

# Innovation Award



**DANGEROUS DECIBELS®**



UNIVERSITY of  
NORTHERN COLORADO



*February 22, 2013*





# Program Profile

- An ongoing public health campaign to reduce the incidence of noise-induced hearing loss (NIHL) and tinnitus since 1999.
- Multiple years of grant funding and program development formative and summative evaluation approaches
- Research outcomes have guided and substantiated the effectiveness of the program
- Originally developed for the K-12 age group using inquiry-based learning but reaching all age groups
- Successful in engaging parents, teachers, professionals, management, employees and military officers/personnel



[www.dangerousdecibels.org](http://www.dangerousdecibels.org)





# Dangerous Decibels Team



Left to right – Billy Martin, Genna Martin, Judy Sobel, Deanna Meinke, Susan Griest, Linda Howarth, Ga-lo Vann





## *The Problem*

- ~ 26 million Americans between the ages of 20 and 69 have high-frequency hearing loss.
- > 30 million Americans are exposed to dangerous levels of noise on a regular basis.
- Henderson (2006) indicated that 16.7% of 12-18 year olds had hearing loss consistent with noise-induced threshold shifts.
- Tinnitus has been reported in up to 59% of children. 19.6% indicating it as a cause of suffering (Coelho et al., 2007).



## World Health Organization report on noise exposure to North American children:

“...they may receive more noise at school than workers from an 8-hour workday at a factory.





# The Solution

- Change knowledge, attitudes, and behaviors
- Teach prevention strategies
- Health Communication Theory = implement change...
  - ✓ Provide message early and often
  - ✓ Use different modalities
  - ✓ “Involve me and I understand”
- Partnerships and collaborations are essential







## What makes Dangerous Decibels unique?

Developed and evaluated a variety of interventions and applied them to a wide range of settings and populations

Combined education, exhibits and research with common educational messages.

Adopted nationally and internationally







# What makes Dangerous Decibels unique?

## *Partnerships and Collaborations*

- Basic science researchers
- Hearing scientists
- Hearing conservation experts
- Health communication experts
- Science museum educators & exhibit builders
- School teachers
- Students
- Civic leaders
- Volunteers
- Business leaders

# What makes Dangerous Decibels unique?

Partnership based -



## Other Affiliates/Collaborators/Funders





# International affiliates – New Zealand and Australia



Te Kaporeihana Āwhina Hunga Whara



A division of Australian Hearing.



## What makes Dangerous Decibels unique?

Learning to protect hearing is a complex health behavior change. Dangerous Decibels interventions are based on the principles of health communication research to increase their effectiveness.

- Health Belief Model
- Theory of Reasoned Action & Planned Behavior
- Social Cognitive Theory

Sobel, J., Meikle, M.  
Applying Health Behavior Theory to  
Hearing-Conservation Interventions.  
*Seminars in Hearing* 29:81-89, 2008.





