Centre for Ageing Research

Summaries of Research Interests

- Updated April 2023 –

Contents

Dr Faraz Ahmed, Lecturer in Health Inequalities, Division of Health Research

Faraz is currently a Lecturer in Health Inequalities at Lancaster University and the Director of Studies (Taught Programmes) in the Division of Health Research. Following his Medical Research Council PhD studentship at the Institute of Public Health (University of Cambridge), he joined the Lancaster Dementia Research Team as a Senior Research Associate, working within the national Neighbourhoods and Dementia Programme.

Faraz is a Public Health researcher, with extensive experience in international health and working with minority ethnic communities in the UK. Prior to starting his research at the Institute of Public Health (University of Cambridge), he was working as a Research Fellow at the University of York. He has a strong interest in addressing inequalities in health. His previous experience includes public-private partnerships in increasing TB case-detection among poor and disadvantaged groups, health systems evaluation, and developing and evaluating health promotion programmes for minority ethnic groups.

Research Overview/Interests

My research interests focus on patient experience, dementia, equity and health services research. During my education and research, I have worked on a number of mixed methods projects. In addition to receiving training in mixed-methods research at the University of Cambridge during my PhD, I have also received training in qualitative research methods short course from the University of Oxford. The qualitative research method course provided training in conducting qualitative research and various analytical techniques. In my doctoral study, I have specifically used thematic analysis for my qualitative data, and developed a number of mixed-effect regression models to analyse my quantitative data.

Recent Papers

- Arnold, R., **Ahmed, F.,** Clarke, A., Quinn, N., Beenstock, J. and Holland, P. (2023) The Relationship between Parental Adverse Childhood Experiences and the Health, Wellbeing, and Development Outcomes of their Children: A Systematic Review. *Public Health*, pp.S0033-3506(23)00113-0
- Reeves, D., Holland, F., Morbey, H., Hann, M., **Ahmed, F.,** Davies, L., Keady, J., Leroi, I., & Reilly, S. (2023). Retrospective study of more than 5 million emergency admissions to hospitals in England: Epidemiology and outcomes for people with dementia. *PLOS ONE*, *18*(3), e0281158.
- Harding, A., Morbey, H., **Ahmed, F.,** Opdebeeck, C., Elvish, R., Leroi, I., Williamson, P. R., Keady, J., & S.T. Reilly (2021). A Core Outcome Set for Nonpharmacological Community-Based Interventions for People Living With Dementia at Home: A Systematic Review of Outcome Measurement Instruments. The Gerontologist, 61(8), e435–e448. https://doi.org/10.1093/geront/gnaa071
- **Ahmed, F.,** Morbey, H., Harding, A., Reeves, D., Swarbrick, C., Davies, L., Hann, M., Holland, F., Elvish, R., Leroi, I., Burrow, S., Burns, A., Keady, J., and Reilly, S. (2020). Developing the evidence base for evaluating dementia training in NHS hospitals (DEMTRAIN): a mixed-methods study protocol. BMJ Open, 10(1), https://doi.org/10.1136/bmjopen-2019-030739
- Dodd, A.L., Reilly, S., **Ahmed, F**, and C. Thomas (2020) Chapter 1. Critical Appraisal – how to examine and evaluate the research evidence. In: Walshe, C. and S. Brearley (2020) Handbook of Theory and Methods in Applied Health Research. Edward Elgar Publishing Ltd.
- Burt, J., Campbell, J., Abel, G., Aboulghate, A., **Ahmed, F.**, et al. (2017) Improving patient experience in primary care: a multimethod programme of research on the measurement and improvement of patient experience. *NIHR Programme Grants for Applied Research*, 5 (9). [Free full text]
- **Ahmed, F.,** G.A. Abel, C.E. Lloyd, J. Burt, and M. Roland (2015) Does the availability of a South Asian language in practices improve reports of doctor-patient communication from South Asian patients? Cross sectional analysis of a national patient survey in English general practices. *BMC Family Practice*. 16(1). [Free full text]
- **Ahmed, F.,** J. Burt, and M. Roland (2014) Measuring Patient Experience: Concepts and Methods. *The Patient - Patient-Centered Outcomes Research*, 7(3) pp. 235-241. [Free full text]
- Saunders, C.L., G.A. Abel, A. El Turabi, **F. Ahmed**, and G. Lyratzopoulos (2013) Accuracy of routinely recorded ethnic group information compared with self-reported ethnicity: evidence from the English Cancer Patient Experience survey. *BMJ Open*, 3(6) [Free full text]

Sarah Allinson, Senior Lecturer, Division of Biomedical and Life Sciences

Since joining Lancaster University, my research activities have been directed towards understanding the processes by which our cells protect themselves from DNA damage. Damage to the DNA in our cells occurs continuously throughout our lifetimes. However, if it remains unrepaired, this damage can cause the accumulation of mutations which are implicated in cancer and other aging-related diseases. Understanding how cells tackle the problem of accurately repairing DNA damage, and how these defensive mechanisms can become compromised, is a major focus of my research.

Biological Effects of Ultraviolet Radiation

Exposure to UV radiation, from either sunlight or the recreational use of sunbeds, is the primary cause of skin cancer, cases of which have risen more than four-fold over the past 40 years. While the effects of short wavelength UV (UVB) are relatively well-understood, the effects of longer wavelength UV (UVA) are less well-studied. UVA is the major UV component of the sun's radiation that reaches the earth's surface and also comprises 99% of the output from sunbeds. UVA is able to generate DNA-reactive free radicals in the skin and these have been implicated in the cancer-causing effects of UVA. Free radical damage, together with its ability to penetrate deep into the dermal layers of the skin, also underlies the well-established link between UVA and skin photoaging, the effects of which are quite distinct from normal chronological aging.

Much of my recent work has been aimed at understanding **how the DNA damage response is activated in skin cells after exposure to UV.** For example we have shown that unexposed cells located adjacent to UVA-exposed cells activate the DNA damage response via the so-called 'bystander effect'. This suggests a mechanism by which UV damage might further propagate into the deeper layers of the skin, with implications for both skin cancer and photoaging.

This work has been supported by Boots UK Ltd, North West Cancer Research and The Dowager Countess Eleanor Peel Trust.

Medical Applications of Cold Atmospheric Plasma

Plasma is often defined as the fourth state of matter and consists of a gas in which energy has pulled electrons away from atoms and molecules to form ions, such as occurs in lightning. The growing field of plasma medicine uses devices that produce plasmas at room/body temperature to treat various medical conditions, such as diabetic foot ulcers (DFUs) and, potentially, cancer. Working in collaboration with Professor Rob Short of the Materials Science Institute, my laboratory is studying the effects of plasmas on human skin cells and cancer cells. We hope to identify the most effective way of treating wounds, including DFUs, with plasma devices, while minimising any potential negative effects. We are also investigating whether plasmas can be used to treat skin cancer.

This work is currently supported by the Engineering and Physical Sciences Research Council.

Peter J Diggle, Distinguished Professor, CHICAS, Lancaster Medical School

Keywords: Statistics; spatial epidemiology

My research is in the development of statistical methods for spatial and longitudinal data analysis, motivated by applications in the Biomedical and population health sciences. As such, it is generically rather than specifically relevant to the work of the Centre for Ageing Research. I am happy to be a first point of contact for members of the Centre who feel that the research would benefit from the use of statistical methods for the design and/or analysis of studies involving the collection of spatially and/or longitudinally referenced data.

Diggle, P.J., Heagerty, P., Liang, K.Y. and Zeger, S.L. (2002). Analysis of Longitudinal Data (second edition). Oxford: Oxford University Press.

Diggle, P.J. and Chetwynd, A.G. (2011). Statistics and Scientific Method: an Introduction for Students and Researchers. Oxford: Oxford University Press.

Diggle, P.J. (2013). Statistical Analysis of Spatial and Spatio-Temporal Point Patterns (3rd edition) Boca Raton: CRC Press

Diggle, P.J. and Giorgi, E. (2019). Model-based Geostatistics: Methods and Applications in Global Public Health. Boca Raton: CRC Press

Dr Gavin Brookes, UKRI Future Leader Fellow, Linguistics and English Language

Gavin is a UKRI Future Leader Fellow working in the Department of Linguistics and English Language at Lancaster University. As a linguist, Gavin is interested in the ways in which language but also images are used to represent illnesses and other health-related phenomena and our experiences and understandings of them. In 2021, Gavin was awarded a grant of approximately £1 million for his UKRI Future Leaders Fellowship project, titled 'Public Discourses of Dementia: Challenging Stigma and Promoting Personhood' ([Promising future leader receives £1 million to examine language about dementia | Lancaster University](#)). The four-year project, starting in January 2022, will examine how dementia, people with it, and their relatives and carers are represented in contemporary media, for example in the context of the press, public health campaigns, commercial stock images, and charity campaigns. Gavin's recent publications on dementia and ageing include:

- Brookes, G., Putland, E. and Harvey, K. (2021). 'Multimodality: An analysis of dementia representation in charity campaigns'. In: G. Brookes and D. Hunt (Eds*.), Analysing Health Communication: Discourse Approaches*. Basingstoke: Palgrave Macmillan. In Press.

- Harvey, K. and Brookes, G. (2019). Looking through dementia: what do commercial stock images tell us about aging and cognitive decline? *Qualitative Health Research*, 29(7), 987-1003.

- Lampropoulou, S., Koleva, K., Harvey, K., Brookes, G. (2019). Linguistic approaches. In: J. Billington (Ed.), *Reading and Mental Health*. Basingstoke: Palgrave Macmillan, pp. 241-263.

- Brookes, G., Harvey, K., Chadborn, N. and Dening, T. (2018). "Our biggest killer": multimodal discourse representations of dementia in the British press. *Social Semiotics*, 28(3), 371-395.

More broadly, Gavin's research to-date has addressed topics such as dementia, mental health, chronic illness, and patient feedback on healthcare experiences. Gavin tends to adopt a corpus linguistic methodology which involves using specialist computer programs to analyse vast collections of textual data (i.e. typically millions and sometimes billions of words). Other recent publications include:

- Brookes, G. and Baker, P. (2021). *Obesity in the News: Language and Representation in the Press.* Cambridge: Cambridge University Press.

- Brookes, G. and Hunt, D. (2021). *Analysing Health Communication: Discourse Approaches*. Basingstoke: Palgrave Macmillan.

- Hunt, D. and Brookes, G. (2020). *Corpus, Discourse and Mental Health*. London: Bloomsbury.

Dr Sue Broughton, Senior Lecturer, Division of Biomedical and Life Sciences

Investigating the Role of Diet and Insulin/IGF-like Signalling in Brain Ageing

Improvements in healthcare and lifestyle in many countries have resulted in increased health and life expectancy. The downside is that more people are now living long enough to experience the diseases and loss of physical and mental function that come with ageing. Therapeutic interventions that can improve health and function at older ages are thus much needed in our ageing society. A major breakthrough in research into the biology of ageing has been the discovery that it is possible to extend the normal lifespan of laboratory model organisms such as yeast, the fruit fly, the nematode worm and the mouse. Encouragingly these long-lived animals appear to remain healthy for longer than normal animals. The regulation of lifespan in these very different kinds of organisms has been found to involve similar mechanisms, opening up the use of the much simpler and shorter-lived invertebrate organisms (worms and flies) to understand human ageing. In particular, diet and the cellular nutrient sensing signalling pathways, Insulin/IGF-like and TOR, have been found to be very important in regulating lifespan and healthspan. However, although neuronal function and cognition is key to human well-being it remains under-studied in the context of ageing. My research aims to understand how the brain ages and to determine if behavioural health can be improved at older ages by lifespan extending reductions in diet or insulin signalling.

I carry out my research in the fruit fly, *Drosophila melanogaster,* because it is a principal invertebrate model organism of both ageing and behavioural research. The fly performs complex behaviours controlled by the brain which decline with age as they do in humans. Moreover, the fly's brain has similarities to those of mammals and has been used to study neurodegenerative diseases producing important results that are directly applicable to humans. My research involves genetically manipulating genes under different dietary conditions and determining the effects on brain ageing. An exploratory walking behaviour is used as a measure of brain function throughout the life of the flies to determine functional effects on brain ageing. I have shown that both dietary restriction and reduced insulin signalling in the brain of flies do not benefit the normal age-related decline of exploratory walking behaviour despite extending lifespan. Moreover, different neuronal subtypes play discrete roles in lifespan and behavioural declines with serotonergic neurons mediating the beneficial effect of reduced insulin signalling on lifespan. My research has the exciting prospect of providing a greater understanding of the molecular processes underlying brain ageing and elucidating how insulin signalling alterations that are otherwise beneficial can impede behavioural function. In this way I aim to identify therapeutic regimen to improve neuromuscular/behavioural system ageing in humans.

