



Christmas Newsletter 2020



THE UNIVERSITY of EDINBURGH
Lothian Birth Cohorts



Welcome to the Lothian Birth Cohorts (LBC) 2020 newsletter. It has been an extraordinary year, but the LBC team have been as busy as ever, and as is tradition, we want to take the opportunity to let you know what we have been up to during the past 12 months. In this newsletter we will update you on our latest research and publications, as well as the some scientific and public engagement events we've been involved in. Of course, none of this would be possible without you; thank you for your continued involvement and support. We hope you have a very happy Christmas, and wish you and your loved ones all the best for 2021.

If you would like to get in touch, please find our contact details at the end of this newsletter. Please let us know if any of your contact details have changed, or are about to, so we can update our records. We are always delighted to hear from you.

Professor Ian Deary's Retirement

As we told you in the letter accompanying this newsletter, our esteemed director of the LBCs, Professor Ian Deary, retired on 30th November 2020 after over 35 years of research at the University of Edinburgh. Ian has led the LBC1921 and LBC1936 projects since their inception, in 1999 and 2004 respectively.

As expected, as news of his retirement spread, we received an outpouring of appreciation for Ian from his very many LBC team members and collaborators, past and present. Ian has had an incredible career, with a scientific legacy that extends far beyond his many discoveries, awards, publications, and successful grants; he also leaves behind a personal legacy of collegiality, support, fun, and inspiration. The success of the LBCs is due, of course, to the strength of the data collected from you - the LBC participants - and, undeniably, to Ian's extensive experience, knowledge, and infectious passion for discovery. We are grateful to Ian for his leadership, guidance, and friendship, and wish him a long, happy and productive retirement. Thank you, Ian!



However, we are pleased to say that we are not saying a proper goodbye to Ian, just yet! He will be staying as a key member of the team as Professor Emeritus, so the LBCs can still count on his invaluable support and guidance.

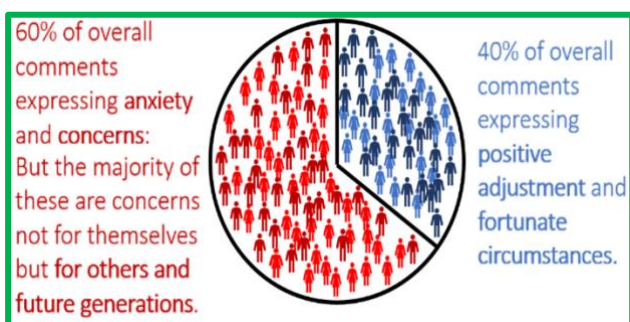
We are delighted to congratulate Dr Simon Cox, who will take over as Director of the Lothian Birth Cohorts. Simon is Principal Investigator on the current brain scanning part of the study, funded by the Medical Research Council. He has worked with the LBCs since starting his PhD in 2009; some of you may have met him during cognitive testing appointments at the Western General Hospital. In addition, the team welcome two new investigators, Dr Michelle Luciano and Dr Susie Shenkin. Both have a long history of LBCs experience and collaboration, and their respective genetics and clinical expertise will enhance the team's skills. They will join the LBC Investigator Team alongside Simon, and Dr Tom Russ, Dr Mark Bastin and Professor Joanna Wardlaw.

The LBCs have attracted world-leading researchers over the years, and Ian has built a team of experts who can lead the project in his stead. We're very excited to move into wave 6 with this great new team!

LBCs in the time of COVID-19

As many of you know, the start of wave 6 of LBC1936 cognitive testing was delayed due to the COVID-19 outbreak. However, the LBC team did not lose momentum: we continued to write and publish papers, process and release data, and launched a new and exciting project online, since we couldn't meet participants in person: the Lothian Birth Cohort 1936 COVID-19 questionnaire.

