

Miller School Doctoral Student Explores Connection Between Vision and Cognition

When Diane Zheng, MS, was a teenager growing up in southern China, she watched as her grandmother's personality faded and transformed as a result of Alzheimer's disease. Then, in recent years, the pain resurfaced as her family watched her father-in-law deteriorate and eventually pass away from the same disease.



David J. Lee, Ph.D., with Diane Zheng, MS

Both of these experiences prompted Zheng, a fifth-year epidemiology Ph.D. student in the Department of Public Health Sciences, to wonder about the factors that may affect cognition, which is the brain's ability to orient, reason, comprehend, and remember information. Diseases such as dementia and Alzheimer's rapidly affect cognition, which Zheng observed firsthand.

“I could see how a person changed,” said Zheng. “You become a different person when you lose your cognitive ability, and it becomes quite a burden on people who take care of you.”

Zheng had always been intrigued by cognition, but when she graduated from the University of Minnesota with a master’s in biostatistics and became a senior data analyst at the University of Miami Miller School of Medicine, her job pushed her to delve into research on vision under David J. Lee, Ph.D., a chronic disease epidemiologist and professor of public health sciences. After more than 10 years of working together, during which Zheng demonstrated her aptitude for complex statistics, Dr. Lee encouraged Zheng to pursue a Ph.D. in public health.

During a longitudinal research class a few years ago, Zheng came across the opportunity to pair her interests of vision and cognition. She used a data set that tracked more than 2,500 seniors living in Salisbury, Maryland, and monitored their vision and cognition for eight years. Applying newly learned analysis methods, Zheng was able to find that as vision declines in old age, so do cognitive abilities. She also uncovered the idea that vision has a stronger influence on cognition than the other way around, which was the first time this type of association had been reported. Her findings raise the possibility that taking care of your eyes can reduce the rate of cognitive deterioration in older adults.

“Scientists are studying different ways to slow down cognitive decline, but this is one way we can – by maintaining good vision in older people,” said Zheng.

Zheng’s findings were published in an [article](#), coauthored by

Dr. Lee and Byron L. Lam, M.D., professor of ophthalmology at the Miller School's Bascom Palmer Eye Institute, in the September issue of *JAMA Ophthalmology*. The issue also contained an editorial praising Zheng for her contribution to the field, which is a rare honor, Dr. Lee noted. Then, during the summer, several dozen news outlets around the world published articles citing Zheng's research.

In November, Zheng will receive the Mortin W. Silverman Outstanding Student Paper (Project) Award from the American Public Health Association's Vision Care Section for her paper. The award is given to a student who has contributed significantly to improving the field of eye care.

"To this day, there has been a sense that taking care of your vision is somehow less important than attending to other health issues," said Dr. Lee. "But this paper shows you cannot ignore ocular health, because it is essential to healthy aging."

Although Dr. Lee said Zheng has always had a strong ability to unravel data, she was able to build upon that knowledge as a graduate student, which helped her paper garner such thorough findings. In 2016, Zheng received a prestigious F-31 grant from the National Eye Institute, which allowed her to work with an expert from Purdue University to further develop her analytic skills. The grant has helped Zheng with the paper she already published and her dissertation, in which she is researching a link between vision and chronic conditions, such as diabetes, hypertension, or arthritis.

"As people are living longer, they often have multiple conditions, and many of them seem to cluster together, like

diabetes and hypertension,” said Zheng. “So, we are looking at how they affect vision and how they affect quality of life – and even increase risk of premature mortality.”

Zheng is hoping to finish her dissertation this spring and graduate with her Ph.D. in May, but she wants to keep exploring the role of vision in a person’s health.

“This paper has continued to motivate me to research this topic, and I hope it will open more doors for research collaboration,” said Zheng. “I am thankful for the opportunity to continue working on my research interest during my graduate study and for the mentoring I got from my department.”