Annual Report: May 2020

Alzheimer Scotland Dementia Research Centre

www.alzscotdrc.ed.ac.uk

@AlzScotDRC

providing a high quality environment
for dementia research

THE UNIVERSITY OF EDINBURGH

Alzheimer Scotland
Action on Dementia

Contents

Welcome 4

Members and Staff 5

Research Members' Activities 6

Collaborations and External Funding 28

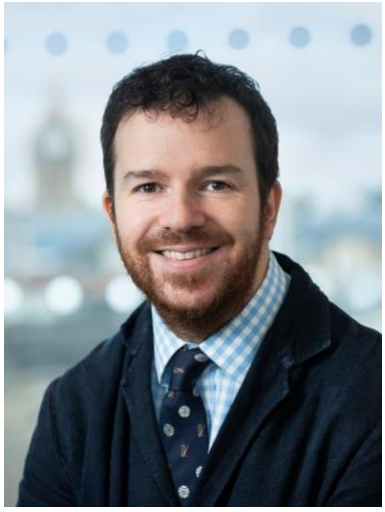
Dementia Brain Tissue Bank 29

Mapping the Alzheimer's brain: major new project to discover disease mechanisms 29

altmetric.com 32

Centre members' publications on PubMed 35

Welcome



Dr Tom Russ
Director, Alzheimer Scotland Dementia Reseach Centre

It is a great pleasure to welcome you to this annual report for 2019–20, Phase 2 of funding of the Alzheimer Scotland Dementia Research Centre (ASDRC), in partnership with the University of Edinburgh. These are far from normal times but we are endeavouring as a Centre to continue with our research — despite the global COVID-19 pandemic — as much as is possible.

While many of our projects have been able to continue with remote working, the work of the Brain Tissue Bank has had to be temporarily paused. The NHS Neuroprogressive and Dementia Network staff who recruit potential donors have either been redeployed to clinical services or are no longer permitted to visit people at home. And as I write, the post-mortem suite at the Royal Infirmary of Edinburgh is being used as part of the response to COVID-19 and so no research post-mortem examinations are currently possible.

In addition to our presence on Twitter (currently 1353 followers) and the web, we have been exploring the ways in which the ASDRC can be more outward facing, bringing Alzheimer Scotland much-deserved credit for the work that they support at our centre. I have tried to make this report more accessible and intend to circulate it more widely than before. For instance, we quite regularly receive small charitable donations from a variety of sources for which we are most grateful. As well as sending a letter of thanks, we will now include a copy of this report to show the research that these donations fund. We had hoped to produce a professionally-designed and printed report but this will have to wait until some degree of normality returns.

Similarly, we had planned a public meeting in May for approximately 200 delegates to launch this annual report and to celebrate our past PhD students. We had invited several former students — now working across Scotland, the rest of the UK, as well as in Spain and the USA — to return to Edinburgh to describe their doctoral projects work at the Centre and what they are now doing. We still hope to hold this meeting, possibly later this year.

In a similar vein, the ASDRC now has responsibility for supervising the research activity of all NHS registrars in Old Age Psychiatry in South-East Scotland. We have created a new grade for them — *Alzheimer Scotland Research Affiliates* – and feel that they are a very good fit with us.

We congratulate Ruth Sibbett on handing in her PhD thesis (though her viva will be postponed until a time when face-to-face examinations are again possible) and bade a sad farewell to Steph West while welcoming back Denise Munro as our administrative secretary.

Members and Staff

Director	Dr Tom Russ
PhD Students *ASDRC unless stated*	Ms Helen Corby (ESRC) Dr Sahan Mendis Dr Donncha Mullin (Psychiatry – starting July 2020) Mr Jure Mur (Lothian Birth Cohorts) Dr Luisa Parkinson Dr Martha Pollard Ms Rose Vincent (ECRED) Dr Katherine Walesby Mr Miles Welstead (Lothian Birth Cohorts)
MSc Students	Ms Anna Bryan (Music)
Alzheimer Scotland Research Affiliates *NHS trainee doctors* *in old age psychiatry*	Dr Stephen Foster Dr Duncan Gray Dr Meroe Grove Dr Carol Sherriff Dr Lucy Stirland Dr Georgina Weatherdon
Associate Post-Doctoral Fellows	Dr Jenni Burton (Glasgow) Dr Lucy Hiscox (Delaware, USA) Dr Harriet Ingle (Glasgow Caledonian) Dr Lewis Killin (NHS/UoE) Dr Sarah McGrory (UoE) A/Prof Mario Parra-Rodriguez (Strathclyde) Dr Ratko Radakovic (East Anglia) Dr Keith Smith (UoE)
Other members	Professor David Batty (UCL)
Administrative Secretary	Ms Denise Munro/Mrs Stephanie West
Brain Tissue Bank Technician	Ms Julie O'Shaughnessy

Research Members' Activities

Helen Corby
PhD Student (ESRC-funded)
September 2017—Present

Supervisors:
Dr Tom Russ
Dr Chris Dibben (GeoSciences)
Dr Matthew Iveson (Psychology)

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Scottish Graduate School of Social Science
Sgoil Cheumnaichean Saidheans Sòisealta na h-Alba

Research Summary

I am researching the things that people who need social care in old age have in common. This might suggest possible areas where we can help older people maintain their independence longer or identify certain groups who need more care than others in old age. I am using the Scottish Longitudinal Study (a random sample of about one twentieth of the Scottish population which is anonymously linked to data from the UK Census).

I am particularly interested if any of these things changed following the introduction of the free personal and nursing care policy in Scotland in 2002. If these things have changed, this could tell us about how the policy benefits people, possible short-comings of the policy, and in-equalities in who benefits from the policy.

I am also interested in understanding how informal care provided by friends and family members living within the household might help older people maintain their independence. With an increasing number of older people living alone in recent times, is losing this source of informal care going to increase the need for social care provided by care services and care homes?

Research Highlight

I was accepted onto the Scottish Graduate School for Social Science's Internship Scheme and was placed in the Scottish Government. I worked in the analysis team within the Children and Families Department there on a three month project. My project involved updating research measuring adversity in childhood for Scottish Children. I really enjoyed my internship and gained valuable skills I can use in my own research as well as getting to experience a research career outside of academia.

Public Engagement

1. UK Census Longitudinal Studies Conference 2019, Queen's University Belfast, Belfast
   The Arthur's Seat Effect: Why living in the quiet leafy suburbs might be linked to care home entry in old age: A longitudinal analysis of the factors associated with receiving formal care for the elderly in Scotland (19th April 2019, presentation)

2. UK Census Longitudinal Studies Conference 2019, Queen's University Belfast, Belfast
   The Arthur's Seat Effect: Why living in the quiet leafy suburbs might be linked to care home entry in old age: A longitudinal analysis of the factors associated with receiving formal care for the elderly in Scotland (19th April 2019, poster)

3. Voice of Young Science: Standing Up for Science workshop , Edinburgh (20th September 2019, workshop)

4. Society for Longitudinal and Lifecourse Studies International Conference 2019, University of Potsdam, Germany
   The Arthur's Seat Effect: Why living in the quiet leafy suburbs might be linked to care home entry in old age: A longitudinal analysis of the factors associated with receiving formal care for the elderly in Scotland (25-27th September 2019, presentation)

Publication

Later this year a report from my internship research will be published by Scottish Government.

Sahan Mendis
Clinical Research Fellow
February 2019—Present

Supervisors:
Dr Tom Russ
Dr Graciela Muniz-Terrera (Centre for Clinical Brain Sciences)

Alzheimer Scotland
Action on Dementia

Research Summary

Sahan is a PhD student who is researching the Lothian Birth Cohort 1936 dataset who were aged 70 when recruited and are now in their mid-80s. In his current phase of work, he will be exploring possible links between socioeconomic status and neuroimaging changes in later life within this dataset. This is a very important area of research because there is emerging evidence suggesting that an individual's socioeconomic status may have a significant impact on cognitive function with age. Socioeconomic status can also be measured in various ways such as through individual-based measures (e.g. occupation), area-defined levels (such as area deprivation), and these can be measured at different points in life such as childhood, adulthood, and later life. Thus, analyzing the Lothian Birth Cohort 1936 may provide further insights into how the above points may influence neuroimaging changes in older age.

Research Highlight

- During his PhD, Sahan has taught University of Edinburgh medical students during their psychiatry attachment and wrote a blog for the Alzheimer Scotland 2019 Conference: '118 years after the first diagnosis of Alzheimer's disease – Where are we now?'
- Another highlight was attending the Centre away day in September 2019. This was a valuable opportunity to present his planned research and receive constructive feedback on it.

Donncha Mullin
@doctormullin
Clinical Research Fellow (funded by the Royal College of Psychiatrists and the Masonic Charitable Foundation)
Starting July 2020

Supervisors:
Dr Graciela Muniz-Terrera (Centre for Clinical Brain Sciences)
Dr Tom Russ

Donncha Mullin is a Psychiatry trainee and exercise enthusiast, having qualified first as a Physiotherapist before studying Medicine. He can be found running in the hills of Scotland but is native to Ireland. Dr Mullin undertook his Psychiatry Core Training years in Edinburgh but still feels a strong affinity to Glasgow, where he studied at undergraduate level.

Current Role

Dr Mullin is currently volunteering for the academic year 2019/20 in Malawi as an Assistant Clinical Lecturer in Psychiatry. This role involves organising the mental health teaching and examinations for year 4 and 5 medical students at the College of Medicine, University of Malawi. The role includes the teaching of postgraduate psychiatry trainees in Malawi also, partly by developing an e-learning platform to allow distance learning and Dr Mullin is taking the lead in rewriting the postgraduate mental health curriculum. The post comes with varied and extensive leadership and management responsibilities and includes a significant clinical responsibility at Queen Elizabeth Central Hospital, Malawi, where Dr Mullin trains medical students in psychiatric assessment and management.

Research

Dr Mullin was recently awarded a 3-year clinical fellowship PhD from the Royal College of Psychiatrists and Masonic Charitable Foundation to commence in July 2020 with the project:

Development of a polygenic risk score of motoric cognitive risk syndrome for early identification of individuals at high risk of dementia

Clinical Importance

Dementia will be an enormous public health issue in the future but there is still no effective drug treatment. Preventing even a small number of cases will reduce people's suffering and have massive savings for society. Dementia is a condition with a collection of symptoms including memory loss, thinking difficulties, problems with language and behavioural changes. Most experts agree that the origins of dementia lie many years, even decades, before people notice these symptoms.

However, what can be picked up in these early years is that people's walking speed will have slowed and they will report some thinking difficulties. Combining these two symptoms is called **Motoric Cognitive Risk** (MCR) syndrome and it forms a very accurate way of predicting who will go on to develop dementia years later.

Measuring walking speed and enquiring about thinking difficulties is a quick, cheap, and easy thing to do in clinic to help identify people at risk of developing dementia early. Once people who are at a high risk of developing dementia are identified, they can make changes to their lives and circumstances and plan for their future while they are still young and healthy. There is a lot of promising work looking at ways of delaying the onset of dementia such as combining physical and brain training which could be used.

We do not know if MCR syndrome can be attributed to someone's genes and it is important to look at this in detail to see if there are any other areas that we could target to reduce the risk of developing dementia.

Research Plans

Dr Mullin will use two large UK datasets to explore the relationship between MCR syndrome and brain health (using measures of walking speed, memory, and thinking). He will use the largest dataset (UK Biobank) to look at the natural variations in the code that makes up the genes of 500,000 different people to see which of these genetic variants are associated with MCR syndrome. Dr Mullin will combine these variants to get a personalised risk score for the development of MCR syndrome which he will then test out in over 1,000 people in a separate dataset (the Lothian Birth Cohort 1936). This could identify targets for treatment or prevention to ultimately contribute to a decreased number of people living with dementia worldwide.

Public engagement activities

Dr Mullin can be found on twitter @doctormullin and has also blogged about research on the National Elf Service site https://www.nationalelfservice.net/author/donncha-mullin/.