## What makes Dangerous Decibels unique?

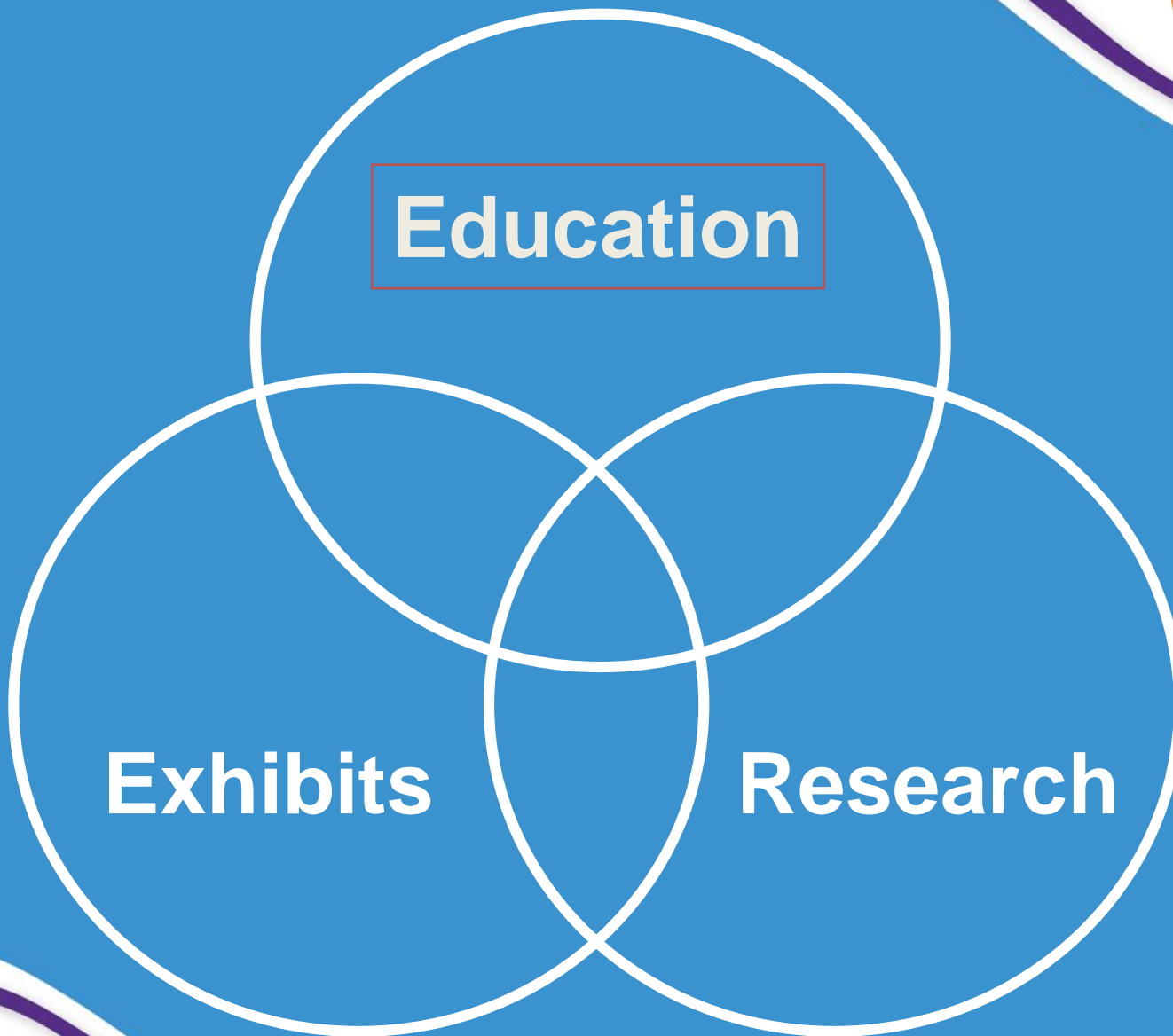
Uses three underlying educational messages throughout the program

- What are sources of dangerous sounds?
- What are consequences of exposure to dangerous sounds?
- How do I protect myself from dangerous sounds?





# What makes Dangerous Decibels unique?



# Dangerous Decibels Activities



*Innovative training materials and techniques impacting large numbers of people*

## Exhibits

- Science museum exhibition
- Health and science fairs
- Virtual Exhibit online
- Website resources

## Education

- K-12 classroom program
- Educator training

Jolene

## Research

- Effectiveness studies
- Public health research



# Science Museum Exhibition

Open June 1, 2002 to May 5, 2011

- First exhibition in the world dedicated to reducing noise-induced hearing loss and tinnitus
- 12 exhibit components – 2,000 ft<sup>2</sup> / 186 m<sup>2</sup>
- Over 5,000,000 visitors



