ☐ Never YC 23.8(5) YS 23.8(5)

13. Have you ever seen your parents/grandparents use earplugs or ear muffs?

☐ Yes YC 76.2(16) YS 47.6(10) ☐ No YC 19.0(4) YS 14.3(3) ☐ Not Sure YC 4.89(1) YS 38.1(8)

14. Earplugs are hard to put in my ears.

strongly agree	agree	don't know	disagree	strongly disagree
YC 19.0(4) YS 0.0(0)	YC 33.3(7) YS 57.1(12)	YC 9.5(2) YS 14.3(3)	YC 33.3(7) YS 28.6(6)	YC 4.8(1) YS 0.0(0)

15. I know what I need to do to protect my hearing.

strongly agree	agree	don't know	disagree	strongly disagree
YC 61.9(13) YS 50.0(11)	YC 38.1(8) YS 45.5(10)	YC 0.0(0) YS 0.0(0)	YC 0.0(0) YS 45.0(1)	YC 0.0(0) YS 0.0(0)

16. If my hearing is damaged, I might hear ringing in my ears all the time.

strongly agree	agree	don't know	disagree	strongly disagree
YC 33.3(7) YS 36.4(8)	YC 14.3(3) YS 40.9(9)	YC 52.4(11) YS 22.7(5)	YC 0.0(0) YS 0.0(0)	YC 0.0(0) YS 0.0(0)

17. My hearing will stay healthy because I protect it.

strongly agree	agree	don't know	disagree	strongly disagree
YC 40.0(8) YS 45.5(10)	YC 55.0(11) YS 45.5(10)	YC 5.0(1) YS 9.1(2)	YC 0.0(0) YS 0.0(0)	YC 0.0(0) YS 0.0(0)

18. The more time I spend around loud sound, the worse my hearing will be.

strongly agree	agree	don't know	disagree	strongly disagree
YC 66.7(14) YS 68.2(15)	YC 33.3(7) YS 31.8(7)	YC 0.0(0) YS 0.0(0)	YC 0.0(0) YS 0.0(0)	YC 0.0(0) YS 0.0(0)

19. My friends would tease me if I wore earplugs or earmuffs.

strongly agree	agree	don't know	disagree	strongly disagree
YC 0.0(0) YS 0.0(0)	YC 23.8(5) YS 19.0(4)	YC 61.9(13) YS 66.7(14)	YC 4.8(1) YS 14.3(3)	YC 9.5(2) YS 0.0(0)

20. I will use hearing protection when I use a lawn mower.

strongly agree	agree	don't know	disagree	strongly disagree
YC 28.6(6) YS 28.6(6)	YC 28.6(6) YS 38.1(8)	YC 28.6(6) YS 19.0(4)	YC 4.8(1) YS 9.5(2)	YC 9.5(2) YS 4.8(1)

21. I know how to use earplugs when I need them.

strongly agree	agree	don't know	disagree	strongly disagree
YC 38.1(8) YS 40.9(9)	YC 57.1(12) YS 45.5(10)	YC 4.8(1) YS 13.6(3)	YC 0.0(0) YS 0.0(0)	YC 0.0(0) YS 0.0(0)

22. I will always be able to enjoy listening to music if I protect my ears from loud sounds.

strongly agree	agree	don't know	disagree	strongly disagree
YC 33.3(7) YS 40.9(9)	YC 52.4(11) YS 45.5(10)	YC 4.3(3) YS 13.6(3)	YC 0.0(0) YS 0.0(0)	YC 0.0(0) YS 0.0(0)

23. If my hearing is harmed, it will be hard to understand people talking to me.

strongly agree	agree	don't know	disagree	strongly disagree
☐ YC 42.9(9) YS 59.1(13)	☐ YC 42.9(9) YS 36.4(8)	☐ YC 14.3(3) YS 4.5(1)	☐ YC 0.0(0) YS 0.0(0)	☐ YC 0.0(0) YS 0.0(0)

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24. Are you: ☐ Male YC 69.9(16) YS 45.5(10) or ☐ Female? YC 30.4(7) YS 54.5(12)

25. Did you and your mom or dad spend time together exploring the Dangerous Decibels® Virtual Exhibit (games) website in the last three months?

☐ Yes, Less than 15 minutes YC 0.0(0) YS 0.0(0) ☐ Yes, 15-30 minutes YC 9.5(2) YS 9.12) ☐ Yes, 30-60 minutes YC 14.3(3) YS 4.5(1)

☐ Yes, Longer than 1 hour YC 0.0(0) YS 0.0(0) ☐ No YC 76.2(16) YS 72.7(16)

26. Are you:

☐ Hispanic/Latino YC 4.3(1) YS 9.1(2)
☐ White YC 91.3(21) YS 90.9(20)
☐ Black, African American YC 4.3(1) YS 0.0(0)
☐ Not Sure YC 0.0(0) YS 0.0(0)
☐ American Indian, Eskimo, or Aleutian YC 0.0(0) YS 0.0(0)
☐ Asian or Pacific Island YC 0.0(0) YS 0.0(0)
☐ Other_____ YC 0.0(0) YS 0.0(0)

