

Impact Objectives

- Develop a greater understanding of the impact of lifestyle factors, specifically physical activity and nutrition, on health via interactions with genes, musculoskeletal function, physical ability, immunity, cognition, psychological wellbeing and social functioning
- Delve deeper into the factors influencing health in older age and develop interventions and health policies to ensure a greater percentage of older adults achieve healthy and active ageing
- Create a standardised toolkit of best practice measures of physical activity and nutritional status and key related variables, and encourage European communities to adopt a multidisciplinary approach to the challenge of ageing

Lengthening healthy life

Professor Anna Whittaker's research on physical activity and nutritional influences on ageing is seeking to promote healthy ageing, matching lifespan with healthspan



Could you begin with an introduction to yourself and key research interests?

I am a Professor in Behavioural Medicine, HCPC registered Health Psychologist and Fellow of the British Psychological Society working at the University of Birmingham, UK in the areas of psychoneuroimmunology, cardiovascular psychophysiology and behavioural medicine.

I am particularly interested in the impact of behavioural and lifestyle factors on health via interactions between the cardiovascular, neuroendocrine and immune systems. My main areas of research are: 1) ageing, stress and physical activity effects on health and wellbeing, particularly immunity, where I am engaged in large grant funded projects to examine the synergistic impact of ageing and psychological and behavioural factors such as stress, depression and physical activity on indices of immunity and physical frailty; and 2) cardiovascular stress reactivity, where I am developing a new theory of the negative health and behavioural correlates of blunted physiological responses to psychological stress and am engaged in several collaborations on large datasets, particularly showing the importance of the impact of social support and depression on health outcomes, including mortality and physical frailty.

From what context did PANINI emerge?

Despite the increasing lifespan of the population within Europe, healthspan (years

spent in good health) is not keeping pace, thus there is an urgent need to understand the factors influencing health in older age and develop and validate interventions and health policies to ensure more of our older adults achieve healthy and active ageing.

Consequently, the PANINI project was created, which includes a network of eight beneficiaries with 10 partner organisations in Europe to conduct innovative research on ageing around the themes of physical activity and nutrition. It aims to determine how these variables interact to predict healthy or unhealthy ageing, as well as health status in older age, and to assess the effectiveness of different approaches to altering these variables as targets for interventions.

What is the importance of multidisciplinary to the project?

Without multidisciplinary, ageing research will continue to work in silos, addressing one bodily system or age-associated disease at a time, while not considering how these interact, and how the factors contributing to optimal functioning and health interact to result in healthier ageing. Therefore, in studying the impact of broader factors, such as nutrition and physical activity, on a range of multidisciplinary outcomes developed as the PANINI standardised measures toolkit, we are able to assess and address a number of factors ranging from the genetic, epigenetic, psychological, cognitive, biological, physiological, immunological and endocrinological, through to the functional and social. In this way, we can

focus on different factors or interventions, such as the Mediterranean diet or reducing sedentary time, or physical resistance training on each of these outcomes, and measure how these outcomes interact with each other to contribute to overall health and wellbeing.

Who are the expected end users of your work?

End users are primarily older adults, particularly those attached to the PANINI studies, as they will be involved in various interventions and tests to try to better understand and prevent or decrease frailty. However, we of course hope to benefit all older adults by having a better understanding of the predictors of poorer health in later life, as well as having tested efficient ways to alleviate this. Health professionals will also be able to utilise our recommended interventions and measures.

What is next for PANINI?

In the short term we would like to gain funding to properly validate the standardised toolkit of measures in order to be able to roll this out more widely. This would enable standardisation of measures in a range of older cohorts across many countries, in order to build big datasets with greater power to examine predictors of healthy and unhealthy ageing across a range of relevant outcomes. This would involve testing the toolkit in large cohort studies.



