

SOCIAL CIRCUMSTANCES AND EPIGENOMICS PROMOTING HEALTH IN THREE COUNTRIES

This project proposes an integrated set of aims and analyses of existing social and epigenetic data from three national studies of aging in the family of Health and Retirement studies (the US Health and Retirement Study (HRS), the Northern Ireland Cohort for the Longitudinal Study of Ageing (NICOLA), and the Irish Longitudinal Study of Aging (TILDA)); assays of existing samples to produce longitudinal epigenetic data for the three countries are also proposed. Comparative analyses based on these data will address central questions about how life circumstances in both childhood and adulthood affect epigenetic change and how different historical and life-course exposures in these countries may result in differential patterns of associations. The project will also examine how epigenetic changes in turn are associated with health after age 50. The proposal is submitted in response to the US-Ireland Research and Development Partnership, a unique research initiative involving funding agencies from the United States (US), the Republic of Ireland (RoI), and Northern Ireland (NI). Proposals are submitted to each of the three countries with funding requested for each country's participation from their respective grant agency (e.g., US NIH); grant review is done only by NIH for all three projects based on this proposal. The project will examine the links between lifetime social, economic, psychological, environmental and behavioral circumstances, and epigenetic markers related to aging and health, and subsequent health. Epigenetic modification is one of the "hallmarks" of aging, i.e. an underlying physiological change that can speedup or delay aging-related health outcomes. Faster aging is characteristic of people in adverse social circumstances and epigenetic change, particularly DNA methylation (DNAm), appears to be especially influenced by adverse social circumstances, both at early ages and at later ages. This project will be unique in evaluating how a variety of social circumstances, i.e. low levels of education and income, minority group membership, adverse childhood experiences, adult traumas, risky health behaviors, psychological states, and chronic stress, are associated with epigenetic markers in three different countries, with somewhat different historical, social and behavioral characteristics which are operating in different health policy regimes – allowing for both replication where effects are hypothesized to be similar and differentiation where they are hypothesized to differ (e.g., where risk characteristics are differentially patterned by SES). The applicants are uniquely placed with their resources to explore how socioeconomic experiences across the life course alter epigenetic profiles to influence health outcomes such as biological dysregulation, frailty, disability, chronic disease, and premature mortality. The three data sets have been harmonized for information collection from the beginning of the studies and were designed to encourage comparative analysis. They have been harmonized in the survey information and the development of the epigenetic data in the three countries. Each country has strong independent research teams who bring unique expertise and resources and a history of collaboration to this collaborative proposal.

Public Health Relevance Statement:

Narrative This project will answer basic questions about how life circumstances in both childhood and adulthood affect epigenetic change and how that change in turn is associated with health after age 50 in three countries with different histories and life circumstances. It will add significantly to our understanding of how social, economic, psychological factors get under the skin.