APPENDIX I

RAW DATA FROM PARENT QUESTIONNAIRES

Dangerous Decibels®: UNC Baseline Parent Questionnaire

Parent Control % (n)
Parent Study % (n)

1. During the **past year**, approximately how often did you do each of the following activities?
(check the box that best describes your experience)

	Never	1-3 times a year	1-3 times a month	1-3 times a week	nearly every day
a. Go to a tractor pull, monster truck show, or a motorcycle/car/truck race	PC 65.2(15) PS 63.6(14)	PC 34.8(8) PS 36.4(8)	PC 0.0(0) PS 0.0(0)	PC 0.0(0) PS 0.0(0)	PC 0.0(0) PS 0.0(0)
b. Use a gas-powered lawn mower/chain saw/ leaf blower	PC 34.8(8) PS 9.1(2)	PC 13.0(3) PS 22.7(5)	PC 47.8(11) PS 63.6(14)	PC 4.3(1) PS 4.5(1)	PC 0.0(0) PS 0.0(0)
c. Use power tools	PC 34.8(8) PS 31.8(7)	PC 30.4(7) PS 31.8(7)	PC 17.4(4) PS 13.6(3)	PC 13.0(3) PS 13.6(3)	PC 4.3(1) PS 9.1(2)
d. Ride on a jet ski, 4- wheeler, snowmobile, or motorcycle	PC 60.9(14) PS 28.6(6)	PC 17.4(4) PS 28.6(6)	PC 4.3(1) PS 23.8(5)	PC 8.7(2) PS 14.3(3)	PC 8.7(2) PS 4.8(1)
e. Fire a gun or near someone firing a gun (such as **hunting or target shooting**)	PC 43.5(10) PS 31.8(7)	PC 43.5(10) PS 36.4(8)	PC 8.7(2) PS 31.8(7)	PC 4.3(1) PS 0.0(0)	PC 0.0(0) PS 0.0(0)
f. Play in a band	PC 82.6(19) PS 100.0(22)	PC 4.3(1) PS 0.0(0)	PC 4.3(1) PS 0.0(0)	PC 0.0(0) PS 0.0(0)	PC 8.7(2) PS 0.0(0)
g. Go to a concert or loud sporting event	PC 39.1(9) PS 18.2(4)	PC 47.8(11) PS 50.0(11)	PC 8.7(2) PS 18.2(4)	PC 4.3(1) PS 13.6(3)	PC 0.0(0) PS 0.0(0)
h. Set off fireworks	PC 4.3(1) PS 13.6(3)	PC 95.7(22) PS 86.4(19)	PC 0.0(0) PS 0.0(0)	PC 0.0(0) PS 0.0(0)	PC 0.0(0) PS 0.0(0)
i. Use stereo earphones (**Ipod, MP3 player**)	PC 39.1(9) PS 22.7(5)	PC 17.4(4) PS 18.2(4)	PC 21.7(5) PS 27.3(6)	PC 13.0(3) PS 13.6(3)	PC 8.7(2) PS 18.2(4)
j. Ride on a tractor or other farm equipment	PC 47.8(11) PS 27.3(6)	PC 17.4(4) PS 40.9(9)	PC 26.1(6) PS 13.6(3)	PC 4.3(1) PS 13.6(3)	PC 4.3(1) PS 4.5(1)

2. During the **past year**, have you been around loud sound that made your ears hurt or gave you "ringing" sounds in your ears. ☐ Yes PC 39.1(9) PS 50.0(11) ☐ No PC 47.8(11) PS 45.5(10) ☐ Not Sure PC 13.0(3) PS 4.5(1)

3. How often do you wear earplugs or ear muffs when you are around loud sound?

☐ Always PC 4.3(1) PS 4.5(1) ☐ Often PC 8.7(2) PS 13.6(3) ☐ Sometimes PC 39.1(9) PS 18.2(4) ☐ Rarely PC 17.4(4) PS 18.2(4) ☐ Never PC 26.1(6) PS 45.5(10) ☐ Not around loud sound PC 4.3(1) PS 0.0(0)

4. Which of the following types of sound can be loud enough to damage your hearing?
(*check all that apply*)

- ☐ Stereo Headphones or Walkman — PC 82.6(19) PS 90.9(20)
- ☐ Fireworks — PC 78.3(18) PS 100.0(22)
- ☐ Dishwasher — PC 87.0(20) PS 95.5(21)
- ☐ Gunfire — PC 100.0(23) PS 100.0(22)
- ☐ Concert — PC 87.0(20) PS 86.4(19)
- ☐ Washing machine — PC 87.0(20) PS 95.5(21)

5. Which of the following are good ways to protect your hearing when you are around loud sound?
(*check all that apply*):

- ☐ Walk away from the loud sound — PC 78.3(18) PS 86.4(19)
- ☐ Turn down the volume — PC 95.7(22) PS 95.5(21)
- ☐ Spend less time around loud sounds whenever possible — PC 87.0(20) PS 90.9(20)
- ☐ Put cotton or Kleenex in your ears — PC 65.2(15) PS 50.0(11)
- ☐ Use earplugs or ear muffs — PC 100.0(23) PS 100.0(22)

