The Disconnected Mind aims to understand how changes in the brain’s white matter – its connectivity – contribute to age-related cognitive decline in humans.

**Newsletter 30: Summer 2015**
Welcome to the Disconnected Mind summer newsletter. As usual, this issue includes some of our recent publications, regular contribution from our colleagues at Age UK, and news and reports from recent events. Get in touch for more information about anything in the newsletter, particularly if you have something you would like to be included in a future issue. Contact details are on the last page.

**Age UK Board of Trustees commits to Disconnected Mind funding till 2019.**
Following a meeting in late March this year, the Age UK Board of Trustees committed in principle to continue funding The Disconnected Mind project until 2019. This will allow health, cognitive, brain imaging and other data to be collected from all members of the Lothian Birth Cohort 1936 (LBC1936) at age 79-80. It will allow these data to be collated and validated, and papers to be written for scientific journals.

Professor Ian Deary, Director of The Disconnected Mind project said, “On behalf of the LBC1936 participants and the research team at the University of Edinburgh, I am very grateful to Age UK for this further generous support. This will take our relationship with Age UK to well over a decade. I applaud the vision of Tom Wright and his wonderful staff in affording us the opportunity to collect data and report findings on these amazing older people. The discoveries have tumbled out, gaining in number and importance as the cohort has matured.”

“There are too many of our pals at Age UK to mention everyone, but Libby Archer, James Goodwin, and the fundraising team have been a pleasure to work with.”

“The wave of testing that we are conducting now is especially important. It will complete a decade of follow-up for the LBC1936, and they are now the same age as the smaller LBC1921 when my team first tested them. As I said above, more and more important results about healthy ageing will appear in the next few years from this corner of the UK.”

**LBC1936 Study Update – Wave 4**
We have now seen 189 participants at the Wellcome Trust Clinical Research Facility, completing cognitive and physical tests for a fourth time, at about age 79. So far, 111 have already completed a brain MRI scan, 158 have completed a Doppler ultrasound of their carotid arteries, and 154 have worn the activPAL activity monitor for over a week.

Between wave 3 and wave 4, we asked participants about their lifetime residential addresses. This forms part of a collaboration with the Mobility, Mood and Place project, and specifically a work package called ‘Life Course of Place’ which investigates how aspects of neighbourhoods lived in throughout life might influence health, such as historical data on air quality.

Read about the project here: [https://sites.eca.ed.ac.uk/mmp/](https://sites.eca.ed.ac.uk/mmp/)

Study researcher Catherine Tisch has created a blog to explain the “two key problems we have to overcome to
address our project aims: (1) knowing where the participants lived between the ages of 11 and 70+ years, and (2) knowing what their neighbourhood environments were like throughout their lives.” You can read Catherine’s blog here, which describes how they have addressed the first challenge. A forthcoming blog will then describe the latter.

Lipidomics
We are pleased to announce a new type of biomarker – lipoproteins - is to be measured in LBC1936. Lipoproteins are made of lipids bound to proteins and are used to transport fats and cholesterol around the body via the bloodstream. We already know that some lipoproteins, like APOE, influence cognitive and brain ageing. With funding from the Dementias Platform UK, and in collaboration with the National Phenome Centre in London, we will measure several thousand lipoproteins in about 600 members of LBC1936, with blood plasma samples and cognitive and brain imaging data available. We will then look to see how these lipoproteins influence cognitive and brain ageing.

LBC Brains on Tour
CCACE’s Dave Liewald and Robin Morton have been working with Simon Cox and Mark Bastin from the DMind project to create 3D printed brains and brain images from the LBC member’s MRI scans, to illustrate differences in brain ageing. The two brains printed so far show contrasting degrees of atrophy (shrinkage), and there are also plans to print a brain of someone diagnosed with Alzheimer’s disease. These are powerful tools for conveying compelling questions behind brain and cognitive ageing research, and the brains are already well-travelled. They were used at the Science Festival as part of the BrainBox drop-in session (see below). Professor Deary also included them into his James McKeen Cattell Fellow Award Address at the 27th Annual Convention of the Association for Psychological Science in New York in May.

One of a several images created by Dave Liewald has also been chosen for an upcoming Medical Research Council Biomedical Picture of the Day – more in the next newsletter…
Staff news
We are sad to say goodbye to Dr David Alexander Dickie, who has been analysing the structural MRI data on The Disconnected Mind project since he completed his PhD at the Brain Research Imaging Centre. He has moved to a postdoctoral position on the project “Quantification of vascular disease burden to stratify dementia for diagnosis and care management”, a collaboration between The University of Edinburgh, IXICO Technologies Ltd, and Imperial College London.