Selected publications

- Dravecz, N, Shaw, T., Davies, I., Brown, C., Ormerod, L., Vu, G., Walker, T., Taank, T., Shirras, A., & **Broughton, S**., (2022) Reduced Insulin Signalling Targeted to Serotonergic Neurons but Not Other Neuronal Subtypes Extends Lifespan in Drosophila melanogaster. Frontiers in Aging Neuroscience. 14: p893444

- Partial Inhibition of RNA Polymerase I Promotes Animal Health and Longevity (2020) Martinez Corrales, G., Filer, D., Wenz, K. C., Rogan, A., Phillips, G., Li, M., Feseha, Y., **Broughton, S.** & Alic, N. Cell Reports. 30, 6, p. 1661-1669.

- Glover Z., Hodges M.D., Dravecz N., Cameron J., Asquith H., Shirras A. and **Broughton S.J.** (2019) Loss of Angiotensin-converting Enzyme-related (ACER) Peptidase Disrupts Behavioural and Metabolic Responses to Diet in *Drosophila melanogaster.* J. Exp. Biol. 222, doi:10.1242/jeb.194332

- Liao S, **Broughton S** and Nässel DR (2017) Behavioral Senescence and Aging-Related Changes in Motor Neurons and Brain Neuromodulator Levels Are Ameliorated by Lifespan-Extending Reproductive Dormancy in Drosophila. Front. Cell. Neurosci. 11:111. doi: 10.3389/fncel.2017.00111

- M.Z.B. Haji Ismail, M.D. Hodges, M. Boylan, R. Achall, A.D. Shirras & **S.J Broughton** (2015) The *Drosophila* Insulin Receptor Independently Modulates Lifespan and Locomotor Senescence. PLoS ONE 10(5): e0125312. doi:10.1371/journal.pone.0125312.

- N. Alic, J. M. Tullet, T. Niccoli, **S. Broughton**, M. P. Hoddinott, C. Slack, D. Gems, and L. Partridge. (2014) Cell-Nonautonomous Effects of dFOXO/DAF-16 in Aging. Cell Rep 6(4):608-16.

David Clancy, Lecturer, Division of Biomedical and Life Sciences

Keywords: Ageing, genetics, Drosophila, mitochondria

Genetics and biology of ageing. Ageing is the process which increases the chance of death over time. Because fundamental causes of ageing at the level of molecules within cells are similar across species, I do a lot of my work (though not all) using a model organism, the fruit fly *Drosophila melanogaster*. As a living subject of research it has many benefits: short generation time and lifespan, easy to breed in large numbers, comprehensive and well established genetic manipulation techniques, no ethics considerations, and essential similarities with humans at biochemical, cellular and genetic levels.

Seeking genes which modulate the ageing process. I have been selecting for extreme longevity in flies in order to discover new genes for longevity-assurance. Altering their expression can then identify possible anti-ageing targets for drug treatment.

Measuring biochemical damage and testing its relevance to ageing. This process of damage is mitigated by our genetic makeup, which helps explain the huge variation in lifespan we see across species. Currently the lab is measuring the effects of deletions in the DNA of mitochondria, cell components which make energy as well as a host of other critical functions. These measures may provide useful biomarkers of ageing, to indicate risk of age-related disease, or to monitor efficacy of treatments.

Seeking novel antibiotics and antivirals from an insect source. We have demonstrated antibiotic and anti-viral (SARS-CoV2) activity from fractions isolated from fruit flies. We are also testing these for activity against a panel of cancer cell lines.

Nagarajan-Radha, V, Aitkenhead, I, **Clancy, DJ**, Chown, SL and Dowling, DK (2019) Sex-specific effects of mitochondrial haplotype on metabolic rate in Drosophila melanogaster support predictions of the Mother's Curse hypothesis. *Philosophical Transactions of the Royal Society* (in press).

Drummond, E, Short, E and **Clancy, D** (2019) Mitonuclear gene X environment effects on lifespan and health: How common, how big? *Mitochondrion*. **49:** 12-18 .

Wolff JN, Camus MF, **Clancy DJ**, Dowling DK (2016) Complete mitochondrial genome sequences of thirteen globally sourced strains of fruit fly (Drosophila melanogaster) form a powerful model for mitochondrial research. *Mitochondrial DNA*. **28**:1-3.

Clancy, DJ and Birdsall, J (2013) Flies, worms and the Free Radical Theory of Ageing *Ageing Research Reviews* **12**: 404-12.

Koudounas, S**,** Green, EW and **Clancy, DJ** (2012) Reliability and variability of sleep and activity as biomarkers of ageing in Drosophila *Biogerontology*, **13**: 489-99.

Camus MF, **Clancy DJ**, Dowling DK (2012) Mitochondria, Maternal Inheritance, and Male Aging *Current Biology* **22**: 1717-21.

Danni Collingridge Moore, Research Fellow, Division of Health Research

I am a Research Fellow based at the International Observatory on End of Life Care, with over ten years' experience working in health research and project management. My research interests focus on care homes, social and health care and end of life care for ageing populations. I am a mixed method researcher, conducting systematic and scoping reviews, randomised controlled trials, epidemiolocal studies and evaluations, specifically among older populations in health care settings.

I am the inaugural Dowager Countess Eleanor Peel Trust Sir Robert Boyd Fellow, a three-year post-doctoral fellowship. The fellowship was awarded to my project titled 'Living and dying in care homes during the COVID-19 pandemic: what worked well and why?' The three-stage project includes a scoping review of policy recommendations issued during the pandemic, case studies of care homes that performed relatively well or poorly during the pandemic, in terms of infections, outbreaks and hospital admissions, and a transparent expert consultation.

During the COVID-19 pandemic, I was seconded to the Cabinet Office as a subject matter expert on adult social care. I co-ordinated the sourcing, analysis and presentation of health data on the COVID-19 dashboard, providing forecasting assessments to identify likely COVID-19 scenarios and potential indicator metrics. My role included preparing briefing notes to provide wider situational awareness on key issues, including deaths in domiciliary care and risk factors for COVID-19 outbreaks in care homes. I engaged with wider stakeholders including NHS, PHE, DHSC and the British Army to locate and access new data sources to add to the COVID-19 dashboard. I managed a team of SEO/HEOs to ensure data presented was relevant, timely and meaningful. I was awarded an MBE in the 2022 New Year's Honours' list for my work during this time.

In my first role at IOELC, I coordinated the England arm of the EU funded PACE (Comparing the effectiveness of palliative care for elderly people in care homes in Europe) programme of research. The role involved four work programmes; overseeing the implementation of a cross sectional, mortality follow back study of fifty care homes in England, managing a cluster randomised controlled trial of 12 care homes, implementing the PACE Steps to Success intervention, including conducting interviews and focus groups to evaluate the implementation of the intervention; supporting the refinement and launch of the PACE Steps to Success intervention, a free to use resource for care homes, translated into six languages; and conducting a scoping review of strategies for the implementation of palliative care education and organizational interventions in care homes. I also supported an expert user group at the World Research Congress of the EAPC in Bern, Switzerland, to discuss the findings from the scoping review, which informed the recommendations of the EAPC White Paper on Palliative Care Implementation in Long-Term Care Facilities. In 2019, I was involved in the development of a MOOC titled "Improving Palliative Care in Care Homes for Older People", which attracted over 1000 students internationally in its launch year (2019).

Professor Trevor J. Crawford, Reader of Neuropsychology, Department of Psychology & Centre for Aging Research

A new diagnostic marker for Alzheimer's Disease (AD)

Dementia is a worldwide problem, largely associated with the ageing process although it can occur in younger people where it is more likely to have a genetic component. There are many forms of dementia, Alzheimer's being one of them. Because we are currently living in a time when people are living far longer than they have done previously, more people are being diagnosed with Alzheimer's and the incidence is likely to rise considerably. However, it only affects a smallish proportion of the population and there is increasing hope on the horizon.

Recently I attended the Alzheimer's Research UK 2023 conference in Aberdeen, where there was excitement that increasing momentum of neurobiological extensive research will reveal the fundamental mechanisms of the disease in the near future. However, we are still lacking effective diagnostic tools. Currently, the most reliable ones are a brain scan or a lumber puncture, both of which are invasive, expensive procedures and carry risks. The alternative, at present, is psychological testing but in all of these cases, it is likely that the disease is well-developed before symptoms manifest and therefore these tests come rather late in the day.

What is required is a diagnostic tool which would detect changes in the brain at a much earlier stage which is where our current research comes in. We are using an eye-tracking technique to try and determine whether it is possible via a special eye test to determine whether such changes are taking place. The research is still on-going with people who have a diagnosis of Alzheimer's, older healthy people and also younger people as a comparison. Our recent findings are promising and suggest that this method might be able to detect these changes. If so, this would be a relatively cheap, non-invasive test which could be given along with a routine eye test anywhere in the world and would be a major breakthrough, enabling new treatments to be targeted at an early stage in the course of the disease. We are also beginning to explore effective ways to monitor changes in cognition while people during everyday activities, such as watching films or TV. A further project is investigating how we might be able to improve memory in older adults and people with dementia by using movements of the eyes to stimulate the brain.

Selected publications

Wilcockson, T, Mardanbegi, D, Xia, B, Taylor, S, Sawyer, P, Gellersen, H, Leroi, I, Killick, R & Crawford, T 2019, 'Abnormalities of saccadic eye movements in dementia due to Alzheimer's disease and mild cognitive impairment', Aging, vol. 11, no. 15, pp. 5389-5398. https://doi.org/10.18632/aging.102118

Readman, M., Polden, M., Gibbs, M., Wareing, L., & Crawford, T. (2021). The Potential of Naturalistic Eye Movement tasks in the Diagnosis of Alzheimer's Disease: A Review. *Brain Sciences*, *11*(11), [1503]. https://doi.org/10.3390/brainsci11111503

Polden, M., & Crawford, T. (2022). On the Effect of Bilateral Eye Movements on Memory Retrieval in Ageing and Dementia. *Brain Sciences*, *2022*(12), [1299]. https://doi.org/10.3390/ brainsci12101299

Neil Dawson, Senior Lecturer, Division of Biomedical and Life Sciences

Keywords: Cognition, Neurodevelopmental Disorders, Schizophrenia, Autism, Alzheimer's Disease

My research is focused on understanding the biological mechanisms of ageing and how these contribute to brain and cognitive ageing in particular. In addition, much of my research is focused on understanding the mechanisms of Alzheimer's disease, the contribution of ageing to this disorder and in developing new interventions that might benefit people with Dementia. I'm also interested in how the genes underlying neurodevelopmental disorders, such as Autism and Schizophrenia, modulate the ageing to contribute to accelerated ageing in these populations.

Selected Recent Publications

Hughes R, Whittingham-Dowd J, Clapcote S, Broughton S, **Dawson N** (2022). Altered medial prefrontal cortex and dorsal raphe activity predict genotype and correlate with abnormal learning behaviour in a mouse model of autism-associated 2p16.3 deletion. Autism Research 15 : 614-627.

Owens L, Bracewell J, Benedetto A, **Dawson N**, Gaffney C, Parkin E (2022). BACE1 overexpression reduces SH-SY5Y cell viability through a mechanism distinct from Amyloid-β peptide accumulation: Beta prime mediated competitive depletion of sAβPPα. Journal of Alzheimer's Disease 83 : 1201-1220.

Tanquiero SR, Mouro FM, Ferreira CB, Freitas CF, Fonseca-Gomes J, Simões do Couto F, Sebastião AM, **Dawson N***, Diógenes MJ* (2021). Sustained NMDA receptor hypofunction impairs brain-derived neurotrophic factor signalling in the PFC, but not in the hippocampus, and disturbs PFC-dependent cognition in mice. Journal of Psychopharmacology 35:730-743. *equal senior author contribution

Mitchell EJ, Thomson RL, Bristow GC, **Dawson N***, Pratt JA*, Morris BJ* (2020). Drug-responsive autism phenotypes in the 16p11.2 deletion mouse model: a central role for gene-environment interactions. Scientific Reports 10:12303. *equal senior author contribution

Bristow GC, Thomson DM, Openshaw RL, Mitchell EJ, Pratt JA*, **Dawson N***, Morris BJ* (2020). 16p11 duplication disrupts hippocampal-orbitofrontal-amygdala connectivity, revealing a neural circuit endophenotype for schizophrenia. Cell Reports 31:107536. *equal senior author contribution.