In April 2019, Dr Mullin was selected as a Wellcome-Gatsby Travelling Fellow to attend the British Neuroscience Association Festival in Dublin. He recorded the experience and development of the travelling fellows and created a poster which was presented at the Royal College of Psychiatrists Annual Medical Education Conference in Glasgow, Sept 2019: *Connecting with the brain: promoting engagement of psychiatrists with neuroscience.*

Publication

- **Stirland LE**, González-Saavedra L, **Mullin DS**, Ritchie CW, Muniz-Terrera G, **Russ TC** (2020) Measuring multimorbidity beyond counting diseases: systematic review of community and population studies and guide to index choice. *British Medical Journal.*

Jure Mur
PhD Student, Lothian Birth Cohorts
August 2019—Present *(Wellcome Trust-funded)*

Supervisors:
Dr Tom Russ
Dr Simon Cox
Dr Riccardo Marioni
Dr Graciela Muniz-Terrera (Centre for Clinical Brain Sciences)

Research Summary

My main research interests are environmental risk factors in health and disease, especially in relation to cognitive decline and dementia. My current focus lies in studying the prevalence and consequences of the use of anticholinergic drugs. These are a group of prescription- and over-the-counter medicines that are commonly prescribed for many different conditions. Anticholinergic drugs block the activity of the receptor for acetylcholine, a prominent neurotransmitter that cells in the brain and other parts of the nervous system use to communicate with one another. Past studies have demonstrated links between the use of anticholinergic drugs and various adverse outcomes, including poorer physical and cognitive performance, and an increased risk of dementia. Moreover, these drugs often have many side effects that are especially prominent in older adults. It is currently unclear what the long-term prevalence of anticholinergic prescribing is in the UK, nor do we understand the biological underpinnings of the drugs' effects. In my research I utilize databases that survey in-depth information on sociodemographic- and biological characteristics of large numbers of people (UK Biobank and the 1947 Scottish Mental Survey Cohort from which the Lothian Birth Cohort 1936 are drawn). I use these data to explore patterns in prescribing of anticholinergics drugs and how it relates to people's health.

Research Highlight

- A study on whether blood methylation – a type of epigenetic modification – is associated with dementia or with risk factors for cardiovascular disease.
- Exploraing changes in the prevalence of anticholinergic prescribing in the UK,1989 to 2017.

Public Engagement

- Science Alive Gala Day, as part of the Midlothian Science Festival 2019. Activities included educational games for children and explaining the functioning of the brain and neuroscience.
- Speaking at a Dementia Café in Dunbar. This included talking about my research to people with dementia and their friends and relatives.

Publications

- **Mur J**, McCartney DL, Walker RM, et al. (2020). DNA methylation in APOE: The relationship with Alzheimer's and with cardiovascular health. [Manuscript submitted]

Luisa Parkinson
PhD Student
November 2018—Present

Supervisors:
Dr Tom Russ
Dr Finn Lindgren (Maths)

Alzheimer Scotland
Action on Dementia

Research Summary

I am researching how the environment we experience during our lives can affect our risk of developing dementia in later life. This might suggest ways to change our environment to reduce the risk of developing dementia for future generations.

We know that where you live can affect your risk of developing dementia and that living in areas with high air pollution or with certain things in the drinking water can increase your risk of developing dementia. However, most of this work is based on the environment people are exposed to in later life. The environment we are exposed to changes throughout our lives either due to us moving or due to areas changing around us. The brain changes that progress to dementia start many years before the onset of signs of dementia. I am interested in understanding when exposure to a poor environment has greatest effect on our risk of developing dementia. Does it have greatest effect from a certain period of life, such as childhood, mid-life, or later life, or are effects from across a whole life course important.

I am currently focusing on two areas that are important to my research. The first is understanding how to combine environmental data with dementia data in a statistical model to give the maximum information about how the environmental factors are influencing dementia risk. The second is identifying older sources of environmental data to cover the childhood and mid-life periods for people who are now in their eighties (e.g. the Lothian Birth Cohort 1936) and where necessary working out how to convert this data from paper to digital format.

Research Highlight

- Obtaining a favourable opinion letter from the NHS Research Ethics Committee to enable me to undertake the research on environmental risk factors for dementia in the study cohort

Public engagement

I had the opportunity to chat about my research with the Dalkeith and Musselburgh Dementia cafés and understand their thoughts on what aspects of the environment may have an influence on the risk of developing dementia based on their own experiences.

Martha Pollard
@slantinglight
PhD Student
December 2018—Present

Supervisors:
Dr Tom Russ
Prof. Heather Wilkinson (Health in Social Science)
Revd Dr Harriet Harris (Chaplaincy)

Alzheimer Scotland
Action on Dementia

Research Summary

'What feels like freedom?' Views and experiences of liberation in psychiatric settings explored from four perspectives: people living with dementia, carers, medical staff, and spiritual care staff.

A substantial and expanding body of research, policy, and practice initiatives to improve the experience of care for people with dementia has shown the importance of person-centred care in supporting well-being. Especially complex medical, social, and ethical issues arise in psychiatric settings where issues of restriction and freedom may operate in balance or conflict. To date, a limited amount of research has been conducted which directly explores ideas and experiences of freedom from differing perspectives: people living with dementia, carers, medical staff, and spiritual care staff. Using qualitative methodology, this research aims to explore freedom and dementia in psychiatric (residential) settings from these multiple perspectives. It will focus on what people experience as more freeing, and less freeing, in medical, social, interpersonal, and spiritual ways, drawing on the frameworks and concepts of disability and liberation theologies, in addition to social science and medicine. Hearing the voice of people living with dementia in such settings, triangulated with the perspectives of others, is vital for learning more about ways to support human rights and the least restrictive options in care within a setting that is locked for safety. This is the first research that has asked these questions about freedom and liberation in such settings, and from triangulated perspectives including the person living with dementia.

Research Highlight

Pilot explorations of 'what feels like freedom' with a group of carers and people living with dementia; and a public audience. The topic was of strong interest to the groups and responses suggested themes about the freeing nature of creativity such as music, singing, poetry, and meditative practice; the sense of freedom arising from empathic listening and communication; and conversely the feeling of decreased freedom because of difficulty expressing oneself; being 'ordered around;' hearing unkind words being spoken about others; and recalling time in the National Service. An additional exploration with a chaplain working in psychiatric setting revealed both overlapping and differing themes from that of carers and people living with dementia; with an equally high level of interest in freedom.

Publications, outreach, and presentations

- Blog about the Medicine of the Person conference on the theme 'Patients Without Capacity' held in the Czech Republic in July 2019, jointly written with a fellow Edinburgh PhD conference delegate also researching the experience of dementia. The society's interest is in treatment of the whole person, including medical, social and spiritual and it continues the work of the late Dr Paul Tournier. The talks shared best practice as well as case studies of ethics issues and their resolution. I was invited to speak at the 2020 conference in the Netherlands, on the theme of 'Solitude and Isolation in Health Care.'
- 'Creativity, Interaction and Dementia' public workshop for Dementia Friendly Pentlands, June 2019, as part of Dementia Awareness Week.
- 'Hope, Dementia and Degrees of Freedom': presentation/outreach session for Midlothian Science Festival, 10 October 2019, as part of themed session called 'Think: Memories and Music.'

COVID-19 UPDATE: In response to the rapidly-changing situation with COVID-19, Martha's research has turned to the impact of social distancing measures on persons living with dementia and carers in community settings. Her research will explore ideas and experiences of freedom in relation to sheltering/lockdown, from perspectives of persons living with dementia, and carers. She is in the process of applying for ethical approval for this sub-project.

Luisa and Martha were both featured in the *'Early Career Researchers Spotlight'* in the Scottish Dementia Research Consortium Annual Report 2019/20 (www.sdrc.scot/annual-report-2019-20):

Luisa Parkinson

I am in my second year of my PhD in the Alzheimer Scotland Dementia Research Centre at the University of Edinburgh, investigating environmental risk factors for dementia.

Prior to this I gained my undergraduate degree in Veterinary Medicine and Physiology at the University of Cambridge and worked both in first opinion practice and clinical research.

Dementia is a complex condition, with genetics, lifestyle and environmental factors all playing a role in whether an individual develops it. There is also a variation in your risk of developing dementia based on where you live. My project aims to explore the amount of this geographic variation that is explained by environmental factors and whether the effects of environmental factors are stronger in a specific life period, such as childhood, or are cumulative over a lifetime.

I am currently investigating how different spatio-temporal modelling methods affect the results of an analysis using data on deaths with dementia in Scotland. The aim is to better understand how arbitrary modelling decisions influence the results and how best to minimise these effects to ensure that the results are robust. There are several areas where legislators feel that the evidence linking environmental factors to dementia is currently insufficient to allow them to bring in new policies.

If my PhD project could add to the evidence and help to get legislation in place to reduce the risk of developing dementia for future generations, that would be a fantastic outcome.

Martha Pollard

I am currently undertaking a PhD studentship funded by the Alzheimer Scotland Dementia Research Centre at University of Edinburgh.

I have an undergraduate degree in psychology and an MSc and PhD in Public Health Sciences, focussing on the epidemiology of cardiovascular disease. From there I moved to cognitive ageing research in the Lothian Birth Cohort studies and lectured in psychology from 2001-2009. During this time, many unpaid carers of people living with dementia told me of their difficulties of finding the care they needed.

Stepping out of academia, I took up agency care work. I then moved into emotional and social support roles in the charity sector, where I developed friendship groups and creative engagement with people living with dementia and carers in programmes at the Eric Liddell Centre. I also volunteered as a befriender with Alzheimer Scotland.

Looking to deepen my emotional support work, I started training as a counsellor in 2016 and am on course to qualify this year. My current PhD studentship fits ideally with my urge to contribute to understanding of, and insights into living with dementia. My current research is in conjunction with the Edinburgh Centre for Research on the Experience of Dementia (ECRED), also at the University of Edinburgh. I am exploring dementia and freedom in psychiatric settings (specialist dementia units), from four perspectives: people living with dementia; unpaid carers/family members; medical/social care staff, and chaplains.

My aim is for closer integration of my community-based, counselling and academic work, all focussed on ways to maximise freedom and flourishing for people living with dementia and carers: and for everyone.

Rose Vincent
@roseevincent
PhD Student, ECRED
(Alzheimer's Society-funded)
February 2020—Present

Supervisors:
Professor Heather Wilkinson (ECRED)
Dr Tom Russ

[ECRED stands for the **E**dinburgh **C**entre for **R**esearch on the **E**xperience of **D**ementia]

Research Summary

I recently began my PhD studentship with Professor Heather Wilkinson and Dr Tom Russ. I will be exploring the experience of isolation in people with young-onset dementia and the potential role for voluntary action. My current work for Alzheimer Scotland has demonstrated to me the lack of age-appropriate services and support available for people with young-onset dementia, and my early work delving into the literature has also shown me the dearth of research in this area. Having just started out I have a lot to decide and develop, but I am excited to be on this path.

Since beginning earlier this year, I have started a joint ECRED-ASDRC journal club which meets monthly (via videoconference at the moment) to discuss interesting journal articles.

Research Highlight

The research highlight for me this year is obtaining my funding from Alzheimer's Society and getting to move to Edinburgh to begin the project.

Katherine Walesby
@kewdoc
Clinical Research Fellow
August 2015—Present

Supervisors:
Dr Tom Russ
Dr Susan Shenkin (Geriatric Medicine)