6. Hearing an extremely loud sound even one time can cause you to lose some of your hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 30.4(7) PS 9.1(2)	☐ PC 56.5(13) PS 68.2(15)	☐ PC 13.0(3) PS 22.7(5)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)

7. Sound that is too loud can damage the tiny hair cells of the inner ear.

strongly agree	Agree	don't know	disagree	strongly disagree
☐ PC 4.3(1) PS4.5(1)	☐ PC 47.8(11) PS 50.0(11)	☐ PC 43.5(10) PS 40.9(9)	☐ PC 4.3(1) PS 4.5(1)	☐ PC 0.0(0) PS 0.0(0)

8. Being around loud sounds a lot will help your ears get used to it and protect your hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 65.2(15) PS 27.3(6)	☐ PC 26.1(6) PS 68.2(15)	☐ PC 4.3(1) PS 0.0(0)	☐ PC 0.0(0) PS 4.5(1)	☐ PC 4.3(1) PS 0.0(0)

9. Wearing earplugs around your friends/co-workers/others (if no one else is wearing them) would be:

- ☐ Very embarrassing — PC 4.3(1) PS 0.0(0)
- ☐ Somewhat embarrassing — PC 13.0(3) PS 13.6(3)
- ☐ A Little embarrassing — PC 26.1(6) PS 22.7(5)
- ☐ Not at all embarrassing — PC 56.5(13) PS 63.6(14)

10. If you were around loud machinery with your child present, would you use hearing protection?

Definitely Yes	Probably Yes	Don't Know	Probably No	Definitely No
☐ PC 39.1(9) PS 13.6(3)	☐ PC 21.7(5) PS 31.8(7)	☐ PC 26.1(6) PS 4.5(1)	☐ PC 13.0(3) PS 45.5(10)	☐ PC 0.0(0) PS 4.5(1)

11. During the past year, if you were around loud sound did you try any of the following:

- ☐ Turn down the volume — PC 60.9(14) PS 77.3(17)
- ☐ Use Ear Muffs — PC 17.4(4) PS 13.6(3)
- ☐ Use Ear Plugs — PC 47.8(11) PS 45.5(10)
- ☐ None of the above — PC 17.4(4) PS 4.5(1)
- ☐ Walk away from loud sound — PC 65.2(15) PS 59.1(9)
- ☐ Not around loud sound — PC 13.0(3) PS 0.0(0)

12. Have you ever talked to your child about protecting their ears when they are around loud sounds?

- ☐ Yes, more than once — PC 66.7(14) PS 47.6(10)
- ☐ Yes, one time only — PC 23.8(5) PS 42.9(9)
- ☐ Never — PC 9.5(2) PS 9.5(2)

13. Have you ever seen your child use earplugs or ear muffs?

- ☐ Yes — PC 65.2(15) PS 50.0(11)
- ☐ No — PC 26.1(6) PS 50.0(11)
- ☐ Not Sure — PC 8.7(2) PS 0.0(0)

14. Earplugs are hard to put in my ears.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 26.1(6) PS 18.2(4)	☐ PC 30.4(7) PS 50.0(11)	☐ PC 4.3(1) PS 13.6(3)	☐ PC 39.1(9) PS 13.6(3)	☐ PC 0.0(0) PS 4.5(1)

15. I know what I need to do to protect my hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 26.1(6) PS 9.1(2)	☐ PC 56.5(13) PS 72.7(16)	☐ PC 13.0(3) PS 18.2(4)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 4.3(1) PS 0.0(0)

16. If my hearing is damaged, I might hear ringing in my ears all the time.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 8.7(2) PS 0.0(0)	☐ PC 39.1(9) PS 54.5(12)	☐ PC 43.5(10) PS 27.3(6)	☐ PC 8.7(2) PS 18.2(4)	☐ PC 0.0(0) PS 0.0(0)

17. My hearing will stay healthy because I protect it.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 18.2(4) PS 0.0(0)	☐ PC 50.0(11) PS 45.5(10)	☐ PC 9.1(2) PS 31.8(7)	☐ PC 22.7(5) PS 22.7(5)	☐ PC 0.0(0) PS 0.0(0)

18. The more time I spend around loud sound, the worse my hearing will be.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 30.4(7) PS 18.2(4)	☐ PC 65.2(15) PS 77.3(17)	☐ PC 0.0(0) PS 4.5(1)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 4.3(1) PS 0.0(0)

19. My friends/co-workers/others would tease me if I wore earplugs or earmuffs.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 30.4(7) PS 9.1(2)	☐ PC 34.8(8) PS 63.6(14)	☐ PC 26.1(6) PS 22.7(5)	☐ PC 8.7(2) PS 4.5(1)	☐ PC 0.0(0) PS 0.0(0)

20. I will use hearing protection when I use a lawn mower.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 4.3(1) PS 4.5(1)	☐ PC 21.7(5) PS 13.6(3)	☐ PC 34.8(8) PS 9.1(2)	☐ PC 39.1(9) PS 72.7(16)	☐ PC 0.0(0) PS 0.0(0)