The team were quick to spot that the experiences of older people were vastly underrepresented in research published on COVID-19, both nationally and internationally. We hoped that questionnaire responses about the effect of lockdown on your lives, combined with the vast amount of data collected at previous waves, would make a valuable contribution to current research on COVID-19 in those over age 80. The questionnaire covered over 20 different themes, including physical and mental health, knowledge and feelings about COVID-19, and impact on daily activities. Many questions were new, but we also included some which we had asked before, such as on exercise, sleep and social support, so we could examine how your answers had been affected by the pandemic. We were delighted to receive almost 200 responses to the online questionnaire in less than 10 days. Many thanks to all those who were able to take part in the questionnaire.



Graphic from a LBC1936 COVID-19 paper: percentage of positive and negative comments

Once the data were collected in June, we began analysing and writing up your very interesting responses. To date, we have written four papers on a range of topics, including: which factors affected coping and behaviour during lockdown; the effect of lockdown on changes in lifestyle and factors such as sleep, physical activity, and loneliness; associations between garden use during lockdown and health and wellbeing; and a paper examining the comments section, where you told us about your personal experiences of the pandemic.

The questionnaire has already attracted the attention of Public Health Scotland (PHS), who were quick to notice how valuable your data is for understanding the effects of the pandemic on older people. In July, PHS contacted the LBC team and we prepared a privileged first view of the COVID-19 questionnaire results, which Prof Ian Deary presented to their Enhanced Surveillance Cell working group. Following the presentation, epidemiologist Markéta Keller, on behalf of PHS, said: “the LBC1936 COVID-19 Questionnaire has produced most interesting insights into older people’s feelings, understanding of, and responses to the current situation. It has certainly broadened our understanding and perceptions. Such knowledge will ultimately benefit the wider Scottish population. Many thanks to Professor Deary, the LBCs team and every one of the LBC1936 study participants!”



Your questionnaire responses have also attracted the attention of the media. In November, Mike Wade, senior reporter from *The Times*, published a story highlighting the important contribution that the LBCs are making to COVID-19 research. Mike was aware that older people have been underrepresented in COVID-19 studies to date, and that their voices have been lacking in news and media coverage too. Mike recognised the value of the LBC1936 COVID-19 survey in addressing this important gap, so he wrote about our findings and interviewed two LBC1936 participants about their experience of lockdown. He is already planning a second, longer feature!



LBCs on BBC Two Horizon episode: 'The Great British Intelligence Test'

In February, we were very excited to welcome the BBC to the LBC offices at 7 George Square, to film a special episode of *Horizon* all about intelligence and featuring the Lothian Birth Cohorts. The special BBC Two show was watched live by 1.4 million viewers in May. Dr Michael Mosely and Dr Hannah Fry demonstrated cognitive tests on volunteers, much like those undertaken by LBC participants, and revealed the results of the Great British Intelligence Test: an online series of cognitive tests designed by researchers at Imperial College.



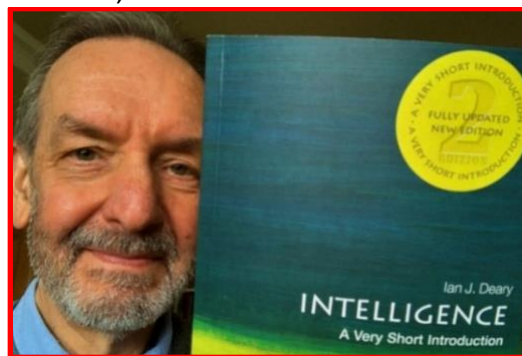
Above: Dr Simon Cox filming with Dr Hannah Fry and Bobby Seagull. Below: Dr Michael Mosely with LBC1936 participants, Mr Patrick Forsyth and Mrs Audrey Mackie.



The programme highlighted the LBCs' unique history and contribution to cognitive ageing research. Two LBC1936 participants, Mrs Audrey Mackie and Mr Patrick Forsyth, explained to Dr Mosely what they thought kept them sharp, such as regular physical activity like cycling or playing golf. Professor Deary was shown reviewing some key insights into successful cognitive ageing, and Dr Simon Cox explained links between thinking skills and features of the brain, such as brain size, and the importance of white and grey matter health. The show also featured segments from the radiographers at Edinburgh Imaging Facility, and from former team member, now LBC collaborator, Professor Alan Gow of Heriot Watt University.