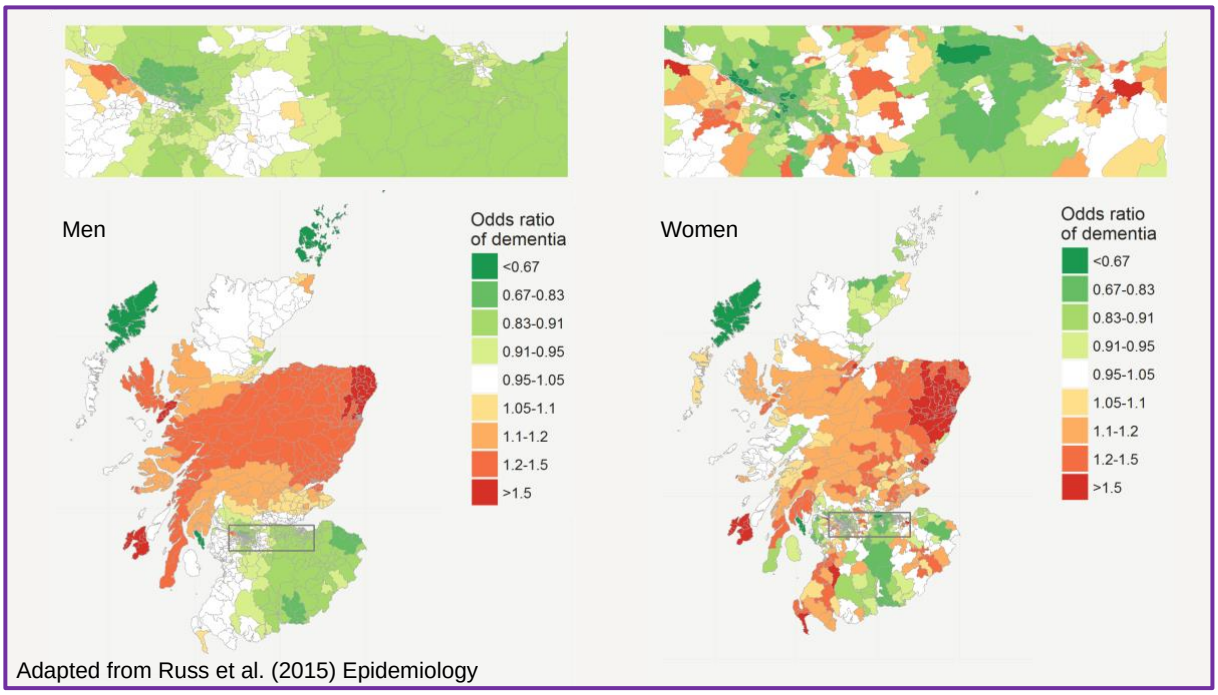
Alzheimer Scotland
Action on Dementia

Research Summary

My work carried out in New Zealand looking at dementia prevalence within a nationally-collected big database (called the Integrated Data Infrastructure, IDI) was accepted for publication in Australasian Journal in Ageing and is in press. This is the first report of national dementia prevalence in New Zealand using New Zealand data. Previous estimates of national dementia prevalence were based on other countries' data extrapolated to New Zealand. This will hopefully be the start of further collaborative work with the University of Auckland researchers. Our study found that the counts of dementia between 2012-2015 were lower than anticipated. However, these results need to be interpreted with caution as they were collected from secondary care discharges (hospital discharges), prescribing of anti-dementia drugs, and mortality records with a diagnosis of dementia recorded. Further work is required to expand the ascertainment of dementia, particularly those within primary care and who may not have a diagnosis of dementia formally. We hope that this first paper will be the catalyst to further develop a comprehensive expanded national epidemiological study of dementia prevalence in New Zealand. The paper is entitled "Prevalence and geographical variation of dementia in New Zealand (NZ) from 2012-2015: Brief report utilising routinely collected data within the Integrated Data Infrastructure (IDI)" and was a collaborative project with researchers in New Zealand. This work will additionally form a chapter in my PhD.

I am due to begin work on cleaning the data and then analysing the Scottish Mental Survey (SMS) 1947 data which have been linked to health records, mortality records, and prescribing records within the secure "safe haven" at eDRIS (the **e**lectronic **D**ata **R**esearch and **I**nnovation **S**ervice). This data are all anonymised and de-identified. The aims are to: a) ascertain how many of the cohort had dementia recorded in their digital health records; b) look at geographical variation of dementia ascertainment across Scotland; and c) compare this with previous geographical work (see picture on next page) within Scotland in the older SMS1932 cohort.

I am continuing my work on a systematic review looking at Geographical Variation of Dementia. There have been a number of new published articles since the previous systematic review in 2012. This has involved reading and screening 13,000 abstracts and over 500 full text articles. We have now narrowed down the essential published articles to include in the review and are in the process of beginning to extract the relevant data to undertake the analysis. The whole work will form two to three papers when published due to the scale of the review.



Adapted from Russ et al. (2015) Epidemiology

Research Highlight

Helping develop the national Big Data within geriatric medicine interest group aligned to the British Geriatric Society

Public Engagement

Oral presentation — planned as pre-conference session at Nordic Congress on Gerontology in Reykjavik, June 2020 discussing Scottish Mental Survey 1947 and longitudinal factors influencing geographical variation of dementia. This has had to be postponed due COVID19 and will take place as a videoconference to help develop future collaboration with Nordic colleagues.

Poster Presentations – I have had my New Zealand research accepted for two conferences. The research posters were on:

- Nordic Congress on Ageing, Reykjavik, Iceland, June 2020 (Postponed)
- Alzheimer's Association International Conference, Amsterdam, July 2020 (to be confirmed)

Publications

1. 'Prevalence and geographical variation of dementia in New Zealand (NZ) from 2012-2015: Brief report utilising routinely collected data within the Integrated Data Infrastructure (IDI)' *Australasian Journal on Ageing* – first author (in press)
2. 'Growing research in Geriatric Medicine' Commentary article in *Age and Ageing*, accepted and in press – co-author/collaborator
3. Todd OM, **Burton JK**, Dodds RM, Hollinghurst J, Lyons RA, Quinn TJ, Schneider A, **Walesby KE**, Wilkinson C, Conroy S, Gale CP, Hall M, Kate Walters K, Clegg AP. New Horizons in the use of routine data for ageing research. Age and Ageing. 2020 Feb 10. pii: afaa018. doi: 10.1093/ageing/afaa018. [Epub ahead of print]
4. Doney ASF, Bonney W, Jefferson E, **Walesby KE**, Bittern R, Trucco E, Connelly P, McCrimmon RJ, Palmer CNA. Investigating the Relationship Between Type 2 Diabetes and Dementia Using Electronic Medical Records in the GoDARTS Bioresource. Diabetes Care. 2019 Oct;42(10):1973-1980. doi: 10.2337/dc19-0380.

Miles Welstead
@welsteadmiles
PhD Student, Lothian Birth Cohorts (Age UK-funded)
April 2019—Present

Supervisors:
Dr Michelle Luciano (Psychology)
Dr Tom Russ
Dr Graciela Muniz-Terrera (Centre for Clinical Brain Sciences)

Research Summary

Whilst my background is primarily in cognitive decline research, I have found a great interest in the occurrence of frailty in later life. The more I read about frailty the more confusing it becomes due to a research field with lots of contrasting views. However, frailty can affect a vast number of people in later life and I think being able to identify those who are at highest risk is a crucial step for us to be able to get people on a healthier trajectory with a lower risk of frailty and subsequently a lower risk of disease, disability, and death. Accordingly, I decided to try to gain a better understanding of it by making it the main focus of my PhD. The first step was to systematically review what is currently known about frailty progression. My systematic review found that the research field is indeed quite messy but that several factors can increase or reduce an individual's risk of becoming frail. Accordingly, I decided to explore these factors further.

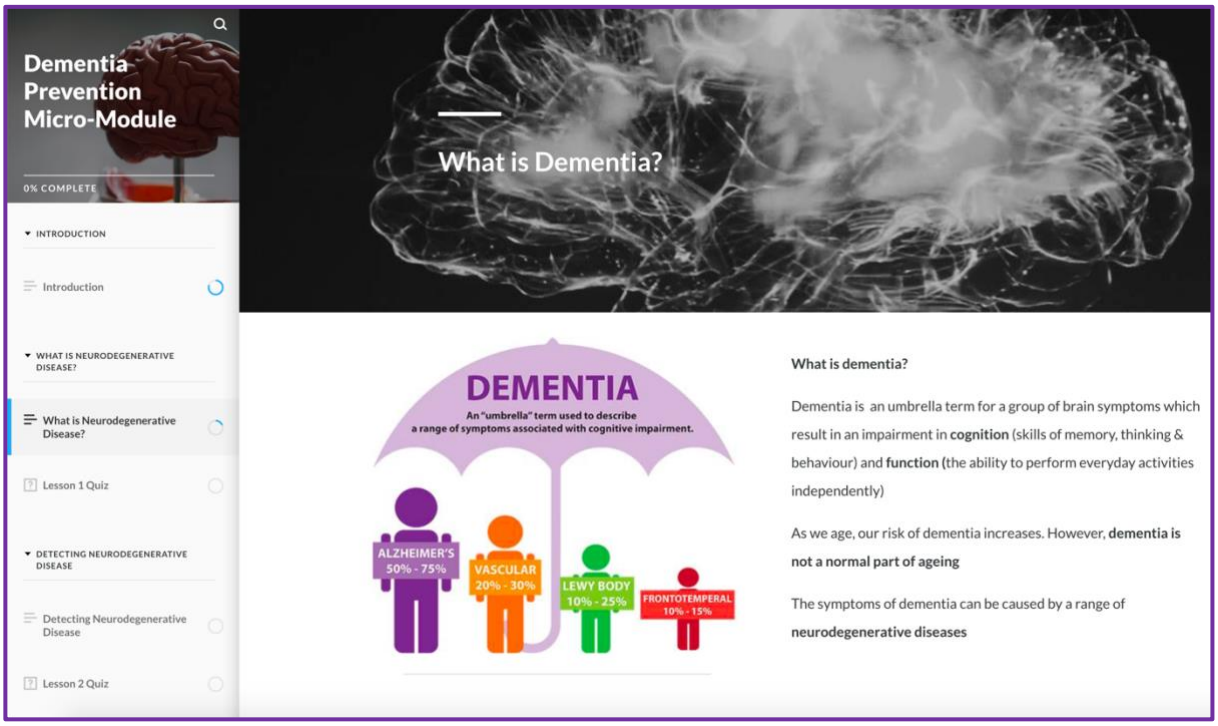
I am fortunate to work with the Lothian Birth Cohort 1936, with whom the ASDRC has close links, for my PhD. As a brief background of this cohort, in 1936 every 11 year old school child in Scotland was given a cognitive assessment. In the early 2000s these assessments were found in a basement, the researcher's equivalent of striking gold. Since then hundreds of these individuals, now in their late life, have been followed up five times and have been measured with cognitive tests, brain scans, genetic markers and much more. I have been able to utilise this unique resource to see how frailty changes and test which factors influence change. So far I have tested one factor: inflammation. Our findings showed that inflammation is associated with higher rates of frailty over time but that the way in which you measure frailty can affect this association. My next step is to continue exploring frailty in the Lothian Birth Cohort 1936 and try to work out which factors have the biggest impact of frailty risk. I hope that by doing this we will be able to improve the ability of detecting frailty risk at an early stage.

Research Highlight

- Completing two research papers that are now under consideration for being published.
- Gaining a better understanding of statistical modelling and analysis.

Public Engagement

- Joining a group of neuroscientists to meet with screenwriters from the Edinburgh International Film Festival and discuss ideas that could translate to film/TV.
- Helping run a science class with the Midlothian Science Festival.
- Creating an online interactive learning module about dementia lifestyle interventions (accessible from: bit.ly/BrainHealthEd):



- Helping to run a cognitive assessment course at the Alzheimer's Disease Research Methodology Summer School run by University of Edinburgh Dementia Prevention.

Anna Bryan
MSc Student (Scholarship from the St. Andrew's Society of the State of New York)
September 2019—Present

Supervisors:
Dr Katie Overy (Music)
Dr Tom Russ

SAINT ANDREW'S SOCIETY
OF THE STATE OF NEW YORK
Est. 1756

Research Summary

Anna is an MSc student in the Reid School of Music, studying music and dementia. For her master's project, Anna will be doing an ethnographic exploration of the use of music in nursing homes in Edinburgh. She will be observing what music is present and in what format, as well as who is being exposed to this music and who is initiating it. Anna will also be conducting interviews with the staff, volunteers, and family members of residents to learn more about their own perceptions of music and its usefulness for patients with dementia. This research will provide a detailed depiction of how music inhabits the space of dementia patients in these nursing homes, as well as contribute to the literature relating to the barriers and facilitators for music intervention implementation. [As with many projects, this plan is having to be modified following the social distancing regulations in response to COVID-19.]

Research Highlight

I am looking forward to attending "The Vascular Brain – Eurolife PhD course" at the Centre for Molecular Medicine, Karolinksa Institutet, Stockholm in May this year. [It is now taking place through videoconference rather than face-to-face.] This is what the course will be about:

"Brain function depends on constant supply of glucose and oxygen from blood vessels. Efficient communication between neural cells and vessels is essential for correct brain function and relies on selective transport of nutrients across the blood-brain barrier. Brains are particularly vulnerable to dysfunction of blood flow and loss of barrier properties which can lead to dementia and neurological disease. The purpose of the course is to deepen the understanding of concepts underlying cerebrovascular development, cell signaling, imaging methods and vascular contributions to neurodegenerative diseases."

Public Engagement

In February 2020, Anna represented ASDRC on a panel discussing music and dementia at the Edinburgh Wellbeing Festival, along with representatives from Playlist for Life and Music for Dementia 2020.

Anna also co-organizes a music and dementia reading group that meets monthly in the Reid School of Music.

Stephen Foster
Higher Trainee in Old Age Psychiatry (NHS)
Alzheimer Scotland Research Affiliate
August 2017—Present

Research Summary

I am an ST6 trainee in Psychiatry of Old Age and I am currently based in the Older Adults Mental Health Service, NHS Fife. I work within a memory clinic setting providing assessments for patients with suspected dementia. I also provide input to our acute inpatient assessment unit at Stratheden Hospital (Muirview Ward).