21. I know how to use earplugs when I need them.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 34.8(8) PS 4.59(1)	☐ PC 56.5(13) PS 68.2(15)	☐ PC 8.7(2) PS 22.7(5)	☐ PC 0.0(0) PS 4.5(1)	☐ PC 0.0(0) PS 0.0(0)

22. I will always be able to enjoy listening to music if I protect my ears from loud sounds.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 26.1(6) PS 9.1(2)	☐ PC 60.9(14) PS 68.2(15)	☐ PC 8.7(2) PS 18.2(4)	☐ PC 4.3(1) PS 4.5(1)	☐ PC 0.0(0) PS 0.0(0)

23. If my hearing is harmed, it will be hard to understand people talking to me.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 56.5(13) PS 27.3(6)	☐ PC 39.1(9) PS 72.7(16)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 4.3(1) PS 0.0(0)

24. There are specific hearing protection devices designed for children.

Yes	No	Not Sure
☐ PC 69.6(16) PS 45.5(10)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 30.4(7) PS 54.5(12)

25. Are you: ☐ Male or ☐ Female?

PC 17.4(4) PS 22.7(5) | PC 82.6(19) PS 77.3(17)

26. Are you:

- ☐ Hispanic/Latino — PC 4.3(1) PS 9.1(2)
- ☐ White — PC 91.3(21) PS 90.9(20)
- ☐ Black, African American — PC 4.3(1) PS 0.0(0)
- ☐ Not Sure — PC 0.0(0) PS 0.0(0)
- ☐ American Indian, Eskimo, or Aleutian — PC 0.0(0) PS 0.0(0)
- ☐ Asian or Pacific Island — PC 0.0(0) PS 0.0(0)
- ☐ Other _____ — PC 0.0(0) PS 0.0(0)

Dangerous Decibels®: UNC Post Parent Questionnaire

Parent Control	% (n)
Parent Study	% (n)

1. During the **past year**, approximately how often did you do each of the following activities?
(check the box that best describes your experience)

	Never	1-3 times a year	1-3 times a month	1-3 times a week	nearly every day
a. Set off fireworks	PC N/A PS 22.7(5)	PC N/A PS 77.3(17)	PC N/A PS 0.0(0)	PC N/A PS 0.0(0)	PC N/A PS 0.0(0)
b. Go to a concert or loud sporting event	PC N/A PS 9.1(2)	PC N/A PS 59.1(13)	PC N/A PS 22.7(5)	PC N/A PS 9.1(2)	PC N/A PS 0.0(0)
c. Go to a tractor pull, monster truck show, or a motorcycle/car/truck race	PC N/A PS 59.1(13)	PC N/A PS 40.9(9)	PC N/A PS 0.0(0)	PC N/A PS 0.0(0)	PC N/A PS 0.0(0)
d. Use power tools	PC N/A PS 27.3(6)	PC N/A PS 31.8(7)	PC N/A PS 22.7(5)	PC N/A PS 9.1(2)	PC N/A PS 9.1(2)
e. Fire a gun or near someone firing a gun (such as **hunting or target shooting**)	PC N/A PS 31.8(7)	PC N/A PS 40.9(9)	PC N/A PS 27.3(6)	PC N/A PS 0.0(0)	PC N/A PS 0.0(0)
f. Use stereo earphones (**Ipod, MP3 player**)	PC N/A PS 27.3(6)	PC N/A PS 4.5(1)	PC N/A PS 36.4(8)	PC N/A PS 13.6(3)	PC N/A PS 18.2(4)
g. Use a gas-powered lawn mower/chain saw/ leaf blower	PC N/A PS 9.1(2)	PC N/A PS 31.8(7)	PC N/A PS 59.1(13)	PC N/A PS 0.0(0)	PC N/A PS 0.0(0)
h. Ride on a tractor or other farm equipment	PC N/A PS 27.3(6)	PC N/A PS 45.5(10)	PC N/A PS 9.1(2)	PC N/A PS 18.2(4)	PC N/A PS 0.0(0)
i. Play in a band	PC N/A PS 100.0(22)	PC N/A PS 0.0(0)	PC N/A PS 0.0(0)	PC N/A PS 0.0(0)	PC N/A PS 0.0(0)
j. Ride on a jet ski, 4- wheeler, snowmobile, or motorcycle	PC N/A PS 36.4(8)	PC N/A PS 27.3(6)	PC N/A PS 18.2(4)	PC N/A PS 13.6(3	PC N/A PS 4.5(1)

2. Sound that is too loud can damage the tiny hair cells of the inner ear.

strongly agree	Agree	don't know	disagree	strongly disagree
PC N/A PS 81.8(18)	PC N/A PS 18.2(4)	PC N/A PS 0.0(0)	PC N/A PS 0.0(0)	PC N/A PS 0.0(0)

3. During the **past year**, have you been around loud sound that made your ears hurt or gave you "ringing" sounds in your ears. Yes PC N/A PS 45.5(10) No PC N/A PS 45.5(10) Not Sure PC N/A PS 9.1(2)

