

Gene-Environmental Interplay of Verbal Fluency and Episodic Memory: Evaluating Moderation by Sleep Duration and Educational Attainment

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Sleep may moderate cognitive performance via differing etiological pathways at shorter versus longer sleep durations. As low socioeconomic (SES) is associated with both poorer sleep quality and lower cognitive performance, we evaluated whether sleep moderates underlying genetic and environmental contributions to cognitive performance. Data was extracted from the Interplay of Genes and Environment across Multiple Studies (IGEMS) consortium (Mage = 56.4 range = 34–91 years, N = 5976, Female = 40.2%, 1228 complete MZ pairs, 1760 complete DZ pairs). We fitted extended univariate ACE models with sleep as the primary moderator, while accounting for moderation by education level (International standard classification of education; ISCED), to cognitive traits verbal fluency (i.e., Animal Naming) and episodic memory (i.e., Word List).

Significant ACE moderation via both sleep duration and ISCED was observed for verbal fluency (LRT $p < 0.009$), indicating that both may influence etiological contributions to verbal fluency. For episodic memory, sleep duration and ISCED were significant when dropped together from the model (LRT $p = 0.005$), but only significant individually for ISCED (LRT $p = 0.016$). This indicates that SES may be more influential than sleep duration in moderating ACE components for episodic memory performance. However, sleep duration showed nominal moderation of A, or both C and E ($p < 0.048$). Overall, after adjusting for moderation by educational attainment, full model patterns implicate differing underlying mechanisms at either end of sleep duration. There were higher genetic influences at short sleep duration and higher shared environmental influences at long sleep duration.

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