Alongside colleagues, I am in the process of completing a systematic review into the use of a particular type of drug — 5-HT6 antagonists — in dementia. Several years ago these compounds received considerable pharmaceutical interest following the results of preclinical studies that suggested that they might be helpful in improving cognition (thinking skills). Unfortunately many subsequent clinical trials failed to show a similar beneficial effect. However, by gathering all available results (both published and unpublished) and combining these statistically in a meta-analysis, we hope to clarify whether there may be a treatment effect within specific subgroups which might warrant further exploration.

Duncan Gray
Higher Trainee in Old Age Psychiatry (NHS)
Alzheimer Scotland Research Affiliate
August 2017—Present

Research Summary

I am a final year Old Age Psychiatry Trainee (ST6) working in the Scottish Borders. I provide support for patients with Dementia in both Community and Inpatient settings, and am currently the Responsible Medical Officer for patients on the Dementia Assessment and Treatment ward at the Borders General Hospital in Melrose.

I am currently involved in conducting two systematic reviews of the scientific literature The first I have undertaken with Dr Stephen Foster and is looking at whether there is evidence for the use of 5-HT6 antagonists in dementia. We are now embarking on the meta-analysis to combine these data and hope to publish this later this year. This is potentially an opportunity to identify another group of drugs to support patients with dementia.

The second systematic review is looking at whether there is a difference in the risk of developing dementia depending on whether you reside in a rural or urban area. I am supporting Dr Katherine Walesby with this.

Meroe Grove
Higher Trainee in Old Age Psychiatry (NHS)
Alzheimer Scotland Research Affiliate
August 2017—Present

Research Summary

I am completing a systematic review investigating the side effects of antipsychotic medication in people over the age of sixty five years. This topic was important for me to as I work as an Old Age Psychiatry registrar and we regularly use antipsychotic medication for patients who experience hallucinations, trouble with their mood, or distress related to dementia. We know that this type of medication can cause irregular heart rhythms and other heart complications but when I looked for research about using these medicines for older adults, there was no clear guidance about side effects particular to this age group. As a result, I am compiling the information from available research to inform our understanding of the risk and benefits when prescribing and to enable us to provide better quality information to patients so they can make informed choices about their care.

Carol Sherriff
Higher Trainee in Old Age Psychiatry (NHS)
Alzheimer Scotland Research Affiliate
August 2014—Present

Research Summary

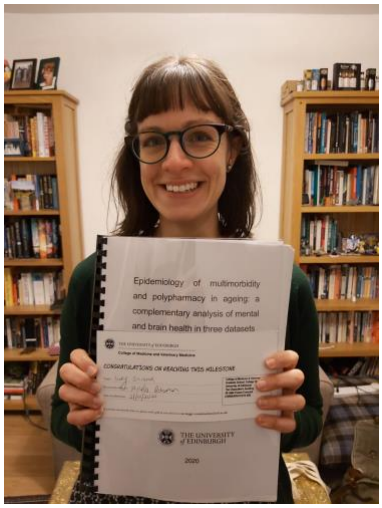
I am an old age psychiatry trainee working in NHS Lothian. My post does not offer much time for research however since last year I have been contributing to the Lothian Birth Cohort 1936 (LBC1936) study. I will be screening wave 6 participants by examining their electronic medical records to identify people who may have dementia prior to invitation for testing.

Publication

I am interested in non-pharmacological alternatives for the treatment of behavioural and psychological symptoms of dementia. I completed a systematic literature review to establish whether music therapy improved neuropsychiatric symptoms in patients with delirium and/or dementia in the general hospital environment. Music therapy was feasible in this setting and had a positive effect on some neuropsychiatric symptoms. However there was no published evidence for the use of music therapy in the treatment of neuropsychiatric symptoms in the general hospital.

Sherriff C, Matthews J, Reynish EL, Shenkin SD. Music therapy for neuropsychiatric symptoms in the general hospital: a systematic review. *Music and Medicine* 2017; 9 (4) 217-226.

Lucy Stirland
@stirlandia
Higher Trainee in Old Age Psychiatry (NHS)
Alzheimer Scotland Research Affiliate
August 2015—Present



Research Summary

I'm a psychiatrist doing specialist training in the care of older people. For the last three years, I've been doing a PhD (the PsySTAR programme, funded by the Medical Research Council and the Medical Research Foundation) studying people who have several conditions (multi-morbidity). I was interested in their mental health and whether we could predict if they would get dementia. I used information from two dementia research studies and from NHS records. Overall, people with many conditions were more likely to be depressed. There weren't clear links between having lots of conditions and having test results that might predict dementia. This means that it is important for health workers to look out for depression in people who have lots of other conditions. These people are also likely to get dementia.

I'll continue my research by looking at NHS prescription records (for everyone in Scotland over the age of 50 years) to see if certain medicines are linked with dementia. The NHS has a very large amount of information but doesn't hold much detail. I'll also study the Lothian Birth Cohort 1936 which is smaller but contains the results of detailed memory and depression tests.

I'm currently applying to the Scottish Government Chief Scientist Office for a Clinical Lecturer post, but the application process is in limbo due to COVID-19.

Research Highlight

My research highlight of the past year was passing my PhD viva examination in March 2020.

Publications

1. **Stirland LE**, Gonzalez-Saavedra L, **Mullin DS**, Ritchie CW, Muniz-Terrera G, **Russ TC**. Measuring multimorbidity beyond counting diseases: systematic review of community and population studies and guide to index choice. BMJ. 2020; 368: m160.
2. **Stirland LE**. "Chapter 17: Medication and Dementia." In: Jackson GA, Tolson D (Eds) *Textbook of Dementia Care: An Integrated Approach.* London: Routledge, 2019

Georgina Weatherdon
Higher Trainee in Old Age Psychiatry (NHS)
Alzheimer Scotland Research Affiliate
August 2019—Present

Research Summary

I currently have one half day research session per week as part of my Old Age Psychiatry clinical training. This has been an excellent opportunity to enhance my research skills and contribute to two key research projects. I am currently conducting a systematic review looking into cardiac complications of patients over the age of 65 on antipsychotic medication with my colleague, Dr Meroe Grove. This is a review of the literature looking at the rate of heart problems associated with the use of antipsychotic medications in older adults. We hope this will inform future clinical guidelines regarding heart monitoring for older adults on antipsychotic medication for which there are no current specific guidelines. We have had our systematic review accepted by PROSPERO (www.crd.york.ac.uk/prospero/, an international database for registered systematic reviews,) and completed our database searches. We are now at the stage of commencing our data collection by going through all the records returned from these searches.

I am also assisting with Wave 6 of the 1936 Lothian Birth Cohort. This is a follow up study of the Scottish Mental Survey of 1947 looking at childhood intelligence. The aim is to examine the distribution and causes of cognitive ageing in this population. I am screening medical records for all participants to establish diagnoses of dementia/cognitive impairment along with my colleague Dr Carol Sherriff. Unfortunately due to the current COVID-19 situation this research has been postponed temporarily. However I am excited to be involved in such an important, world-renowned study in the future.

Collaborations and External Funding

We are now recognised as a Centre with substantial expertise in clinical dementia research, particularly epidemiology, and close links with NHS clinical services and the NHS Research Scotland Neuroprogressive and Dementia Network (formerly the Scottish Dementia Clinical Research Network). Thus, we are occasionally approached by other academics within the University and elsewhere to support or join their applications for grants and fellowships relating to dementia. In the last year we have supported applications from:

- Engineering within the University of Edinburgh (Wellcome Trust – unsuccessful; resubmitted to Alzheimer's Society and the Engineering and Physical Sciences Research Council, EPSRC)
- An early career researcher at Heriot Watt University (Wellcome Trust – unsuccessful; resubmitted to the J Macdonald Menzies and the Sir Halley Stewart Trusts
- A senior researcher at Strathclyde University (Alzheimer's Research UK)
- An early career researcher at University College London (Sir Henry Wellcome Fellowship – decision awaited)
- Swedish colleagues from Karolinska Institutet (Stockholm) and Jönköping University to add our epidemiological and geographical expertise to their five year 37,205,106 SEK (£2.97 million) bid to the Swedish Riksbanks Jubileums Fund entitled "Participation and change in old age: Differences in Evolving Life-experiences at Transitional Ages (DELTA). Identifying causal factors and strategies to promote participation"

We have welcomed a number of externally-funded PhD students into the Centre, including studentships funded by Age UK, Alzheimer's Society the Economic and Social Research Council, the Royal College of Psychiatrists and the Masonic Charitable Foundation, and Wellcome Trust. We continue to work closely with the Lothian Birth Cohort studies with many of our students and staff both using the data as researchers as well as contributing to the follow-up of this internationally-renowned study, principally in identifying participants (who are now in their mid-80s) who have developed dementia through reviewing their NHS records (for which they have given permission), linking them with broader electronic health records, and reviewing a small number of people face-to-face.

Our work on air pollution and dementia – in particular our paper in *Current Opinion in Psychiatry* (doi: 10.1097/YCO.0000000000000480) entitled "Air pollution and brain health: defining the research agenda" – which previously informed an Alzheimer's Society report (www.alzheimers.org.uk/for-researchers/report-on-link-between-air-pollution-and-dementia) has been further recognised by an invitation to join InSPIRE, a "newly emerging network of twenty-two academics at fourteen UK universities, research centres and institutes. Its purpose is to help establish the public health policy-research agenda on how PM2.5 and other priority air pollutants impact cognitive health across the lifespan." We were asked to contribute to a workshop at the University of Durham which has had to be postponed.

Finally, we are pleased to be part of the Advanced Care Research Centre, a new £20 million research partnership at the University of Edinburgh funded by Legal & General. This has only recently been announced and the specific focus of this project has not yet been made clear. https://www.ed.ac.uk/news/2020/collaboration-to-improve-life-for-ageing-populatio

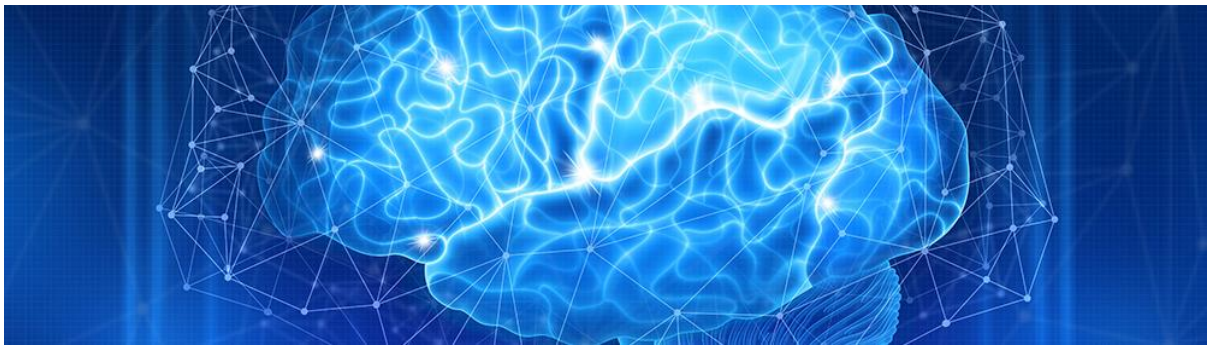
Dementia Brain Tissue Bank

The Brain Tissue Bank continues to grow: we now have 117 donors, 48 of whom have provided brain tissue. Given that the Brain Tissue Bank has now been in place for a number of years, procedures are working smoothly and we continue to see its value with a fair proportion of findings arising that were not suspected clinically during the donor's life. This is highlighting the importance of future research into ways of defining diagnoses more carefully. We remain, as always, very grateful for all the support this invaluable resource receives.

We are currently reviewing all aspects of the process of donation, from our leaflets, through recruitment, to the donation process after the potential donor dies. Informal feedback from families has been that the process of donation has been a smooth one. We understand from researchers who are using the brain tissue in their research that accessing the clinical data collected before death to complement the information derived directly from the brain tissue is not always straightforward and we are working with the Neuroprogressive and Dementia Network, the Edinburgh Brain and Tissue Bank, and the Health Informatics Centre at the University of Dundee to streamline this process as much as possible.

We are continuing to explore collaborations with the Dementia Research Institute (DRI) to extend the Brain Tissue Bank to participate in specific projects, such as the human Alzheimer disease atlas which is described on the following pages, reproduced from the DRI website.