4. Which of the following are good ways to protect your hearing when you are around loud sound? (*check all that apply*):

- ☐ Walk away from the loud sound PC N/A PS 100.0(0)
- ☐ Turn down the volume PC N/A PS 100.0(0)
- ☐ Spend less time around loud sounds whenever possible PC N/A PS 90.9(20)
- ☐ Put cotton or Kleenex in your ears PC N/A PS 95.5(21)
- ☐ Use earplugs or ear muffs PC N/A PS 100.0(0)

5. Which of the following types of sound can be loud enough to damage your hearing?

(*check all that apply*)

- ☐ Stereo Headphones or Walkman PC N/A PS 86.4(19)
- ☐ Fireworks PC N/A PS 90.9(20)
- ☐ Dishwasher PC N/A PS 100.0(22)
- ☐ Gunfire PC N/A PS 90.9(20)
- ☐ Concert PC N/A PS 90.9(20)
- ☐ Washing machine PC N/A PS 100.0(0)

6. How often do you wear earplugs or ear muffs when you are around loud sound?

☐ Always PC N/A PS 0.0(0) ☐ Often PC N/A PS 5.0(1) ☐ Sometimes PC N/A PS 35.0(7) ☐ Rarely PC N/A PS 35.0(7) ☐ Never PC N/A PS 25.0(5) ☐ Not around loud sound PC N/A PS 0.0(0)

7. Hearing an extremely loud sound even one time can cause you to lose some of your hearing.

strongly agree ☐ PC N/A PS 80.0(16) | agree ☐ PC N/A PS 20.0(4) | don't know ☐ PC N/A PS 0.0(0) | disagree ☐ PC N/A PS 0.0(0) | strongly disagree ☐ PC N/A PS 0.0(0)

8. If you were around loud machinery with your child present, would you use hearing protection?

☐ Definitely Yes PC N/A PS 31.6(6) ☐ Probably Yes PC N/A PS 52.6(10) ☐ Don't Know PC N/A PS 0.0(0) ☐ Probably No PC N/A PS 15.8(3) ☐ Definitely No PC N/A PS 0.0(0)

9. Have you ever talked to your child about protecting their ears when they are around loud sounds?

☐ Yes, more than once PC N/A PS 45.0(9) ☐ Yes, one time only PC N/A PS 50.0(10) ☐ Never PC N/A PS 5.0(1)

10. Have you ever seen your child use earplugs or ear muffs?

☐ Yes PC N/A PS 55.0(11) ☐ No PC N/A PS 10.0(8) ☐ Not Sure PC N/A PS 5.0(1)

11. Earplugs are hard to put in my ears.

strongly agree ☐ PC N/A PS 25.0(5) | agree ☐ PC N/A PS 60.0(12) | don't know ☐ PC N/A PS 5.0(1) | disagree ☐ PC N/A PS 10.0(2) | strongly disagree ☐ PC N/A PS 0.0(0)

12. Being around loud sounds a lot will help your ears get used to it and protect your hearing.

strongly agree ☐ PC N/A PS 75.0(15) | agree ☐ PC N/A PS 15.0(3) | don't know ☐ PC N/A PS 0.0(0) | disagree ☐ PC N/A PS 10.0(2) | strongly disagree ☐ PC N/A PS 0.0(0)

13. My hearing will stay healthy because I protect it.

strongly agree ☐ PC N/A PS 30.0(6) | agree ☐ PC N/A PS 65.0(13) | don't know ☐ PC N/A PS 5.0(1) | disagree ☐ PC N/A PS 0.0(0) | strongly disagree ☐ PC N/A PS 0.0(0)

14. The more time I spend around loud sound, the worse my hearing will be.

strongly agree ☐ PC N/A PS 60.0(12) | agree ☐ PC N/A PS 35.0(7) | don't know ☐ PC N/A PS 0.0(0) | disagree ☐ PC N/A PS 0.0(0) | strongly disagree ☐ PC N/A PS 5.0(1)

15. Wearing earplugs around your friends/co-workers/others (if no one else is wearing them) would be:

☐ Very embarrassing PC N/A PS 0.0(0)
☐ Somewhat embarrassing PC N/A PS 10.0(2)
☐ A Little embarrassing PC N/A PS 25.0(5)
☐ Not at all embarrassing PC N/A PS 65.0(13)

16. During the past year, if you were around loud sound did you try any of the following:

☐ Turn down the volume PC N/A PS 86.4(19)
☐ Use Ear Muffs PC N/A PS 27.3(6)
☐ Use Ear Plugs PC N/A PS 50.0(11)
☐ None of the above PC N/A PS 0.0(0)
☐ Walk away from loud sound PC N/A PS 86.4(19)
☐ Not around loud sound PC N/A PS 0.0(0)

17. If my hearing is damaged, I might hear ringing in my ears all the time.

strongly agree ☐ PC N/A PS 36.4(8) | agree ☐ PC N/A PS 40.9(9) | don't know ☐ PC N/A PS 4.5(1) | disagree ☐ PC N/A PS 18.2(4) | strongly disagree ☐ PC N/A PS 0.0(0)

