

Practice imperfect—repeated cognitive testing can obscure early signs of dementia

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Alzheimer's disease (AD) is a progressive, neurodegenerative condition that often begins with mild cognitive impairment or MCI, making early and repeated assessments of cognitive change crucial to diagnosis and

treatment.

But in a paper published online in the journal *Alzheimer's & Dementia: Diagnosis, Assessment & Disease Monitoring*, a team of researchers led by scientists at the University of California San Diego School of Medicine found that repeated testing of middle-age men produced a "practice effect" which obscured true cognitive decline and delayed detection of MCI.

"When persons take the same or similar tests repeatedly over time, they simply get better at taking the tests," said first author Jeremy A. Elman, Ph.D., a postdoctoral fellow in the lab of senior author William S. Kremen, Ph.D., professor of psychiatry and co-director with Carol E. Franz, Ph.D., of the Center for Behavior Genetics of Aging at UC San Diego School of Medicine. "The consequence is that their results may not accurately reflect the reality of their condition."

Researchers re-tested 995 middle- to late-middle-aged men in a six-year follow-up of the Vietnam Era Twin Study of Aging (a longitudinal study of male-male twins who had all served in the military sometime between 1965 and 1975, though almost 80 percent reported no combat exposure). A second group of 170 age-matched males were tested for the first time. Group differences were used to calculate practice effects.

The scientists found that there were significant practice effects in most cognitive domains, and diagnoses of MCI doubled from 4.5 to 9 percent after correcting for practice effects. "In other words," said Kremen, "some men would have declined to levels indicating impairment on follow-up testing had they not been exposed to the tests before."

The authors said the disparity has significant clinical consequences. Consider, for example, two people with similar characteristics who have identical cognitive [test](#) scores just above the threshold for an MCI

diagnosis. The only difference: One individual is being tested for the first time while the other has taken such tests before.

"We can infer that the second individual may actually have more impairment, but the effects of practice are artificially increasing their scores," wrote the authors. "This scenario would suggest that the individual may have dipped below the norm-based threshold and would have been diagnosed as having MCI had the test been taken for the first time."

The clinical significance, they said, is that treatment for AD is shifting increasingly toward prevention strategies that rely on early identification. The researchers say their findings strongly suggest the importance of correcting for [practice](#) effects in longitudinal studies of older adults, such as using similar replacement persons taking the test for the first time.

More information: Jeremy A. Elman et al, Underdiagnosis of mild cognitive impairment: A consequence of ignoring practice effects, *Alzheimer's & Dementia: Diagnosis, Assessment & Disease Monitoring* (2018). [DOI: 10.1016/j.dadm.2018.04.003](https://doi.org/10.1016/j.dadm.2018.04.003)

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