

EXPOSURE TO PARTICULATE AIR POLLUTION AND COGNITIVE DECLINE IN OLDER WOMEN

Jennifer Weuve, *Rush Institute for Healthy Aging, Rush University Medical Center, Chicago, IL, USA; Harvard School of Public Health, Boston, MA, USA*

Robin C. Puett, *Arnold School of Public Health, University of South Carolina, Columbia, SC, USA; South Carolina Statewide Cancer Prevention and Control Program, Columbia, SC, USA*

Joel Schwartz, *Harvard School of Public Health, Boston, MA, USA; Channing Laboratory, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, USA*

Jeffrey D. Yanosky, *Penn State University College of Medicine, Hershey, PA, USA*

Francine Laden, *Harvard School of Public Health, Boston, MA, USA; Channing Laboratory, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, USA*

Francine Grodstein, *Harvard School of Public Health, Boston, MA, USA; Channing Laboratory, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, USA*

Background and Aims: Chronic exposure to particulate air pollution may accelerate cognitive decline in older adults. We examined long-term exposure to thoracic (PM₁₀) and fine (PM_{2.5}) particulate air pollution in relation to cognitive decline.

Methods: Our investigation included 17282 US women, aged 70-81 years, who were participants in the Nurses' Health Study. We used geographic information systems (GIS)-based spatio-temporal smoothing models to estimate recent (1 month) and long-term (6-13 years) exposures to PM₁₀, and PM_{2.5} for women residing in the contiguous US. We evaluated the women's cognition using validated telephone assessments of cognition, administered 3 times at approximately 2-year intervals, including tests of general cognition, verbal memory, category fluency, and attention. We used generalized estimating equation regression to estimate differences in the rate of cognitive decline over 4 years, across levels of PM₁₀ and PM_{2.5} exposures preceding cognitive testing.

Results: Higher levels of long-term exposure to both PM₁₀ and PM_{2.5} were associated with significantly faster cognitive decline. Decline on a global score, combining results of all 6 tests, was 0.017 standard units worse per 10 µg/m³ increment in PM₁₀ exposure (95% confidence interval, -0.027 to -0.007) and 0.036 units worse per 10 µg/m³ increment in PM_{2.5} exposure (95% confidence interval, -0.064 to -0.008). These differences in cognitive trajectory were similar to the differences in trajectories between women in our cohort who were 1.5 and three years apart in age, respectively, indicating that the long-term effects of particulate air pollution are cognitively equivalent to aging by up to three years. Recent exposures to PM₁₀ and PM_{2.5} were not significantly associated with cognitive decline.

Conclusions: Long-term exposure to PM₁₀ and PM_{2.5}, at levels typically experienced by many persons in the US, is associated with significantly worse cognitive decline in older women.