# Should scores on mild cognitive impairment tests be adjusted for sex?

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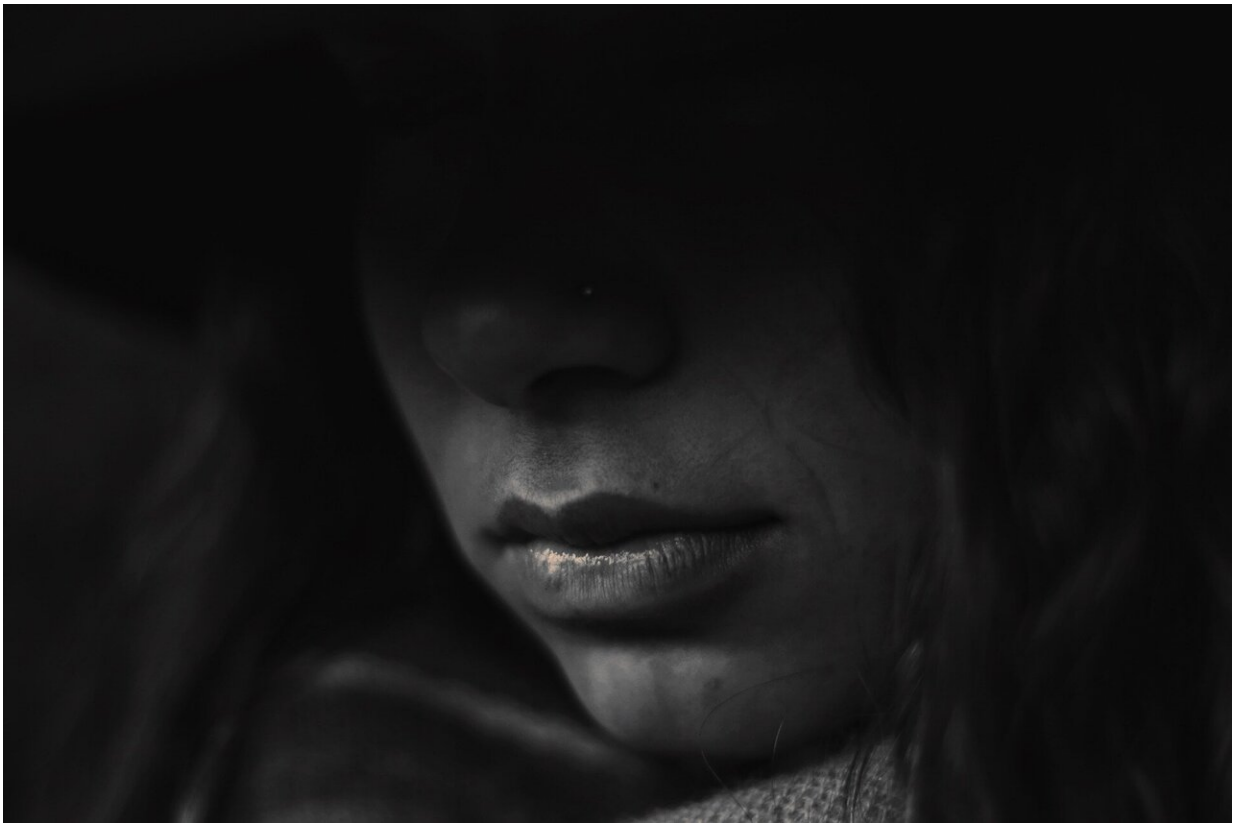

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Using sex-specific scores on memory tests may change who gets diagnosed with mild cognitive impairment (MCI) by 20 percent, with possibly more women and fewer men being diagnosed, according to a

study published in the October 9, 2019, online issue of *Neurology*, the medical journal of the American Academy of Neurology. Mild cognitive impairment, a precursor to dementia, is when people have problems with memory and thinking skills.

Because women typically score higher than men on tests of verbal memory, they may not be diagnosed with mild cognitive impairment as early as men are, even when they have the same levels of Alzheimer's disease-related brain changes, such as the amount of amyloid plaque deposits in the brain or the amount of shrinkage in the hippocampus area of the brain.

In the new study, researchers used memory test scores based on sex instead of averages for both men and women. Using the sex-specific scores, researchers found that 10 percent more women were diagnosed with MCI and 10 percent fewer men were diagnosed with MCI than when the averages were used.

"If these results are confirmed, they have vital implications," said study author Erin E. Sundermann, Ph.D., of the University of California, San Diego. "If women are inaccurately identified as having no problems with memory and thinking skills when they actually have mild cognitive impairment, then treatments are not being started and they and their families are not planning ahead for their care or their financial or legal situations. And for men who are inaccurately diagnosed with mild cognitive impairment, they can be exposed to unneeded medications along with undue stress for them and their families."

The study involved 985 people from the Alzheimer's Disease Neuroimaging Initiative. All of the participants took a verbal memory test that involves learning a list of 15 unrelated words and recalling as many as possible in five immediate tests, where scores range from zero to 75, and also after learning another list and then a 30 minute delay,

where scores range from zero to 15.

In a separate group of older adults from the Mayo Clinic Study of Aging, the researchers calculated the typical set of scores that indicate memory impairment based on the average and range of test scores across men and women, and then another set of scores that were specific to each sex and took into account women's typically higher scores on the tests. These two sets of scores were then used to determine who had MCI and who did not among the first group of study participants, The difference in the scores for men and women was an average of six points on the test within a score range of zero to 75 and an average of two points on the test taken after a delay within a score range of zero to 15.

Using the typical scores based on averages across men and women, 120 women, or 26 percent of the women, were diagnosed with MCI. With the sex-specific scores, 165 women, or 36 percent, were diagnosed with the condition. For men, 239 men, or 45 percent, were considered to have MCI when typical scores were used. When using the sex-specific scores, 184 men, or 35 percent, were diagnosed with the condition.

Additionally, when the researchers compared markers of brain changes that occur in the precursor stages of Alzheimer's disease, such as amyloid plaque deposits, they found that the brain changes were more advanced than normal in the women whose diagnosis changed from normal to MCI when using the sex-specific scores. In the men whose diagnosis changed from MCI to normal when using the sex-specific scores, their brain changes closely resembled healthy older adults. These findings support the idea that the use of sex-specific scores on tests determining MCI and Alzheimer's disease improves diagnostic accuracy.

Sundermann said the results also have implications for research, if they are confirmed. "When the typical average cut-off scores are used for diagnosis, women might respond less to treatments in a clinical trial than

men because they are at a more advanced stage of the disease, while men might not respond because some of them do not actually have MCI," she said. "These combined factors would result in research that reduces the estimate of how well treatments work for both men and women."

Limitations of the study include that participants were mostly well-educated compared to the general population, so the results may not apply to all groups.

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