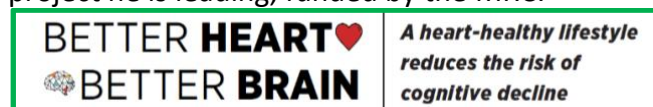
Intelligence: A very short introduction

In March, we celebrated the publication of Professor Ian Deary's second edition of 'Intelligence: A very short introduction'. The book explores intelligence in ten key questions, helping the reader understand why some people's brains and thinking skills age better than others, what more intelligent brains look like, and, in a brand new chapter, what research shows about how childhood intelligence relates to later health and survival. Ian said, "About 80% of the book is new in this edition, and I was delighted that so many chapters featured Lothian Birth Cohorts data". Following publication, Ian has presented the book online during the Edinburgh Science Festival, the Cheltenham Science Festival, and for a special talk to members of the University of the Third Age in Cockermouth, Cumbria.



Cardiovascular risks to brain health: Global Council on Brain Health report

LBC investigator Professor Joanna Wardlaw was part of the expert investigator group on a newly published report from *The Global Council on Brain Health (GCBH)*, 'The Brain-Heart Connection: GCBH Recommendations to Manage Cardiovascular Risks to Brain Health'. The report summarises evidence on the relationship between heart and brain health, and has important recommendations for healthy older adults and healthcare providers on how individuals can help maintain brain health as they age. In the LBC studies, we have a wealth of data which can be used to investigate the heart-brain link. Dr Simon Cox's study about associations between vascular risk factors and brain structures, published in the *European Heart Journal* last year was featured as a key reference in the report; Simon will be extending this work using the LBC brain and carotid artery scans as part the ongoing project he is leading, funded by the MRC.



New LBC projects: music and geography

With every year, the value of LBC data continues to grow, attracting keen collaborators and new sources of funding to allow us to address new research questions. Here we highlight two new projects which received funding in 2020.



Following a successful application for an ESRC New Investigator grant, Dr Judy Okely together with Professor Ian Deary and Dr Katie Overy (Reid School of Music) are examining whether experience playing a musical instrument is associated with better cognitive, brain, or psychological health in older age, or with less cognitive decline. Based on your answers to the LBC1936 musical experience questionnaire at wave 5, initial results suggest greater experience playing a musical instrument is associated with slightly healthier lifetime change in general cognitive ability (between ages 11 and 70). These findings are already garnering attention: they were featured in *The Global Council on Brain Health's* report (pictured above) on the potential for music to promote healthy brain ageing, and Judy was invited to present the results on the University of Edinburgh's (UoE) 'Forward Thinking' podcast. Judy also shared her findings, and joined in with some singing, at an online "singing and science" event in November, with choir director Heather MacLeod, as part of the national Being Human festival.

We were also pleased to secure ESRC funding to continue LBC's collaboration with the UoE's School of Geosciences. Professor Jamie Pearce will head the project, using your lifetime addresses that you diligently filled out for us at the end of wave 3. They will investigate whether lifetime exposure to green space, air pollution, and area-level deprivation relate to healthy cognitive, brain, and biological ageing. Findings from an earlier phase of this collaboration were recently reported in the media: in July, journalist Julia Thrift referenced the research in an article in *The New Statesman*, all about why access to green space during COVID-19 lockdown was so important for short-term stress reduction and long term cognitive outcomes.

When science becomes art

It's been a busy year for one of our neuroscientists, Dr Colin Buchanan. Colin uses tractography in his research; a 3D modelling technique to represent the brain's white matter connections from your brain scans. These stunning images won Colin a 1st place prize when he submitted a series of his images representing healthy white matter connections to a University Postdoc photography competition 'Picture that research!'. Congratulations Colin!



