

WELCOME!

Welcome to the Lothian Birth Cohorts (LBCs) 2023 Christmas newsletter! We are delighted to share with you some of the developments and updates of the past year. As always, it has been very busy, with the LBC team making great progress with the study. This newsletter presents highlights of the past year, from the completion of a 6th wave of testing to the reunion that many of you attended in May, along with recent scientific findings and public engagement events. We remain incredibly grateful for your continued support of the study – none of this would be possible without you. We hope you enjoy reading the newsletter and look forward to your feedback!

WAVE 6 OF THE LBC1936 STUDY
COMPLETED!

An important accomplishment of the last year was the completion of Wave 6 of the LBC1936 study. The team saw a total of 293 of you at the Wellcome Trust Clinical Research Facility (WTCRF) for cognitive testing appointments, and 196 at the Edinburgh Imaging Facility (EIF) in the Royal Infirmary of Edinburgh for brain Magnetic Resonance Imaging (MRI) scans. Your data becomes more valuable every time we see you, and we are extremely grateful for your ongoing support and dedication to the LBCs. The team are now preparing for a new wave of testing, due to begin early next year. You can expect to hear from us in the new year, and we look forward to welcoming you back again for Wave 7 of the LBC1936 Study!

THE LBC REUNION 2023

To celebrate the completion of the 6th wave of data collection, many of you joined the LBC team and collaborators at the study Reunion. The Reunion took part on a sunny Saturday in May at the beautiful National Museum of Scotland. It was a wonderful opportunity to celebrate your dedication and commitment to the study, to show how your hard work and data have contributed to novel scientific discoveries, how this work makes a difference for future generations, and how we engage with the public to raise awareness about healthy cognitive ageing based on the findings. We hope you found the talks interesting and enjoyed the chance to catch up with friends and staff over coffee and cakes.



LBC participants at the reunion in May 2023

The study director, Dr Simon Cox, said: *“The reunion was a great opportunity for the team and collaborators to meet and engage with the participants; to tell them how we have been holding up our end of the bargain, and also to ask their views and suggestions for future studies. The team did a super job of putting on such a fantastic day, and the participants’ positive feedback reflected this. It’s exciting that testing for LBC1936 Wave 7 will soon resume, and we are all looking forward to seeing you in 2024-2025!”*

LBC1936 STAFF UPDATES

Thank you, Alison Pattie, Danielle Page, and Beth Jones!



Alison Pattie with Mr Andrew Begg who was the 293rd and final Wave 6 participant

We were sad to say goodbye to three of our valued team members this year. Alison Pattie has been a core member of the LBC studies since their inception in 1998, when Professors Ian Deary and John Starr set the study in motion. She worked closely with the LBC1921 and LBC1936, and was a key member of the cognitive testing team throughout all waves of both studies. Alison announced her retirement in Spring 2019, but we were delighted when she came back in October 2021 to help the LBC1936 team after the COVID-19 delay, lending her considerable experience and expertise to our efforts, helping us complete Wave 6 in good time. We were delighted that Alison was also able to join us at the reunion and catch up with many of you, and we hope that she will join us for future reunion events. Reflecting on her experience with the LBC study, Alison said: *"The many years I worked with the LBC studies have flown by so quickly and I consider myself very lucky to have worked with such pleasant participants and colleagues."*



LBC1936 Research Assistant, Danielle Page

This summer LBC1936 Research Assistant Danielle Page was accepted onto the competitive Doctorate programme in Clinical Psychology at the University of Edinburgh. Danielle was a member of the LBC1936 testing team, and was also responsible for all appointment bookings, so many of you will have spoken to her on the phone, or will know her from your visits to the study. We wish Danielle the best of luck, and are certain that she will thrive in her new role, just as she did with the LBCs.