Hughes R, Whittingham-Dowd J, Simmons RE, Clapcote SJ, Broughton SJ, **Dawson N** (2020). Ketamine restores thalamic-prefrontal cortex functional connectivity in a mouse model of neurodevelopmental disorder associated 2p16.3 deletion. Cerebral Cortex 30:2358-2371.

Fiona Eccles, Senior Lecturer on the Doctorate in Clinical Psychology, part of the Division for Health Research

My research interests are in the cognitive, emotional and social aspects of neurological conditions, with a particular focus on neurodegenerative conditions such as Parkinson's and Huntington's disease and other similar movement disorders such as dystonia. I am interested in the everyday experience of people living with these conditions and in developing psychological therapies to help people (and their relatives) live well and reduce psychological distress.

Current projects

- Investigating the impact of the covid-19 pandemic on people affected by Parkinson's in the UK. This study is funded by UKRI/ESRC and conducted jointly with Parkinson's UK. (PI: Jane Simpson) This study is now in the writing up phase.
- Guide-HD: Guided self-help for anxiety among Huntington's disease gene expansion carriers: a randomised controlled feasibility trial (PI: Maria Dale). This study is currently recruiting.

Relevant recent publications

Eccles, F., Sowter, N., Spokes, T., Zarotti, N., & Simpson, J. (2023). Stigma, self-compassion, and psychological distress among people with Parkinson's. *Disability and Rehabilitation*, *45*(3), 425-433. https://doi.org/10.1080/09638288.2022.2037743

Dale, M., Wood, A., Zarotti, N., Eccles, F., Gunn, S., Kiani, R., Mobley, A., Robertson, N., & Simpson, J. (2022). Using a Clinical Formulation to Understand Psychological Distress in People Affected by Huntington's Disease: A Descriptive, Evidence-Based Model. *Journal of Personalized Medicine* , *12*(8), [1222]. https://doi.org/10.3390/jpm12081222

Zarotti, N., Eccles, F., Broyd, A., Longinotti, C., Mobley, A., & Simpson, J. (2022). Third wave cognitive behavioural therapies for people with multiple sclerosis: a scoping review. *Disability and Rehabilitation*. https://doi.org/10.1080/09638288.2022.2069292

Anestis, E., Eccles, F., Fletcher, I., Triliva, S., & Simpson, J. (2022). Healthcare professionals' involvement in breaking bad news to newly diagnosed patients with motor neurodegenerative conditions: a qualitative study. *Disability and Rehabilitation*, *44*(25), 7877-7890. https://doi.org/10.1080/09638288.2021.2002436

Simpson, J., Zarotti, N., Varey, S., Anestis, E., Holland, C., Murray, C., & Eccles, F. J. R. (2022). 'It's a double whammy': A qualitative study of illness uncertainty in individuals with Parkinson's disease in the context of COVID-19. *Chronic Illness*, *18*(4), 860-873. https://doi.org/10.1177/17423953211043101

Wieringa, G., Dale, M., & Eccles, F. (2021). Adjusting to living with Parkinson's disease; a meta-ethnography of qualitative research. *Disability and Rehabilitation*. https://doi.org/10.1080/09638288.2021.1981467

Wieringa, G., Dale, M., & Eccles, F. (2022). The experience of a sample of individuals in the United Kingdom living in the pre-manifest stage of Huntington's disease: an interpretative phenomenological analysis. *Journal of Genetic Counseling*, *31*(2), 375-387. https://doi.org/10.1002/jgc4.1497

Eccles, F., Craufurd, D., Smith, A., Davies, R., Glenny, K., Homberger, M., Rose, L., Theed, R., Peeren, S., Rogers, D., Skitt, Z., Zarotti, N., & Simpson, J. (2021). Experiences of mindfulness-based cognitive therapy for premanifest Huntington's disease. *Journal of Huntington's disease*, *10*(2), 277-291. https://doi.org/10.3233/JHD-210471

Anestis, E., Eccles, F., Fletcher, I., & Simpson, J. (2021). Neurologists' current practice and perspectives on communicating the diagnosis of a motor neurodegenerative condition: a UK survey. *BMC Neurology*, *21*, [34]. https://doi.org/10.1186/s12883-021-02062-6

Zarotti, N., Dale, M., Eccles, F., & Simpson, J. (2020). Psychological Interventions for People with Huntington's Disease: A Call to Arms. *Journal of Huntington's disease*, *9*(3), 231-243. https://doi.org/10.3233/JHD-200418

Dr Amy Gadoud, Senior Clinical Lecturer, Lancaster Medical School

Amy Gadoud is a Senior Lecturer in Palliative Medicine at Lancaster Medical School where she is NIHR Integrated Clinical Academic Training Lead. She also works with colleagues in the International Observatory on End of Life Care, Lancaster University. Her main research interest is ensuring equality in access to palliative care and she uses a range of research methods from analysing large datasets to qualitative studies. She has obtained research funding from a range of sources from major bodies e.g., NIHR and Academy of Medical Sciences as well as local charities e.g. North West Cancer Research. She works clinically as a Honorary Community Consultant in Palliative Medicine at Trinity Hospice and Blackpool Teaching Hospitals NHS Foundation Trust.

Dr Chris Gaffney, Senior Lecturer in Integrative Physiology, Lancaster Medical School

Research Profile

My research seeks to understand the basic physiology and metabolism (chemical reactions) that underpin disease, health, and athletic performance. My research encompasses molecular work using cells and the model organism *C. elegans*, through to human-based trials. My current work investigates the impact and mechanisms of physiological stress imparted by ageing, surgery, and spaceflight or ground-based analogues. Chris is an Editorial Board fellow with the Journal of Physiology and a member of the European College of Sports Science (ECSS) Reviewing Panel.

Chris' lab currently comprises of 7 PhD/MD students and 3 MSc by Research students, and his work is funded by UKRI, NIHR, and charities.

Key words

Physiology; muscle metabolism; exercise physiology; glycaemic control; surgery; skeletal muscle; immobilisation; ageing

Selected Recent Publications

Yasar, Z., Ross, M., **Gaffney, C.***, Postlethwaite, R., Wilson, R., Hayes, L. (2023)**.** Aerobically trained older adults show impaired resting, but preserved exercise-induced circulating progenitor cell count, which was not improved by sprint interval training. Pflügers Archiv - European Journal of Physiology, 10.1007/s00424-022-02785-6.

Owens, L., Bracewell, J., Benedetto, A., Dawson, N., **Gaffney, C.***, Parkin, E. (2022). BACE1 Overexpression Reduces SH-SY5Y Cell Viability Through a Mechanism Distinct from Amyloid-β Peptide Accumulation: Beta Prime-Mediated Competitive Depletion of sAβPPα. Journal of Alzheimer's Disease. 86, 3, p. 1201-1220.

Wrench, E., Rattley, K., Lambert, J., Killick, R., Hayes, L., Lauder, R., **Gaffney, C*** (2022). There is no dose–response relationship between the amount of exercise and improvement in HbA1c in interventions over 12 weeks in patients with type 2 diabetes: a meta-analysis and meta-regression. Acta Diabetologica, 59(11):1399-1415.

Yasar, Z., Elliott, B., Kyriakidou, Y., Nwokoma, C., Postlethwaite, R., **Gaffney, C.***, Dewhurst, S., Hayes, L. (2021). Sprint interval training (SIT) reduces serum epidermal growth factor (EGF), but not other inflammatory cytokines in trained older men**.** European Journal of Applied Physiology, 121, 7, p. 1909-1919.

Lambert, J., Hayes, L., Keegan, T., Subar, D., **Gaffney, C.J.*** (2021). The impact of prehabilitation on patient outcomes in hepatobiliary, colorectal, and upper gastrointestinal cancer surgery: a PRISMA-accordant meta-analysis. Annals of Surgery, 274 (1): 70-77.

Dr Andrew Harding, Lecturer in Health Inequalities, Faculty of Health and Medicine

Keywords: Ageing; mixed economy of welfare; access to care and support; information-giving; dementia; housing; care/nursing homes; Core outcome sets; Qualitative; Realist methodology

Andrew's main research interest concerns how older people navigate, access and engage with health and social care provision, mostly in the context of mixed economies of welfare and in a policy context that positions people as consumers of services where increased levels of agency are required. He is also interested in exploring inequalities in this areas. Within this area, Andrew has made theoretical and empirical contributions to the literature on information-giving, specialist housing, dementia, care and nursing homes. Andrew has expertise in realist methodology and is on the editorial board of BMC Geriatrics and PLOS One.

Key publications:

Harding, A.J.E. (2021) Older people, information-giving and active agency practices in health, social care and housing: Theory, evidence and reflections. Ageing & Society, doi: 10.1017/S0144686X21001884

Cousins, E., Preston, N., Doherty, J., Varey, S., **Harding, A**., Adrienne, M., Harrison Dening, K., Finucane, A., Carter, G., Mitchell, G., & Brazil, K. (2022). Implementing and evaluating online advance care planning training in UK nursing homes during COVID-19: findings from the Necessary Discussions multi-site case study project. *BMC Geriatrics*, *22*, [419]. https://doi.org/10.1186/s12877-022-03099-z

Bavelaar, L., Nicula, M., Morris, S., Kaasalainen, S., Achterberg, W., Loucka, M., Vickova, K., Thompson, G., Cornally, N., Hartigan, I., **Harding, A**., Preston, N., Walshe, C., Cousins, E., Harrison Dening, K., De Vries, K., Brazil, K., & van der Steen, J. T. (2022). Developing country specific questions about end-of-life care for nursing home residents with advanced dementia using the nominal group technique with family caregivers. *Patient Education and Counseling*, *105*(4), 965-973. https://doi.org/10.1016/j.pec.2021.07.031

Harding, A., & Reilly, S. (2021). Dementia trials, outcomes, and outcome measurement instruments for people living with dementia and family carers – considerations on how to improve the "gold standard". International Psychogeriatrics, 33, 4, 327-330. https://doi.org/10.1017/S1041610220003749

Harding, A.J.E., Morbey, H., Ahmed, F., et al (2020) Core outcome set for nonpharmacological community-based interventions for people living with dementia at home: A Systematic Review of Outcome Measurement Instruments. The Gerontologist. https://doi.org/10.1093/geront/gnaa071

Reilly, S.T., **Harding, A.J.E**., Morbey, H. et al (2020) What is important to people with dementia living at home? A set of core outcome items for use in the evaluation of non-pharmacological community-based health and social care interventions. Age and Ageing, afaa015, https://doi.org/10.1093/ageing/afaa015

Harding, A.J.E., Hean, S., Parker, J and Hemingway, A. (2020) "It can't really be answered in an information pack…": A realist evaluation of a telephone housing options service for older people. Social Policy and Society, 19, 3, 361-378 doi:10.1017/S1474746419000472.

Harding, A.J.E., Parker, J., Hean, S. & Hemingway, A. (2018) Supply-side review of the UK specialist housing market and why it is failing older people. Housing, Care and Support, 21 (2), 41-50 https://doi.org/10.1108/HCS-05-2018-0006

Harding, A.J.E., Parker, J., Hean, S. and Hemingway, A. (2018) Efficacy, outcome and impact of telephone information and advice on welfare: the need for realist evaluation. Social Policy and Society, 17 (1), 1-21

Professor Carol Holland, Professor in Ageing, Division of Health Research and Director of C4AR

https://orcid.org/0000-0001-7109-6554

Carol is a psychologist focusing on applied impacts of cognitive and health psychology of ageing. She works across disciplines and sectors, bringing together a range of expertise in projects addressing challenges of ageing. She has interests in reduction of risk factors for frailty, cognitive decline and dementia. She is currently President of the British Society of Gerontology, the national learned society representing researchers in ageing. She supervises a range of PhD students in topics related to ageing and dementia.