18. I know what I need to do to protect my hearing.

strongly agree ☐ PC N/A PS 63.6(14) | agree ☐ PC N/A PS 36.4(8) | don't know ☐ PC N/A PS 0.0(0) | disagree ☐ PC N/A PS 0.0(0) | strongly disagree ☐ PC N/A PS 0.0(0)

19. I know how to use earplugs when I need them.

strongly agree ☐ PC N/A PS 63.6(14) | agree ☐ PC N/A PS 36.4(8) | don't know ☐ PC N/A PS 0.0(0) | disagree ☐ PC N/A PS 0.0(0) | strongly disagree ☐ PC N/A PS 0.0(0)

20. I will always be able to enjoy listening to music if I protect my ears from loud sounds.

rongly agree ☐ PC N/A PS 50.0(11) | agree ☐ PC N/A PS 45.5(10) | don't know ☐ PC N/A PS 0.0(0) | agree ☐ PC N/A PS 4.5(1) | strongly disagree ☐ PC N/A PS 0.0(0)

21. My friends/co-workers/others would tease me if I wore earplugs or earmuffs.

strongly agree ☐ PC N/A PS 27.3(6) | agree ☐ PC N/A PS 45.5(10) | don't know ☐ PC N/A PS 18.2(4) | disagree ☐ PC N/A PS 9.1(2) | strongly disagree ☐ PC N/A PS 0.0(0)

22. There are specific hearing protection devices designed for children.

☐ Yes PC N/A PS 95.5(21) ☐ No PC N/A PS 0.0(0) ☐ Not Sure PC N/A PS 4.5(1)

23. I will use hearing protection when I use a lawn mower.

strongly agree ☐ PC N/A PS 22.7(5) | agree ☐ PC N/A PS 50.0(11) | don't know ☐ PC N/A PS 9.1(2) | disagree ☐ PC N/A PS 18.2(4) | strongly disagree ☐ PC N/A PS 0.0(0)

24. If my hearing is harmed, it will be hard to understand people talking to me.

strongly agree ☐ PC N/A PS 63.6(14) | agree ☐ PC N/A PS 27.3(6) | don't know ☐ PC N/A PS 4.5(1) | disagree ☐ PC N/A PS 0.0(0) | strongly disagree ☐ PC N/A PS 45.0(1)

25. Are you: ☐ Male PC 17.4(4) PS 22.7(5) or ☐ Female? PC 82.6(19) PS 77.3(17)

26. Are you:
- ☐ Hispanic/Latino PC 4.3(1) PS 9.1(2)
- ☐ White PC 91.3(21) PS 90.9(20)
- ☐ Black, African American PC 4.3(1) PS 0.0(0)
- ☐ Not Sure PC 0.0(0) PS 0.0(0)
- ☐ American Indian, Eskimo, or Aleutian PC 0.0(0) PS 0.0(0)
- ☐ Asian or Pacific Island PC 0.0(0) PS 0.0(0)
- ☐ Other_____ PC 0.0(0) PS 0.0(0)

Dangerous Decibels®: UNC Follow-up Parent Questionnaire

Parent Control % (n)
Parent Study % (n)

1. During the **past year**, approximately how often did you do each of the following activities?
(check the box that best describes your experience)

	Never	1-3 times a year	1-3 times a month	1-3 times a week	nearly every day
a. Go to a tractor pull, monster truck show, or a motorcycle/car/truck race	☐ PC 71.4(15) PS 68.2(15)	☐ PC 28.6(6) PS 31.8(7)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)
b. Use a gas-powered lawn mower/chain saw/ leaf blower	☐ PC 33.3(7) PS 9.1(2)	☐ PC 33.3(7) PS 27.3(6)	☐ PC 33.3(7) PS 63.6(14)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)
c. Use power tools	☐ PC 38.1(8) PS 22.7(5)	☐ PC 47.6(10) PS 31.8(7)	☐ PC 4.8(1) PS 22.7(5)	☐ PC 4.8(1) PS 18.2(4)	☐ PC 4.8(1) PS 4.5(1)
d. Ride on a jet ski, 4- wheeler, snowmobile, or motorcycle	☐ PC 66.7(14) PS 40.9(9)	☐ PC 9.5(2) PS 36.4(8)	☐ PC 9.5(2) PS 4.5(1)	☐ PC 9.5(2) PS 13.6(3)	☐ PC 4.8(1) PS 4.5(1)
e. Fire a gun or near someone firing a gun (such as **hunting or target shooting**)	☐ PC 52.4(11) PS 31.8(7)	☐ PC 33.3(7) PS 36.4(8)	☐ PC 14.3(3) PS 31.8(7)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)
f. Play in a band	☐ PC 90.5(19) PS 100.0(21)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 4.8(1) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 4.8(1) PS 0.0(0)
g. Go to a concert or loud sporting event	☐ PC 42.9(9) PS 9.1(2)	☐ PC 47.6(10) PS 59.1(13)	☐ PC 9.5(2) PS 22.7(5)	☐ PC 0.0(0) PS 9.1(2)	☐ PC 0.0(0) PS 0.0(0)
h. Set off fireworks	☐ PC 23.8(5) PS 31.8(7)	☐ PC 76.2(16) PS 68.2(15)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)
i. Use stereo earphones (**Ipod, MP3 player**)	☐ PC 33.3(7) PS 36.4(8)	☐ PC 23.8(5) PS 13.6(3)	☐ PC 28.6(6) PS 27.3(6)	☐ PC 9.5(2) PS 4.5(1)	☐ PC 4.8(1) PS 18.2(4)
j. Ride on a tractor or other farm equipment	☐ PC 47.6(10) PS 31.8(7)	☐ PC 19.0(4) PS 31.8(7)	☐ PC 23.8(5) PS 13.6(3)	☐ PC 4.8(1) PS 22.7(5)	☐ PC 4.8(1) PS 0.0(0)

