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Air pollution exposure and cognitive performance in middle age: findings from the CONSTANCES cohort

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ABSTRACT

INTRODUCTION - Exposure to air pollution has been suggested to be associated with lower cognitive performance. In this study we aimed to test the association between exposure to several air pollutants and different cognitive performance domains. METHODS - We used cognitive performance data (episodic memory, language skills, executive function) from the enrollment phase of the CONSTANCES cohort for participants aged 45 years and more. Air pollution exposure data ($PM_{2.5}$, black carbon and NO_2) were derived from land use regression models developed for western Europe. Linear regression models on z-score of outcomes were used to test the hypothesizes. RESULTS - We included 61,462 participants. The mean exposure to $PM_{2.5}$, black carbon and NO_2 was 16.83 µg/m^3 (SD=3.13); 1.77 10^{-5}/m (SD= 0.55) and 25.24 µg/m^3 (SD= 11.63) respectively. We found significant negative association mainly on semantic fluency of language skill, and all executive function tests for black carbon and NO_2 exposure. Findings for $PM_{2.5}$ were significant only for semantic fluency. The largest effect size (β coefficients) for both NO_2 and $PM_{2.5}$ was found for semantic fluency [$PM_{2.5}$: -0.047 (95% CI: -0.072, -0.021); NO_2: -0.039 (95% CI: -0.059, -0.019)], whereas for black carbon it was for digit symbol substitution test on executive domain [-0.046 (95% CI: -0.065, -0.027)]. DISCUSSION - Controlling air pollution as one of the modifiable risk factors of dementia could potentially reduce its risk or delay its onset.

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