



Application number/Title: 41601 - Non-additive effects in control of complex human traits

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Keywords provided by the Applicant PI to describe the research project:
complex-traits, genetics/genotyping, health, health economics, non-additive effects, wellbeing

Application Lay Summary:

Most models of human disease risk assume that effects of different risk factors are independent from each-other. In other words, it is commonly assumed that different risks can be "added up" into a global risk factor of a specific disease or a general indicator of human health. However, this assumption ignores the possibility that risks may somehow interact leading to an overall lower or higher risk to health. The assumption of the independence of various risks and is assumed for the contribution of both genes and environment. In this project, we aim to study the extent to which non-additive (interaction) effects influence complex human traits, including traits with direct relevance for health and wellbeing.

We plan to carry out our study on two levels. First, on the genetic level, we will try to understand how genetic changes interact, which will ultimately advance our understanding of non-Mendelian disease. Second, on the level of phenotypes, we are interested in understanding how interaction of environmental factors, complex traits and genetics shapes complex human traits. We will study the interactions of a range of phenotypes with each other and with the underlying genetic component, and how these interactions shape organism-level traits, including wellbeing and common disease. We will take into account the influence of environmental factors, such as income and education, which impact human health and wellbeing. Our study may advance a comprehensive understanding of interactions of genes and phenotypes, and, ultimately, lead to a better understanding of the main determinants of human health and disease.