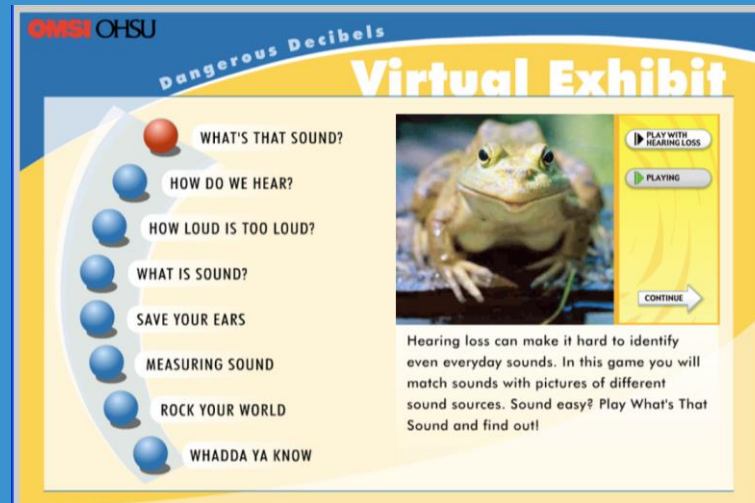


# Dangerous Decibels Activities

*Innovative training materials and techniques impacting large numbers of people*

## Exhibits

- Science museum exhibition
- Health and science fairs
- Virtual Exhibit online
- Website resources



# Science Museum Exhibition



How Loud is Too Loud



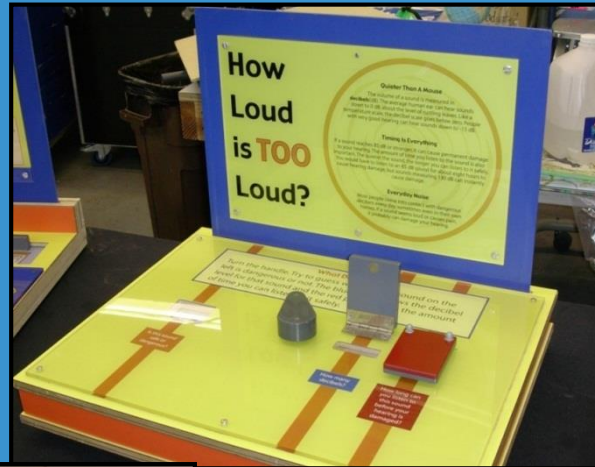
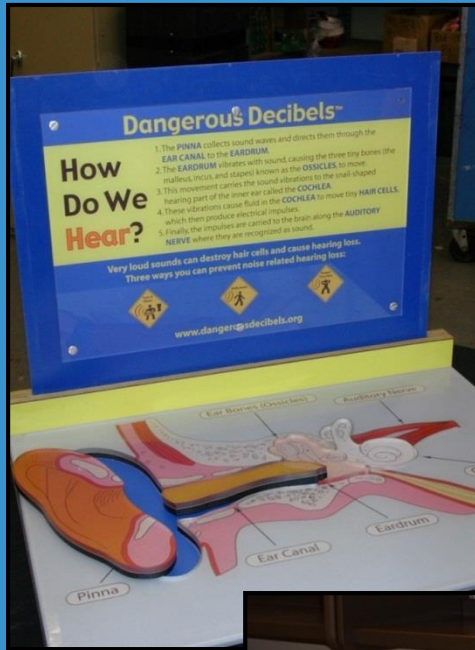
Whaddya Know?



Save Your Ears



# Exhibits: Health and Science Fairs



Interactive Displays  
We go to many fairs throughout the year and take along tabletop units for participants to interact with and learn.

# Exhibits: Virtual Exhibit Online



The screenshot shows the Dangerous Decibels website interface. At the top left is the logo. To its right are images of an 'EDUCATOR RESOURCE GUIDE' and a CD. A 'Classroom Materials' section offers resources for educators. A navigation bar includes links for Home, News, About Us, Education, Exhibit, Research, Store, and Contact. The main heading is 'Dangerous Decibels Virtual Exhibit'. Below it, a paragraph states the exhibit is a collection of games and activities. A bulleted list asks about sound sources, effects, and protection. A note mentions the exhibit is based on the physical exhibit at OMSI OHSU. A link to contact the team is provided. A section for a French version is also present. A 'Virtual Exhibit CD Available' section features a CD image and a note about headphones. The footer states the CD is available in English only.

**Dangerous Decibels Virtual Exhibit**

This is a collection of games, demonstrations and activities that will answer three important questions:

- What are the sources of dangerous sounds?
- What are the effects of listening to dangerous sounds?
- How do I protect myself from dangerous sounds?

