



**Application number/Title:** 41382 - Gene-Environment Interplay in the Generation of Health and Education Inequalities (GEIGHEI)

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**Keywords provided by the Applicant PI to describe the research project:**

GxE, education, environment, genetics, obesity, smoking

**Application Lay Summary:**

We examine how Genes and the Environment (GxE) interact to generate inequalities in education and health over the life course. Previous research has established that both genes and the environment play a role in determining educational outcomes and risky health behavior. For example, some people have genetic variants that make them more susceptible to nicotine addiction, but not all of them develop smoking habits; their environment, too, plays a role.

We use genetic information from the UK Biobank and similar repositories to identify the genetic variants that play a role in determining educational achievement and risky health behaviors (smoking, drinking, obesity) to create a polygenic score that quantifies this genetic influence. We then study how these genetic measures interact with data on the environment to study whether (and how) a stable, high-quality childhood environment can overcome genetic disadvantage.

In studying the environmental factors, we incorporate methods from the social sciences to investigate whether policy changes, such as the introduction of maternity leave in 1976/1977 or the change in the compulsory school-leaving age in 1972, have affected children differently depending on their genetic makeup. This allows us to study whether (and how) a stable, high-quality childhood environment can overcome genetic disadvantage and to identify which individual, social, and policy environments curtail risky health behaviour among individuals with elevated genetic risk.

The project will take approximately 36 months and will typically use all available observations in the UKB that (i) are of European descent, (ii) have been successfully genotyped, and (iii) have measures of the outcomes under investigation.