Research Overview and Interests

Carol has several ongoing or recently completed projects focussing on frailty. This includes the Cognitive Frailty Interdisciplinary Network (CFIN) which brings together researchers, clinicians, third sector organisations, business and older people themselves to examine suitable targets for intervention to prevent, delay or reverse this conjunction of physical frailty with cognitive impairment. Other recent research includes the Evaluation of Sport England funded Together an Active Future (TaAF), physical activity promotion programme, which examined factors that facilitated or impeded implementation of interventions in the different contexts and communities of East Lancashire. Other research has included the EU funded project FOCUS which aimed to critically reduce the impact of frailty in Europe by developing methodologies and tools focusing on early diagnosis, screening and management of frailty. Frailty is a common clinical syndrome in older adults that brings an increased risk for poor health outcomes including falls, poor quality of life, dependence, hospitalisation and mortality. Our work has demonstrated that frailty can be addressed even in the very old with significant frailty, and our qualitative work with a range of stakeholders has shown the roles of psychological resilience, lifestyle health behaviour and social support in preventing the worst outcomes.

Some Recent Papers

Simpson J, Zarotti N, Varey S, Anestis E, Holland C, Murray C, Eccles FJR (2022) 'It's a double whammy': A qualitative study of illness uncertainty in individuals with Parkinson's disease in the context of COVID-19 *Chronic Illness,* https://doi.org/10.1177/17423953211043101

Balki E, Hayes N, Holland C (2022) Effectiveness of technology interventions in addressing social isolation and loneliness in older adults: systematic umbrella review. JMIR Ageing **5(4),** doi:10.2196/40125

Garner IW, Varey S, Navarro-Pardo E, Marr C, Holland C (2022) An observational cohort study of longitudinal impacts on frailty and well-being of COVID-19 lockdowns in older adults in England and Spain. *Health and Social Care in the community,* https://doi.org/10.1111/hsc.13735

O'Donnell E, Holland C, Swarbrick, C (2022) Strategies used by care home staff to manage behaviour that challenges in dementia: A systematic review of qualitative studies *International Journal of Nursing Studies,* 104260, https://doi.org/10.1016/j.ijnurstu.2022.104260

Garner I, Burgess A & Holland C (2020) Developing and Validating the Community-Oriented Frailty Index (COM-FI) *Archives of Gerontology and Geriatrics, 91.* 104232 https://doi.org/10.1016/j.archger.2020.104232

Garner I, **Holland C**. (2020) Age friendliness of living environments from the older person's viewpoint: development of the age-friendly environment assessment tool**,** *Age and Ageing* https://doi.org/10.1093/ageing/afz146

Dr Hannah Jarvis, Lecturer in Sports and Exercise Science, Lancaster Medical School

Keywords: Biomechanics, Stroke, Rehabilitation, Amputees, Mixed Methods

My research aims to understand how a disease or injury affects our ability to walk, specifically biomechanics, gait and gait analysis, stroke, amputees, complex trauma and how we can develop better more informed rehabilitation programmes for people with these conditions.

Stroke:
Highlights of the research papers I have published include a publication in the leading stroke research journal "Stroke" (Jarvis et al 2019) which was reported by the BBC (http://www.bbc.co.uk/news/uk-wales-50168047) for its potential clinical impact and novelty regarding the use of a threshold walking speed to predict return to employment post-stroke. I am the first person to report gait patterns of young stroke survivors (Jarvis et al 2021) am a member and co-author of a leading Cochrane review team evaluating research evidence on physical activity after stroke (Saunders et al 2020). I am a registered stakeholder for NICE guidelines for Stroke Rehabilitation, and I contribute and advise on research outcomes to be included in the current re-iteration of those NICE guidelines. Key grants and ongoing projects from my stroke research include:

1. £44,816.00 Sir Halley Stewart Trust (2022). To measure how stroke survivors walk indoors and outdoors
2. £8000.00 HEE NIHR integrated clinical academic programme internship (2022). This in partnership with a clinician from the Northern Care Alliance for a research project investigating barriers and facilitators to outdoor exercise for young stroke survivors.
3. £99,916.00 Stroke Research Innovation Education Fund (2021). This is a pioneering project I lead called WALKEasy (Walk Easy After Young Stroke) which is the first to collect and investigate the relationship between biomechanical, neuromuscular, vascular, cognitive, neurological, and demographic data in young stroke survivors when they walk.
4. £95,215.00 Brecon Beacons National Park (2019). I am the Director of Studies for a PhD project investigating the effect of outdoor rehabilitation on quality of life and walking performance after stroke.
5. £88,106.00 Stroke Research Innovation Education Fund (2018). This project reported metabolic cost and walking speed of young stroke survivors.

Amputees:
I worked in collaboration with the Ministry of Defence (2013- 2016) where I was based at the Defence Medical rehabilitation Centre Headley Court. I am the first person to report gait patterns of UK military personal injured from blast trauma (amputation and limb salvage) from conflicts in Afghanistan and Iraq. This includes key papers - Jarvis et al 2017 (Archives of Physical Medicine and Rehabilitation Impact factor: 2.697) which reported efficiency, temporal and spatial parameters of amputees walking, and in Jarvis et al 2020 (Annals of Physical Medicine and Rehabilitation 2020 (Impact Factor 5.393) joint kinematics and kinetics of amputees. In 2021, with colleagues from Imperial College London, University of Birmingham and the Ministry of Defence I was awarded the prestigious "Excellence in Clinical Science Award" from Wiley publishing for a paper (Ding et al 2019, Journal of Orthopedic Research (Impact Factor 3.494) reporting risk factors to osteoarthritis in amputees which was published. The research outcomes from these and other papers I have published informed the Chilcot enquiry, NHS guidelines and future care of injured military personnel. have delivered invited presentations at the Blast Centre - Imperial College London, NATO (North Atlantic Treaty Organisation) and the Defence Science Equipment and Innovation showcasing my ability to present my research to a wide range of audiences.

Outside of academia I have competed to international level at mountain running and represented Wales 21 times.

Dr Jemma Kerns, Senior Lecturer, Lancaster Medical School

Keywords: Osteoporosis, osteoarthritis, diagnostics, laser based (Raman) spectroscopy

I am a senior lecturer and director of research at Lancaster Medical School. I joined Lancaster as a Lecturer 2014, and have built, and leads, a research group on bone biology and spectroscopic diagnostic development. I have just completed an Academy of Medical Sciences Springboard Award on osteoarthritis, and have just started a project funded by EPSRC on osteoporosis.

My research is largely pre-translational but includes experience as a clinical project (device study) Manager. My primary goal is to translate laser-based spectroscopy as a clinical tool to have a positive impact through improving patient health and wellbeing by enabling detection of pre-clinical biochemical changes that are indicative of disease e.g., bone diseases and cancer. I lead collaborative projects with multiple NHS Trusts, locally and nationally. My research aligns with the Faculty of Health and Medicine theme of Ageing and I co-lead the LMS Experimental Medicine research group.

I am a senior spectroscopist certified by the Society for Applied Spectroscopy, a member of the Royal Society of Chemistry and have recently joined the Versus Arthritis College of Experts.

Professor Joanne Knight, Chair in Applied Data Science

Keywords: **Routinely collected Data,** Neurology, Data Science

I use routinely collected data to investigate a range of things such as epidemiology and health service provision of diseases common in the ageing population. I have also looked at routinely collected data for care home residents.

Recent papers relating to aging include:

- Jackson et al 2022, 'Numbers and types of neurological emergencies in England and the influence of socioeconomic deprivation: a retrospective analysis of hospital episode statistics data', BMJ Open, vol. 12, no. 11, e061843.
- Biggin et al 2021. Variation in waiting times by diagnostic category: an observational study of 1951 referrals to a neurology outpatient clinic. *BMJ Neurology Open.* BMJ Neurology Open. 3, 1, 8 p.
- Johnson, O. et al. A modelling framework for developing early warning systems of COPD emergency admissions. 2021 *Spatial and Spatio-temporal Epidemiology.* 36, 9 p.
- Wall, J. et al Late-onset epilepsy predicts stroke: Systematic review and meta-analysis. *Epilepsy and Behaviour*. Vol. 115, 107634, 01.02.2021
- Biggin, F. et. al. Routinely collected patient data in neurology research: a systematic mapping review. In: *BMC Neurology*. 2020. (20):431, 9 p.
- Editorial: Kemp et. al. "COVID-19 exposes the urgent need for coding of outpatient neurology episodes." BMJ Neurology Open. 2020;2(2) DOI 10.1136/bmjno-2020-000080
- Mirza SS, et. al. *APOE* ε4, white matter hyperintensities, and cognition in Alzheimer and Lewy body dementia. *Neurology*. 2019;93(19):e1807-e1819. doi:10.1212/WNL.0000000000008377
- Rhodes, C.J. et.al. Genetic determinants of risk in pulmonary arterial hypertension: international genome-wide association studies and meta-analysis. 1/03/2019 In: Lancet Respiratory Medicine. 7, 3, p. 227-238. 12 p.
- APOE-ε4, white matter hyperintensities, and cognition in Alzheimer and Lewy body dementia. Saeed Mirza, Saira; Saeed, Usman**; Knight, Jo**; Ramirez, Joel; Stuss, Donald; Keith, Julia; Nestor, Sean M.; Yu, Di; Swardfager, Walter; Rogaeva, Ekaterina; George-Hyslop, Peter St.; Black, Sandra E.; Masellis, Mario. In: Neurology, Vol. 93, No. 19, 05.11.2019, p. e1807-e1819
- Evangelos Evangelou et al. "Genetic analysis of over one million people identifies 535 novel loci for blood pressure." *Nature Genetics.* 2018 Oct;50(10):1412-1425. doi: 10.1038/s41588-018-0205-x. Epub 2018 Sep 17.

Grant funding in this area:

- PI **Medical Research Council**, "Impact of the COVID-19 Pandemic on Care Home Pathways, Outcomes and Safety of Care", £252,446 2020-2021
- Co-Applicant **Health Data Research UK** – "HDR-UK North", £3.4M, 2020-2023
- Co-Investigator, **National Institute of Health Research** "Applied Research Collaboration North West Coast", £2,497,941 to Lancaster awarded over 2019-2024
- Co-I **The Academy of Medical Sciences** "ENIGMA-PD-Vasc: An international multicentre analysis of cerebral vascular changes in Parkinson's disease" £16,617.99. 03/21 → 02/23
- Co-Investigator, **EPSRC**, "Future Places: A Digital Economy Centre on Understanding Place Through Pervasive Computing", 2,931,666.05 to Lancaster awarded over 2020-2025
- Co-Investigator **North West Social Science Doctoral Training Partnership** CASE Studentship Competition. "Modelling Respiratory Care in the Morecambe Bay Area".

Dr Robert Lauder, Senior Lecturer, Division of Biomedical Life Sciences / Lancaster Medical School

Understanding Osteoarthritis to develop better treatments

Introduction

Osteoarthritis is a common condition in old age, causing chronic pain and reducing people's quality of life. Its incidence is increasing, and it brings a wider socio-economic burden through reduction in mobility and increased healthcare costs.

Two parts of the body integrally involved with the development of osteoarthritis are the meniscus and articular cartilage. The **meniscus** is the largest tissue of the knee joint, and is often referred to as the cartilage of the knee joint. All of our tissues undergo constant maintenance to remove older and poorly functioning molecules, and replace these with new. This means that the components of the meniscus contribute significantly to the composition of synovial fluid, which reduces friction between the articular cartilage of synovial joints during movement.

Articular cartilage is the smooth, white tissue that covers the ends of bones where they come together to form joints. Healthy cartilage in our joints makes it easier to move, allowing the bones to glide over each other with very little friction.

Damage to the meniscus can be caused by traumatic injuries, or by degeneration. Degeneration of the meniscus is common, and – unlike traumatic damage – is very strongly correlated with the development of osteoarthritis up to 15-20 years later; it may indeed be an inevitable outcome of aging. A degenerative meniscal tear may be the first indication of widespread OA within the joint.

Understanding age-related meniscal degeneration is central to diagnosing, delaying and preventing osteoarthritis and so enhancing quality of life for our ageing population.

Lancaster research into age-related changes in meniscal macromolecules

Research in the Lauder Lab seeks to understand the structure and function of molecules in the connective tissue called glycosaminoglycans (GAGs) and the proteoglycans (PGs) to which they are attached. These are involved in many developmental processes which makes them important potential targets for therapy.

Changes in their structure (whether normal age-related changes, or abnormal pathology-related changes) can be used as markers of damage and of disease long before any clinical symptoms are evident. Indeed, it's clear that molecular changes are taking place 15 – 20 years before any clinical symptoms are seen.