Mapping the Alzheimer's brain: major new project to discover disease mechanisms



A new UK DRI initiative to create an 'atlas' of the brain at different stages of Alzheimer's disease is set to rapidly improve our understanding of the processes that lead to people developing the illness. This will be the first time that UK brain tissue resources have been coordinated on such a scale to study Alzheimer's disease pathology at every stage of the illness.

33 million

Around 33 million people worldwide have Alzheimer's disease

Very little is known about what causes Alzheimer's disease, which accounts for around two thirds of all dementia cases (around 33 million people worldwide). There are still no treatments that can stop, slow or prevent it. Understanding the biological mechanisms behind the disease is essential to finding ways to treat it.

Our Multi-'omics Atlas Project (MAP) will use an unprecedented range of advanced techniques to examine tissue from eight different regions of the brain. The aim is to gain a much fuller understanding of key cell characteristics, including what influences the genes of individual

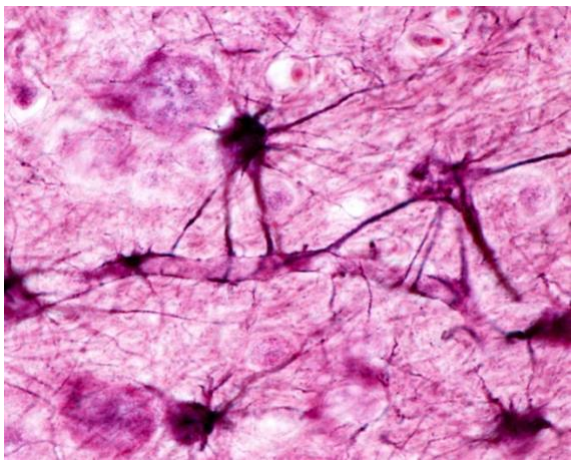
cells to be expressed, and the role of proteins and other factors on their function. The data obtained will be combined with information gathered from microscopic examination of the tissue, and with the medical history of each brain donor. Powerful new molecular imaging technology will be used to examine subtle but important differences in cell types and their relationships in the brain. From these data, scientists will be able to develop a better understanding of how individual cells function and interact with their environment.

> "Developing this resource for all researchers in the field gives us an exciting and unique opportunity to work together to understand the processes involved in Alzheimer's disease."
>
> *Dr Johanna Jackson, senior scientist at Imperial College London and Scientific Project Manager for MAP*

Working with Brains for Dementia Research, the UK Brain Banks Network and Alzheimer Scotland Dementia Research Centre, our team will develop a tissue resource of carefully selected, well-annotated and centrally managed brains with one hemisphere frozen and the other prepared for microscopic analysis. Material from eight standardised sampling regions will be studied, both at the level of the single cell and by observing multi-cellular characteristics. As we establish the resource, we plan to tackle key, previously unanswered questions about tissue quality that will help refine similar studies in future, including how time between death and freezing of tissue impacts its quality, and what is the best measure of tissue quality.

All data and spatial information will be compared across different brain regions and at different stages of the disease. By studying tissue at the early stage of illness, we hope to determine the most optimal time to target the disease before widespread neurodegeneration takes place. Efforts to target the late stages of Alzheimer's disease have thus far proved ineffective, and the field is now focusing efforts on developing therapies to be given as early as possible to alter the course of the illness.

During the initial three-year pilot, we will study 12 brains of people who had Alzheimer's at different stages of the disease, and six brains of people without the illness. Eventually, we hope to increase the number of brains studied to 48, to further enhance our understanding of the disease process. The project is designed so that it can be extended to include new techniques as they are developed, using the same set of donor brains, and to add new data to the existing dataset. We hope that the study could eventually be expanded to map the pathology of other neurodegenerative diseases.



Our team will develop a tissue resource of carefully selected, well-annotated and centrally managed brains with one hemisphere frozen and the other prepared for microscopic analysis.

The UK DRI is putting £2 million behind the project, which will be managed by Dr Johanna Jackson at our centre at Imperial College London, under the leadership of Professor Paul Matthews. It has the potential to further our understanding of disease manifestation and progression on an unprecendented level, thanks to the number of techniques being used together, the number of brain regions being studied at different phases of disease, and the rigorous approach to standardisation of tissue. Researchers worldwide will be able to access and use the data, so facilitating new understanding of disease mechanisms, development of more precise biomarkers, and the discovery of novel drug targets.

Dr Johanna Jackson, senior scientist at Imperial College London and Scientific Project Manager for MAP, commented:

> *"Developing this resource for all researchers in the field gives us an exciting and unique opportunity to work together to understand the processes involved in Alzheimer's disease. This greater understanding of the cell types involved in different brain regions at different stages will not only further our knowledge and address unanswered questions about the disease but will also inform drug discovery studies. This work is vital to gain more information about a disease which has such a devastating effect on our ageing population."*

Professor Paul Matthews, UK DRI Centre Director at Imperial, commented:

> *"Alzheimer's, like other neurodegenerative diseases, involves many complex interactions between cells throughout the brain. There is much that we still don't know about these underlying mechanisms and their causes. Filling this knowledge gap is vital if we are to find new effective treatments and approaches to slowing and preventing this devastating illness.*
>
> *"To truly understand what is going on when someone develops Alzheimer's, we need to map the interactions and mechanisms happening in different parts of the brain. Thanks to recent advances in the fields of multi-'omics, imaging and computational methods, we are now in a position to take huge leaps forward in understanding how and why Alzheimer's develops."*

Professor Bart De Strooper, Director of the UK DRI, commented:

> *"This project will enable us to understand Alzheimer's disease in incredible depth. We will be able to record all molecular changes that occur in the billions of cells in the brain with unprecedented detail. I am particularly pleased by the extent of cooperation across the scientific community that the UK DRI has been able to establish to achieve this groundbreaking aim."*

The programme is the second in our series of Directors' Strategic Initiatives, with the first being a £2 million award for a gene therapy facility announced last year.

https://ukdri.ac.uk/news-and-events/mapping-the-alzheimers-brain-major-new-project-to-discover-disease-mechanisms *Article published: 3 March 2020*

Research attention (all time)

Total mentions
17,800
Total number of mentions for research outputs in this report

Research outputs
564
Total number of research outputs in this report, including those without mentions

Outputs with mentions
448
Total number of research outputs in this report that have Altmetric mentions

Sources of attention
15
Number of attention sources that mention research outputs in this report

Social media 15,961 mentions | News and blogs 1,591 mentions | Other sources 144 mentions | Policy and patents 83 mentions | Academic sources 21 mentions

Research attention (since May 2019)

Total mentions
614
Total number of mentions for research outputs in this report

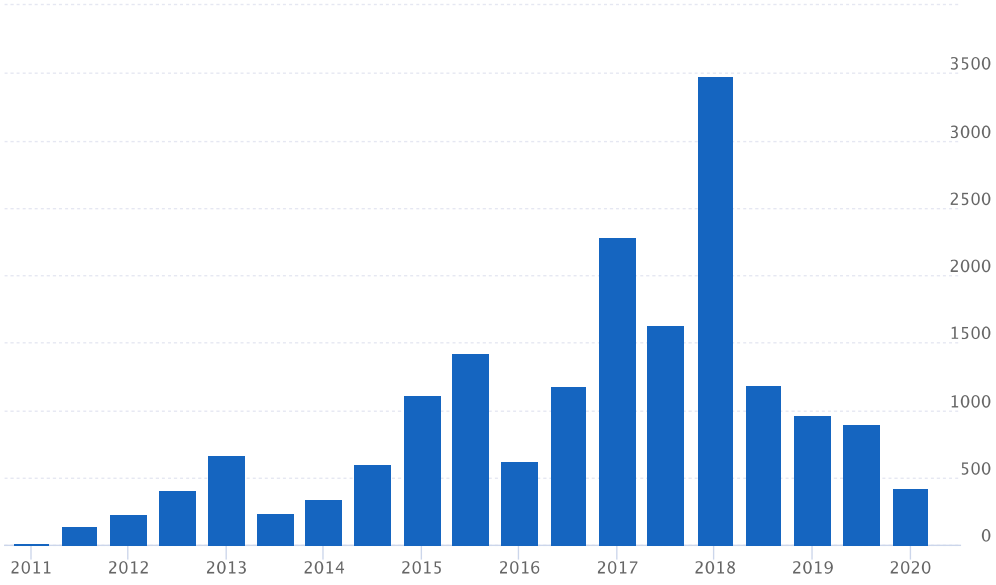
Research outputs
21
Total number of research outputs in this report, including those without mentions

Outputs with mentions
21
Total number of research outputs in this report that have Altmetric mentions

Sources of attention
4
Number of attention sources that mention research outputs in this report

Social media 600 mentions | News and blogs 14 mentions | Academic sources 0 mentions | Policy and patents 0 mentions | Other sources 0 mentions

Attention over time



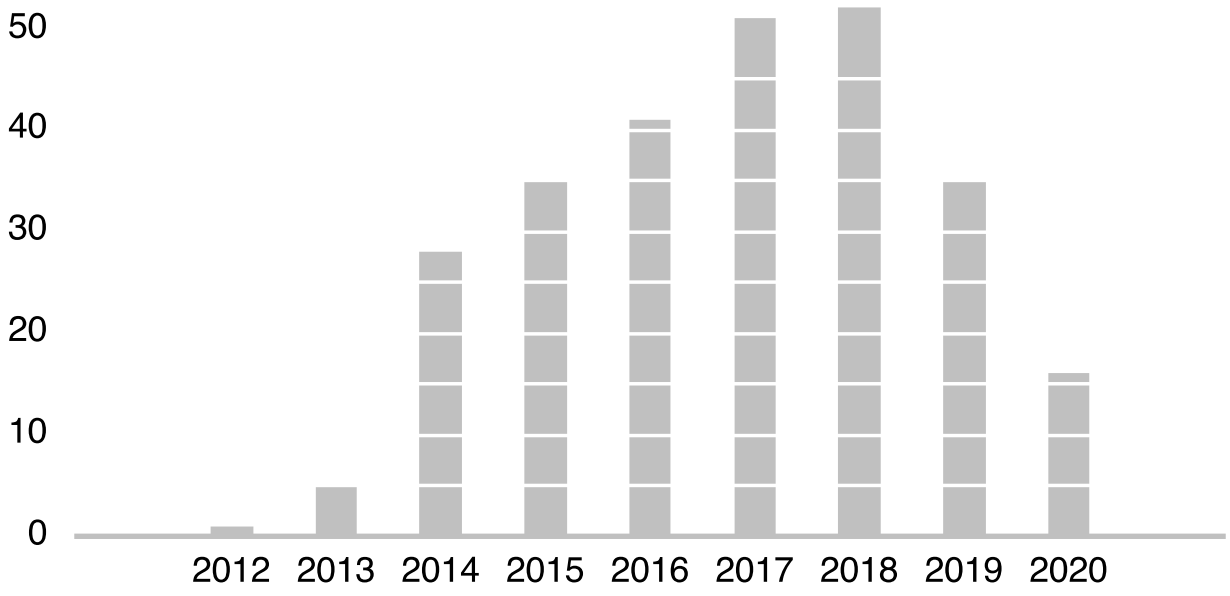
Top ten publications (of all time) in terms of Altmetric attention score

Rank	Attention Score	Research Output
#1		Study of 300,486 individuals identifies 148 independent genetic loci influencing general cognitive function Article in **Nature Communications**, May 2018
#2		Rare and low-frequency coding variants alter human adult height Article in **Nature**, February 2017
#3		Environmental risk factors for dementia: a systematic review Article in **BMC Geriatrics**, October 2016
#4		GWAS of 126,559 Individuals Identifies Genetic Variants Associated with Educational Attainment Article in **Science**, May 2013
#5		KLB is associated with alcohol drinking, and its gene product β-Klotho is necessary for FGF21 regulation of alcohol preference Article in **Proceedings of the National Academy of Sciences of the United States of America**, November 2016
#6		Cigarette smoking and thinning of the brain's cortex Article in **Molecular Psychiatry**, February 2015
#7		Directional dominance on stature and cognition in diverse human populations Article in **Nature**, July 2015
#8		Psychological distress in relation to site specific cancer mortality: pooling of unpublished data from 16 prospective cohort studies Article in **British Medical Journal**, January 2017
#9		Genome-wide association meta-analysis in 269,867 individuals identifies new genetic and functional links to intelligence Article in **Nature Genetics**, June 2018
#10		Genetic analysis of over 1 million people identifies 535 new loci associated with blood pressure traits Article in **Nature Genetics**, September 2018