A radical approach

A project led by the University of Birmingham, UK, is seeking to understand the numerous factors that contribute to healthy ageing versus frailty, and validate interventions and influence policy to promote healthy ageing

Although life expectancy is dramatically increasing, healthspan is not keeping pace, and most Europeans spend their last decade in ill health, which beyond the individual, has implications for health and social care, and pensions. This is why understanding the numerous factors that contribute to healthy ageing versus frailty, and validating interventions and influencing policy to promote healthy ageing is a research priority across Europe.

Physical Activity and Nutrition Influences In ageing (PANINI) is a Marie Curie Multi-site Innovative Training Network (ITN) that began in 2016 and will draw to a close in 2019. It is headed up by Anna Whittaker, Professor in Behavioural Medicine, HCPC registered Health Psychologist and Fellow of the British Psychological Society based at the School of Sport, Exercise & Rehabilitation Sciences, University of Birmingham, UK.

A HOLISTIC APPROACH

The project is addressing the lack of innovative, multidisciplinary training and research in ageing by examining the influence of physical activity and nutrition on age-related changes from gene to societal level. PANINI is coordinating research laboratories across Europe to focus on cutting-edge ageing and health research through training 11 Early Stage Researchers (ESRs) across scientific disciplines to create a multifactorial approach to the challenge of ageing in the 21st century.

The project's goals are to:

- Stimulate collaborative ageing research across Europe from basic science to clinical intervention on the interaction of physical activity and nutrition through training a network of researchers
- Develop a consensus on key outcomes needed in ageing research and use this to develop and test a standardised toolkit of 'best practice' measures of physical activity and nutritional status and key related variables
- Utilise the toolkit across PANINI research projects to develop a shared dataset across different European ageing populations
- Coordinate new PANINI data based on the standardised toolkit and harmonise this with existing European data to strengthen the PANINI dataset to assess the physical activity and nutritional status interactions in a range of older adult populations, with a range of frailty levels
- Compare novel physical activity and nutritional interventions to improve healthy ageing and assess the potential mechanisms underlying intervention responsiveness
- Develop an online repository of training material on physical activity and nutrition in older adults for continuing professional development (CPD)
- Create a healthy ageing policy recommendations document

PANINI has a strong communication strategy for the dissemination of knowledge gained from shared/individual projects, and

will create a healthy ageing policy document with key stakeholders who are partners in PANINI, to enable its impact to reach beyond both the academic community, and the duration of the project.

COLLABORATION AND MULTIDISCIPLINARITY

PANINI is highly collaborative, with the University of Birmingham in the UK working alongside: Technische Universiteit Eindhoven, Netherlands; Universidade do Minho, Portugal; Jyväskylä Yliopisto, Finland; Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek Tno, Netherlands; Stichting Vu, Netherlands; Alma Mater Studiorum, Università Di Bologna, Italy; and Personal Genomics Srl, Italy. The multidisciplinary nature is necessary to address and assess a range of factors including the genetic, epigenetic, psychological, cognitive, biological, physiological, immunological and endocrinological, through to the functional and social, as Whittaker explains: 'Working with each other in PANINI means we can bring together expertise and training across all these topics to integrate measures and approaches into each individual PANINI project, which would not be possible if the research remained in separate disciplines.' As Whittaker highlights: 'For example, we are integrating epigenetic analyses into physical activity intervention outcomes, as well as immunological outcomes, to examine potential mechanisms of effect.'



The team behind the PANINI project

Others are pulling together different sources of data from across the PANINI network to address questions such as the prevalence of malnutrition in frail older populations and its overlap and interaction with poorer physical function.'

Whittaker continues: 'Another beneficiary will draw on the data brought together by the PANINI network to develop mathematical models, which will test how active and inactive older populations differ across the range of biological indices of healthy ageing and how these factors differentially contribute to muscle health and function. Our shared dataset integrates all of these measures from the toolkit and beyond, so we can understand contributors to and modifiers of healthy ageing across a range of outcomes, rather than limiting ourselves to studying only one index of health, for example physiological or cognitive function.'