His work will involve developing methods for automatically diagnosing structural brain damage on scans that is associated with cognitive decline, stroke and dementia. However, we are delighted that he will continue to collaborate on DMind work. David said, “It was an absolute privilege to work on The Disconnected Mind project and I am immensely grateful to Professor Wardlaw, Professor Deary, and Dr Bastin for giving me this fantastic opportunity. But I am delighted that I will continue to collaborate with Ian, Simon, Stuart and the rest of the team at 7 George Square”.

We also bid farewell to visiting researcher Dr Aina Maria Yañez Juan, who returns to the University of the Balearic Islands in Spain, following a 4-month visit to the Centre for Cognitive Ageing and Cognitive Epidemiology (CCACE). She was researching links between social activity, alcohol intake and cognition, and she collaborated with the DMind’s Dr Dominika Dykiert to investigate these relationships in the LBC data. She said, “I am very grateful for the hospitality of the CCACE members. They have provided an enjoyable and productive period of research and study. I hope that there will be exciting opportunities for future projects and collaborations.”

News from Age UK
This year has flown by so far! We were delighted when, at the end of March, Age UK’s Board of Trustees committed in principle to funding The Disconnected Mind project for a further three years, from April 2016 (when our current commitment ends) through to March 2019. We look forward to continuing to develop the already excellent relationship with you that began over 10 years ago when our support for the LBC1936 studies began.

March also saw Age UK’s Chief Executive, Tom Wright, congratulating Ian on his 2014 ISIR Lifetime Achievement Award and the three further awards that he is receiving in 2015. Tom said, “It is testimony not only to the quality of your research but also to the esteem in which you are held by your contemporaries. We
have always known that the LBC1936 research was in good hands. It is a great morale booster for everyone at Age UK to see one of our foremost partners receiving such huge recognition for their work, especially in an area so important to us.”

Tom Wright CBE, Age UK Chief Executive

Knowledge transfer continues through various Age UK activities. In May, we published the fourth book in our annual *Improving Later Life* series that presents latest research findings written by experts in an accessible style for professional audiences who work for and with older people. *Vulnerability and resilience in older people* explores what factors and experiences make us more susceptible to the risk of adverse outcomes in later life and which others help to buoy and protect us. Ian Deary, John Starr and Catharine Gale are among the expert contributors in a section on cognitive and mental health, along with Marcus Richards (University College London). Download a pdf from the link above or ask Phil Rossall for free printed copies: phil.rossall@ageuk.org.uk

The Disconnected Mind project continues to inspire Age UK staff. Our last column conveyed Nyree Guider’s enthusiasm. This time, it’s the turn of Helen Finch, who joined Age UK’s Fundraising Division as Product and Proposition Development Manager in March. Helen’s exposure to the project began almost immediately. She said “It’s a fascinating project, not least because of its longevity. The data are a treasure trove that give us such an extraordinary opportunity to learn so much about cognitive ageing and the potential to change older people’s lives for the better.” Helen’s no stranger to research participation herself as she and her twin sister are in the King’s College London Twins UK project. One of her key activities at Age UK is to develop the proposition that colleagues will use to raise funds to support the project from 2016 to 2019.

In June, Age UK celebrated its wonderful volunteers during Volunteers Week. An amazing 75,000 individuals across the Age UK network, which includes the London office and local Age UKs, donate their time to us. Supporting older people through our Call in Time befriending service, campaigning for us, helping in one of our shops and volunteering for local Age UK activities are among the myriad ways volunteers help. Combined,
they give around 10 million hours per year, an astonishing number that makes us proud.

On a final positive note, sunshine has finally broken through in London and so we wish you all a very happy summer!

New Scientific Highlights:

Coupled changes in white matter and cognitive ability
Since its beginning, The Disconnected Mind project has aimed to understand the contribution of the brain’s connective wiring (its white matter) to cognitive ageing. We and others have previously reported that having white matter in better condition at any given time is related to better thinking skills. A paper led by Dr Stuart Ritchie (published in the Journal of Neuroscience) has now shown that declines in white matter in the LBC1936 over 3 years (measured in the same way on the same scanner) are significantly related to 3-year declines in general thinking skills (on the same tests, over the same period). This is the clearest evidence yet of the importance of white matter for staying cognitively healthy in older age. This is the very core of the idea encapsulated in ‘The Disconnected Mind’. We continue to look for factors that influence this.

Atlas of older brains could help diagnosis of Alzheimer’s disease
A report led by DMind’s David Alexander Dickie, published recently in PLoS ONE, described the creation of a digital atlas of MRI brain images that may be used to support earlier diagnoses of neurodegenerative diseases in older people, such as Alzheimer’s. Extension of the work, widely reported in sources such as Daily Express, Daily Mirror, Consumer Affairs, and STV News, is planned to include MRI images from the Lothian Birth Cohorts in order to improve the diagnostic capabilities of the method. You can listen to David discussing the research on Good Morning Scotland here (beginning at 56:38).