Danielle said: *"To the LBC participants: it has been a privilege and pleasure to get to know so many of you over these last 6 years. I'm going to miss my time with you terribly. I have learnt so much from you, and have many fond memories of the conversations and laughs we shared. Although I'm incredibly sad to leave, I'm also excited for this opportunity: I am lucky to have been assigned as NHS Lothian's 'older adult aligned' trainee, meaning that the majority of my 3 years of clinical work and research will involve supporting older adults with issues such as mental health or cognitive problems. I am excited to be able to continue to work with older adults, and to directly help people, all thanks to what I have learned from my time with the LBCs. Perhaps our paths will cross again at an LBC reunion event in future. Thank you, each and every one of you."*



LBC1936 Research Assistant, Beth Jones

Beth Jones joined the LBC in July 2022 as a Research Assistant to help accelerate Wave 6 testing post-COVID. Beth embraced her role and quickly became a valuable part of the team, with her kind and caring approach. Her role extended beyond data collection and processing, and she was instrumental in providing input and support for many other activities around the office and the study, including helping with school workshops and the Reunion! Beth has now completed her MSc degree, supervised by the study director Dr Simon Cox, and will be back at the University of Edinburgh for graduation, with plans for volunteering abroad from early next year.

Beth said: *"I have really loved my time with the LBCs, it has been wonderful meeting new people, getting to know the cohort and I have gained so much experience from the opportunity. Though I am sad to leave, I am excited for new opportunities."*

Welcome to the team, Sabela!

We are delighted to introduce a new member to the LBC team. Sabela Mendez joined us as a new Research Assistant in September, and has been working alongside Adele Taylor, Dr Janie Corley and Paul Redmond to support the smooth running of the LBC1936 study and preparations for the next wave of testing.

Sabela will take over from Danielle Page in handling administrative tasks including appointment bookings, and will also be part of the LBC1936 testing team at Wave 7. She is very excited about meeting many of you when you return for your next testing appointment!

Sabela said: *"I feel very privileged to be starting this new role with the LBC study. The team have been very welcoming, and I am inspired by everyone's passion for developing our collective knowledge into the ageing process."*



Our new Research Assistant, Sabela Mendez

SCIENTIFIC HIGHLIGHTS

We are grateful to you all for volunteering your time and your ongoing support of the study, contributing such a range of valuable data to this world-class research project for almost 20 years. Here we feature a few scientific discoveries our researchers have made with your data in 2023.

Musical training in earlier life for healthy mind in older years

Dr Judy Okely, past member of the LBC team and now a lecturer in Psychology at Napier University, has been researching the impact of musical instrument training on cognitive function across the life-course. Her work with LBC1936 showed that playing a musical instrument is associated with higher cognitive performance in older age.



Dr Judy Okely at the reunion in May this year

Her most recent study examined the nature of this cognitive advantage in a sample of 420 LBC1936 participants for whom we had data on lifetime musical experience. While all participants' test performance tended to decline during ageing, those with more experience playing a musical instrument showed sustained, slightly higher performance levels on some tests of cognitive function in the 8th and 9th decade of life, even after taking into consideration health status, years of education and childhood cognitive ability.

The results suggest that earlier musical training affords cognitive advantages, some of which are maintained during older age. The results have drawn significant attention in the media, and were covered as part of a special edition of the Today Programme that was guest edited by a community music group in Glasgow (BBC Radio 4 - Today, 19/08/2023). They were picked up by national and international news outlets, including The Daily Mail, The Sun and the New York Post.

Dr Okely said: *"This study was made possible by the invaluable contributions of LBC1936 participants, who completed detailed and repeated assessments of cognitive ability. This allowed us to examine the relationship between early life musical experience and cognitive performance in later years over time and spanning multiple domains of cognitive ability."*

LBC1936 post-mortem brain samples used to understand mechanisms promoting cognitive resilience in older age