The Virtual Exhibit is based on the [Dangerous Decibels exhibit](#) at the [Oregon Museum of Science and Industry](#) in Portland, Oregon.

If you have questions, please [contact the Dangerous Decibels team](#).

**Dangerous Decibels Virtual Exhibit in French!**  
*Commencez Decibels Dangereux Exposition Virtuelle! »*

**Virtual Exhibit CD Available** 

The Dangerous Decibels Virtual Exhibit is also available as a stand-alone CD (English version only)

**Classroom Materials »**  
We offer a variety of classroom materials and resources for educators. The Dangerous Decibels Educator Kit provides many of the supplies you might need to develop your own program on prevention of noise-induced hearing loss.

Home News About Us Education Exhibit Research Store Contact

**Dangerous Decibels Virtual Exhibit**  
**START HERE**  
OMSI OHSU

**Note:** If you are using headphones, please be sure to adjust the volume on your computer to a comfortable and safe level before entering the virtual exhibit. To access all areas of the virtual exhibit, you'll need the free Macromedia Flash and Macromedia Shockwave plug-ins.

The Virtual Exhibit is an online version of the OMSI museum exhibit.

A set of eight interactive games.

The Virtual Exhibit is available to everyone with internet access. A CD of the Virtual Exhibit is also available.





# Exhibits: Virtual Exhibit Online

OMSI OHSU  
Dangerous Decibels  
**Virtual Exhibit**

- WHAT'S THAT SOUND?
- HOW DO WE HEAR?
- HOW LOUD IS TOO LOUD?
- WHAT IS SOUND?
- SAVE YOUR EARS
- MEASURING SOUND
- ROCK YOUR WORLD
- WHADDA YA KNOW

Hearing loss can make even everyday sounds. match sounds with pict sound sources. Sound e Sound and find out!

Table of Contents for the Virtual Exhibit

OMSI OHSU  
Décibels Dangereux  
**Exposition virtuelle**

- DE QUEL SON S'AGIT-IL?
- COMMENT ENTENDONS-NOUS?
- EST-CE QUE C'EST TROP FORT?
- LE SON, C'EST QUOI?
- PROTÈGE TES OREILLES
- MESURER LE SON
- BRASSE LA CAGE!
- QU'EST-CE QUE TU CONNAIS?

QU'EST-CE QUE TU CONNAIS?  
DÉBUTE

Mets tes connaissances à l'épreuve et joue à Qu'est-ce que tu connais?

Canadian colleagues from the University of Ottawa helped us translate the Virtual Exhibit into French.

L'adaptation du Dangerous Decibels Virtual Exhibit a été rendue possible grâce au soutien financier de Widex Canada. La traduction française a été réalisée par Mélanie Poirier, étudiante à la maîtrise en audiologie et Véronique Vaillancourt, audiologiste, sous la supervision de Chantal Laroche, Ph.D., du Laboratoire de recherche en audiologie de l'Université d'Ottawa.

# Exhibits: Virtual Exhibit Online



Virtual Exhibit is used in the classroom and at hearing health promotion events.



# Exhibits: Internet Resources



**Meet Jolene & The Family »**  
 Jolene is a system for measuring the sound levels of personal stereo systems. She is part of the Dangerous Decibels education and research projects. Jolene was constructed using a used fashion mannequin and a sound level meter.  
 Learn how to build your own Jolene and join the family!

Home News About Us Education Exhibits Research Store Contact

## Information Center

Resources and guides on various aspects of hearing loss and hearing loss prevention.

### How Loud is Too Loud? »

A guide to how long you can be exposed to different types of sounds before possible hearing damage can occur. [Read more](#)

### How to Protect Your Hearing.

Three ways to protect your hearing. [Read more](#)

### How We Hear »

An overview of how the ear functions. [Read more](#)

### Hearing Loss »

There are many different kinds of hearing loss. Here we have information about

### Noise Induced Hearing Loss »

NHL is probably the most common occupational hazard facing people today. It is 30 million Americans are exposed to potentially harmful sounds at work. Dangerous noise-induced hearing loss. [Read more](#)

### NIHL and Veterans »

**Protecting Your Hearing »**  
 Noise-induced hearing loss can be prevented!  
 Learn about the three things you can do to protect your hearing from damaging noises.