2. During the **past year**, have you been around loud sound that made your ears hurt or gave you "ringing" sounds in your ears. ☐ Yes PC 33.3(7) PS 54.5(12) ☐ No PC 61.9(13) PS 36.4(8) ☐ Not Sure PC 4.8(1) PS 9.1(2)

3. How often do you wear earplugs or ear muffs when you are around loud sound?

☐ Always PC 14.3(3) PS 0.0(0) ☐ Often PC 9.5(2) PS 18.2(4) ☐ Sometimes PC 28.6(6) PS 27.3(6) ☐ Rarely PC 9.5(2) PS 36.4(8) ☐ Never PC 33.3(7) PS 13.6(3) ☐ Not around loud sound PC 4.8(1) PS 4.5(1)

4. Which of the following types of sound can be loud enough to damage your hearing?
(*check all that apply*)

- ☐ Stereo Headphones or Walkman — PC 81.0(17) PS 100.0(22)
- ☐ Dishwasher — PC 85.7(18) PS 95.5(21)
- ☐ Concert — PC 9.5(2) PS 100.0(0)
- ☐ Fireworks — PC 95.2(20) PS 100.0(22)
- ☐ Gunfire — PC 100.0(21) PS 100.0(22)
- ☐ Washing machine — PC 90.5(19) PS 95.5(21)

5. Which of the following are good ways to protect your hearing when you are around loud sound?
(*check all that apply*):

- ☐ Walk away from the loud sound — PC 95.2(20) PS 95.5(21)
- ☐ Turn down the volume — PC 100.0(21) PS 100.0(22)
- ☐ Spend less time around loud sounds whenever possible — PC 85.7(18) PS 90.9(20)
- ☐ Put cotton or Kleenex in your ears — PC 71.4(15) PS 95.5(21)
- ☐ Use earplugs or ear muffs — PC 100.0(21) PS 100.0(22)

6. Hearing an extremely loud sound even one time can cause you to lose some of your hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 38.1(8) PS 81.8(18)	☐ PC 57.1(12) PS 13.6(3)	☐ PC 4.8(1) PS 4.5(1)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)

7. Sound that is too loud can damage the tiny hair cells of the inner ear.

strongly agree	Agree	don't know	disagree	strongly disagree
☐ PC 38.1(8) PS 77.3(17)	☐ PC 38.1(8) PS 22.7(5)	☐ PC 19.0(4) PS 0.0(0)	☐ PC 4.8(1) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)

8. Being around loud sounds a lot will help your ears get used to it and protect your hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 71.4(15) PS 72.7(16)	☐ PC 23.8(5) PS 18.2(4)	☐ PC 4.8(1) PS 0.0(0)	☐ PC 0.0(0) PS 9.1(2)	☐ PC 0.0(0) PS 0.0(0)

9. Wearing earplugs around your friends/co-workers/others (if no one else is wearing them) would be:

- ☐ Very embarrassing — PC 4.8(1) PS 0.0(0)
- ☐ Somewhat embarrassing — PC 4.8(1) PS 4.5(1)
- ☐ A Little embarrassing — PC 14.3(3) PS 27.3(6)
- ☐ Not at all embarrassing — PC 76.2(16) PS 68.2(15)

10. If you were around loud machinery with your child present, would you use hearing protection?

Definitely Yes	Probably Yes	Don't Know	Probably No	Definitely No
☐ PC 38.1(8) PS 36.4(8)	☐ PC 42.9(9) PS 45.5(10)	☐ PC 14.3(3) PS 9.1(2)	☐ PC 4.8(1) PS 9.1(2)	☐ PC 0.0(0) PS 0.0(0)

11. During the past year, if you were around loud sound did you try any of the following:

- ☐ Turn down the volume — PC 71.2(15) PS 90.9(20)
- ☐ Use Ear Muffs — PC 9.5(2) PS 36.4(8)
- ☐ Use Ear Plugs — PC 52.4(11) PS 68.2(15)
- ☐ None of the above — PC 4.8(1) PS 4.5(1)
- ☐ Walk away from loud sound — PC 66.7(14) PS 59.1(13)
- ☐ Not around loud sound — PC 9.5(2) PS 0.0 (0)

