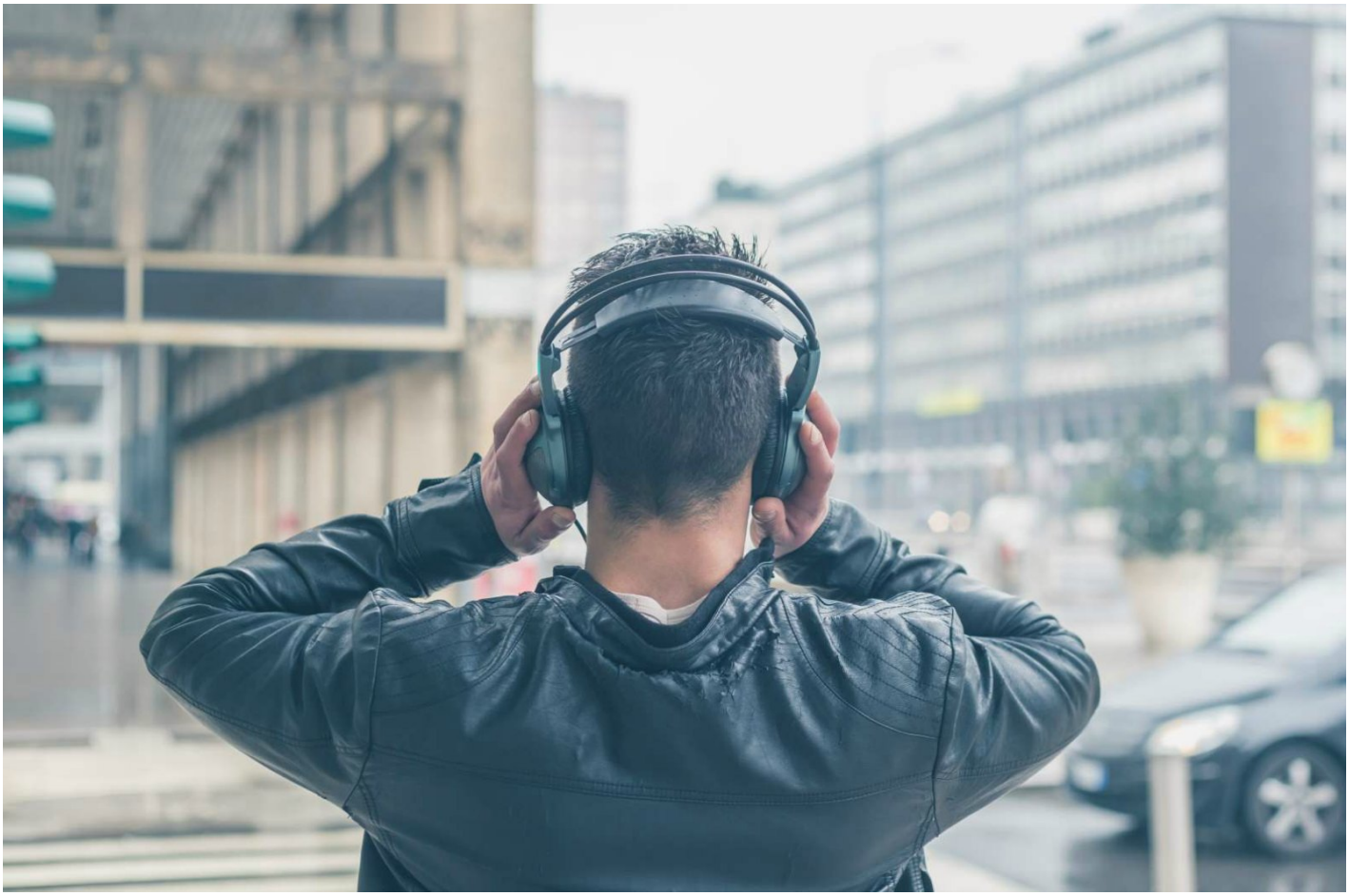
Jolene Delivers A Message Kids Can Hear

Oregon Health

Oregon Health & Science University



She may appear an unlikely superhero — dressed in thrift shop fashions and outlandish hairstyles — but Jolene is coming to the rescue of schoolchildren around the world, teaching them about the danger of hearing loss caused by loud music played through headphones.

Developed from the research and innovative outreach by the Oregon Health & Science University (OHSU) in Portland, Jolene is changing behaviors at a critical time. More of a what than a who, Jolene is a mannequin equipped with off-the-shelf electronics that measure sound level in decibels and a sidekick who simply and clearly explains the effect loud noise has on the human body. Wherever she visits, people use a music player to identify the volume they normally listen to, and then the earpieces are shared with Jolene.

In her ears, however, she records the sound volume in decibels, and then her creator, Genevieve “Genna” Martin, hands over a piece of paper saying how long it is safe to listen.

“I wanted to make a cooler version that appealed to young people — not just measuring the output of an iPod but

something that people want to interact with at a health fair or event," she says. "The average concert is 120 decibels, and it only takes 10 seconds before your ears may begin to get damaged. So we ask, would you buy a ticket for a concert if you had to leave after 10 seconds? That gets people thinking about using earplugs or other protection."

Jolene is part of a broader education program, called Dangerous Decibels, that began in the Portland area in 2000. Genna Martin's innovation — much like the iPod itself — was not in being first with new technology. Instead, it was about democratizing and spreading the popularity using a new and popular platform. Just as the iPod supports the iTunes music store, Jolene provides a friendly introduction to Dangerous Decibels.

In many ways, hearing and public health are both a professional and personal concern for William Martin, Ph.D., creator of Dangerous Decibels and an OHSU professor who does research on noise-induced hearing loss (NIHL) prevention. He holds a joint appointment in otolaryngology/head-neck surgery and public health preventive medicine. He launched Dangerous Decibels to educate kids about NIHL — a condition he experiences firsthand. Over the last decade, the program has worked with other groups in the region and nationwide including a walk-through giant ear exhibit at the Oregon Museum of Science and Industry. "There are consequences as you get older, and kids, by the time they're 30, could have the hearing of a 60-year-old because of overexposure," stated William Martin.

A Growing Problem, Often Overlooked

The Dangerous Decibels group started with a National Institutes of Health grant to educate children about hearing health. According to the National Institute on Deafness and Other Communication Disorders, approximately 30 million Americans are affected by hearing loss. And as many as 25 million have experienced tinnitus, the ringing that indicates ear damage most commonly caused by loud sound exposure. Without much education into what sound levels are normal or safe, people can be at risk for NIHL — both from one-time extreme exposure or ongoing loud sound. For example, usual conversation is approximately 60 decibels, and city traffic noise can reach 85 decibels. Hazardous noise starts above 85 decibels for a period of eight hours during one day.

An explosion or gunshot can reach 140 decibels. Riding a motorcycle — even with a helmet — can average 100 decibels. Persistent loud sound in enclosed space such as subways or sports arenas can also accelerate hearing loss when exposure causes damage to the sensitive hair cells of the inner ear and related nerve endings.

The Pacific Northwest has a cluster of organizations devoted to the science and public health aspects of hearing issues. The American Tinnitus Association is based in Portland. Among military personnel, tinnitus is the most common service-related disability and NIHL ranks second. The U.S. Department of Veterans Affairs has its national research center in Portland devoted to preserving hearing for affected soldiers.

During her high school years, Genna Martin volunteered with Dangerous Decibels, educating fourth graders on hearing safety. In 2005, she took a summer internship at OHSU's Center for Research in Occupational and Environmental Toxicology to pursue a project that could spread the message about hearing safety and portable music.

She modified a second-hand mannequin using some power tools and a silicone ear used to demonstrate hearing aids. After mounting and wiring a microphone and sound-level meter, Jolene was created — named for a minor TV series character and dressed in a leather jacket and blue dyed hair.

From there, the duo traveled to conferences and events where people asked for their own model. That led to the Jolene Cookbook, an online guide with photos that OHSU makes available as a simple, royalty-free download agreement through its technology portal. Organizations in 44 states and 21 countries have downloaded the instructions.

Operating more like an open-source development project, where each user can customize a Jolene with a unique look, clothing or style, the venture is managed by the Martins and the university's technology transfer office, which chose to freely share the plans to encourage broader use. No wonder Jolene has siblings Günter, Shoque, Flame and Deci-Bell as far away as Australia, Canada and on military bases in Europe. They appear on a family album Web site hosted by Dangerous Decibels (www.dangerousdecibels.org).

> *"It really has its own momentum, and getting it out to groups worldwide has been great," says Michele Gunness, OHSU senior technology development manager. "And when it's built by young people, they're more likely to pay attention to the message."*

The construction isn't that technically difficult, adds Genna Martin, but it's not always easy finding torso-and-head mannequins. So she often scours eBay for auction items. What makes Jolene unique is her approachability. People often come and ask about it in public, and that curiosity makes them receptive to the advice of reducing volume, limiting the duration of loud noise and wearing protective gear.

Jolene Makes New Friends

One hallmark of Jolene's success is the students willing to counsel younger kids about the dangers of extreme noise.

Martin's advice is spreading to new audiences thanks to the reach of the Web and social media such as Facebook — where Jolene Ohsu has more than 100 friends, and explains "I'm pretty quiet but I love music and meeting new people!"

"In our study, we saw that 16 percent of 16-18 year olds were listening consistently at levels above safe limits every day of the week — it was like working in a factory or at a logging site listening to a chainsaw for eight or nine hours a day," William Martin adds. "We gave people the measurements showing how long they could listen safely, and 44 percent of people who were at dangerous levels said they would change the behavior. That's a remarkable feat with a really simple and fun innovation."

Research shows that in a 24-hour-period, every additional 3 decibels above 85 increases and accelerates hearing damage, according to Genna Martin, who graduated from Boston University in 2009 and now works as a researcher in OHSU's department of otolaryngology. So a 91-decibel sound starts to cause harm in half the time of an 88-decibel level. That bit of science is easier to accept from a neutral third-party like Jolene.

"It's gone far beyond anything we imagined, especially the requests to translate into Chinese, Spanish, Portuguese and other languages," William Martin says. "It's changing young lives. This is probably the single thing in my career that will have the greatest impact."

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