Our data show that that meniscal and articular GAGs differ, confirming that we must assess their function independently. Our data also show age- and damage-related changes in meniscal GAGs; for example the abundance and detailed structure of the major GAG Chondroitin sulphate changes normally as we age. However, we find that following damage and disease some specific parts of these molecules return to a structure normally found in a much younger person.

These changes are an attempt by the tissue to bring about repair. We know this because features common in young people, and following damage, promote tissue development and repair.

Present and future work

Our goal in understanding these changes is to:

Use them as biomarkers of molecular changes in the tissues, so that osteoarthritis can be diagnosed ahead of the appearance of clinical symptoms

Use them as targets for therapy – by promoting features which are involved in tissue repair and development thus the devastating effects of OA may be delayed or reversed.

Professor Ceu Mateus, Division of Health Research

Keywords: Health economics, quality of life, costs, equity

Céu Mateus is a Professor in Health Economics in the Division of Health Research. She holds a PhD in Public Health-Health Economics from the National School of Public Health, Nova University of Lisbon in Portugal, an MSc in European Social Policy Analysis from Bath University in the UK, and graduated in Economics from ISEG – Lisbon School of Economics and Management, Lisbon University in Portugal. She has over 25 years of experience in research and has developed her expertise around economic evaluation of health technologies and interventions, efficiency measurement, equity, and quality of life with many applications of those topics to elderly populations. She has been involved in several scientific associations in the field of health care such as PCSI, EuHEA and the Portuguese Chapter of ISPOR. She works across disciplines and sectors, bringing together a range of expertise in projects addressing challenges of ageing.

Relevant projects

Mobile Health Biometrics to Enhance Exercise and Physical Activity Adherence in T2D
Manchester Macmillan Supportive and Palliative Care Programme
Testing New Models of Care: An Evaluation of the Lancashire and Cumbria Innovation Alliance NHS Test Bed

Relevant papers

Healthcare use and healthcare costs for patients with advanced cancer; the international ACTION cluster-randomised trial on advance care planning. Korfage, I.J., Polinder, S., Preston, N., van Delden, J.J.M., Geraerds, A., Dunleavy, L., Faes, K., Miccinesi, G., Carreras, G., Arnfeldt, C., Kars, M.C., Lippi, G., Lunder, U., Mateus, C., Pollock, K., Deliens, L., Groenvold, M., van der Heide, A., Rietjens , J. 15/11/2022 In: Palliative Medicine.

Systematic voiding programme in adults with urinary incontinence following acute stroke: the ICONS-II RCT. Watkins, C., Tishkovskaya, S., Brown, C., Sutton, C., Garcia, Y.S., Forshaw, D., Prescott, G., Thomas, L., Roffe, C., Booth, J., Bennett, K., Roe, B., Hollingsworth, B., Mateus, C., Britt, D., Panton, C. 31/07/2022 In: Health Technology Assessment. 26, 31, p. 1-88. 88 p.

Self-efficacy of older people using technology to self-manage COPD, hypertension, heart failure or dementia at home: An overview of systematic reviews. Chalfont, G., Mateus, C., Varey, S., Milligan, C. 30/09/2021 In: The Gerontologist. 61, 6, p. e318-e334. 16 p.

Identifying the Main Predictors of Length of Care in Social Care in Portugal. Lopes, H., Guerreiro, G., Esquível, M., Mateus, C. 31/08/2021 In: Portuguese Journal of Public Health. 39, 1, p. 21-35. 15 p.

The role of combinatorial health technologies in supporting older people with long-term conditions: Responsibilisation or co-management of healthcare? Varey, S., Dixon, M., Hernandez Huerta, A., Mateus, C., Palmer, T., Milligan, C. 1/01/2021 In: Social Science and Medicine. 269, 11 p.

Identifying the long-term care beneficiaries differences between risk factors of nursing homes and community-based services admissions. Lopes, H., Mateus, C., Rosati, N. 1/10/2020 In: Aging Clinical and Experimental Research. 32, p. 2099–2110. 12 p.

Impact of long term care and mortality risk in community care and nursing homes populations
Lopes, H., Mateus, C., Rosati, N. 05/2018 In: Archives of Gerontology and Geriatrics. 76, p. 160-168. 9 p.

Ten Years since the 2006 Creation of the Portuguese National Network for Long-Term Care: Achievements and Challenges. Lopes, H., Mateus, C., Hernández-Quevedo, C. 03/2018 In: Health Policy. 122, 3, p. 210-216. 7 p.

Gender disparities in health and healthcare: results from the Portuguese National Health Interview Survey. Perelman, J., Fernandes, A., Mateus, C. 12/2012 In: Cadernos de Saúde Pública. 28, 12, p. 2339-2348. 10 p.

Health-economic burden of Parkinson's disease in Portugal: a cohort study. Reese, J.P., Winter, Y., Rosa, M.M., Rodrigues e Silva, A.M., von Campenhausen, S., Freire, R., Caixeiro Mateus, C., Balzer-Geldsetzer, M., Boetzel, K., Oertel, W.H., Dodel, R., Sampaio, C. 1/03/2011 In: Revista de neurologia. 52, 5, p. 264-274. 11 p.

Costs of illness and care in Parkinson's disease: an evaluation in six countries. von Campenhausen, S., Winter, Y., Rodrigues e Silva, A., Sampaio, C., Ruzicka, E., Barone, P., Poewe, W., Guekht, A., Mateus, C., Pfeiffer, K., Berger, K., Skoupa, J., Bötzel, K., Geiger-Gritsch, S., Siebert, U., Balzer-Geldsetzer, M., Oertel, W.H., Dodel, R., Reese, J.P. 02/2011 In: European Neuropsychopharmacology. 21, 2, p. 180-191. 12 p.

Gender equity in treatment for cardiac heart disease in Portugal. Perelman, J., Caixeiro Mateus, C., Fernandes, A. 07/2010 In: Social Science and Medicine. 71, 1, p. 25-29. 5 p.

Professor Peter McClintock, Research Professor, Department of Physics

Keywords: Nonlinear dynamics; noise; stochastic; cardiovascular system; brain; ageing; biological ion channels

My research, with collaborators, is in nonlinear dynamics and stochastic processes, and particularly their applications to biological systems. I work closely with Aneta Stefanovska *(q.v.)* in relation to projects on human physiology and ageing.

Selected publications

P V E McClintock and L B Kish (ed.) *The Random and Fluctuating World: Celebrating Two Decades of Fluctuation and Noise Letters*, World Scientific, Singapore, 2022 .

A Stefanovska and P V E McClintock (ed.), *Physics of Biological Oscillators: New Insights into Non-Equilibrium and Non-Autonomous Systems*, Springer, Cham, 2021.

P V E McClintock and D G Luchinsky (eds.) *Physics of Ionic Conduction in Narrow Biological and Artificial Channels*, MDPI, Basel, 2021.

 M L Barabash, W A T Gibby, C Guardiani, A Smolyanitsky, D G Luchinsky, and P V E McClintock, "Origin and control of ionic hydration patterns in nanopores'', *Communications Materials* **2**, 65 (2021).

W A T Gibby, M L Barabash, C Guardiani, D G Luchinsky, and P V E McClintock, "Physics of selective conduction and point mutation in biological ion channels", *Physical Review Letters* **126**, 218102 (2021).

Y A Abdulhameed, P V E McClintock, and A Stefanovska, "Race-specific differences in the phase coherence between blood flow and oxygenation: A simultaneous NIRS, white light spectroscopy and LDF study", *Journal of Biophotonics* **13**, e201960131 (2020).

O A Fedorenko, I Kh Kaufman, W A T Gibby, M L Barabash, D G Luchinsky, S K Roberts, and P V E McClintock, "Coulomb blockade and the determinants of selectivity in the NaChBac bacterial sodium channel", *Biochimica et Biophysica Acta (BBA) - Biomembranes* **1862**, 183301 (2020).

Y A Abdulhameed, G Lancaster, P V E McClintock, and A Stefanovska, "On the suitability of laser-Doppler flowmetry for capturing microvascular blood flow dynamics from darkly pigmented skin", *Physiological Measurement* **40**, 074005 (2019).

T Stankovski, T Pereira, P V E McClintock, and A Stefanovska, "Coupling functions: universal insights into dynamical interaction mechanisms", *Reviews of Modern Physics* **89** , 045001 (2017).

V Ticcinelli, T Stankovski, D Iatsenko, A Bernjak, A E Bradbury, A R Gallagher, P B M Clarkson, P V E McClintock, and A Stefanovska, "Coherence and coupling functions reveal microvascular impairment in treated hypertension", *Frontiers in Physiology* **8**, 749 (2017).

T Stankovski, S Petkoski, J Raeder, A F Smith, P V E McClintock, and A Stefanovska, "Alterations in the coupling functions between cortical and cardio-respiratory oscillations due to anaesthesia with propofol and sevoflurane", *Philosophical Transactions of the Royal Society A* **374**, 20150186 (2016).

I Kh Kaufman, P V E McClintock and R S Eisenberg, "Coulomb blockade model of permeation and selectivity in biological ion channels", *New Journal of Physics* **17**, 083021 (2015).

Hazel Morbey, PhD, Research Fellow, Division of Health Research

Professional practitioner background in mental health as a registered mental health nurse and qualified social worker, with experience of working in different health, social care and third sector settings. Contributed to a variety of ageing related studies as a qualitative researcher, largely focused on vulnerable, under-served groups of people and sensitive research areas, such as: elder abuse, older homelessness, older family carers, care home residents, people living with dementia, and end of life. Specific methodological interests and expertise in inclusive, participatory research approaches, culminating in co-research with people living with dementia and carers.

National Institute of Health Research, Research Design Service North West case advisor and specialist public involvement adviser.

National Institute of Health Research, Clinical Research Network health services speciality lead.

I teach and supervise post-graduate students.

Brief summary of most recent research:

Economic and Social Research Council (ESRC)/National Institute of Health Research (NIHR) funded study: The Neighbourhoods and Dementia Programme (N&D). I currently work in the NIHR North West Research Design Service as a case advisor and supervise postgraduate research students conducting dementia related doctoral studies.

Developing a core outcome set for people with dementia living at home in their neighbourhoods and communities (COS)

This study developed a 13 item COS for evaluating non-pharmaceutical, community-based interventions and included extensive consultation with people living with dementia and care partner using co-research and consensus methods.

Developing the evidence base for evaluating dementia training in NHS hospitals (DEMTRAIN)

Viewing the acute hospital as a neighbourhood space increasingly occupied by people living with dementia, the research examines the quality and effectiveness of dementia training programmes in acute hospital settings.

Selected publications

Reilly, S, Harding, A, **Morbey, H**, Ahmed, F, Williamson, P, Swarbrick, C, Leroi, I, Davies, L, Reeves, D, Holland, F, Hann, M & Keady, J (2020), 'What is important to people with dementia living at home? A set of core outcome items for evaluating non-pharmacological community-based health and social care interventions', *Age and Ageing*. https://doi.org/10.1093/ageing/afaa015/5739151

Ahmed, F, **Morbey, H**, Harding, A, Reeves, D, Swarbrick, C, Davies, L, Hann, M, Holland, F, Elvish, R, Leroi, I, Burrow, S, Burns, A, Keady, J & Reilly, S (2020), 'Developing the evidence base for evaluating dementia training in NHS hospitals (DEMTRAIN): a mixed-methods study protocol', *BMJ Open*, vol. 10, no. 1, e030739. https://doi.org/10.1136/bmjopen-2019-030739

Morbey, H, Harding, A.J.E, Swarbrick, C, Ahmed, F, Elvish, R, Keady, J, Williamson, P, Reilly, S.T, (2019), 'Involving people living with dementia in research: an accessible modified Delphi survey for core outcome set development', *Trials*. 20, no. 12, doi:10.1186/s13063-018-3069-6.

Milligan, C, & **Morbey, H,** (2016) 'Care, coping and identity: older men's experiences of spousal care-giving'. *Journal of Aging Studies*. 38, pp105-114.

Morbey, H, (2015) 'Who Cares: Older family carers, their experiences and needs'. In Age UK, Improving later life. Vulnerability and resilience in older people. London: Age UK.

