

Studying Sound Levels and Hearing Loss: Three Combined Studies

Hearing Acuity of School of Music Undergraduate Music Majors

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The purpose of this ongoing study is to track hearing acuity in music majors and, particularly, to note any noise-induced hearing loss experienced by students across time. Data for this project were collected over a two-year period and are continuing to be collected for ongoing analyses. Student audiograms revealed noise damage in over 50% of participants, suggesting that exposure during these years can contribute to hearing loss in this population. Reported outside exposure to noise was minimal. Results suggest that hearing conservation programs should be implemented in undergraduate music programs.

Sound-level Measurements in Music Practice Rooms

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Average and peak sound levels were measured in the practice rooms of a university school of music with the objective of determining whether sound level in student practice rooms were high enough to warrant concern for hearing conservation. Measurements were taken using a dosimeter clipped to the shoulder during 31 student practice sessions. Students representing four musical instrument groups were represented. Mean sound levels measured averaged 88.3-96.2 dBA, which is in excess of levels used by the Occupational Safety and Health Administration to determine the necessity of implementing a hearing conservation program in industrial settings. Mean average levels for the brass group were significantly higher than the string group. Peak levels did not vary significantly between instrument groups. Implications for music education programs are discussed, including the need for 12-hour breaks and the use of musician's earplugs.

Genetic Susceptibility to Noise-Induced Hearing Loss

Dr. Susan Phillips, *Dr. Vince Henrich*, Professor of Biology & *Dr. Sandra Mace*

The general purpose of this study has focused on the relationship between exposure to noise and the level of noise-induced hearing loss (NIHL), as indicated by a decline in high-frequency hearing acuity at 6000 Hz (a "noise notch"). This in turn, is intended to serve as a foundation for characterizing a phenotype that indicates an underlying genetic predisposition to NIHL. Hearing threshold and survey data collected over three years in a school of music shows that 52% of undergraduate music students show declines in high frequency hearing at 6000 Hz consistent with acoustic overexposure. Declines at 4000

Hz have grown in number over the three years, from 2% the first year to 30% the third year. These “noise notches” are seen in all instrument groups, including voice, and are not associated with any particular instrument. Among music students, 13.5% show indications of hearing loss in both ears, despite no indications of unusual noise exposure or ototoxicity. Further, hearing loss is asymmetric, with notches occurring more frequently in the right ear of musicians showing unilateral hearing loss and more deeply in the right ear of those students with a bilateral hearing loss. By contrast, this directionality of hearing loss is not as pronounced in non-music students, suggesting that an affective process may be involved. The results further suggest that some students are genetically predisposed to noise-induced hearing loss.