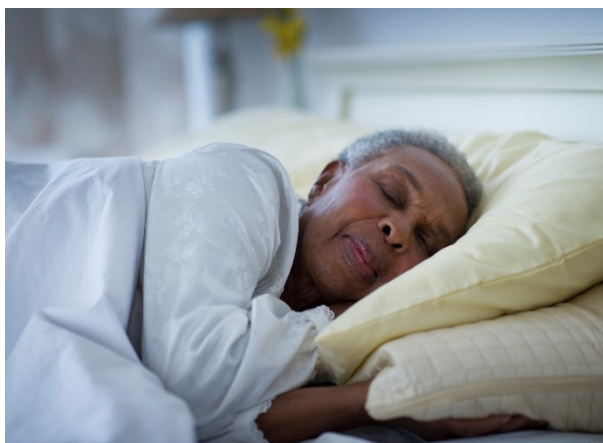
Neurodegenerative disorders like Alzheimer's Disease (AD) are difficult to diagnose clinically. This is why it is exciting that recent studies show great promise for distinguishing people with AD from healthy controls using proteins related to AD found in the blood.

Dr Tyler Saunders and colleagues used LBC1936 blood samples and data from cognitive tests to examine whether blood levels of several biomarkers for AD – including the protein called Tau181 – predict cognitive decline between ages 72 and 82. They also used LBC post-mortem brain tissue samples to determine if Tau181, whose accumulation in the brain is a key pathological feature of AD, could be associated with impaired communication between neurons in those without the disease. The study showed that blood biomarkers like Tau181 may indeed be contributing to age-related cognitive decline, but there are special brain cells, called astrocytes, that can clear them out, which may prevent brain degeneration.

The team also focused on the loss of another protein called neurogranin and its role in ageing. Neurogranin is involved in memory formation. Comparing neurogranin in post-mortem brain tissue in AD, healthy LBC agers, and mid-life cohorts, the study found that its levels were significantly reduced in AD. This suggests that loss of brain neurogranin is associated with cognitive decline, and suggests that measuring neurogranin may be useful for tracking disease progression and cognitive decline in those without dementia.

This and other studies demonstrate the immense value of the LBC1936 brain tissue donation and show how these data help make new discoveries that may transform the lives of future generations. We are extremely grateful for all donations to the Lothian Birth Cohort 1936 (LBC1936) Brain Tissue Bank. Participants who have consented to post-mortem brain tissue donation and their next of kin are invited to consult our website for further information and a reminder about the procedures for brain tissue donation: lothian-birth-cohorts.ed.ac.uk/brain-tissue-donation

LBC1936 brain imaging data offer insights into the role of sleep in maintaining brain health



Sleep plays an important role in brain health and general wellbeing. Research suggests that sleep promotes maintenance processes that enhance the brain's physiological health, such as clearance of metabolic waste, proteins, and cell debris that accumulate during daytime brain activity. However, how sleep affects the brain over time in older age is not well understood. We investigated the relationship between sleep and markers of brain health obtained from the magnetic resonance imaging (MRI) scans collected from LBC1936 participants between ages 73 and 79.

Results showed that poorer night-time sleep and increased daytime sleep were associated with markers of poorer brain health, including perivascular spaces, brain atrophy and white matter hyperintensities. These findings are consistent with the proposed role for longer unbroken sleep in brain waste clearance, which helps maintain brain health.

LBC1936 creates a model for dementia diagnosis using medical data linkage

Dr Donncha Mullin was the lead author on an important LBC study that presents a new approach for identifying dementia in research cohorts. Researchers typically rely on participants letting the study researchers know if they have been diagnosed with dementia; and so will not catch everyone.



This is why Dr Mullin and a team of dementia experts reviewed the health records of over 800 LBC1936 participants. They were able to map the incidence and prevalence of all-cause dementia and dementia subtypes in almost the entire LBC1936 for the first time.

They identified 118 individuals as having developed dementia from their health records, compared to only 21 that we already knew about from participants or their families having got in touch to inform the study team. This highlights the need for a robust clinical dementia outcome on which to base research and analysis, instead of less reliable self-reported diagnoses.

Dr Mullin said: *“We hope the study can serve as a guide for other studies of dementia diagnosis. The information can help researchers understand more about what causes dementia as people get older. What is particularly exciting is the prospect of combing the results of this study with all the additional information available in the LBC1936, which could provide vital data for further analyses and insights into predictors of dementia over a person's lifetime.”*

For those who wish to find out more about this process, you can find details of Dr Mullin's paper at the end of this newsletter.

