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Genetic and Environmental Moderation of Cognitive Performance by Smoking Behavior

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ABSTRACT

Tobacco use is a known health burden and phenotypic research has found worse cognitive functioning linked with smoking behavior. To further examine the etiological impact of smoking behavior on cognitive functioning biometric moderation models were tested using twin data from 12 studies in the Interplay of Genes and Environment Across Multiple Studies (IGEMS) consortium (N=24,536 [F=51.3%], Mage=60.7 years [SD=12.2], Complete pairs based on cognitive task: 476 to 2,250 MZ and 691 to 4,201 DZ). Smoking measures included smoking status variables (e.g., ever and current smokers) and log₁₀ transformed pack-years. Cognitive measures included fluency, processing speed, and spatial reasoning. Generalized estimating equation models, controlling for pair dependency, age, sex, and country showed current smokers had significantly lower scores on all cognitive measures (Cohen's d: -.11 [fluency] to -.35 [spatial]); pack-years showed similar patterns (Cohen's d: -.04 [fluency] to -.14 [speed] per log₁₀ year). Extended univariate moderation models were tested entering smoking status and pack-years. Likelihood ratio tests supported significant moderation by smoking status for speed and pack-years for fluency, resulting in lower genetic and higher environmental influences with increasing pack-years. Processing speed differed with higher genetic contributions for smokers. Spatial reasoning followed fluency trends but was non-significant. Overall, moderation patterns suggest greater smoking-related environmental influences across all tasks. Smoking behavior represents a complex moderator of the etiology of age-sensitive cognitive tasks. Further work examining additional moderating contexts (e.g., sex, country, birthyear) will be reviewed.

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