CLEAR OBJECTIVES

The project's research programme is delivered via six cross-sectoral interdisciplinary work packages (WPs). WP1 is focused on standardisation, bringing together all of the projects in the network with a view to standardising physical function and nutrition measurements and contributing to the development of a shared database for analysis of various ageing profiles across the range of different older adult populations within PANINI. WP2 studies physical activity and will look to understand the effects of physical activity versus sedentariness on muscle function, metabolism, endocrine and immune function, mobility and wellbeing in ageing. The focus of WP3 is nutrition, exploring the links between nutritional choices and nutritional status in ageing, and the changes in fat and muscle mass and function which contribute to physical frailty and ill-health. WP4 encompasses training, with a view to equipping the ESRs with a range of generic and task specific training across sectors essential to the successful development of their careers and completion of their PhDs. WP5 is all about dissemination, and WP6 is concerned with management.

COMBINING EXPERTISE

The techniques and methodologies employed are: epigenetics and genomics; systems biology; neuro-endocrine and immune changes; physiological measurements; nutritional assessment and nutritional status; measures of body composition and activity; assessment of learning and memory, executive function and mental flexibility; depression, anxiety, social support and stress levels; a quantitative and qualitative assessment approach to understanding dietary intake and choices, and the impact of the social environment in diverse ethnic groups; feasibility study assessments including the acceptability of methods to be developed as larger scale lifestyle interventions and the adherence to interventions.

A VALUABLE TOOLKIT

The project will recommend a key set of nutrition and physical activity measures and core outcomes in ageing, making up a standardised toolkit, and seek to make the toolkit widely available outside the PANINI consortium to encourage standardised measurements beyond the project. Although it is too soon to assess PANINI's progress, evidence is beginning to be collated as Whittaker reveals: 'Evidence is starting to emerge that certain nutritional interventions can reverse the process of epigenetic ageing (DNA methylation patterns) in specific older population groups, and relate to different elements of cognitive function, which is promising.' Looking ahead, the team plans to continue using PANINI's datasets. 'We will seek to continue to utilise the PANINI shared dataset and gain funding to employ personnel to work on maintaining and interrogating this, potentially adding to it further through links with other European studies, and answering research questions that such a broad database of a range of older populations allows,' explains Whittaker. 'Follow-on studies to run larger scale trials of interventions that PANINI shows to be feasible and potentially effective, will also be an important next step.'

Evidence is starting to emerge that certain nutritional interventions can reverse the process of epigenetic ageing in specific older population groups

Project Insights

FUNDING

Horizon 2020 Marie Curie Multi-site Innovative Training Network Grant no: 675003.

COLLABORATORS

University of Birmingham, UK • Technische Universiteit Eindhoven, Netherlands • Universidade do Minho, Portugal • Jyväskylä Yliopisto, Finland • Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek Tno, Netherlands • Stichting VU, Netherlands • Alma Mater Studiorum, Università Di Bologna, Italy • Personal Genomics Srl, Italy

CONTACT

Professor Anna Whittaker
Project Coordinator

T: +44 1214144398
E: a.c.whittaker@bham.ac.uk
W: www.birmingham.ac.uk/staff/profiles/sportex/phillips-anna.aspx
W: www.birmingham.ac.uk/panini
Social media: @PANINI_EU

PROJECT COORDINATOR BIO

Professor Anna C. Whittaker (previously Phillips) is Professor in Behavioural Medicine, HCPC registered Health Psychologist and Fellow of the British Psychological Society working at the University of Birmingham, UK in the areas of Psychoneuroimmunology, Cardiovascular Psychophysiology and Behavioural Medicine. She is particularly interested in the impact of stress and other behavioural factors on health via interactions between the cardiovascular, neuroendocrine and immune systems.



Physical Activity and Nutrition Influences In ageing



This project is funded by the European Union

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