Home News About Us Education Exhibits Research Store Contact

## Classroom Materials and Resources

- Dangerous Decibels Educator Kit**  
 The Dangerous Decibels Educator Kit is meant as a supplement to the Educator Training Workshop. The kit provides many of the supplies you might need to develop your own program on prevention of noise-induced hearing loss. [More »](#)
- Coloring Sheets**  
 This set of three coloring sheets work well for the young kids. We use them at fairs where the young kids will be attending. We have crayons out for them and they can color them at our booth or take them home with them. They make good take-homes. [More »](#)
- Educator Resource Guide**  
 The guide is an illustrated, spiral paperback (8.5 x 11 and 105 pages) K-8 classroom supplement with hands-on activities, background information, and experiments. [More »](#)
- Educator Resource DVD**  
 The DVD is a multilayered introduction to how we hear, what decibels are, types of hearing loss, how to protect ears, tinnitus and more. Includes demonstrations of classroom activities that can be done. [More »](#)
- Virtual Exhibit CD**  
 Dangerous Decibels' Virtual Exhibit is now available as a stand-alone CD. [More »](#)

**NOISE-INDUCED HEARING LOSS CAN BE PREVENTED!** [Read the latest news!](#)

Home News About Us Education Exhibits Research Information Center Store Contact

**Did You Know?..?**  
 12.5% of 8-19 year olds in the U.S. (5.2 million) have documented evidence of elevated hearing thresholds directly attributed to noise exposure.  
Nielsen, A.S. et al. NCHADS II, 9/00-9/04, United States, Pediatrics, 105, 2007

**Join us to prevent noise-induced hearing loss and tinnitus!**

**Dangerous Decibels®**  
 The Dangerous Decibels mission is to significantly reduce the prevalence of noise-induced hearing loss and tinnitus (ringing in the ear) through exhibits, education, and research.

North American children "may receive more noise at school than workers from an 8-hour work day at a factory"  
Report of a World Health Organization Prevention of Deafness Hearing Impairment Informal Consultation II, WHO, Geneva, 1997

40 to 50 million Americans have tinnitus, one-quarter of them to a severity that they seek medical help.  
Geldray, M.D. and Jacobson, G.P., Otolaryngol Clinics N Amer, 1996

[www.dangerousdecibels.org](http://www.dangerousdecibels.org)



# Education

## Dangerous Decibels “Classroom” Program

- 50-minute program
- K-12 and beyond
- Easily adapted to industrial and military settings
- Evidenced based effectiveness







# Education

## Educator Training Workshops

- Formalized 2-day training program teaches anyone to easily and effectively tell children and adults about protecting hearing.
- Training and certifying the participants to present the classroom program
- Open to all professional & educational backgrounds.
- Open to ANYONE interested in teaching an effective program about NIHL prevention





## Who attends the Educator Workshops?

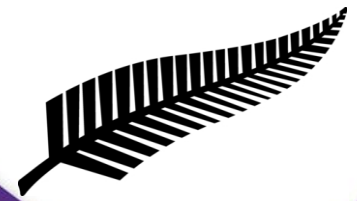
Museum educators  
Audiologists  
School nurses  
Physicians  
Industrial hygienists  
Corporate staff  
Exhibit makers  
Office managers  
Research assistants  
University professors  
Undergrad & grad students  
School hearing screening technicians  
Occupational health nurses  
Agricultural safety educators

High school students  
Speech pathologists  
Basic scientists  
Administrators  
School teachers  
Hearing therapists  
Health & safety advisors  
Military health staff  
Social workers  
Writers

Music teachers  
Choral directors  
Psychologists  
Safety trainers  
Audio Engineers  
Molecular biologists



# International Expansion



## Workshop participants in New Zealand

- The New Zealand government agency, Accident Compensation Commission (ACC), has adopted the Dangerous Decibels program and now has a group of Dangerous Decibels-trained educator trainers who are presenting their own workshops in New Zealand.
- The goal of ACC is to place the program in every school in the country and reach 70,000 school children in the next two years.