Top five publications (since May 2019) in terms of Altmetric attention score

Rank	Attention Score	Research Output
#1	133	Associations of autozygosity with a broad range of human phenotypes Article in **Nature Communications**, October 2019
#2	72	Smoking does not accelerate leucocyte telomere attrition: a meta-analysis of 18 longitudinal cohorts Article in **Royal Society Open Science**, June 2019
#3	26	Predicting incident dementia 3-8 years after brief cognitive tests in the UK Biobank prospective study of 500,000 people Article in **Alzheimer's & Dementia: the Journal of the Alzheimer's Association**, October 2019
#4	26	Investigating the Relationship Between Type 2 Diabetes and Dementia Using Electronic Medical Records in the GoDARTS Bioresource Article in **Diabetes Care**, August 2019
#5	21	Association analyses identify 31 new risk loci for colorectal cancer susceptibility Article in **Nature Communications**, May 2019

The total number of publications on PubMed affiliated to ASDRC continues to grow (N=264):



Centre members' publications on PubMed

May 2019—Present (N=35)

1. Davies G, Lam M, Harris SE, Trampush JW, Luciano M, Hill WD, Hagenaars SP, Ritchie SJ, Marioni RE, Fawns-Ritchie C, Liewald DCM, Okely JA, Ahola-Olli AV, Barnes CLK, Bertram L, Bis JC, Burdick KE, Christoforou A, DeRosse P, Djurovic S, Espeseth T, Giakoumaki S, Giddaluru S, Gustavson DE, Hayward C, Hofer E, Ikram MA, Karlsson R, Knowles E, Lahti J, Leber M, Li S, Mather KA, Melle I, Morris D, Oldmeadow C, Palviainen T, Payton A, Pazoki R, Petrovic K, Reynolds CA, Sargurupremraj M, Scholz M, Smith JA, Smith AV, Terzikhan N, Thalamuthu A, Trompet S, van der Lee SJ, Ware EB, Windham BG, Wright MJ, Yang J, Yu J, Ames D, Amin N, Amouyel P, Andreassen OA, Armstrong NJ, Assareh AA, Attia JR, Attix D, Avramopoulos D, Bennett DA, Bohmer AC, Boyle PA, Brodaty H, Campbell H, Cannon TD, Cirulli ET, Congdon E, Conley ED, Corley J, Cox SR, Dale AM, Dehghan A, Dick D, Dickinson D, Eriksson JG, Evangelou E, Faul JD, Ford I, Freimer NA, Gao H, Giegling I, Gillespie NA, Gordon SD, Gottesman RF, Griswold ME, Gudnason V, Harris TB, Hartmann AM, Hatzimanolis A, Heiss G, Holliday EG, Joshi PK, Kahonen M, Kardia SLR, Karlsson I, Kleineidam L, Knopman DS, Kochan NA, Konte B, Kwok JB, Le Hellard S, Lee T, Lehtimaki T, Li SC, Lill CM, Liu T, Koini M, London E, Longstreth WT, Jr., Lopez OL, Loukola A, Luck T, Lundervold AJ, Lundquist A, Lyytikainen LP, Martin NG, Montgomery GW, Murray AD, Need AC, Noordam R, Nyberg L, Ollier W, Papenberg G, Pattie A, Polasek O, Poldrack RA, Psaty BM, Reppermund S, Riedel-Heller SG, Rose RJ, Rotter JI, Roussos P, Rovio SP, Saba Y, Sabb FW, Sachdev PS, Satizabal CL, Schmid M, Scott RJ, Scult MA, Simino J, Slagboom PE, Smyrnis N, Soumare A, Stefanis NC, Stott DJ, Straub RE, Sundet K, Taylor AM, Taylor KD, Tzoulaki I, Tzourio C, Uitterlinden A, Vitart V, Voineskos AN, Kaprio J, Wagner M, Wagner H, Weinhold L, Wen KH, Widen E, Yang Q, Zhao W, Adams HHH, Arking DE, Bilder RM, Bitsios P, Boerwinkle E, Chiba-Falek O, Corvin A, De Jager PL, Debette S, Donohoe G, Elliott P, Fitzpatrick AL, Gill M, Glahn DC, Hagg S, Hansell NK, Hariri AR, Ikram MK, Jukema JW, Vuoksimaa E, Keller MC, Kremen WS, Launer L, Lindenberger U, Palotie A, Pedersen NL, Pendleton N, Porteous DJ, Raikkonen K, Raitakari OT, Ramirez A, Reinvang I, Rudan I, Dan R, Schmidt R, Schmidt H, Schofield PW, Schofield PR, **Starr JM**, Steen VM, Trollor JN, Turner ST, Van Duijn CM, Villringer A, Weinberger DR, Weir DR, Wilson JF, Malhotra A, McIntosh AM, Gale CR, Seshadri S, Mosley TH, Jr., Bressler J, Lencz T, Deary IJ. Author Correction: Study of 300,486 individuals identifies 148 independent genetic loci influencing general cognitive function. *Nat Commun* 2019; **10**(1): 2068.
2. Law PJ, Timofeeva M, Fernandez-Rozadilla C, Broderick P, Studd J, Fernandez-Tajes J, Farrington S, Svinti V, Palles C, Orlando G, Sud A, Holroyd A, Penegar S, Theodoratou E, Vaughan-Shaw P, Campbell H, Zgaga L, Hayward C, Campbell A, Harris S, Deary IJ, **Starr JM**, Gatcombe L, Pinna M, Briggs S, Martin L, Jaeger E, Sharma-Oates A, East J, Leedham S, Arnold R, Johnstone E, Wang H, Kerr D, Kerr R, Maughan T, Kaplan R, Al-Tassan N, Palin K, Hanninen UA, Cajuso T, Tanskanen T, Kondelin J, Kaasinen E, Sarin AP, Eriksson JG, Rissanen H, Knekt P, Pukkala E, Jousilahti P, Salomaa V, Ripatti S, Palotie A, Renkonen-Sinisalo L, Lepisto A, Bohm J, Mecklin JP, Buchanan DD, Win AK, Hopper J, Jenkins ME, Lindor NM, Newcomb PA, Gallinger S, Duggan D, Casey G, Hoffmann P, Nothen MM, Jockel KH, Easton DF, Pharoah PDP, Peto J, Canzian F, Swerdlow A, Eeles RA, Kote-Jarai Z, Muir K, Pashayan N, Harkin A, Allan K, McQueen J, Paul J, Iveson T, Saunders M, Butterbach K, Chang-Claude J, Hoffmeister M, Brenner H, Kirac I, Matosevic P, Hofer P, Brezina S, Gsur A, Cheadle JP, Aaltonen LA, Tomlinson I, Houlston RS, Dunlop MG. Association analyses identify 31 new risk loci for colorectal cancer susceptibility. *Nat Commun* 2019; **10**(1): 2154.
3. Wilkinson T, Schnier C, Bush K, Rannikmae K, Henshall DE, Lerpiniere C, Allen NE, Flaig R, **Russ TC**, Bathgate D, Pal S, O'Brien JT, Sudlow CLM. Identifying dementia outcomes in UK Biobank: a validation study of primary care, hospital admissions and mortality data. *Eur J Epidemiol* 2019; **34**(6): 557-65.

HIGHLIGHT: UK Biobank is a major UK study with 500,000 participants aged 40-69 years at baseline in 2006-2010. These participants are now entering the higher risk phase of life for developing dementia and ascertaining dementia outcomes is essential, but highly challenging in such a large group of people scattered across the UK.

4. de Vries PS, Brown MR, Bentley AR, Sung YJ, Winkler TW, Ntalla I, Schwander K, Kraja AT, Guo X, Franceschini N, Cheng CY, Sim X, Vojinovic D, Huffman JE, Musani SK, Li C, Feitosa MF, Richard MA, Noordam R, Aschard H, Bartz TM, Bielak LF, Deng X, Dorajoo R, Lohman KK, Manning AK, Rankinen T, Smith AV, Tajuddin SM, Evangelou E, Graff M, Alver M, Boissel M, Chai JF, Chen X, Divers J, Gandin I, Gao C, Goel A, Hagemeijer Y, Harris SE, Hartwig FP, He M, Horimoto A, Hsu FC, Jackson AU, Kasturiratne A, Komulainen P, Kuhnel B, Laguzzi F, Lee JH, Luan J, Lyytikainen LP, Matoba N, Nolte IM, Pietzner M, Riaz M, Said MA, Scott RA, Sofer T, Stancakova A, Takeuchi F, Tayo BO, van der Most PJ, Varga TV, Wang Y, Ware EB, Wen W, Yanek LR, Zhang W, Zhao JH, Afaq S, Amin N, Amini M, Arking DE, Aung T, Ballantyne C, Boerwinkle E, Broeckel U, Campbell A, Canouil M, Charumathi S, Chen YI, Connell JM, de Faire U, de Las Fuentes L, de Mutsert R, de Silva HJ, Ding J, Dominiczak AF, Duan Q, Eaton CB, Eppinga RN, Faul JD, Fisher V, Forrester T, Franco OH, Friedlander Y, Ghanbari M, Giulianini F, Grabe HJ, Grove ML, Gu CC, Harris TB, Heikkinen S, Heng CK, Hirata M, Hixson JE, Howard BV, Ikram MA, Jacobs DR, Johnson C, Jonas JB, Kammerer CM, Katsuya T, Khor CC, Kilpelainen TO, Koh WP, Koistinen HA, Kolcic I, Kooperberg C, Krieger JE, Kritchevsky SB, Kubo M, Kuusisto J, Lakka TA, Langefeld CD, Langenberg C, Launer LJ, Lehne B, Lemaitre RN, Li Y, Liang J, Liu J, Liu K, Loh M, Louie T, Magi R, Manichaikul AW, McKenzie CA, Meitinger T, Metspalu A, Milaneschi Y, Milani L, Mohlke KL, Mosley TH, Mukamal KJ, Nalls MA, Nauck M, Nelson CP, Sotoodehnia N, O'Connell JR, Palmer ND, Pazoki R, Pedersen NL, Peters A, Peyser PA, Polasek O, Poulter N, Raffel LJ, Raitakari OT, Reiner AP, Rice TK, Rich SS, Robino A, Robinson JG, Rose LM, Rudan I, Schmidt CO, Schreiner PJ, Scott WR, Sever P, Shi Y, Sidney S, Sims M, Smith BH, Smith JA, Snieder H, **Starr JM**, Strauch K, Tan N, Taylor KD, Teo YY, Tham YC, Uitterlinden AG, van Heemst D, Vuckovic D, Waldenberger M, Wang L, Wang Y, Wang Z, Wei WB, Williams C, Wilson G, Wojczynski MK, Yao J, Yu B, Yu C, Yuan JM, Zhao W, Zonderman AB, Becker DM, Boehnke M, Bowden DW, Chambers JC, Deary IJ, Esko T, Farrall M, Franks PW, Freedman BI, Froguel P, Gasparini P, Gieger C, Horta BL, Kamatani Y, Kato N, Kooner JS, Laakso M, Leander K, Lehtimaki T, Magnusson PKE, Penninx B, Pereira AC, Rauramaa R, Samani NJ, Scott J, Shu XO, van der Harst P, Wagenknecht LE, Wang YX, Wareham NJ, Watkins H, Weir DR, Wickremasinghe AR, Zheng W, Elliott P, North KE, Bouchard C, Evans MK, Gudnason V, Liu CT, Liu Y, Psaty BM, Ridker PM, van Dam RM, Kardia SLR, Zhu X, Rotimi CN, Mook-Kanamori DO, Fornage M, Kelly TN, Fox ER, Hayward C, van Duijn CM, Tai ES, Wong TY, Liu J, Rotter JI, Gauderman WJ, Province MA, Munroe PB, Rice K, Chasman DI, Cupples LA, Rao DC, Morrison AC. Multiancestry Genome-Wide Association Study of Lipid Levels Incorporating Gene-Alcohol Interactions. *Am J Epidemiol* 2019; **188**(6): 1033-54.
5. Bateson M, Aviv A, Bendix L, Benetos A, Ben-Shlomo Y, Bojesen SE, Cooper C, Cooper R, Deary IJ, Hagg S, Harris SE, Kark JD, Kronenberg F, Kuh D, Labat C, Martin-Ruiz CM, Meyer C, Nordestgaard BG, Penninx B, Pepper GV, Revesz D, Said MA, **Starr JM**, Syddall H, Thomson WM, van der Harst P, Whooley M, von Zglinicki T, Willeit P, Zhan Y, Nettle D. Smoking does not accelerate leucocyte telomere attrition: a meta-analysis of 18 longitudinal cohorts. *R Soc Open Sci* 2019; **6**(6): 190420.
6. Marioni RE, Harris SE, Zhang Q, McRae AF, Hagenaars SP, Hill WD, Davies G, Ritchie CW, Gale CR, **Starr JM**, Goate AM, Porteous DJ, Yang J, Evans KL, Deary IJ, Wray NR, Visscher PM. Correction: GWAS on family history of Alzheimer's disease. *Transl Psychiatry* 2019; **9**(1): 161.
7. Valdes Hernandez MDC, Ballerini L, Glatz A, Munoz Maniega S, Gow AJ, Bastin ME, **Starr JM**, Deary IJ, Wardlaw JM. Perivascular spaces in the centrum semiovale at the beginning of the 8th decade of life: effect on cognition and associations with mineral deposition. *Brain Imaging Behav* 2019.
8. Turcot V, Lu Y, Highland HM, Schurmann C, Justice AE, Fine RS, Bradfield JP, Esko T, Giri A, Graff M, Guo X, Hendricks AE, Karaderi T, Lempradl A, Locke AE, Mahajan A, Marouli E, Sivapalaratnam S, Young KL, Alfred T, Feitosa MF, Masca NGD, Manning AK, Medina-Gomez C, Mudgal P, Ng MCY, Reiner AP, Vedantam S, Willems SM, Winkler TW, Abecasis G, Aben KK, Alam DS, Alharthi SE, Allison M, Amouyel P, Asselbergs FW, Auer PL, Balkau B, Bang LE, Barroso I, Bastarache L, Benn M, Bergmann S, Bielak LF, Bluher M, Boehnke M, Boeing H, Boerwinkle E, Boger CA, Bork-Jensen J, Bots ML, Bottinger EP, Bowden DW, Brandslund I, Breen G, Brilliant MH, Broer L, Brumat M, Burt AA, Butterworth AS, Campbell PT, Cappellani S, Carey DJ, Catamo E, Caulfield MJ, Chambers JC, Chasman DI, Chen YI,

