The long-term goal of my research is to understand how age-related changes in auditory and cognitive functions limit speech understanding and translate this new knowledge into clinical strategies to improve the outcomes of older listeners, especially those with cochlear implants. In pursuit of the long-term goal, I am working on two lines of research to investigate speech understanding in two aging populations.

The first line of work focuses on older adults with cochlear implants. An increasing number of older adults use cochlear implants to treat hearing loss. But they tend to show worse speech understanding than younger cochlear-implant users. The disparity in speech understanding outcomes is an important issue that needs to be addressed. The rationale is that if someone gets a cochlear implant, we should strive to ensure they receive maximal benefits from this intervention. My research aims to uncover mechanisms underlying the speech understanding difficulties among older cochlear-implant users. Speech understanding involves integrating what's coming to our ears (i.e., bottom-up sensory inputs) and top-down cognitive-linguistic processes. Under this general framework, my research focuses on how bottom-up and top-down processes interact to explain speech understanding difficulties among older cochlear-implant users, using behavioral and electrophysiological methods. Findings from this work have implications for informing rehabilitation strategies to optimize outcomes for older cochlear-implant users.

The second line of work focuses on older adults with mild cognitive impairment (MCI). MCI is a significant risk factor for progression to dementia. MCI is associated with declines in auditory and cognitive functions. Natural speech processing requires auditory and cognitive skills, which may be impaired in listeners with MCI. However, the extant MCI studies generally examined speech processing with controlled but unnatural paradigms (e.g., isolated words). Findings from those controlled paradigms do not readily generalize to naturalistic settings. My research aims to study how the brain processes speech signals in naturalistic conditions in listeners with MCI. This line of work can provide a more accurate understanding of how age-related cognitive impairments affect communication abilities. This line of work will also contribute to developing non-invasive brain metrics that may provide diagnostic values of cognitive impairments.

I believe my research is directly related to the Institute for Successful Longevity's goal to understand the mechanisms of age-associated disorders and functional and cognitive declines.