# Education

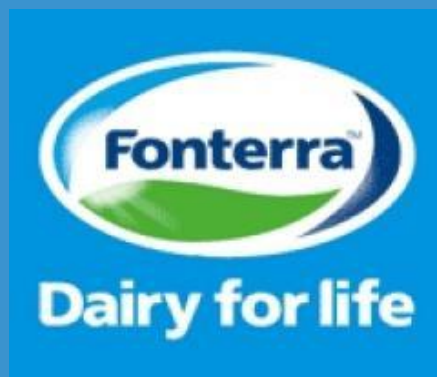
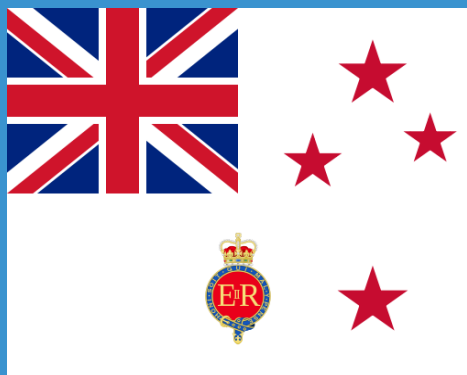
**The Dangerous Decibels program is easily adapted to adults in industry & military settings**

The program is now presented to all new recruits in the NZ Defense Forces, NZ police force, to NZ railway workers, to those in the dairy industry and dozens of other industrial settings.





# Crossover to occupational settings



NZ: National program for NIHL/tinnitus prevention



# Crossover to occupational settings

US corporate and military representatives attending Dangerous Decibels educator training workshops

Program presented to employees and their children in Nevada mining community

Program applicable to manufacturing, service, construction, mining, agriculture, transportation, healthcare, oil and gas industries among others



# Educator Workshop participants from around the world.





# Education: Jolene



**Jolene** is a mannequin with a sound level meter connected to her ear. She is used for education and research regarding personal music system listener beliefs and practices.

Jolene accurately measures sound pressure generated by devices.





# The Jolene Cookbook



**The Jolene Cookbook** is a step-by-step instruction manual show how to make your own Jolene. A free download from the website.



So far it has been downloaded in 50 states, 4 territories, and 35 countries



Some of Jolene's siblings





## Award winning

In 2010 the Association of University Technology Managers selected Jolene as one of the top 30 innovations in the world having a positive impact on quality of life.

Association of University Technology Managers®

# The Better World Report

The Positive Impact of  
Academic Innovations  
on Quality of Life





# Dangerous Decibels Activities

*Innovative training materials and techniques impacting large numbers of people*

## Research

- Intervention effectiveness
- Epidemiology of NIHL
- Native American communities



Funded by NIH – NIDCD & CDC  
R25 RR15634  
R25 DC006431  
R21  
CDC !U48DP001937-02





# Research

## Dangerous Decibels Program Evaluations

		<u>N</u>	<u>Grade Level</u>
2001	Classroom formative	297	– 4 <sup>th</sup>
2002	Classroom formative	400	– 1 <sup>st</sup> 4 <sup>th</sup> 7 <sup>th</sup>
2003*	Classroom summative	1630	– 1 <sup>st</sup> 4 <sup>th</sup> 7 <sup>th</sup>
2004-05	Four interventions summative	1118	– 4 <sup>th</sup>
2005-06	Paired interventions summative	889	– 4 <sup>th</sup>
	Total	4334	students





# Research Outcomes

## Recommendations

- Implement hearing health education in schools
- Use interpersonal communication methods whenever possible.
- Use more than one intervention modality, over time

# Science Museum Exhibit & Public Health Research



94,000 visitors participated in research  
June 2002 – May 2011

## Listen Up!

A computer game that includes a hearing test (4kHz) plus a survey asking about the visitors sound exposure for the last year.

Data, from those who agreed to be part of a research study, was sent to the Oregon Hearing Research Center for analysis.

