

## Sex Differences in the Association between Sleep Efficiency and Cognition in Individuals with Mild Cognitive Impairment

Bari Pinkett, Isabella Faasumalie, Nicholas Bienko, Cynthia A. Munro

### Objective:

The risk for developing Alzheimer's disease (AD) is greater in women than in men for reasons that are not completely understood. We have argued that differential effects of stressors on cognition in women compared to men may underlie this disparity. Considering poor sleep as a stressor, we examined the association between self-reported sleep efficiency and cognitive test scores in individuals with mild cognitive impairment (MCI) due to AD.

### Participants and Methods:

The sample comprised 62 individuals (41 women, 21 men) ages 61 – 93 years ( $M = 72.3$ ;  $SD = 7.1$ ) with MCI. As part of a larger study, subjects were administered the Pittsburgh Sleep Quality Index (PSQI) and tests of memory and executive functioning. Memory tests were the immediate and delayed recall trials of the NAB Word List and the Morris Revision, 4<sup>th</sup> edition story memory. Executive measures were Digit Span Backwards (total score), phonemic fluency (sum of two trials), and Trail Making Test (TMT) part B (number of seconds to complete). We used Pearson's correlation to examine associations between PSQI sleep efficiency and each cognitive test score across the sample. We then compared PSQI sleep efficiency scores in men and women using a  $t$ -test, and repeated the correlational analyses after stratifying for biological sex.

### Results:

Across the entire sample, PSQI sleep efficiency scores were associated with all three executive test scores ( $r = .31, -.28, \text{ and } -.29$ ; all  $p < .03$ ), but none of the memory measures. PSQI sleep efficiency score did not differ between men ( $M = 0.67$ ;  $SD = 0.97$ ) and women ( $M = 0.90$ ;  $SD = 1.13$ ;  $t(60) = .81, p = .42$ ). Repeating the analyses after stratifying the sample by sex revealed that the association between sleep efficiency and cognition can be attributed to women. Specifically, higher PSQI efficiency scores (indicating poorer self-reported sleep efficiency) were correlated with longer time to complete the TMT part B in women ( $r = .420, p = .007$ ) but not men ( $r = -.013, p = .954$ ); lower score on Digits Backwards in women ( $r = -.389, p = .013$ ) but not men ( $r = -.047, p = .839$ ); and fewer words produced on phonemic fluency in women ( $r = -.317, p = .046$ ) but not men ( $r = -.200, p = .385$ ). PSQI efficiency score was not associated with memory scores or the other executive test scores in either sex.

### Conclusions:

In women with MCI, worse self-reported sleep efficiency strongly and consistently predicts worse performance on tests of executive functioning, whereas in men with MCI, self-reported sleep efficiency is unrelated to cognitive functioning. These findings indicate that, despite no sex difference in self-reported sleep efficiency, the effect of poor sleep efficiency may be more cognitively detrimental in women than in men. We suspect that this differential negative effect of sleep efficiency might contribute to women's increased risk of AD and/or faster progression of MCI to AD. Research with larger samples and objective sleep measures will be important to elucidate the specific characteristics of sleep that have sex-specific effects on AD risk factors.