Morbey, H, & Payne, S, (2015) '*Involvement of family carers in care for older people*'. In Van den Block L, Albers G, Martins Pereira S, Onwuteaka-Philipsen B, Pasman R, & Deliens L (eds). Palliative Care for Older People: A Public Health Perspective Oxford: Oxford University Press.

Morbey, H, (2015), '*Who Cares: older family carers of older people*', Later Life Series: Improving Later Life. London, Age UK.

Professor Chris Plack, Department of Psychology

As we age, hearing ability declines, and most people over the age of 60 experience some difficulties with their hearing. For many people this can result in social isolation and a substantial reduction in quality of life. Hearing loss is associated with dementia, although a causative association has not yet been established.

I have broad interests in the physiology and psychology of normal and impaired hearing. Most recently, I have been investigating neural hearing deficits that are not detectable by standard clinical tests, but which may nevertheless impact on real-world listening ability. I am also investigating the links between hearing loss and neurodegenerative diseases.

Selected publications

Shehabi, A., Prendergast, G., and Plack, C.J. (2022). "The relative and combined effects of noise exposure and aging on auditory peripheral neural deafferentation: A narrative review," Front. Aging Neurosci. 14, 877588.

Shehabi, A., Prendergast, G., Guest, H., and Plack, C.J. (2022). "The effect of lifetime noise exposure and aging on speech-perception-in-noise ability and self-reported hearing symptoms: An online study," Front. Aging Neurosci. 14, 890010.

Littlejohn, J., Venneri, A., Marsden, A. and Plack, C.J. (2021). "Self-reported hearing difficulties are associated with loneliness, depression and cognitive dysfunction during the COVID-19 pandemic," Int. J. Audiol. 61, 97-101.

Carcagno, S., and Plack, C.J. (2021). "Effects of age on psychophysical measures of auditory temporal processing and speech reception at low and high levels," Hear. Res. 400, 108117.

Slade, K., Plack, C.J., and Nuttall, H.E. (2020). "The effects of age-related hearing loss on the brain and cognitive function," Trends Neurosci. 43, 810-821.

Bones, O., and Plack C.J. (2015). "Losing the music: Aging affects the perception and subcortical neural representation of musical harmony," J. Neurosci. 35, 4071-4080.

King, A., Hopkins, K., and Plack, C.J. (2014). "The effects of age and hearing loss on interaural phase difference discrimination," J. Acoust. Soc. Am. 135, 342-351.

Marmel, F., Linley, D., Carlyon, R.P., Gockel, H.E., Hopkins, K., and Plack, C.J. (2013). "Subcortical neural synchrony and absolute thresholds predict frequency discrimination independently," J. Ass. Res. Otolaryngol. 14, 757-766.

Professor Paul Rayson, Director of UCREL and Professor in Natural Language Processing, School of Computing and Communications

I am director of the UCREL research centre and a Professor in the School of Computing and Communications, in the Infolab21 building at Lancaster University in Lancaster, UK. A long term focus of my work is the application of semantic-based NLP in extreme circumstances where language is noisy e.g. in historical, learner, speech, email, txt and other CMC varieties. My applied research is in the areas of mental health, dementia detection, online child protection, cyber security, learner dictionaries, and text mining of historical corpora and annual financial reports. I was a founding co-investigator of the five-year ESRC Centre for Corpus Approaches to Social Science (CASS) which is designed to bring the corpus approach to bear on a range of social sciences. I'm also a member of the multidisciplinary centre Security Lancaster, and Lancaster Digital Humanities, and the Data Science Institute.

Relevant projects:

Metaphor in end-of-life care (MELC) http://ucrel.lancs.ac.uk/melc/
SAMS (Software Architecture for Mental health Self management) http://ucrel.lancs.ac.uk/sams/

Relevant papers:

Jagfeld, G., Lobban, F., Rayson, P., & Jones, S. (2021). Understanding who uses Reddit: Profiling individuals with a self-reported bipolar disorder diagnosis. In Proceedings of the Seventh Workshop on Computational Linguistics and Clinical Psychology: Improving Access. DOI : 10.18653/v1/2021.clpsych-1.1

Semino, E., Demjen, Z., Demmen, J., Koller, V., Payne, S., Hardie, A., & Rayson, P. (2017). The online use of Violence and Journey metaphors by patients with cancer, as compared with health professionals: a mixed methods study. BMJ Supportive and Palliative Care, 7(1), 60-66. DOI: 10.1136/bmjspcare-2014-000785

Demmen, J. E., Semino, E., Demjen, Z., Koller, V., Hardie, A., Rayson, P., & Payne, S. (2015). A computer-assisted study of the use of violence metaphors for cancer and end of life by patients, family carers and health professionals. International Journal of Corpus Linguistics, 20(2), 205-231. DOI: 10.1075/ijcl.20.2.03dem

Gledson, A., Asfiandy, D., Mellor, J., Omer Faraj Ba-Dhfari, T., Stringer, G., Couth, S., ... Sawyer, P. H. (2016). Combining mouse and keyboard events with higher level desktop actions to detect mild cognitive impairment. In Healthcare Informatics (ICHI), 2016 IEEE International Conference on. IEEE. DOI: 10.1109/ICHI.2016.22

Bull, C. N., Asfiandy, D., Gledson, A., Mellor, J., Couth, S., Stringer, G., ... Sawyer, P. H. (2016). Combining data mining and text mining for detection of early stage dementia: the SAMS framework. In Resources and ProcessIng of linguistic and extra-linguistic Data from people with various forms of cognitive/psychiatric impairments (RaPID '16) workshop: Proceedings of the 10th International Conference on Language Resources and Evaluation (LREC '16). (pp. 35-40). European Language Resources Association (ELRA).

Sawyer, P., Sutcliffe, A., Rayson, P., & Bull, C. (2015). Dementia and social sustainability: challenges for software engineering. In Software Engineering (ICSE), 2015 IEEE/ACM 37th IEEE International Conference on (Volume:2) . (pp. 527-530). IEEE. DOI: 10.1109/ICSE.2015.188

Sutcliffe, A., Rayson, P., Bull, C., & Sawyer, P. (2014). Discovering affect-laden requirements to achieve system acceptance. In 22nd IEEE International Requirements Engineering Conference (RE'14). (pp. 173-182). IEEE. DOI: 10.1109/RE.2014.6912259

Dr Yakubu Salifu, Lecturer, Division of Health Research

Keywords: **Palliative care, qualitative research, cancer, health inequality, care of older adults**

Yakubu is currently a Lecturer in Palliative Care at Lancaster University, following his brief role as Research Associate at the University of Nottingham, where he completed his PhD in Nursing Studies. Yakubu is a module lead for Palliative Care module and co-convenor for Ethics in Biomedicine course, based within the BLS. He has been involved in an EU funded project called Mypal that explored the use of technology (health apps) in monitoring the health outcomes of patients with malignancies. You may also want to read about the Mypal newsletter he edited https://mypal-project.eu/newsletter-05/. Yakubu's research working is making significant impact. For example, his research is a foundation for the formation of a charity in Ghana called COMPASS Ghana, where he is the Chief Executive Officer.

His research interest falls under mainly palliative care/managing care at the end of life for adults and older adults. Additionally, Yakubu is interested in palliative care around health and social policy for vulnerable people, including the aged, who have challenges in accessing care especially in resource-poor settings. This involves how policy and professional interventions address the challenges of patients and families in dealing with long term chronic conditions. Yakubu's mainly methodological interests are the use of qualitative methods (individual, dyad, and focus group interviews), and has received further training in Qualitative research methodologies at University of Alberta in Canada. Current and recent research projects include:

1. Payne, S., **Salifu, Y.**, Begovic, D., & Greenwood, A. (2022). The European MyPal study: Developing digital health for adults and children with cancer.

2. **Salifu, Y.**, Almack, K., & Caswell, G. (2021). 'My wife is my doctor at home': A qualitative study exploring the challenges of home-based palliative care in a resource-poor setting. *Palliative Medicine*, *35*(1), 97–108. https://doi.org/10.1177/0269216320951107

3. Bentley, A., Morgan, T., **Salifu, Y**., & Walshe, C. (2021). Exploring the experiences of **living with Lewy body dementia**: An integrative review. *Journal of Advanced Nursing*, 00, 1– 14. https://doi.org/10.1111/jan.14932

4. Bentley, A., **Salifu, Y.,** & Walshe, C. (2021). Applying an Analytical Process to Longitudinal Narrative Interviews With Couples Living and Dying With Lewy Body Dementia. *International Journal of Qualitative Methods*, *20*, 16094069211060653.

5. Abboah-Offei, M., **Salifu, Y.,** Adewale, B., Bayuo, J., Ofosu-Poku, R., & Opare-Lokko, E. B. A. (2021). A rapid review of the use of face mask in preventing the spread of COVID-19. *International journal of nursing studies advances*, *3*, 100013. https://pubmed.ncbi.nlm.nih.gov/33313575/

6. Bayuo, J., Anago, E. K., Agyei, F. B., **Salifu, Y.,** Kyei Baffour, P., & Atta Poku, C. (2021). "Resuscitate and Push": End-of-Life Care Experiences of Healthcare Staff in the Emergency Department–A Hermeneutic Phenomenological Study. *Journal of Palliative Care*, 08258597211050740. https://journals.sagepub.com/doi/abs/10.1177/08258597211050740

7. Sailian, S. D., **Salifu, Y.,** Saad, R., & Preston, N. (2021). How is Dignity Understood and Preserved in Patients with Palliative Needs in the Middle East? An Integrative Review. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8285813/

Professor Jane Simpson, Professor of the Psychology of Neurodegenerative Conditions, Division of Health Research

Introduction

My research relates to understanding psychological outcomes in people with adult-onset long-term health conditions, particularly neurodegenerative diseases. My research has mainly focused on people with Parkinson's disease, Huntington's disease (HD) and dementia. My interest in psychological outcomes includes the quantitative predictors of outcomes such as low mood and quality of life, qualitative research on the experience of general and specific aspects of particular conditions and the relevance of therapeutic approaches to improve well-being, including mindfulness interventions.

A psychological approach to understanding well-being and psychological distress in people with neurodegenerative conditions is a relatively new and unexplored area in many illnesses – with the exception of dementia where innovative approaches have emphasised the importance of a biopsychosocial approach. Elsewhere, explanations for psychological distress have tended to be biological (as opposed to psychological) and relate to the other neurobiological changes. Similarly therapeutic options have traditionally been around medication rather than psychological therapy

Current projects

- Parkinson's and COVID: funded by UKRI.
- Control in people with Parkinson's disease. Rolling programme of work funded by Parkinson's UK.
- Creating clinical guidance for people with neurodegenerative conditions. British Psychological Society.
- Guided self-help interventions for people with Huntington's. Funded by Gossweiler Foundation.

Some sample references

Simpson, J., Eccles, F.J.R., & Zarotti, N. (2021). *Psychological interventions for people with Huntington's disease, motor neuron disease, Parkinson's disease and multiple sclerosis: evidence-based guidance.* Leicester: BPS.

Zarotti, N., Eccles, F.J.R., … Simpson, J. (2021). Psychological interventions for people with motor neuron disease: a scoping review. *Amyotrophic Lateral Sclerosis and Frontotemporal Degeneration*, 22(1-2),1-11. doi: 10.1080/21678421.2020.1788094

Anestis, E., Eccles, F. J., Fletcher, I., & Simpson, J. (2021). Neurologists' current practice and perspectives on communicating the diagnosis of a motor neurodegenerative condition: a UK survey. *BMC Neurology, 21*, 1-9.

Gregg, J., Simpson, J., & Perez Algorta, G. (2021). What is the relationship between people with dementia and their caregiver's illness perceptions post diagnosis and the impact on help seeking behaviour? A systematic review. *Dementia: the International Journal of Social Research and Practice.*

Leigh, N., Simpson, J., & Eccles, F.J.R. (2021). Does a lack of social support and perceived stigma influence the relationship between motor neurone disease related stress and psychological distress? *British Journal of Health Psychology, 26,* 289-306.

Zarotti, N., Eccles, F.J.R., ….. Simpson, J. (2021). Psychological interventions for people with Parkinson's disease in the early 2020s: Where do we stand? *Psychology and Psychotherapy: Theory, Research and Practice, 94*, 760–79.

