Establishing the contributions of attained education and the polygenic index for attained education to likelihood of dementia

Malin Ericsson1,2, Nancy L Pedersen2, Marianne Nygaard3, Chandra A Reynolds4,5, Perminder Sachdev6, Anbu Thalamuthu6, Margaret Gatz7

1Aging Research Center, Stockholm University & Karolinska Institutet, 2Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, 3Institut for Sundhedstjenesteforskning, Syddansk Universitet, 4Department of Psychology & Neuroscience, 5University of Colorado Boulder, 6University of California Riverside.

Objective
The educational gradient in dementia is well established. Despite this, there are still ambiguities around the role of underlying confounding in terms of genetic influences and gene–environment interplay. In this study, we investigated the role of educational factors (genetic and attained) on dementia using genetic propensity for educational attainment (PGIedu) and attained education.

Results

Conclusions
• Both attained education and measured genetic propensities for education are independently related to dementia, with higher genetic propensities and higher level of education predicting a lower likelihood of dementia.
• These results lend further support for a causal education–health relationship but also raise the importance of independent genetic contributions and gene–environment interplay.

Material and methods
Analyses were based on twin data retrieved from eight studies from the Consortium on Interplay of Genes and Environment Across Multiple Studies (IGEMS). The final sample included twins born 1892–1963 (n=5 366). The Latent Dementia indicator (LDI) was used to estimate likelihood of dementia (a higher LDI score corresponds to a lower likelihood of dementia). Educational factors were educational attainment (ISCED) and PGSEdu (EA4).

Covariates: sex, birth year, age at interview, zygosity, study, and the first 10 pc's.

Linear and mixed regression models were applied to estimate the influence of genetic propensity and attained education on likelihood of dementia (LDI). Between-within analyses were performed to investigate familial confounding (Fig 1) and presence of passive gene–environment correlation (Fig 2). To investigate if the association between education and LDI differs depending on genetic propensities for education, we added an interaction term between attained education and tertiles of PGIedu to the model.