

# Study finds better visual acuity is associated with less decline in cognitive functioning over time

4 July 2018, by Merrill Elias

Lower visual acuity is associated with both lower cognitive function and greater declines in cognitive functioning over a five-year period, according to a new University of Maine study.

The longitudinal research by Peter Dearborn and co-investigators affiliated with the UMaine Graduate School of Biomedical Science and Engineering, and the Department of Psychology found lower vision was associated with test performance scores for global cognitive functioning, visual-spatial organization and memory, and verbal-episodic memory. However, visual acuity scores were unrelated to working memory, scanning and tracking and executive functioning domains.

Decreased sensory abilities such as vision and hearing are common with advancing age and associated with decreased quality of life, including engagement in reading, social activities and physical activity.

Studies prior to this investigation have related decreased visual acuity to cognitive ability, but with two distinct differences from the UMaine study: Only a few measures of cognitive ability were examined and prior studies did not control for a range of cardiovascular disease risk factors or events (e.g., acute stroke, heart disease, diabetes mellitus, kidney disease, hypertension) that are positively correlated with loss of visual acuity.

The UMaine study, published in the *Journal of the International Neuropsychological Society* (2018: 24, 1–9), employed data from the sixth (2001–06) and seventh (2006–10) waves of the Maine Syracuse Longitudinal Study (MSLS). There were 655 study participants free from acute stroke, dementia and kidney dialysis. The participants were followed over approximately five years with a

comprehensive battery of cognitive tests. Using the basic Snellen Eye Test, visual acuity was measured before and after the longitudinal follow-up in persons with normal uncorrected vision or corrective lenses.

Relations between visual acuity and cognitive function were adjusted for variables found to be related to visual acuity and cognition: age, education, gender, ethnicity, depressive symptoms, physical functioning deficits, chronic kidney disease, plasma homocysteine levels, systolic blood pressure and hypertension.

The UMaine research team hypothesized that [cognitive abilities](#) that placed heavier demands on vision would exhibit the highest magnitude of associations between vision and cognitive test performance. Surprisingly, this hypothesis was not confirmed. Longitudinal analyses (change in performance from wave six to wave seven) found no associations between visual ability and the cognitive domain placing heaviest demands on vision, scanning and tracking. Moreover, visual acuity was significantly associated with verbal episodic memory, a domain measured by tests that do not involve visual stimuli.

The study was limited in the following ways that need to be addressed in future studies: The physiological mechanisms relating low visual acuity to cognition were not studied, albeit vision-related cardiovascular disease and functional disabilities were controlled; and the Snellen Eye Test is a simple screening [test](#) for vision, as compared to other tests and an exhaustive ophthalmological examination.

The UMaine research team hopes that the study will promote future investigations that take advantage of the most sophisticated technologies

in measurement of visual acuity, and examine possible physiological mechanisms explaining the relation between lower [vision](#) ability and lowered cognitive performance in some cognitive domains.

Immediately following the Dearborn et al. paper, an article examining retinal thickness (a correlate of acuity) in relation to dementia was published online by *JAMA Neurology* (June 25). Thinning of the neural fiber retina was associated with increased risk of developing dementia. The *JAMA* paper strongly supports the need for further investigation of [physiological mechanisms](#) relating [visual acuity](#) to lower cognitive performance.

UMaine researchers point out that the social-psychological hypothesis also needs to be examined. Visual impairment reduces the range and quality of social, work and leisure activities that permit exposure to intellectual tasks that facilitate retention of intellectual acumen, the team notes, but many possible mechanisms relating visual impairment and cognition have yet to be explored.

Provided by University of Maine

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