The Athlete's Auditory World

By Nina Kraus, PhD

My uncle, Hans Kraus, was a bit of a Renaissance man: a mountaineer, a writer, and an immigrant-turned-orthopedist for John F. Kennedy. Throughout his career, he advocated for what has become common wisdom—that we should engage in regular, vigorous physical activity to support physical, mental, and cognitive wellness.

Lately, I've been thinking about Hans a lot since I've been studying the athlete's auditory brain. Much of this work has focused on understanding how concussions affect auditory processing. (By the way, they do. Concussions disrupt the precision of neural responses to sound and cause difficulty hearing speech in noise.)

My lab, Brainvolts, has embarked on a longitudinal study of elite collegiate student-athletes to understand the short- and long-term effects of concussions on the auditory brain. In this study, we test nearly 500 elite athletes annually, before and after their sports seasons.

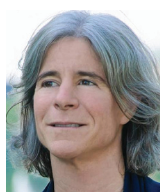
This NIH-funded project provided a unique and unexpected opportunity to ask a broader question: Do elite athletes process sound differently than the rest of us? We measured neural responses to speech in 500 athletes and compared them with those of age- and sex-matched non-athlete controls (*Sports Health*: e-publication ahead of print, doi:10.1177/1941738119892275). Athletes' responses had lower levels of background activity, meaning they encoded speech more robustly than the controls. Like static on a radio, this background neural activity interferes with the formation of a crisp, clear signal of incoming sound. In short, this suggests that athletes have healthier brain processing of sound.

I find this discovery intriguing, and I'm excited to learn more over the next few years. While we think that engaging in physical activity leads to healthier auditory function, it could be that the need to communicate effectively in the field—which is almost as challenging an auditory environment as a restaurant—trains the brain to pick up sounds more efficiently. It's also possible that attenuated background neural activity contributes to success in sports. We plan to follow these elite athletes over the next five years to determine if continued high-level physical activity amplifies this advantage for sound processing.

This research also suggests we should explore physical activity as a way to augment auditory processing overall and in populations that struggle, such as older adults. We know that regular exercise benefits physical health and even staves off declines in brain function as we age. I think that physical activity can fit into a program of hearing health. After all, we need to think about hearing health in the context of physical, mental, and cognitive fitness. I should note that, while our finding focuses on elite athletes in peak physical condition, I suspect this auditory processing advantage falls on a continuum, and that weekend warriors such as myself might receive some modicum of benefit.

As I reflected on these findings, I was reminded of some of the origins of hearing health care. Much of the tools used in audiology today, particularly electrophysiological tests, have their origins in a broader perspective that focused on neurologic health in general rather than on hearing in a narrow sense. I think audiology should return to this holistic view of hearing health as part of a bigger picture, with audiologists as members of interdisciplinary health care teams.

I think this vision would resonate with Uncle Hans, who focused in his career on enhancing wellness rather than treating diseases. We should adopt a similar approach to hearing health care.



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