Chronic inflammation and its impact on cognitive health across the lifespan

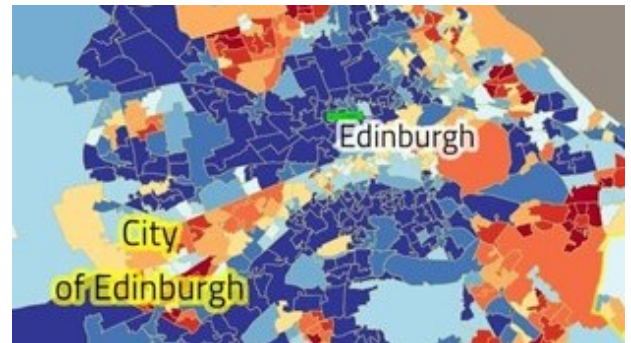
Inflammation is the body's response to injury or infection, recognised by heat, redness, swelling, pain in the affected area. Typically, we think of inflammation as a brief reaction, but if it persists, it can cause subtle yet cumulative harm to cells, tissues, and organs. This type of 'chronic' inflammation poses long-term risks to health, but less is known about the effect on brain structure and cognitive function across the life course.

Dr Eleanor Conole explored this issue in her recently-completed PhD project, which used new research techniques based on DNA methylation signatures (DNAm) using LBC1936 blood and saliva samples. Eleanor showed that the saliva-based DNAm signatures of inflammation were more strongly associated with brain structure and cognitive function than traditional blood-based measures, with those found to have more inflammation having poorer cognitive and brain health.

In her latest study, she applied similar methods to investigate the impact of inflammation on brain development in newborns.

Her findings suggest that sustained inflammation may also be a factor in neurodevelopmental disruption related to prematurity, and that saliva samples could offer a new non-invasive way to predict and monitor inflammation.

Environments and ageing



Deprivation map of Edinburgh where darker red colours indicate more deprived areas (SIMD, 2020)

Neighbourhoods influence our physical and mental health. Urban areas in particular face numerous environmental challenges, including air pollution.

The rich longitudinal data of the LBC1936 study helps us understand how environments throughout life are associated with ageing differences. Dr Gergo Baranyi has led several LBC-related studies exploring the relationship between neighbourhood features and their impact on cognitive function, frailty, and biological ageing. His research highlights the importance of our environment and its lasting effects on health and ageing.

Gergo's team showed that living in disadvantaged areas of Edinburgh in mid- and late adulthood was associated with –on average– slightly lower levels of general cognitive ability at age 70, and faster cognitive decline in the following years. In another recent publication, using data from a different cohort, he found that spending early childhood in areas with higher air pollution is linked with earlier mortality, including cancer-related deaths and neurodegenerative disorders.

Gergo co-presented his work at a recent Scottish Parliament Cross-Party Group meeting, attended by MSPs, clinicians, pharmacological and charity representatives and people living with lung conditions.

Anticholinergic use in the UK: longitudinal trends and associations with cognitive outcomes

Some widely prescribed medications with anticholinergic properties, including antidepressants, drugs to treat pain, and cardiovascular drugs have been associated with some negative health outcomes. It is not clear whether and how they may impact cognitive function and brain structure.

Dr Jure Mur investigated this subject as part of his recently-completed PhD project. Using data from the UK Biobank, Jure has shown that over the past 3 decades, more people are being prescribed with anticholinergic drugs, and that number of anticholinergics prescribed also increases with age. He has also found certain types of anticholinergic drug to be linked with increased risk of dementia.

In a new study, Jure examined how anticholinergic prescribing might influence brain structure and cognitive function in healthy middle-aged and older people. He discovered that the use of some opioid painkillers and a certain type of antibiotics was associated with a slight decrease in general cognitive ability. However, the study found no differences in brain structure between individuals with varying levels of anticholinergic use. These findings raise the possibility that some anticholinergic medications could contribute to dementia and reduced cognitive capacity, although the study alone is not sufficient to draw such conclusions.

