Improving the Assessment of Noise Exposure and Warning Signal Audibility

Improving the Assessment of Noise Exposure and Warning Signal Audibility on Construction Sites

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Overview

Fifty-one percent of construction workers are exposed to hazardous noise that can cause permanent noise-induced hearing loss, and 52% do not wear a hearing protection device. Hearing loss could be reduced more effectively with more accurate measurements of noise exposure, but common occupational noise exposure measurement devices are single-channel noise dosimeters worn on a worker's shoulder that are not advanced enough to capture and analyze complex sounds that threaten workers' hearing. This project examined a more accurate noise exposure and warning signal audibility assessment by using binaural (two-ear) measurements, which are similar to human hearing. Developing this measurement would pave the way for more effective noise characterization and hearing loss prevention, as well as helping workers better identify audio warnings. The researchers obtained binaural measurements with volunteer workers on a mixed-use development construction site and conducted an acoustic perception study in a laboratory with human participants.

Key Findings

- By obtaining binaural measurements on a construction site, the study exposed drawbacks of the standard monaural noise exposure measurement and analysis method.
- The study quantified sound impulsiveness/hazardousness with a binaural loudness metric, a measurement that is not possible with traditional sound pressure level metrics.
- There were significant differences between traditional monaural and binaural assessments of construction site noise exposure, with the binaural measurements always higher than single-channel measurements.
- Binaural assessment, which better reflects noise exposure on a construction site, allowed for identification of a more noise-exposed ear and quantification of asymmetry of noise exposure for each ear.
- A preliminary acoustic perception study in the laboratory, conducted using the recorded warning signals from the operating construction equipment, found that audible warning signals could not be localized.
- The study created a database of approximately 1500 noise events commonly encountered on a construction site from its noise exposure recordings, and this database can be used for future noise exposure metric development and construction noise assessment research.

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Read the report:
https://bit.ly/3SGGQiP

Production of this document was supported by cooperative agreement OH 009762 from the National Institute for Occupational Safety and Health (NIOSH). The contents are solely the responsibility of the authors and do not necessarily represent the official views of NIOSH.

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