This isn't the first time Colin's brains have attracted attention: in January, he had the chance to show off our 3D brain visualisation, using augmented reality (AR) smart glasses, to the Chief Medical Officer for Scotland, Dr Catherine Calderwood, and UoE Principal, Prof Peter Mathieson (pictured below), as well as during BBC's Music Day. Some of you also gave these a try during the most recent Reunion event. Dr Simon Cox led the development of these visualisations as part of an MRC Pilot fund, which allows us to show results of LBC1921 and LBC1936 brain imaging research, and how brain health is related to factors such as smoking, high blood pressure and diabetes. Dr Calderwood was impressed with the AR technology and said it was remarkable but scary to see the potential impact of lifestyle on brain health.



Characterisation of an inflammation-related epigenetic score and its association with cognitive ability

Authors: Anna J. Stevenson et al.

Journal: *Clinical Epigenetics*

Inflammation is the body's response to harmful things, such as infection and injury, by triggering the immune system, increasing blood flow to the damaged area, and releasing antibodies and proteins. Chronic inflammation can sometimes occur, which is when the response lingers longer than normal, and this can cause negative consequences for your body. Chronic inflammation has been linked in the past to dementia, but its link with age-related cognitive decline is unclear. Anna compared a typical measure of inflammation taken from blood samples, an inflammation-related protein called CRP which can sometimes be unreliable, to an 'epigenetic proxy' of the same measure taken from DNA data. She showed that the epigenetic proxy of CRP provides a more reliable signature of chronic inflammation, so researchers can draw clearer conclusions about associations with health outcomes.

Generation of 24 induced pluripotent stem cell lines from members of the LBC1936

Authors: Jamie Toombs et al.

Journal: *Stem Cell Research*

Using the blood samples you generously donated at a previous wave of LBC1936, we generated 'induced pluripotent stem cells', which can be programmed to become any cell type in the body. In our Edinburgh labs, we have started programming these cells to become neurons, the brain cells important for cognition. Using these, we can study the molecular mechanisms inside the cells that are important to vulnerability or resilience to cognitive decline. This amazing resource, now available to the global scientific community, will help push the boundaries of our knowledge of the brain and ageing.



Associations Between Declining Physical and Cognitive Functions in the LBC1936

Authors: Judy Okely et al.

Journal: *The Journals of Gerontology: Series A*

As we get older, we often experience a gradual decline in some cognitive abilities and physical functions. However, it is not clear whether people who experience more cognitive decline also experience more physical decline. Using data from the thinking and fitness tests that you complete at your LBC1936 visits, Judy found that steeper 9-year decline in walking speed and grip strength was related to steeper 9-year decline in memory, processing speed, and visuospatial ability. She also showed that steeper decline in processing speed predicted subsequent steeper decline in grip strength, pointing to a potential order in which changes occur. Declines in processing speed may predict future risk of declining upper body strength.

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

Authors: Ruth Sibbett et al.

Journal: *BMC Psychiatry*

Ruth examined relationships between later life cognitive health in LBC1921, and the methylation of the genetic code (which changes the way our bodies use our DNA). We generally get more of these epigenetic markers (more methylation) as we age. Researchers have suggested that "epigenetic clocks" can be used to measure a person's accelerated ageing based on chemical changes to a person's DNA, based on how much of a mismatch there is between their DNA methylation 'age', and their actual age in years. These "clocks" have been associated with several age-related health outcomes, including prolonged survival. Ruth investigated whether or not this type of accelerated ageing is associated with the onset of dementia, but results did not show any consistent relationship between DNA-based measures of accelerated ageing and dementia risk.



Interested in commenting on research ideas from the University of Edinburgh?

Before we go, a quick message from our new Investigator Dr Susie Shenkin: "My name is Dr Susan Shenkin and I'm a researcher at the University of Edinburgh and a consultant in Medicine for the Elderly at the Royal Infirmary of Edinburgh. I've worked with the LBCs for over 20 years: I ran the Simpson's study, which recruited people born in Edinburgh hospitals between 1921-26. I'm delighted to be working more closely with the LBC again as an investigator, and study medic.

The LBC has shown the power of research to help to understand what happens as we get older. Many researchers at the University are interested in developing research projects on issues that affect people as they grow older, for example: caring for others, moving into residential care, having multiple health conditions, and how these can affect daily life.