KNOWLEDGE EXCHANGE AND IMPACT

LBCs featured in Scottish Parliament

NEUROSCIENCE MATTERS: RESEARCH FOR FUTURE HEALTH

"With support from the Scottish Parliament, Scotland has the potential to become even stronger in neuroscience research."

British Neuroscience Association



'Neuroscience Matters' was a meeting organised by the British Neuroscience Association. It was held at the Scottish Parliament and aimed to show how neuroscience research and those working within neuroscience in Scotland play a critical role in tackling some of the key health challenges of the future. The event showcased world-leading neuroscience research across Scotland, including Lothian Birth Cohorts as being the longest study of human cognition in the world! The LBC study director, Dr Simon Cox, was invited to join the event and meet with the Members of the Scottish Parliament and stakeholders to explain first-hand the importance of continued funding for research on brain and cognitive ageing that will so significantly influence future Scotland.

Simon said: "*It is testament to the hard work and productivity of the team, and the sustained interest the LBC studies have generated, that we were a featured research item at this meeting. It was a fascinating evening, and I found it encouraging to hear strong support for neuroscience research in Scotland from MSPs; there was enthusiasm and recognition for the fact that both basic and applied research have important roles to play in improving lives in Scotland.*"

LBC'S INTERNATIONAL PRESENCE

OHBM annual meeting in Canada



LBC neuroscientists at a conference in Montreal

The Organisation of Human Brain Mapping (OHBM) is an international society dedicated to using neuroimaging to discover the organisation of the human brain. Every year, the society brings together 3,000 neuroscientists to share their latest research. In July, four members of the LBC team – Drs Simon Cox, Colin Buchanan, Anna Fürtjes and Jo Moodie – joined the OHBM annual meeting in Montreal, Canada. The team presented their work investigating the links between brain structure and cognitive function based on data from over 40,000 participants from three different cohorts, including the LBC, the UK Biobank and Generation Scotland's STRADL database (Stratifying Resilience and Depression Longitudinally). Researchers from the Montreal Neurological Institute also presented findings from our collaborative project using the valuable longitudinal brain MRI scans you (LBC1936) contributed.

CHARGE conference in Texas

In October, members of the LBC team, Drs Simon Cox, Gail Davies, and Anna Fürtjes, visited Texas to attend the Cohorts for Heart and Ageing Research in Genomic Epidemiology (CHARGE) conference.

The LBC team have been an active member of the CHARGE consortium for many years; we contribute to a wide variety of research projects investigating genetics, epigenetics and proteomics of aging, health and disease. As part of the CHARGE cognitive working group, Prof Ian Deary and Dr Gail Davies have previously led large genetic analyses of general cognitive function. The LBC team now leads, in collaboration with Drs Elliot Tucker-Drob (University of Texas) and Andrew Grotzinger (University of Colorado), the largest genetic study to date of cognitive decline. This study will bring together data from more than 30 cohorts and could help better understand, diagnose and potentially mitigate Alzheimer's Disease and other dementias.



Drs Simon Cox and Elliott Tucker-Drob at the University of Texas.

After the CHARGE meeting, the team were hosted by Dr Elliot Tucker-Drob at the Lifespan Development Lab, University of Texas, Austin. The team enjoyed lively scientific discussions, planning for existing and future projects, and socialising with a cuppa during 'Tea Time' – which had been specifically added to the busy schedule to make their UK visitors feel at home. Dr Simon Cox also gave a lecture which included many LBC brain imaging research findings.

THE IMPORTANCE OF GREEN SPACES



Green spaces have been associated with improved mental and physical health and well-being and are increasingly recognised as a mitigation measure to buffer the adverse health effects of urban living. In February, Professor Catharine Ward Thompson, delivered an invited keynote address, *'Healthy Parks and Open Space: the Salutogenic Environment'*, at the 49th Spanish National Congress of Parks and Public Gardens (Asociación Española de Parques y Jardines Públicos) in Madrid.