Chowdhury R, Christensen C, Chu AY, Cocca M, Collins FS, Cook JP, Corley J, Galbany JC, Cox AJ, Crosslin DS, Cuellar-Partida G, D'Eustacchio A, Danesh J, Davies G, Bakker PIW, Groot MCH, Mutsert R, Deary IJ, Dedoussis G, Demerath EW, Heijer M, Hollander AI, Ruijter HM, Dennis JG, Denny JC, Di Angelantonio E, Drenos F, Du M, Dube MP, Dunning AM, Easton DF, Edwards TL, Ellinghaus D, Ellinor PT, Elliott P, Evangelou E, Farmaki AE, Farooqi IS, Faul JD, Fauser S, Feng S, Ferrannini E, Ferrieres J, Florez JC, Ford I, Fornage M, Franco OH, Franke A, Franks PW, Friedrich N, Frikke-Schmidt R, Galesloot TE, Gan W, Gandin I, Gasparini P, Gibson J, Giedraitis V, Gjesing AP, Gordon-Larsen P, Gorski M, Grabe HJ, Grant SFA, Grarup N, Griffiths HL, Grove ML, Gudnason V, Gustafsson S, Haessler J, Hakonarson H, Hammerschlag AR, Hansen T, Harris KM, Harris TB, Hattersley AT, Have CT, Hayward C, He L, Heard-Costa NL, Heath AC, Heid IM, Helgeland O, Hernesniemi J, Hewitt AW, Holmen OL, Hovingh GK, Howson JMM, Hu Y, Huang PL, Huffman JE, Ikram MA, Ingelsson E, Jackson AU, Jansson JH, Jarvik GP, Jensen GB, Jia Y, Johansson S, Jorgensen ME, Jorgensen T, Jukema JW, Kahali B, Kahn RS, Kahonen M, Kamstrup PR, Kanoni S, Kaprio J, Karaleftheri M, Kardia SLR, Karpe F, Kathiresan S, Kee F, Kiemeney LA, Kim E, Kitajima H, Komulainen P, Kooner JS, Kooperberg C, Korhonen T, Kovacs P, Kuivaniemi H, Kutalik Z, Kuulasmaa K, Kuusisto J, Laakso M, Lakka TA, Lamparter D, Lange EM, Lange LA, Langenberg C, Larson EB, Lee NR, Lehtimaki T, Lewis CE, Li H, Li J, Li-Gao R, Lin H, Lin KH, Lin LA, Lin X, Lind L, Lindstrom J, Linneberg A, Liu CT, Liu DJ, Liu Y, Lo KS, Lophatananon A, Lotery AJ, Loukola A, Luan J, Lubitz SA, Lyytikainen LP, Mannisto S, Marenne G, Mazul AL, McCarthy MI, McKean-Cowdin R, Medland SE, Meidtner K, Milani L, Mistry V, Mitchell P, Mohlke KL, Moilanen L, Moitry M, Montgomery GW, Mook-Kanamori DO, Moore C, Mori TA, Morris AD, Morris AP, Muller-Nurasyid M, Munroe PB, Nalls MA, Narisu N, Nelson CP, Neville M, Nielsen SF, Nikus K, Njolstad PR, Nordestgaard BG, Nyholt DR, O'Connel JR, O'Donoghue ML, Loohuis LMO, Ophoff RA, Owen KR, Packard CJ, Padmanabhan S, Palmer CNA, Palmer ND, Pasterkamp G, Patel AP, Pattie A, Pedersen O, Peissig PL, Peloso GM, Pennell CE, Perola M, Perry JA, Perry JRB, Pers TH, Person TN, Peters A, Petersen ERB, Peyser PA, Pirie A, Polasek O, Polderman TJ, Puolijoki H, Raitakari OT, Rasheed A, Rauramaa R, Reilly DF, Renstrom F, Rheinberger M, Ridker PM, Rioux JD, Rivas MA, Roberts DJ, Robertson NR, Robino A, Rolandsson O, Rudan I, Ruth KS, Saleheen D, Salomaa V, Samani NJ, Sapkota Y, Sattar N, Schoen RE, Schreiner PJ, Schulze MB, Scott RA, Segura-Lepe MP, Shah SH, Sheu WH, Sim X, Slater AJ, Small KS, Smith AV, Southam L, Spector TD, Speliotes EK, **Starr JM,** Stefansson K, Steinthorsdottir V, Stirrups KE, Strauch K, Stringham HM, Stumvoll M, Sun L, Surendran P, Swift AJ, Tada H, Tansey KE, Tardif JC, Taylor KD, Teumer A, Thompson DJ, Thorleifsson G, Thorsteinsdottir U, Thuesen BH, Tonjes A, Tromp G, Trompet S, Tsafantakis E, Tuomilehto J, Tybjaerg-Hansen A, Tyrer JP, Uher R, Uitterlinden AG, Uusitupa M, Laan SW, Duijn CM, Leeuwen N, van Setten J, Vanhala M, Varbo A, Varga TV, Varma R, Edwards DRV, Vermeulen SH, Veronesi G, Vestergaard H, Vitart V, Vogt TF, Volker U, Vuckovic D, Wagenknecht LE, Walker M, Wallentin L, Wang F, Wang CA, Wang S, Wang Y, Ware EB, Wareham NJ, Warren HR, Waterworth DM, Wessel J, White HD, Willer CJ, Wilson JG, Witte DR, Wood AR, Wu Y, Yaghootkar H, Yao J, Yao P, Yerges-Armstrong LM, Young R, Zeggini E, Zhan X, Zhang W, Zhao JH, Zhao W, Zhao W, Zhou W, Zondervan KT, Rotter JI, Pospisilik JA, Rivadeneira F, Borecki IB, Deloukas P, Frayling TM, Lettre G, North KE, Lindgren CM, Hirschhorn JN, Loos RJF. Publisher Correction: Protein-altering variants associated with body mass index implicate pathways that control energy intake and expenditure in obesity. *Nat Genet* 2019; **51**(7): 1191-2.

9. Imboden M, Wielscher M, Rezwan FI, Amaral AFS, Schaffner E, Jeong A, Beckmeyer-Borowko A, Harris SE, **Starr JM**, Deary IJ, Flexeder C, Waldenberger M, Peters A, Schulz H, Chen S, Sunny SK, Karmaus WJJ, Jiang Y, Erhart G, Kronenberg F, Arathimos R, Sharp GC, Henderson AJ, Fu Y, Piirila P, Pietilainen KH, Ollikainen M, Johansson A, Gyllensten U, de Vries M, van der Plaat DA, de Jong K, Boezen HM, Hall IP, Tobin MD, Jarvelin MR, Holloway JW, Jarvis D, Probst-Hensch NM. Epigenome-wide association study of lung function level and its change. *Eur Respir J* 2019; **54**(1).

10. **McGrory S**, Ballerini L, Okely JA, Ritchie SJ, Doubal FN, Doney ASF, Dhillon B, **Starr JM**, MacGillivray TJ, Trucco E, Wardlaw JM, Deary IJ. Retinal microvascular features and cognitive change in the Lothian-Birth Cohort 1936. *Alzheimers Dement (Amst)* 2019; **11**: 500-9.

11. Munoz Maniega S, Meijboom R, Chappell FM, Valdes Hernandez MDC, **Starr JM**, Bastin ME, Deary IJ, Wardlaw JM. Spatial Gradient of Microstructural Changes in Normal-Appearing White Matter in Tracts Affected by White Matter Hyperintensities in Older Age. *Front Neurol* 2019; **10**: 784.
12. Deary IJ, Ritchie SJ, Munoz Maniega S, Cox SR, Valdes Hernandez MC, Luciano M, **Starr JM**, Wardlaw JM, Bastin ME. Brain Peak Width of Skeletonized Mean Diffusivity (PSMD) and Cognitive Function in Later Life. *Front Psychiatry* 2019; **10**: 524.
13. Rzechorzek NM, Saunders OM, **Hiscox LV**, Schwarz T, Marioni-Henry K, Argyle DJ, Schoenebeck JJ, Freeman TC. Network analysis of canine brain morphometry links tumour risk to oestrogen deficiency and accelerated brain ageing. *Sci Rep* 2019; **9**(1): 12506.
14. **Russ TC**, Lee IM, Sesso HD, Muniz-Terrera G, **Batty GD**. Five-decade trajectories in body mass index in relation to dementia death: follow-up of 33,083 male Harvard University alumni. *Int J Obes (Lond)* 2019; **43**(9): 1822-9.

HIGHLIGHT: We used a statistical technique called latent class mixed modelling to identify different groups of Harvard graduates who had been followed up for five decades to identify if there were different patterns of weight loss/gain and whether these were associated with subsequent dementia risk; earlier weight loss in later life was associated with dementia risk.