12. Have you ever talked to your child about protecting their ears when they are around loud sounds?

- ☐ Yes, more than once — PC 61.9(13) PS 68.2(15)
- ☐ Yes, one time only — PC 23.8(5) PS 27.3(6)
- ☐ Never — PC 14.3(3) PS 4.5(1)

Modified from Dangerous Decibels® at OHSU

13. Have you ever seen your child use earplugs or ear muffs?

☐ Yes PC 76.2(16) PS 72.7(16) ☐ No PC 19.0(4) PS 27.3(6) ☐ Not Sure PC 4.8(1) PS 0.0(0)

14. Earplugs are hard to put in my ears.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 14.3(3) PS 40.9(9)	☐ PC 42.9(9) PS 54.5(12)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 33.3(7) PS 0.0(0)	☐ PC 9.5(2) PS 4.5(1)

15. I know what I need to do to protect my hearing.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 40.0(8) PS 63.6(14)	☐ PC 55.0(11) PS 36.4(8)	☐ PC 5.0(1) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)

16. If my hearing is damaged, I might hear ringing in my ears all the time.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 20.0(4) PS 40.9(9)	☐ PC 40.0(8) PS 45.5(10)	☐ PC 25.0(5) PS 13.6(3)	☐ PC 15.0(3) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)

17. My hearing will stay healthy because I protect it.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 35.0(7) PS 42.9(9)	☐ PC 35.0(7) PS 47.6(10)	☐ PC 25.0(5) PS 9.5(2)	☐ PC 5.0(1) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)

18. The more time I spend around loud sound, the worse my hearing will be.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 40.0(8) PS 72.7(16)	☐ PC 55.0(11) PS 27.3(6)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 5.0(1) PS 0.0(0)

19. My friends/co-workers/others would tease me if I wore earplugs or earmuffs.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 50.0(10) PS 31.8(7)	☐ PC 30.0(6) PS 36.4(8)	☐ PC 10.0(2) PS 22.7(5)	☐ PC 10.0(2) PS 4.5(1)	☐ PC 0.0(0) PS 4.5(1)

20. I will use hearing protection when I use a lawn mower.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 5.0(1) PS 22.7(5)	☐ PC 45.0(9) PS 36.4(8)	☐ PC 30.0(6) PS 22.7(5)	☐ PC 20.0(4) PS 18.2(4)	☐ PC 0.0(0) PS 0.0(0)

21. I know how to use earplugs when I need them.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 50.0(10) PS 68.2(15)	☐ PC 50.0(10) PS 31.8(7)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)

22. I will always be able to enjoy listening to music if I protect my ears from loud sounds.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 25.0(5) PS 40.9(9)	☐ PC 70.0(14) PS 50.0(11)	☐ PC 5.0(1) PS 91.(2)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)

Modified from Dangerous Decibels® at OHSU

23. If my hearing is harmed, it will be hard to understand people talking to me.

strongly agree	agree	don't know	disagree	strongly disagree
☐ PC 55.0(11) PS 68.2(15)	☐ PC 40.0(8) PS 31.8(7)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 0.0(0) PS 0.0(0)	☐ PC 5.0(1) PS 0.0(0)

24. There are specific hearing protection devices designed for children.

☐ Yes PC 81.0(17) PS 95.5(21) ☐ No PC 0.0(0) PS 0.0(0) ☐ Not Sure PC 19.0(4) PS 4.5(1)

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25. Are you: ☐ Male PC 17.4(4) PS 22.7(5) or ☐ Female? PC 82.6(19) PS 77.3(17)

26. What are the ages of your children that attended the Dangerous Decibels® presentation with you?

_____ PC: 10-14.3(3): 11—28.6(6): 12 &10—4.8(1): 8—23.8(5): 9—14.3(3): 9 & 11—4.8(1): Missing—9.5(2) PS: 10 & 8—4.5(1): 10—13.6(3): 11—31.8(7): 12—4.5(1): 13—4.5(1): 8—9.1(2): 27.3(6): 9 & 11—4.5(1)

27. Did you and your child spend time together exploring the Dangerous Decibels® Virtual Exhibit (games) website in the last three months? (note: "child" refers to the one taking the survey and participating in the research study).

☐ Yes, Less than 15 minutes PC 14.3(3) PS 13.6(3) ☐ Yes, 15-30 minutes PC 14.3(3) PS 9.1(2) ☐ Yes, 30-60 minutes PC 0.0(0) PS 0.0(0)

☐ Yes, Longer than 1 hour PC 0.0(0) PS 0.0(0) ☐ No PC 71.4(15) PS 77.3(17)

28. Are you:

☐ Hispanic/Latino PC 4.3(1) PS 9.1(2)
☐ American Indian, Eskimo, or Aleutian PC 0.0(0) PS 0.0(0)
☐ White PC 91.3(21) PS 90.9(20)
☐ Asian or Pacific Island PC 0.0(0) PS 0.0(0)
☐ Black, African Americ PC 4.3(1) PS 0.0(0)
☐ Other_____ PC 0.0(0) PS 0.0(0)
☐ Not Sure PC 0.0(0) PS 0.0(0)