# Science Museum Exhibit & Public Health Research

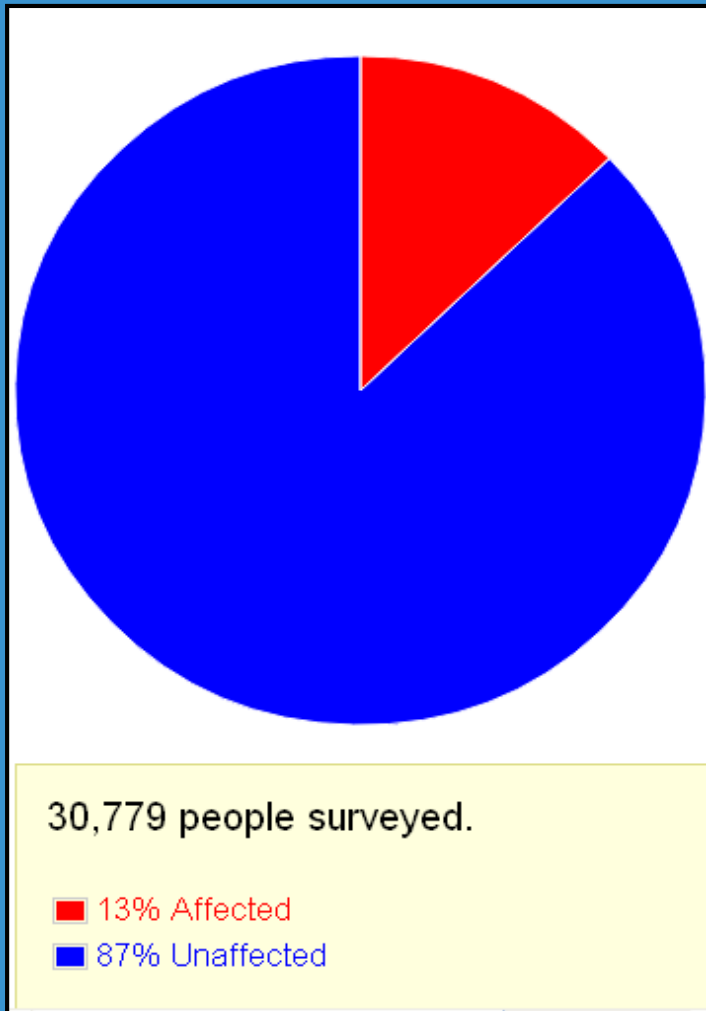


## Percent of 13 year olds self-reported exposures

During the past year, have you:	♂	♀
Used stereo headphones	84%	90%
Been in a car with a loud stereo	69%	88%
Used a lawn mower, leaf blower	68%	40%
Fired a gun	41%	20%
Played in a band	31%	24%

Sample of Research Data from the Listen Up hearing testing booth.

# Science Museum Exhibit & Public Health Research



Percent of 12-19 year olds with hearing thresholds greater than 20 dBHL at 4000 Hz in at least one ear.

Research results can be seen on the Dangerous Decibels website. The results can be displayed using several variables, such as gender and age differences.

Sample results from the Listen Up testing booth.



# Current Research

## Community based NIHL and tinnitus prevention



How do we engage a community and change the local culture to promote hearing loss prevention for a specific target group?