Out and about with the DMind team
As many of you will know, around 180 of the LBC1936 participants have given pre-mortem authorisation to donate their brain tissue to the Edinburgh Brain Bank. Dr Chris Henstridge was in parliament on Monday 9th March to present his post-mortem analysis of the first LBC1936 participant to a panel of politicians and leading scientists at the Set For Britain event. This event is held each year in Westminster, and aims to strengthen links between politicians and scientists at the forefront of UK science. Chris was chosen from hundreds of applicants across the country to take part in this unique event and showcase his work. It drew a lot of interest from delegates, and the sheer scale of the LBC1936 was appreciated by both politicians and scientists alike.

Dr David Alexander Dickie attended the European Stroke Organisation meeting in Glasgow this April to speak about ‘Sample size estimates for white matter hyperintensity trials’. Elsewhere, Devasuda Anglaban attended the Organisation for Human Brain Mapping in Hawaii, where she presented some more of our new longitudinal brain imaging data:
‘Hippocampal integrity in the ageing brain at 73 and 76 years of age’.

Members of the team also continued their wider Knowledge Exchange work, and several were involved in the Edinburgh Science Festival event ‘What’s in your BrainBox?’. Dr Robin Morton and Helen Staton masterminded this interactive session for children aged 8-12, with input from Drs Ritchie and Cox. Among the barrage of innovative activities, firm favourites in the hour-long session saw participants discovering how scientists measure brain structure (creating their own life-size 3D brain models) and how brain cells communicate with each other (using the hilarious ButtHead game to illustrate neurotransmitter binding!). The activity was fully booked on most days, and feedback was excellent. Drs Simon Cox and Gail Davies were also invited to discuss ‘Genes, Brains & Cognitive Ageing in the Lothian Birth Cohorts’ with the very welcoming and engaged members of the University of the 3rd Age Science Group in East Lothian.

DMind Chief receives top award in New York

The Association for Psychological Science (APS) has awarded its top award in applied psychology - the James McKeen Cattell Fellowship - to Ian Deary, the Director of CCACE, at its annual conference in New York. The APS James McKeen Cattell Fellow Award recognizes APS Members for a lifetime of outstanding contributions to the area of applied psychological research. The citation for Ian’s award praised his work on intelligence, personality, and cognitive ageing. It recognised his directing the Lothian cohort studies, and his pioneering work in cognitive epidemiology.

After returning from the APS Ian said, “I was bowled over to have our Lothian Cohorts’ recognised at this highest international level. It was a special personal pleasure to receive the McKeen Cattell award. My first psychology article in the mid-1980s was on McKeen Cattell and his early work on processing speed. The location was also special. I received the award about a couple of miles from where Edinburgh’s Professor Sir Godfrey Thomson spent 1923-1924 in Teachers College Columbia. It was that visit that started the chain of events that led to the work I’ve done that’s been recognised by the APS”.

The APS President Nancy Eisenberg presents Ian with the James McKeen Cattell Fellow Award on 21 May 2015

Ian gave a well-attended hour-long address on his team’s follow-up studies of the LBC1936, and an additional lecture on his newer 6-Day sample project. “It was great to describe our Age UK-funded research to a new international audience” Ian said.

In July of this year Ian will receive the Distinguished Contribution Award from the International Society for the Study of Individual Differences (ISSID). This is only the third time ISSID has made the award in its 30+ year history.
Dr Chris Henstridge presents post-mortem brain analysis at the Set For Britain event in Westminster this March.

Top: Dr Robin Morton (left) with Helen Staton and Dr Simon Cox. Bottom: Dr Robin Morton with the BrainBox in detail.

Participants in the BrainBox workshop at Edinburgh Science Festival learn about measuring brain structure by creating their own version of a series of brain MRI slices.
Newly ‘in press’

Huffman, J. E., 57 authors, Deary, I. J., 7 authors, & Smith, N. L. (in press). Rare and low-frequency variants and their association with plasma levels of fibrinogen, FVII, FVIII, and vWF. *Blood.*


Newly ‘in print’


You can stay up to date on the most recent DM research by checking the regularly-updated list of publications at: [www.lothianbirthcohort.ed.ac.uk](http://www.lothianbirthcohort.ed.ac.uk).

Those requiring a PDF version of anything listed should get in touch with Paul Redmond ([lbc1936@ed.ac.uk](mailto:lbc1936@ed.ac.uk)) in the first instance.

Do also keep Paul updated about your ‘in press’ or recently published papers too. They’ll be added to the website to ensure everyone can see these as soon as possible, and may be profiled in a future newsletter.

**Contact**

Please get in touch with any items for inclusion in future newsletters.

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