15. Doney ASF, Bonney W, Jefferson E, **Walesby KE**, Bittern R, Trucco E, Connelly P, McCrimmon RJ, Palmer CNA. Investigating the Relationship Between Type 2 Diabetes and Dementia Using Electronic Medical Records in the GoDARTS Bioresource. *Diabetes Care* 2019; **42**(10): 1973-80.
16. **Starr JM**. Ageing and epigenetics: linking neurodevelopmental and neurodegenerative disorders. *Dev Med Child Neurol* 2019; **61**(10): 1134-8.
17. Clark DW, Okada Y, Moore KHS, Mason D, Pirastu N, Gandin I, Mattsson H, Barnes CLK, Lin K, Zhao JH, Deelen P, Rohde R, Schurmann C, Guo X, Giulianini F, Zhang W, Medina-Gomez C, Karlsson R, Bao Y, Bartz TM, Baumbach C, Biino G, Bixley MJ, Brumat M, Chai JF, Corre T, Cousminer DL, Dekker AM, Eccles DA, van Eijk KR, Fuchsberger C, Gao H, Germain M, Gordon SD, de Haan HG, Harris SE, Hofer E, Huerta-Chagoya A, Igartua C, Jansen IE, Jia Y, Kacprowski T, Karlsson T, Kleber ME, Li SA, Li-Gao R, Mahajan A, Matsuda K, Meidtner K, Meng W, Montasser ME, van der Most PJ, Munz M, Nutile T, Palviainen T, Prasad G, Prasad RB, Priyanka TDS, Rizzi F, Salvi E, Sapkota BR, Shriner D, Skotte L, Smart MC, Smith AV, van der Spek A, Spracklen CN, Strawbridge RJ, Tajuddin SM, Trompet S, Turman C, Verweij N, Viberti C, Wang L, Warren HR, Wootton RE, Yanek LR, Yao J, Yousri NA, Zhao W, Adeyemo AA, Afaq S, Aguilar-Salinas CA, Akiyama M, Albert ML, Allison MA, Alver M, Aung T, Azizi F, Bentley AR, Boeing H, Boerwinkle E, Borja JB, de Borst GJ, Bottinger EP, Broer L, Campbell H, Chanock S, Chee ML, Chen G, Chen YI, Chen Z, Chiu YF, Cocca M, Collins FS, Concas MP, Corley J, Cugliari G, van Dam RM, Damulina A, Daneshpour MS, Day FR, Delgado GE, Dhana K, Doney ASF, Dorr M, Doumatey AP, Dzimiri N, Ebenesersdottir SS, Elliott J, Elliott P, Ewert R, Felix JF, Fischer K, Freedman BI, Girotto G, Goel A, Gogele M, Goodarzi MO, Graff M, Granot-Hershkovitz E, Grodstein F, Guarrera S, Gudbjartsson DF, Guity K, Gunnarsson B, Guo Y, Hagenaars SP, Haiman CA, Halevy A, Harris TB, Hedayati M, van Heel DA, Hirata M, Hofer I, Hsiung CA, Huang J, Hung YJ, Ikram MA, Jagadeesan A, Jousilahti P, Kamatani Y, Kanai M, Kerrison ND, Kessler T, Khaw KT, Khor CC, de Kleijn DPV, Koh WP, Kolcic I, Kraft P, Kramer BK, Kutalik Z, Kuusisto J, Langenberg C, Launer LJ, Lawlor DA, Lee IT, Lee WJ, Lerch MM, Li L, Liu J, Loh M, London SJ, Loomis S, Lu Y, Luan J, Magi R, Manichaikul AW, Manunta P, Masson G, Matoba N, Mei XW, Meisinger C, Meitinger T, Mezzavilla M, Milani L, Millwood IY, Momozawa Y, Moore A, Morange PE, Moreno-Macias H, Mori TA, Morrison AC, Muka T, Murakami Y, Murray AD, de Mutsert R, Mychaleckyj JC, Nalls MA, Nauck M, Neville MJ, Nolte IM, Ong KK, Orozco L, Padmanabhan S, Palsson G, Pankow JS, Pattaro C, Pattie A, Polasek O, Poulter N, Pramstaller PP, Quintana-Murci L, Raikkonen K, Ralhan S, Rao DC, van Rheenen W, Rich SS, Ridker PM, Rietveld CA, Robino A, van Rooij FJA, Ruggiero D, Saba Y, Sabanayagam C, Sabater-Lleal M, Sala CF, Salomaa V, Sandow K, Schmidt H, Scott LJ, Scott WR, Sedaghati-Khayat B, Sennblad B, van Setten J, Sever PJ, Sheu WH, Shi Y, Shrestha S, Shukla SR,

Sigurdsson JK, Sikka TT, Singh JR, Smith BH, Stancakova A, Stanton A, **Starr JM,** Stefansdottir L, Straker L, Sulem P, Sveinbjornsson G, Swertz MA, Taylor AM, Taylor KD, Terzikhan N, Tham YC, Thorleifsson G, Thorsteinsdottir U, Tillander A, Tracy RP, Tusie-Luna T, Tzoulaki I, Vaccargiu S, Vangipurapu J, Veldink JH, Vitart V, Volker U, Vuoksimaa E, Wakil SM, Waldenberger M, Wander GS, Wang YX, Wareham NJ, Wild S, Yajnik CS, Yuan JM, Zeng L, Zhang L, Zhou J, Amin N, Asselbergs FW, Bakker SJL, Becker DM, Lehne B, Bennett DA, van den Berg LH, Berndt SI, Bharadwaj D, Bielak LF, Bochud M, Boehnke M, Bouchard C, Bradfield JP, Brody JA, Campbell A, Carmi S, Caulfield MJ, Cesarini D, Chambers JC, Chandak GR, Cheng CY, Ciullo M, Cornelis M, Cusi D, Smith GD, Deary IJ, Dorajoo R, van Duijn CM, Ellinghaus D, Erdmann J, Eriksson JG, Evangelou E, Evans MK, Faul JD, Feenstra B, Feitosa M, Foisy S, Franke A, Friedlander Y, Gasparini P, Gieger C, Gonzalez C, Goyette P, Grant SFA, Griffiths LR, Groop L, Gudnason V, Gyllensten U, Hakonarson H, Hamsten A, van der Harst P, Heng CK, Hicks AA, Hochner H, Huikuri H, Hunt SC, Jaddoe VWV, De Jager PL, Johannesson M, Johansson A, Jonas JB, Jukema JW, Junttila J, Kaprio J, Kardia SLR, Karpe F, Kumari M, Laakso M, van der Laan SW, Lahti J, Laudes M, Lea RA, Lieb W, Lumley T, Martin NG, Marz W, Matullo G, McCarthy MI, Medland SE, Merriman TR, Metspalu A, Meyer BF, Mohlke KL, Montgomery GW, Mook-Kanamori D, Munroe PB, North KE, Nyholt DR, O'Connell J R, Ober C, Oldehinkel AJ, Palmas W, Palmer C, Pasterkamp GG, Patin E, Pennell CE, Perusse L, Peyser PA, Pirastu M, Polderman TJC, Porteous DJ, Posthuma D, Psaty BM, Rioux JD, Rivadeneira F, Rotimi C, Rotter JI, Rudan I, Den Ruijter HM, Sanghera DK, Sattar N, Schmidt R, Schulze MB, Schunkert H, Scott RA, Shuldiner AR, Sim X, Small N, Smith JA, Sotoodehnia N, Tai ES, Teumer A, Timpson NJ, Toniolo D, Tregouet DA, Tuomi T, Vollenweider P, Wang CA, Weir DR, Whitfield JB, Wijmenga C, Wong TY, Wright J, Yang J, Yu L, Zemel BS, Zonderman AB, Perola M, Magnusson PKE, Uitterlinden AG, Kooner JS, Chasman DI, Loos RJF, Franceschini N, Franke L, Haley CS, Hayward C, Walters RG, Perry JRB, Esko T, Helgason A, Stefansson K, Joshi PK, Kubo M, Wilson JF. Associations of autozygosity with a broad range of human phenotypes. *Nat Commun* 2019; **10**(1): 4957.

18. Gibson J, **Russ TC**, Clarke TK, Howard DM, Hillary RF, Evans KL, Walker RM, Bermingham ML, Morris SW, Campbell A, Hayward C, Murray AD, Porteous DJ, Horvath S, Lu AT, McIntosh AM, Whalley HC, Marioni RE. A meta-analysis of genome-wide association studies of epigenetic age acceleration. *PLoS Genet* 2019; **15**(11): e1008104.
19. Calvin CM, Wilkinson T, **Starr JM**, Sudlow C, Hagenaars SP, Harris SE, Schnier C, Davies G, Fawns-Ritchie C, Gale CR, Gallacher J, Deary IJ. Predicting incident dementia 3-8 years after brief cognitive tests in the UK Biobank prospective study of 500,000 people. *Alzheimers Dement* 2019; **15**(12): 1546-57.

HIGHLIGHT: Using the dementia outcomes derived by Tim Wilkinson (see above) this Edinburgh team investigated whether performance on the UK Biobank baseline cognitive tests predicted who subsequently developed dementia.

20. Aribisala BS, Riha RL, Valdes Hernandez M, Munoz Maniega S, Cox S, **Radakovic R**, Taylor A, Pattie A, Corley J, Redmond P, Bastin ME, Starr J, Deary I, Wardlaw JM. Sleep and brain morphological changes in the eighth decade of life. *Sleep Med* 2020; **65**: 152-8.
21. Valdes Hernandez MC, Clark R, Wang SH, Guazzo F, Calia C, Pattan V, Starr J, Della Sala S, **Parra MA**. The striatum, the hippocampus, and short-term memory binding: Volumetric analysis of the subcortical grey matter's role in mild cognitive impairment. *Neuroimage Clin* 2020; **25**: 102158.
22. **Hiscox LV**, Johnson CL, McGarry MDJ, Marshall H, Ritchie CW, van Beek EJR, Roberts N, **Starr JM**. Mechanical property alterations across the cerebral cortex due to Alzheimer's disease. *Brain Commun* 2020; **2**(1): fcz049.

HIGHLIGHT: This is a continuation of Lucy Hiscox's doctoral work at the Centre on Magnetic Resonance Elastography (the wobbliness and stiffness of the brain), now being carried out at an international centre of excellence at the University of Delaware, USA.

23. **Russ TC**, Kivimaki M, **Batty GD**. Respiratory Disease and Lower Pulmonary Function as Risk Factors for Dementia: A Systematic Review With Meta-analysis. *Chest* 2020.
24. Moodie JE, Ritchie SJ, Cox SR, Harris MA, Munoz Maniega S, Valdes Hernandez MC, Pattie A, Corley J, Bastin ME, **Starr JM**, Wardlaw JM, Deary IJ. Fluctuating asymmetry in brain structure and general intelligence in 73-year-olds. *Intelligence* 2020; **78**: 101407.
25. **Radakovic R**, Copsey H, Moore C, Mioshi E. Development of the MiNDToolkit for management of cognitive and behavioral impairment in motor neuron disease. *Neurodegener Dis Manag* 2020; **10**(1): 15-25.
26. **Radakovic R**, **McGrory S**, Chandran S, Swingler R, Pal S, Stephenson L, Colville S, Newton J, **Starr JM**, Abrahams S. The brief Dimensional Apathy Scale: A short clinical assessment of apathy. *Clin Neuropsychol* 2020; **34**(2): 423-35.
27. **Hiscox LV**, Johnson CL, McGarry MDJ, Schwarb H, van Beek EJR, Roberts N, **Starr JM**. Hippocampal viscoelasticity and episodic memory performance in healthy older adults examined with magnetic resonance elastography. *Brain Imaging Behav* 2020; **14**(1): 175-85.
28. Lund JB, Li S, Christensen K, Mengel-From J, Soerensen M, Marioni RE, **Starr JM**, Pattie A, Deary IJ, Baumbach J, Tan Q. Age-dependent DNA methylation patterns on the Y chromosome in elderly males. *Aging Cell* 2020; **19**(2): e12907.
29. Harris SE, Cox SR, Bell S, Marioni RE, Prins BP, Pattie A, Corley J, Munoz Maniega S, Valdes Hernandez M, Morris Z, John S, Bronson PG, Tucker-Drob EM, **Starr JM**, Bastin ME, Wardlaw JM, Butterworth AS, Deary IJ. Neurology-related protein biomarkers are associated with cognitive ability and brain volume in older age. *Nat Commun* 2020; **11**(1): 800.
30. Todd OM, **Burton JK**, Dodds RM, Hollinghurst J, Lyons RA, Quinn TJ, Schneider A, **Walesby KE**, Wilkinson C, Conroy S, Gale CP, Hall M, Walters K, Clegg AP. New Horizons in the use of routine data for ageing research. *Age Ageing* 2020.
31. **Radakovic R**, Gray D, Dudley K, Mioshi E, Dick D, Melchiorre G, Gordon H, Newton J, Colville S, Pal S, Chandran S, Abrahams S. Reliability and validity of the brief dimensional apathy scale. *Arch Clin Neuropsychol* 2020.
32. **Stirland LE**, Gonzalez-Saavedra L, Mullin DS, Ritchie CW, Muniz-Terrera G, **Russ TC**. Measuring multimorbidity beyond counting diseases: systematic review of community and population studies and guide to index choice. *BMJ* 2020; **368**: m160.
33. **Sibbett RA**, Altschul DM, Marioni RE, Deary IJ, **Starr JM**, **Russ TC**. DNA methylation-based measures of accelerated biological ageing and the risk of dementia in the oldest-old: a study of the Lothian Birth Cohort 1921. *BMC Psychiatry* 2020; **20**(1): 91.
34. Manera V, Abrahams S, Aguera-Ortiz L, Bremond F, David R, Fairchild K, Gros A, Hanon C, Husain M, Konig A, Lockwood PL, Pino M, **Radakovic R**, Robert G, Slachevsky A, Stella F, Tribouillard A, Trimarchi PD, Verhey F, Yesavage J, Zeghari R, Robert P. Recommendations for the Nonpharmacological Treatment of Apathy in Brain Disorders. *Am J Geriatr Psychiatry* 2020; **28**(4): 410-20.
35. Kawagoe T, Onoda K, Yamaguchi S, **Radakovic R**. Developing and validating the Japanese version of Dimensional Apathy Scale (J-DAS). *Psychiatry Clin Neurosci* 2020. doi: 10.1111/pcn.13009. [Epub ahead of print]