

Research in Progress Abstract - Construction Practice (Non-Pedagogical Content)

Interdisciplinary Study to Determine Environmental Contributions to Vocal Comfort in Occupational Voice-Users

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Voice disorders affect approximately 7.5 million Americans (www.nidcd.nih.gov), have a lifetime prevalence of 28%-57% and a negative impact on work productivity and quality of life. A review of the U.S. Department of Labor Occupational Safety and Health Administration environmental standards indicate inadequate guidelines for workplace ventilation to protect occupational voice users from developing voice disorder. The environment identified by Fang, et al. to improve office work productivity (20°C/40% relative humidity) may not support optimal voice use for occupations requiring extensive voice use (e.g., telemarketers or school teachers). This mismatch between government environmental standards and published evidence signals a gap in our understanding of environmental influences on voice production. Limited attention has been given to the influence of ambient temperature on voice function and, to date, there have been no investigations describing the effects of ambient temperature management method on voice function. There is anecdotal evidence that forced air ventilation, particularly for heating the work space may irritate the vocal folds over time, leading to the development of hoarseness and chronic cough; however, we lack the evidence to understand these claims. Basic research has been completed by Sandage and colleagues to investigate the influence of ambient temperature relative to ambient humidity on vocal function. The proposed interdisciplinary collaboration between the disciplines of Building Science and voice science provides a unique opportunity to craft targeted environmental conditions within which to study building design aspects of heating, ventilation and air conditioning (HVAC). Specifically, the environmental influences of forced air ventilation versus passive methods (i.e., chilled beam) on voice function will be studied. Men and women between the ages of 19-35 will be recruited for this study. Two environmental structures, one with forced air ventilation and one with radiant heating/cooling, will be constructed by students in the Auburn University School of Building Science. Using a repeated measures within-participant design, each volunteer will complete a realistic voice task in both environments, with voice function and perceived voice comfort measures taken before and after the task. Temperature and relative humidity within the two structures will be manipulated to reflect a range of realistic working conditions for professional voice users. Additionally, volunteers will complete a voice task in regular distance intervals from the forced air vent to determine if proximity to air vent influences voice function. The hypotheses for this project are: A) Forced air ventilation is associated with increased voicing effort and reduced voicing ability when compared to radiant environmental temperature methods; B) Perceived voicing effort will increase and voicing ability will decline as participant distance from forced air ceiling vent gets smaller. This is a pilot investigation intended to gather preliminary data for a National Institutes of Health R03 grant. Identification of heating and cooling method effects on voice function using a within-subject repeated measure design will provide new information regarding construction methods for work spaces that will be used by occupational voice users, e.g., telemarketers, teachers.

Key Words: Voice, Disorders, Ventilation, Environmental, Building