Catharine presented to an audience of over 200 parks, gardens and public open space planners and managers, on the theme of 'Parks and Gardens – Natural Health Systems', reviewing her research, including work with the LBC1936 cohort, on parks and open spaces as important areas for health and wellbeing. This work shows that exposure to green spaces is associated with better perceived and objectively measured general health, improved mental health, enhanced brain development in children, reduced risk of chronic diseases, and lower mortality rates.

You can listen to Catharine's interview for a podcast by the World Urban Parks forum, in which she was asked about the work with LBC1936: <https://edin.ac/3mTgHsk>

LBC-inspired guided tours



Dr Tomas Bak giving one of his guided tours.

We have recently launched a new initiative that takes locals as well as those from distant places on guided walking tours inspired by Lothian Birth Cohorts. So far, our walking tours have been featured in event programmes for Brain Awareness Week, Edinburgh Science Festival, Dementia Action Week, and Doors Open Day.

The tours have been led by Dr Tomas Bak, Reader in Human Cognitive Neuroscience in the School of Philosophy, Psychology and Language Sciences and a licenced tour guide, and by Jana Tomastikova, a Psychology student. They surprised and entertained their audience with stories and facts inspired by the LBC research and findings, rich local neuroscience history and heroes. They walked together from George Square to the National Museum of Scotland and other local spots, highlighting unexpected connections between historical buildings, museum artifacts and rich Edinburgh neuroscience research.

We are thrilled with Tomas' and Jana's initiative and are delighted that locals as well as visitors from other parts of the world can now find out about the Lothian Birth Cohorts and local neuroscience in such an engaging way!

Lothian Birth Cohorts at Edinburgh Doors Open Day



Dr Colin Buchanan at the Doors Open Day

Doors Open Days are Scotland's largest free festival that celebrates places and stories. The University of Edinburgh regularly participates in the event, opening doors of many of its buildings to the public. This year, the Lothian Birth Cohorts joined colleagues from the Edinburgh Neuroscience network at the magnificent Playfair Library on Saturday 23 September to welcome visitors and invite them to learn about our research on healthy brain ageing.

Drs Colin Buchanan and Barbora Skarabela drew the visitors' attention with a history of Lothian Birth Cohorts and our hands-on materials that illustrate our research and findings. The visitors were able to view brain ageing with the Augmented Reality glasses and were keen to explore and comment on a pair of the 3D-printed models of healthy and less healthy ageing brains, and discuss the role of lifestyle in the process and what we can do to protect our brains throughout the lifecourse.

It was an exciting event with over 140 visitors who came to talk to us at the Edinburgh Neuroscience table. One of them said *"It was a great opportunity to see and learn about the brain and research connected to ageing, subjects which I knew little about. Amazing!"*.

How to stay sharp in older age: The next generation

The LBC team engages with a wide range of audiences, and it is particularly exciting when we share our work with young people as it is their generation who will benefit from the LBC expertise and findings the most. This is why we were delighted to hear from Rohit Gopikalje, an S4 high-school student, who approached us with an invitation for a workshop for the members of the Boroughmuir High School's Medics Club. With Rohit's help, we joined a group of 20 pupils and their teachers in March to share the LBCs' history and research aims and findings. The students heard from Dr Barbora Skarabela and two of the team's neuroscientists, Drs Colin Buchanan and Jo Moodie, who not only reviewed some of the key concepts in neuroscience and their own research interests but also explained their diverse journeys from high school to becoming neuroscientists.

One of the teachers emailed us to say: *"Thank you all so much for coming in, the students really enjoyed it. My 4th years were telling the rest of the class about the workshop today, which is always a positive sign. We look forward to another visit in the new academic year!"*

The LBC team continues working with local high schools. Most recently, as part of the national Being Human Festival, Adele Taylor, Sabela Mendez and Barbora Skarabela visited Trinity Academy for a workshop with 60 S4 and S5 students interested in Psychology. They presented a series of activities and quizzes inspired by the LBC research with important messages about lifestyle factors that help keep our mind and brain healthy throughout life.