# What's next for Dangerous Decibels?

Train more educators

Continue to increase degree and duration of improvements

Adapt for a wider range of audiences

Figure out how to get the US to embrace prevention

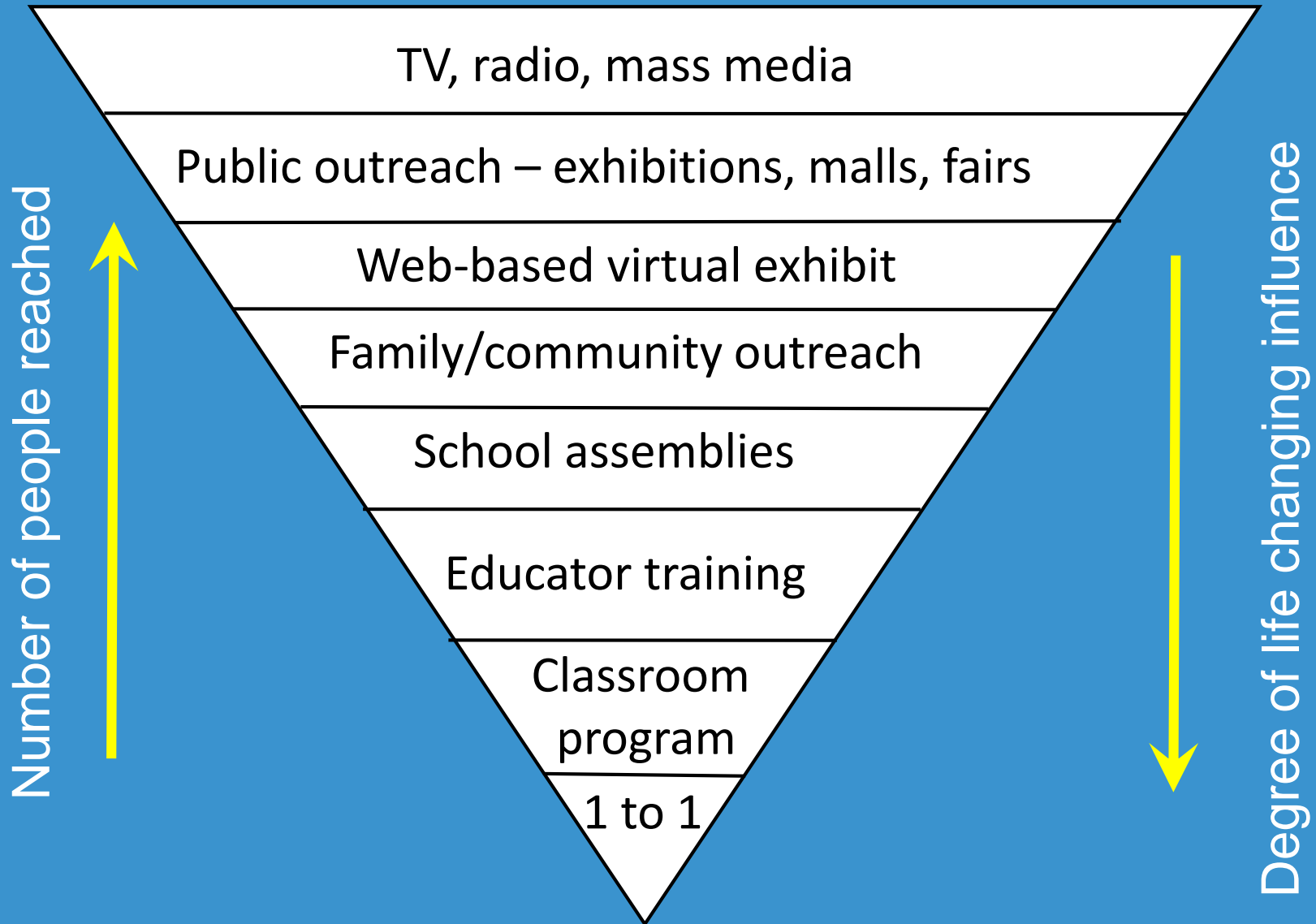
Continue global dissemination



## Lessons learned along the way – What can others learn from our program?

1. You don't have to re-invent the wheel – use what is already available
2. You won't get much done on your own – find good partners
3. Define your educational messages early – they will guide the way
4. Plan your evaluation strategy from the beginning – evaluation is your best friend
5. Have fun

# Raise awareness



# Change behaviors





## Significance of the Award

We are honored to be recognized by the National authority on NIHL prevention

Affirmation that we are headed in the right direction

Reminds us of our place in the prevention Universe

Gives visibility and credibility that will open doors

Motivates us to live up to this standard of greatness



# Contact

## Program Manager

**Linda C. Howarth**

Research Associate

Oregon Hearing Research Center  
Public Health & Preventive Medicine  
Oregon Health & Science University

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