

Smoking behaviors and cognitive functioning in mid- to late-adulthood: Gene-environment interplay

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Smoking has been associated with several health outcomes, however, its impact on the etiology of cognitive functioning in older adults is

unclear. We tested moderation of genetic and environmental contributions to cognition across mid and late-adulthood by smoking behaviors in 8 twin studies from the international IGEMS consortium (N = 11,764; Mage = 63.1 years). Cognitive measures included Symbol Digit, Block Design, Synonyms, Digits Backward and Forward. Smoking behaviors included smoking status and log pack years. Mixed effects regression suggested the strongest negative effects of smoking on Symbol Digit (Bpackyears = - 1.42, $p < 0.0001$) and Block Design (Bpackyears = - 1.79, $p = 0.0008$), controlling for pair dependency, age, sex, and country. Sex moderation was not observed. Smoking behaviors and age were moderators of genetic and environmental components contributing to cognitive performance. An ADE model fit best for Symbol Digit while ACE models fit best for all other cognitive tasks. Biometrical model results suggested generally lower contributions of genetic and non-shared environmental influences, and for ACE models, higher shared environmental contributions on cognition by smoking status and pack years. Synonyms and Digits Forward, however, suggested higher genetic and lower environmental contributions by smoking status. Likelihood ratio tests supported significant moderation for Symbol Digit and Synonyms only. Overall, results illustrate an increasing saliency of smoking related environmental influences, particularly for processing speed, but amplified genetic influences for traits such as verbal ability. Cognitive tasks with speed components may be particularly vulnerable to smoking exposures, implicating important health and neurobiological pathways.

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