School workshops to learn about the LBC history and findings



For a third year, Danielle Page was invited to join the University of Edinburgh's Widening Participation team to deliver a Psychology workshop for primary school children, as part of a scheme addressing educational inequalities and patterns of under-representation in Higher Education.

In a series of workshops, children from target schools learn what university is like, with fun 'real university lectures', that show them university is for everyone. In April and May, over 100 children from Liberton and Craigmoynton primary schools learned about the LBC studies, and – having tried just one tricky cognitive test themselves- marvelled at our participants' ability to get through hours of tests at the clinic!

The children were incredibly engaged and had some brilliant questions about why thinking skills change over time, how MRI machines work, and what an average day working with the LBC studies looks like for Danielle. We can't wait to welcome back more children next year!

Beth Jones who joined Danielle in the April sessions said: *"The two P7 workshops ran really well and it was lovely to see how engaged the pupils were with Psychology. It was particularly great to hear their reflections at the end of the day; many said how keen they were to go to University"*.

THANK YOU FROM THE LBC TEAM

As a member of the LBC1936 cohort, your contributions are helping to further our understanding of cognitive, brain, and general ageing. Thank you for your ongoing interest and involvement; we look forward to seeing you in 2024 and beyond. We wish you and your loved ones a very happy festive season and all the best for 2024!



LBC team in February 2023 in front of McEwan Hall at the University of Edinburgh

Contact us

The team are always delighted to hear from you, so if you would like to get in touch with us, please use the contact details listed on the next page. Please let us know if your contact details have changed, if you require this newsletter in another format, or if you'd like further information about anything you read here.

-  Email: lbc1936@ed.ac.uk
-  Phone: 0131 651 1681
-  Website: lothian-birth-cohorts.ed.ac.uk
-  Twitter: www.twitter.com/EdinUniLBC
-  Post: Lothian Birth Cohorts
Psychology Department
University of Edinburgh
7 George Square
Edinburgh
EH8 9JZ

LBC PUBLICATION HIGHLIGHTS 2023

Aribisala, B.S. et al. (2023). Sleep quality, perivascular spaces and brain health markers in ageing – A longitudinal study in the Lothian Birth Cohort 1936. *Sleep Medicine*.

Baranyi, G. et al. (2023). 'Early life PM2.5 exposure, childhood cognitive ability and mortality between age 11 and 86: A record-linkage life-course study from Scotland'. *Environmental Research*.

Conole, E.L.S. et al. (2023). Immuno-epigenetic signature derived in saliva associates with the encephalopathy of prematurity and perinatal inflammatory disorders. *Brain, Behavior, and Immunity*.

Mullin, D.S. et al. (2023). Identifying dementia using medical data linkage in a longitudinal cohort study: Lothian Birth Cohort 1936. *BMC Psychiatry*.

Mur, J., Marioni, R. E., Russ, T. C., Muniz-Terrera, G., & Cox, S. R. (2023). Anticholinergic burden in middle and older age is associated with lower cognitive function, but not with brain atrophy. *British Journal of Clinical Pharmacology*.

Okely, J. et al. (2023). Cognitive ageing and experience of playing a musical instrument. *Psychology and Aging*.

Saunders, T. et al. (2023). 'Predictive Blood Biomarkers and Brain Changes Associated with Age-Related Cognitive Decline'. *Brain Communications*.

Saunders, T. et al. (2023). 'Neurogranin in Alzheimer's disease and ageing: A human post-mortem study'. *Neurobiology of disease*.

Would you like to receive LBC email updates?

We launched the **LBC participant email mailing list** in Spring 2023. If you, or your friends and family members, would like to receive quarterly newsletters from the LBC team, please email us at lbc1936@ed.ac.uk to sign up. We'll be delighted to send you updates about the study more often!



Lothian Birth Cohorts



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