



Welcome to the LBC1921 newsletter for 2014. From all of the members of the LBC1921 team, please accept our warmest wishes.

We hope that you have had a good, healthy year. As usual, we would like to take this opportunity to tell you what has been happening in the study over the past 12 months. It has been another productive year for the study, which began with the completion of the latest wave of assessments. We are already making plans to see you again at the clinic at the Western General from next year for the sixth time. You don't need to do anything at the moment about the next assessment, except update your address if you have moved house or about to do so.

Everything you read about in this newsletter is a result of your involvement. We hope you are interested to read more about what's been happening. If you wish to get in touch for any further information, our contact details can be found at the end of the newsletter. We are always delighted to hear from you. Thank you again for your commitment and enthusiasm in the LBC1921 study. By taking part, you will be ensuring the LBC 1921 remains one of the longest projects of its kind in the world.

#### **LBC1936 Research in the Spotlight BBC Breakfast Show**

In November, the BBC Breakfast show filmed a short piece on the LBC1936 study to be aired sometime next year. Keep an eye on our Twitter feed (details at the end of this letter) for the date of the upcoming show.

#### **“The greatest-ever study of human development?”**

We are always telling you how important are the data you provide. Well, it's nice to be able to tell you that, internationally, we receive the same opinion. Professor Dave Myers is a highly esteemed U.S psychology professor and author of one of the most-used introductory psychology textbooks. In the monthly magazine —The Observer—of the American Psychological Society he described the Lothian Birth Cohorts as the greatest ever study of human development. He has been a champion of your contributions to international knowledge about cognitive aging ever since he first heard Ian Deary speak about the LBC studies. He mentioned both LBC studies in his Observer essay, but was particularly impressed by the fact that LBC1921 has data on the same individuals from 11 to 90, recognising that this is the longest-running study of cognition in the world. His Observer essay can be found here:

<http://www.psychologicalscience.org/index.php/publications/observer/2014/october-14/teaching-current-directions-in-psychological-science-15.html#myers>

#### **Lifetime achievement in intelligence**

Ian Deary will be attending the conference of the International Society for Intelligence Research from 12-14<sup>th</sup> December to receive their Lifetime Achievement Award for his work on human intelligence. Ian will give a talk on his work, including the LBC1936 study, and will be the subject of an interview about his career studying cognitive ability and cognitive ageing.

#### **Ian Deary addressed the Voluntary Health Scotland (VHS) AGM**

At the Scottish Storytelling Centre in Edinburgh, on 27th November. Professor Ian Deary gave the keynote address to VHS's AGM meeting. His talk was the start of an afternoon symposium on 'Health Wellbeing and Your Brain'. Ian's talk was very well received. There were responses from Jackie Brock, