

Research Reconsidered—From Sound to Noise
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This is the first installment of “Research Reconsidered,” a review of the 2005 NCMEA Research Poster Session intended to bridge the gap between academic research and classroom application. Featured in this article is research on sound levels in music becoming dangerously high and its impact on hearing as conducted by: Dr. Sandra Mace at UNC Greensboro; Jennifer L. Stewart, also at UNC Greensboro; and Dr. Kenneth Murray and Ms. Mary Garabedian at Wingate University.

Dr. Sandra Mace investigated the amount of sound music teachers experience every day. As an elementary music teacher she once wondered why her ears felt as if they were full of cotton, just like the feeling you might experience after a very loud concert. At UNCG, she decided to study hearing related to musicians and music teachers. Although the hearing of musicians is really no different from that of anyone else, we certainly do rely on our hearing in ways, or at least to an extent, that others do not. Because of her experiences with the cotton-filled ear feeling, Mace decided to measure sound levels of other music teachers to determine if they too were experiencing sound levels that might place them at risk for hearing loss.

Together with Dr. Patricia Sink, Mace also measured sound-level exposures of elementary, middle, and high school music teachers using dosimeters. Dosimeters are instruments that measure sound levels across time and calculate an average exposure. Surprisingly, they learned that nearly no elementary, middle, or high school choral teachers were at risk for hearing loss due to sound levels experienced while teaching. However, they also learned that nearly all middle and high school instrumental music teachers experienced greater than a 100% daily dose of sound as defined by the Occupational Safety and Health Administration (OSHA), and therefore should use some form of hearing protection. Mace then studied the level of sound experienced by university-level

performance faculty. Here, she found that thirteen faculty members (35%) experienced greater than a 100% daily dose of sound during at least one of the two days measured, and twelve (32%) experienced greater than a 100% daily dose when both days were averaged. Specifically, woodwind, brass, percussion, voice, jazz band conductors, and accompanist areas averaged greater than a 100% daily dose.

Similarly, Dr. Jennifer Stewart investigated the level of noise exposure for high school marching band students, and whether that exposure changes depending on the instrument a student chooses to play. She measured the sound levels experienced by 16 high school students in a 100-member marching band during two typical days of a five-day camp. The students wore small devices pinned to their clothing that measured personal exposure to noise in decibels. Stewart found that nearly all of the students experienced noise doses above what is recommended by both OSHA and the National Institute of Occupational Safety and Health (NIOSH). Specifically, a snare drum player experienced the highest levels of noise on both days: 3,925% on day one and 1,866% on day two. In contrast, a color guard member experienced the lowest levels of noise on both days: 27% on day one and 23% on day two.

In a related project, Dr. Kenneth Murray and Ms. Mary Garabedian examined sound levels and doses experienced by audience members during live music performances in selected venues. Personal dosimeters were used by both authors and volunteers to measure sound-level exposures in selected settings. The sound dose percentages were calculated using the average sound level (in decibels) and measured time of exposure. Murray and Garabedian found that three types of live music performance resulted in sound doses that exceeded the International Standards Organization (ISO) standard: a symphony orchestra with a rock band, a touring popular music band, and a solo performance in a restaurant. Of these, the highest dose measured was during a solo performance in a restaurant, which was rated at 1,304% of the recommended ISO exposure limit during the two and

one-half hours of measurement. The same event was rated at 105% of the recommended OSHA exposure limit. They also found that these three types of performance as well as a cover band exceeded the ISO standard of 85 decibels average during an eight-hour span, even if none of the sounds were above these levels during that time.

Murray and Garabedian also examined sound levels experienced by performers in various practice settings and found that although organ recitals measured the lowest sound levels, musicians still experienced some aural discomfort during certain selections of these performances. They also found that during practice settings for solo voice and piano, solo cello, and solo French horn, the average sound levels exceeded the ISO standard. It is highly unlikely, however, that practice sessions like these would continue for eight hours.

Based on these three presentations from the 2005 NCMEA Research Poster Session, some music teachers and audience members experience sound levels that place them at risk for hearing loss. Therefore, it is critical for music teachers to educate their elementary and secondary school music students about hearing conservation and the different methods of hearing protection.

Professional musicians and amateur performers should be aware of sound levels and doses not only in individual practice sessions, but also in full rehearsals and performances in ensembles. Other people with concern for potential hearing damage might include employees and audience members who regularly attend or work in venues with sound levels exceeding established standards. The best way for teachers and performers to avoid hearing loss is to use earplugs designed for musicians.

Educating musicians in the prevention of hearing loss is important at all levels of education. Please encourage your colleagues and students alike to use hearing protection in any loud setting when music may quickly escalate from sound to harmful noise.

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