Simpson, J., Zarotti, N., … Eccles, F.J.R. (in press). It's a double whammy': A qualitative study of illness uncertainty in individuals with Parkinson's Disease in the context of COVID-19. *Chronic Illness.*

Dr Kate Slade, Lecturer, Lancaster Medical School

I work as a Lecturer in Psychology in the Sport and Exercise Science team. My research interests are in the psychophysiological and neural consequences of ageing, and hearing loss. In previous work I have sought to understand how excessive effort needed for listening, often experienced by people with hearing loss, is reflected in the body's physiological responses. In my current research in the Neuroscience of Speech and Action lab, we investigate the brain areas involved with speech processing and how these may be affected by age-related hearing loss using neuroscientific methods. We also explore the relationship between hearing loss, mental health, and cognitive decline, and how health inequalities may contribute to hearing loss in later life. Understanding the broad neural, physiological, and psychological impacts of hearing loss helps to shed light on the relationship between hearing ability and healthy ageing.

Twitter: @kateslade94

Recent publications:

Slade, K., Reilly, J. H., Jablonska, K., Smith, E., Hayes, L. D., Plack, C. J., & Nuttall, H. E. (2022). "The impact of age-related hearing loss on structural neuroanatomy: A meta-analysis." Front. Neurol., 13, 950997.

Slade, K., Kramer, S.E., Fairclough, S., and Richter, M. (2021). "Effortful listening: Sympathetic activity varies as a function of listening demand but parasympathetic activity does not," Hear. Res. 410, 108348.

Slade, K., Plack, C.J., and Nuttall, H.E. (2020). "The effects of age-related hearing loss on the brain and cognitive function," Trends Neurosci. 43, 810-821.

Professor Aneta Stefanovska, Professor of Biomedical Physics, Physics Department

Keywords: Nonlinear dynamics, non-autonomous dynamics, coupled oscillators, ageing, cell energy metabolism, endothelium

I study ageing through how things **function**, rather than through how they look, or what is their **structure**. For the study of function I develop theories and methods for non-autonomous, finite-time oscillatory dynamics. These are systems that have clock-like behaviour. When left alone these clocks can be very precise, but when there are two or more clocks then, due to interactions, they may mutually modulate each other's frequencies and amplitudes. The resultant time-variation of frequencies and amplitudes, leads to complex behaviour that looks chaotic or noisy. Although a great deal is known about autonomous oscillatory systems, much less is known about the non-autonomous case.   With my collaborators I am pioneering theories and algorithms to extract useful and deterministic information, mainly by following the ridges in time of the variable frequencies, and extracting information about the strengths of mutual couplings. Some of the algorithms that we have developed are available as the toolbox MODA (Multiscale Oscillatory Dynamics Analysis), written in MatLab and Python.

One of the main areas where I apply the new theories and algorithms is living systems. Nature abounds with clocks, and so does our body. Two well-known clocks are those of the heart beating and breathing. But there are many more oscillatory processes in our body, like the metabolic processes, or brain waves. So, by simultaneously recording activities in our body, we can then extract information of how healthy the clocks are and how well they mutually interact. Diseases, or ageing can be perceived as states when the interactions change.

To learn about these changes, I work in close collaboration with biologists, physiologists and clinicians, and have been involved in studies of anaesthesia, malaria, cancer, hypertension, dementia, and ageing. I am particularly interested in oscillations resulting from endothelial reactivity and cell energy metabolism. Metabolic changes affect all oscillatory processes, as it is they that provide energy for all of the clocks in our body. One of my current projects is on how neuronal and cardiovascular oscillations and couplings change with ageing, Alzheimer's and Huntington's diseases.

Selected publications

M Morris, S Yamazaki, **A Stefanovska** (2022) Multiscale time-resolved analysis reveals remaining behavioral rhythms in mice without canonical circadian clocks, *Journal of Biological Rhythms* **37** (3), 310-328

J Newman, A Pidde, **A Stefanovska** (2021) Defining the wavelet bispectrum, *Applied and Computational Harmonic Analysis* **51**:171-224

A Stefanovska, PVE McClintock, Eds, (2021) *Physics of Biological Oscillators: New Insights into Non-Equilibrium and Non-Autonomous Systems*, Springer

JR Adams, **A Stefanovska** (2021) Modeling cell energy metabolism as weighted networks of non-autonomous oscillators, *Frontiers in Physiology* **11**: 613183

G Lancaster, D Iatsenko, A Pidde, V Ticcinelli, **A Stefanovska** (2018) Surrogate data for hypothesis testing of physical systems, *Physics Reports* **748**: 1-60

LS Cox, PA Mason, MC Bagley, D Steinsaltz, **A Stefanovska**, A Bernjak, PVE McClintock, AC Phillips, J Upton, JE Latimer, T Davis (2014) *Understanding ageing: biological and social perspectives*. in The new science of ageing, pp 25-75 Policy Press, Bristol

Dr Caroline Swarbrick, Senior Lecturer in Ageing, Division of Health Research

Keywords: Dementia; participatory; co-research; qualitative

Research Overview:
My research interests focus on dementia, broadly ranging the trajectory from diagnosis to end of life. With a social science background, I am driving forward a research programme working in partnership with people living with dementia and care partners to develop a collaborative research agenda using creative methods and a co-operative inquiry methodology. We have recently completed our five-year ESRC/NIHR Neighbourhoods and Dementia Study, which produced a suite of films and an animation focusing on the effects of urban regeneration, incorporating reminiscence and life story. I organise the Centre for Ageing Research seminar series and currently supervise 15 PhD students.

Selected Publications:

Dowlen, R., Keady, J., Milligan, C., **Swarbrick, C.**, Ponsillo, N., Geddes, L. & Riley, B. In the moment with music: an exploration of the embodied and sensory experiences of people living with dementia during improvised music-making. *Ageing & Society*, 2021, First View, DOI: 10.1017/S0144686X21000210.

Swarbrick, C., Open Doors, Riley, C., Khetani, B. & Keady J. Reflections on the ethics of co-research alongside people living with dementia: a co-operative inquiry. SAGE Research Methods Cases – Health and Medicine, Part 1, 2020

Calvert, L., Keady, J., Khetani, B., Riley, C., Open Doors Research Group & **Swarbrick, C.** '... This is my home and my neighbourhood with my very good and not so good memories': The story of autobiographical place-making and a recent life with dementia. Dementia, 2020, 19(1): 111-128. doi: 10.1177/1471301219873524

McWilliams, L., **Swarbrick, C.**, Yorke, J., Burgess, L., Farrell, C., Grande, G., Bellhouse, S. & Keady, J. Bridging the Divide: The adjustment and decision-making experiences of people with dementia living with a recent diagnosis of cancer and its impact on family carers. *Ageing and Society*, 2020, 40 (5), 944-965.

Morbey, H., Harding, A., **Swarbrick, C.**, Ahmed, F., Elvish, R., Keady, J., Williamson, P.R. & Reilly, S. Involving people living with dementia in research: an accessible modified Delphi survey for core outcome set development. Trials, 2019, 20:12, doi.org/10.1186/s13063-018-3069-6

Swarbrick, C., Sampson, E. & Keady, J. Notes from the hospital bedside: Reflections on researcher roles and responsibilities at the end of life in dementia. Quality in Ageing and Older Adults, 2017, 18(3): 201-211, doi: 10.1108/QAOA-09-2016-0038

Swarbrick, C.M., Open Doors, EDUCATE, Davis, K. and Keady, J. Visioning change: Co-producing a model of involvement and engagement in research. Dementia: the international journal of social research and practice (Innovative Practice), 2016, published on-line first: doi: 10.1177/1471301216674559

Dr David Tod, Lecturer, Lancaster Medical School

David's research focuses on applied psychology in exercise, physical activity, and sporting contexts, with an interest in how to enhance the delivery of applied psychology interventions to ensure that people engaging in physical activity, exercise, and sport find their participation meaningful and rewarding. He also conducts research on the interactions between people's self-perceptions and their engagement in exercise, physical activity, and sport, along with how these change with aging. David also has expertise in qualitative research and systematic reviewing.

Recent publications include:

Edwards, C., Molnár, G., & Tod, D. (2022). Searching for ontological security: women's experiences leading to high drive for muscularity. *Qualitative Research in Sport, Exercise and Health*, *14*(4), 609-627.

Lange-Smith, S., Cabot, J., Coffee, P., Gunnell, K., & Tod, D. (2023). The efficacy of psychological skills training for enhancing performance in sport: a review of reviews. *International Journal of Sport and Exercise Psychology*, 1-18.

Tod, D., Booth, A., & Smith, B. (2022). Critical appraisal. *International Review of Sport and Exercise Psychology*, *15*(1), 52-72.

Tod, D., Pullinger, S., & Lafferty, M. (2022). A systematic review of the qualitative research examining stakeholders' perceptions of the characteristics of helpful sport and exercise psychology practitioners. *International Review of Sport and Exercise Psychology*, 1-25.

Emmanuel Tsekleves , Professor in Global Health Design Innovation, LICA; Co-Director of the Future Cities Research Institute, Lancaster University

Keywords: Design for health, wellbeing, ageing well

I lead research at the intersection of design, health, wellbeing and technology.
My research is driven by life's mission to show there is always an alternative way of doing things, so that together we can change our world.
How I conduct research:
Take the unconventional perspective – see challenges from a different angle and open up to doing things in a different way;
Push the boundaries – innovation lies in the boundaries of disciplines. Push and live outside of the boundaries every day;
Learn something from everyone – be open to the ideas and points of views of others; they all have something to teach us;
Take a global perspective and do what is right – always do what is globally, environmentally, socially and ethically good;
Find the positive in everything – when things look like they are going wrong, look for what's going right;
Take action – take action today even if it is imperfect.

What I do:

- Driven by the UN's Sustainable Development Goals, my research focuses on tackling community health challenges across the world. Examples of this include:
    o working on understanding how to best clean the home for preventing infection caused by dust at homes in Ghana (DustBunny project);
    o developing health and care policies for senior citizens in Malaysia through creative ways (ProtoPolicyAsia),
    o engaging local communities and stakeholders on water, sanitation and hygiene initiatives in Angola and Cameroon via an international network (WASHable);
    o engaging schoolchildren and students in Ghana and Nigeria in co-developing show labs, that showcase the benefits of turning waste to electric energy that can power their school (ACTUATE);
    o developing new seafood products for senior citizens across Europe and influencing policy (SeaFoodAge).
- Conduct cross-disciplinary research by always working with the recipients of health interventions aimed at improving the quality of life and wellbeing of people into old age, including people with chronic health problems (i.e. Dementia, Parkinson's, Stroke). – see the SODA and Ageing Playfully projects.
- Explore how creative ways, such as speculative design enable citizens and governments engage in policy agenda setting on health and ageing in developed and developing nations – see the ProtoPolicy and ImaginAging projects.
- Generate public interest and attract media attention of national press, such as the Daily Mail, Daily Mirror, The Times, the Daily Mail, Discovery News and several other international online media outlets. Blog regularly for The Guardian and The Conversation on the design and use of technology in Health.

Professor Ian Walker, Professor of Economics, Lancaster University Management School

Ian has been recently collaborated in work on several health-related issues. His main field is education economics but has wider interest in human capital more generally – such as around health.

Asako Ohinata (MRC post doc, now at Leicester U, co-supervised with Bruce Hollingsworth in DHR)

Asako investigated the **supply of informal care** – that is, **caregiving** usually provided by a friend of family member. This something that is very relevant to the current care debate in England. Our work compared caregiving in Scotland and England before and after the 2002 Scottish reform that introduced free formal personal care for the elderly.

Our first paper (Ohinata et al, "The impacts of free universal elderly care on the supply of informal care and labour supply", **Oxford Bulletin of Economics and Statistics,** 2021) investigates the impact on caregiving behaviour of a policy reform which introduced "free" (to the recipient) *formal* personal care for the elderly in Scotland, but this did not happen in England & Wales. These results are not very supportive of the argument that free formal care increases the amount of care provided – the formal care provided for free seems to *crowd out* informal care that was previously freely provided. On the other hand, the resulting reduction in informal labour supply led to an increase in formal labour supply. This is encouraging, since the increase in paid work brings with it additional tax revenue that partially offsets the additional exchequer costs of the free formal care. This implies that free care might not be as expensive for the exchequer as would first appear. In **follow-up work** we are attempting to quantify this "saving.