It is important that these studies are informed by people with experience of these issues. You don't need to have a background in research or healthcare to get involved. The involvement can take place by phone, email or in person."

If you're interested in finding out more and possibly getting involved, please contact Carol Porteous, the Patient and Public Involvement in Research. Her email is carol.porteous@ed.ac.uk and her contact number is 0131 537 3266.



Au revoir, LBC

It's not a goodbye. I'm retiring toward the end of 2020. Dr Simon Cox and the enhanced LBC team will look after the study, and you, very well. Stick with them; they need you to continue with the study, so that the LBC becomes even more internationally-special and important as you get toward 90 and beyond. I'll be in touch with the research team, as emeritus professor, including contributing to research reports, and I shall offer advice if it's needed. It's been a great last 20-odd years for me, since finding out about the Scottish Mental Surveys in 1997. I'm now about three years from the age when I and the team began to study those of you who became the LBC1936's participants. If I was ever inclined to think of you as old, at that time--and I hope I was not--I can see, now, how wrong that would have been. There are lots of other things for me to do for a while, including looking forward to how the LBC team takes you and the study to even greater achievements, providing useful knowledge about health ageing. And, yes, I'll aim to put that knowledge into personal practice.

Yours aye,
Ian Deary

Thank you from the LBC team

As a member of the LBC1921 or LBC1936 cohort, you are helping to further our knowledge and understanding of cognitive, brain, and general ageing. Also, you are helping to train talented new researchers in this important scientific field. We look forward to seeing you in 2020 and beyond.

For a digital copy of this newsletter or a complete list of LBC publications visit our website: www.lothianbirthcohort.ed.ac.uk, and stay up to date with our most recent LBC activities at: www.twitter.com/EdinUniLBC

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Publication Highlights

Highlights of the 52 LBC publications of 2020 so far:

- Altschul, D. M. and Deary, I. J. (2020) 'Playing analog games is associated with reduced declines in cognitive function: a 68 year longitudinal cohort study', *The Journals of Gerontology: Series B*, p. gbz149.
- Beange, I. *et al.* (2020) 'Using a knowledge exchange event to assess study participants' attitudes to research in a rapidly evolving research context', *Wellcome Open Research*, 5, p. 24.
- Cadar, D. *et al.* (2020) 'The long arm of childhood intelligence on terminal decline: Evidence from the Lothian Birth Cohort 1921.', *Psychology and Aging*, 35(6), pp. 806–817.
- Corley, J. (2020) 'Adherence to the MIND diet is associated with 12-year all-cause mortality in older adults', *Public Health Nutrition*, pp. 1–10.
- Harris, S. E. *et al.* (2020) 'Neurology-related protein biomarkers are associated with general fluid cognitive ability and brain volume in older age', *Nature Communications*.
- Madole, J. W. *et al.* (2020) 'Aging-Sensitive Networks Within the Human Structural Connectome Are Implicated in Late-Life Cognitive Declines', *Biological Psychiatry*, p. S0006322320316796.
- Okely, J. A. and Deary, I. J. (2020) 'Associations Between Declining Physical and Cognitive Functions in the Lothian Birth Cohort 1936', *The Journals of Gerontology: Series A*.
- Sibbett, R. A. *et al.* (2020) '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*, 20, p 91.
- Stevenson, A. J. *et al.* (2020) 'Characterisation of an inflammation-related epigenetic score and its association with cognitive ability', *Clinical Epigenetics*, 12(1), p. 113.
- Taylor, A. M. *et al.* (2020) 'Associations between Brief Resilience Scale scores and ageing-related domains in the Lothian Birth Cohort 1936', *Psychology and Aging*.
- Toombs, J. *et al.* (2020) 'Generation of twenty four induced pluripotent stem cell lines from twenty four members of the Lothian 4 Birth Cohort 1936', *Stem cell research*.
- Welstead, M. *et al.* (2020) 'Inflammation as a risk factor for the development of frailty in the Lothian Birth Cohort 1936', *Experimental Gerontology*, 139, p. 111055.