



**Application number/Title:** 41640: Genetic and environmental risk factors for hearing difficulties

**Applicant PI:** Dr Samuel Mathias

**Applicant institution:** Yale University

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

Obesity-related-cancers, body-fat-composition, inflammatory-markers, metabolic-markers

**Application Lay Summary:**

Hearing difficulties are extremely common, have a major impact on quality of life, and are a burden on public health services. In adults, hearing difficulties are mostly acquired through aging or noise exposure. It is widely believed that risk of acquiring hearing difficulties is genetic; in other words, hearing difficulties are influenced by genotype-by-environment (GxE) interactions. However, to date, few genes have been implicated in increasing risk for hearing difficulties, and few specific GxE interactions have been reported. In the proposed three-year project, we aim to generate a novel hearing phenotype from the available UK Biobank data. This phenotype will reflect ability to understand spoken digits in noise: a superior and more ecologically valid measure of hearing than traditional audiometry. We will first calculate the heritability of this phenotype, then search for genetic and environmental factors which influence its variation across individuals. Previous work has established that hearing abilities are related to numerous other biological factors and health problems, including cognitive abilities, depression, and dementia. Here, we will assess to what extent these relationships stem from overlapping genetic and/or environmental factors. If such relationships are genetic in origin, studying them together could improve the chances of finding genetic risk loci. Given the impact hearing difficulties have on individuals and the considerable public health burden, the proposed study is clearly of considerable public interest.