The policy also provided for free residential care – and one might expect that, at the margin, some of the elderly who received non-residential care might move into residential care. There is very limited data on the population in residential care and we are not able to model the extent to which there has been migration into residential homes. It could be the reduction in the costs of residential care might have been insufficient *relative* to the fall in the costs of non-residential care to result in quantitatively important changes in the location of the elderly. On the face of it, the Scottish care home population did not grow over the period around the reform.

The work begs the question of how the health of informal carers is affected by providing informal care, and how the health of the elderly might be affected by being cared for by a formal carer rather than informal carers. This is *on our to-do list*.

Emma Gorman (ESRC PhD student, now at Westminster U, co-supervised with Zucchelli in DHR)

Emma (in Gorman, 2017. "Schooling, occupation and cognitive function: Evidence from compulsory schooling laws," SocArXiv t647a, Center for Open Science) shows that the effect of ageing on cognition is **causally** affected by one's education level when young. The research compares those people who are currently elderly, but who reached the age 15 just before the English minimum school leaving age was raised in 1972 from 15 to 16 (and so were allowed to leave at 15), with similarly elderly people who were born a little later (and were forced to say at school to age 16.) The findings show that having an extra year of schooling greatly improves the later life memory of the elderly (by up to one-half of a standard deviation). There is only limited evidence of causal effects of schooling on measures of verbal fluency and numeric ability - but the increases in mandatory schooling led to improved performance on memory tests many decades after schooling completion.

Education levels have continued to rise and the implication is that investments in education may continue to yield large payoffs as populations age. Estimates of the future incidence of dementia, based on population ageing, may be exaggerated because of the confounding effect of the large rises in education levels that have occurred over time.

Other research (Gorman and Walker, 2021, "Heterogeneous effects of missing out on a place at a preferred secondary school, **Economics of Education Review**), analysed a large sample of a birth

cohort of young people followed through secondary school and up to age 25. We found that missing out on a place in your most highly ranked secondary school has little effect on educational attainment - but it had important adverse effects on smoking participation and mental health at age 25. How big the effects were was affected by the nature of the way in which school choice had been conducted – and supports current policy in England.

In a third paper (Gorman et al, 2021, "Adolescent School Bullying Victimization and Later Life Outcomes", **Oxford Bulletin of Economics and Statistics**) we explore the same cohort study but look at the effects of being bullied. The survey asks about bullying in great detail from age 14 to 16. We assess the effects of bullying victimization on short- and long-term outcomes, including educational achievements, income and mental ill-health at age 25 years. The detailed longitudinal data, linked to administrative records, allows us to control for many of the determinants of child outcomes that have been explored in previous literature, and we employ comprehensive sensitivity analyses to assess the potential role of unobserved variables. The pattern of results suggests that there are quantitatively important detrimental effects on victims. We find that both type of bullying (violent vs not) and its intensity matter for high-stakes educational outcomes at 16 years, but also for long-term outcomes at 25 such as mental health and income.

Dr Jess Wang, Lecturer, Department of Psychology

I study the cognitive basis for social interactions. I am very keen to understand the ways in which we succeed or fail to account for others' perspectives during communication at various stages of the lifespan. I have completed a project funded by the British Academy and the Leverhulme Trust, examining the interactions between age-related changes in working memory capacity and verbal ability, and their implications on perspective-taking. The latest findings will be presented at the European Cognitive Ageing Conference in Leuven, Belgium. I am also fascinated by the variability in cognitive ageing across cultures and age groups.

Dr Qian Xiong, Lecturer in Ageing, Division of Health Research

Areas of Interest:
Migration and mortality, social determinants of health and well-being, life course, gender, ethnicity and race, social relationships, carers' experience, quantitative research methods

Research Overview:
My academic background is in Sociology and Demography. I am a quantitative researcher by training and have expertise in demographic and statistical methods. I had experience in researching fertility, migration, sexuality, ethnicity and residential segregation. Now I aim at developing relevant fields in Gerontology, including residential segregation, urbanisation and migration, gender and ethnic inequalities in ageing and dementia care.

I am interested in these research areas: (1) global ageing issues and cross-country studies, particularly researching on the demographic dynamics (especially migration, mortality and residential segregation) of population ageing; (2) the impact of social, demographic and environmental determinants on health and wellbeing in later life from the life course perspective; (3) intervention studies for delaying frailty and promoting healthy and active ageing across the life course; (4) the carers' experience of caring for older adults with dementia in different cultures; (5) integrated health and social care delivery for supporting older people living independently at home.

I have led a small project on the cultural understanding of dementia and the caring experiences for older people with dementia in China, funded by Global Challenge Internal Seed Corn Grant 2018, Lancaster University Research Committee. I collaborated on studies on the efficacy of musical therapy and Tai Chi exercise for older people with dementia in China. I collaborated on a project on comparing healthy and active ageing outcomes between China, South Korea and EU countries. I have published journal papers using large-scale social surveys data, official statistics and small clinical trial data.

I currently supervise MSc and PhD students whose projects span over areas of informal caregiving for people with dementia, early life experience and loneliness, Covid-19 transmissions among healthcare workers and patients, dry age-related macular degeneration and the relationship-based domiciliary care and loneliness of older people.

Zsuzsanna Balogh, NIHR ARC NWC funded Doctoral Student, Division of Health Research

Supervised by Professor Carol Holland, Dr Jasper Palmier-Claus and Dr David Tod.
PhD Title: The impact of physical activity on the mental wellbeing of bereaved older people (carers and non-carers)

The overall aim of the PhD research project is to improve the understanding of the relationship between physical activity, mental health, and bereavement and coping in older adults, focusing on loss of lifetime partner. It consists of a systematic literature review and two studies. The systematic literature review explores existing research on impacts of physical activity on bereavement, mental health and wellbeing among older people. Study 1 uses secondary data from the English Longitudinal Study of Ageing (ELSA) to examine the relationships between physical activity, bereavement, mental health and quality of life among older people. Study 2 uses life course interviews to explore the relationship between physical activity, bereavement, coping and mental health in people who have been carers for their deceased loved ones and those who have not, and aims to understand the role of physical activity as a potential coping process in bereavement.

Mags Conroy, ESRC Funded PhD candidate, Department of Sociology

Working Title of PhD:

Living with the Impact of Intimate Partner Violence: A Cross-Case Intersectional Analysis of the Experiences and Support Needs of Older Women.

Supervised by Professor Corinne May-Chahal and Dr Lisa Morriss

Key words: Intersectionality, life course theory, ageism, ableism, intimate partner violence, older women, narrative inquiry.

There are now 11.8 million people aged 65 or over in the UK, 1.6 million are aged 85 or over and approximately 70% of these are women (ONS 2018). However, older women, described as "invisible victims" of domestic violence, are one of the largest groups not accessing domestic abuse services (Carthy and Taylor 2018). Given these demographics, alongside there currently being over 2 million older women providing unpaid care in the UK, the context in which women age and live with the impact of IPV is a pressing research priority.

The aim of this research is to better understand the lived experiences of older women, who are living with the impact of intimate partner violence (IPV). The study also aims to gain critical insight into front-line service providers' understanding around the intersectional nature of these experiences.

Using narrative inquiry as a qualitative methodology, alongside a theoretical framing around intersectional life-course theory, the 1st phase of the study involved in-depth narrative interviews with a diverse range of older women, each of whom have had unique experiences of living with the impact of IPV. Focus groups were then held with a range of practitioners and voluntary sector workers. A short film, scripted from the voices of the women from phase I, was played during these focus groups, as a springboard for discussion. Developing shared understandings could hold potential for improvements in multi-agency collaboration in this field. It is envisaged that a practice tool-kit will be produced following the findings from this study. Dissemination will also be via workshops with relevant stakeholders.

Nicholas Davison, EPSRC DTP-funded Doctoral student, Lancaster Medical School

PhD title: VCSEL-based spectroscopy for next generation glucose monitoring
Keywords: Glucose monitoring; Near Infrared (NIR) spectroscopy; Diabetes; Photodetectors; Optical sensing systems; VCSELs

Supervised by Dr Chris Gaffney (Lecturer in Integrative Physiology, Lancaster Medical School), Dr Jemma Kerns (Senior Lecturer and Director of Research, Lancaster Medical School) and Dr Qiandong Zhuang (Reader, Physics Department).

My EPSRC-funded project aims to develop a non-invasive glucose sensing device based on Near Infrared (NIR) absorption spectroscopy. The project is based in both the Physics Department and Lancaster Medical School, facilitated by Material Science Lancaster.

Accurate measurement of blood glucose is important in the management of diabetes but is currently measured using painful, inconvenient, and invasive finger-prick methods. Non-invasive glucose measurement could greatly improve self-management of diabetes and I believe that Near Infrared (NIR) spectroscopy, in the 700-1800nm region, is one of the most promising technologies for this purpose due to its high penetration depths and the well-established range of simple NIR light sources and photodetectors. My research aims are to develop VCSEL-based spectroscopy for glucose sensing in the Near Infrared region, drawing on expertise with NIR detectors and sources in the physics department and aiming to develop a final prototype device which could be used in a clinical setting. Specifically, the project aims to consider the following points:

- Analyse a variety of currently-available NIR detector and source technologies to identify wavelength bands at which glucose absorption can be observed and quantified.
- Develop a bespoke spectroscopy platform for NIR absorption spectroscopy of liquid-based samples containing physiologically-relevant concentrations of glucose.
- Translate the NIR system for analysis of simple scattering-based tissue phantoms.
- Optimise the system design to develop a prototype device.
- Compare the system performance to other currently-available spectroscopy technologies, such as Raman spectroscopy.

The research phase began in late 2020 and remains ongoing. To date, I have investigated the sensing accuracy of a series NIR spectroscopic components, aiming to maximise the resolution of the technique. Using an InGaAs photodiode, dispersive monochromator and globar light source, a 2mmol/L sensing resolution has been achieved in aqueous solution. I have also carried out studies of absorption and scattering by glucose in 10% intralipid emulsion and am working on adapting the system for diffuse reflectance measurements to enable sensing in phantoms and the long-term goal of an *in vivo* non-invasive sensor device.

Aaron Warner, supervised by Dr Jasper Palmier-Claus, Prof Carol Holland, Prof Fiona Lobban and Dr Elizabeth Tyler

Project background

Older adults with bipolar disorder are a particularly vulnerable group, as they commonly experience increased physical health challenges alongside the chronic mental health difficulties associated with bipolar disorder. In addition, research suggests they are also at risk of accelerated cognitive decline in comparison to the general population.

Despite research indicating that older adults with bipolar disorder experience unique challenges and fluctuating care needs, NICE guidelines still suggest that this group should be offered the same treatments as younger groups with bipolar disorder. Consequently, the care that older adults with bipolar disorder receive may be ineffective and inadequate, resulting in poor outcomes and diminished quality of life for this group. Further research is required to improve our understanding of how to enhance care and support for older adults with bipolar disorder in later life.

Aims

This project aims to better understand the priorities and presenting needs of older adults with bipolar disorder to improve the care they receive.

Four studies will be completed:

1. Physical health comorbidities in older adults with bipolar disorder: A systematic review
2. What does it mean to age well with bipolar disorder: A qualitative study using photo elicitation
3. The changing care needs of older adults with bipolar disorder in later life: A narrative analysis
4. Predictors of quality of life in older adults with bipolar disorder: A secondary analysis of The English Longitudinal Study of Ageing data

Overall, this PhD project aims to provide a vital first step in developing our knowledge about the health inequalities faced by older adults with bipolar disorder. Our findings will potentially highlight the essential adaptations that are needed to improve care and alleviate the challenges faced by this group. This may help to enhance the quality of life for older adults with bipolar disorder, reduce disability and enable them to live meaningful lives as they age.

Radek Wincza, Departmental student, Department of Psychology

Supervised by Professor Trevor Crawford (Deputy Director of Lancaster University Centre for Ageing Research), Dr Sally Linkenauger, and Dr Calum Hartley.

My research focuses mainly on understanding the imperfections of our visual perception and how it can differ from physical reality. To do so I am extensively researching visual illusions, a phenomenon that offers a unique window to understanding how our perception works. My previous projects have investigated how the perception of visual illusions is affected by development, genetics, mental health disorders, like schizophrenia or autism, and visual expertise. Lately, I became interested in the methodological differences in research on visual illusions as well as eye movements while observing visual illusions. My PhD project is a continuation of my previous research and explores visual disturbances in Parkinson's disorder, effects of visual illusions on action and perception, and the role of aging and expertise on how we perceive visual illusions.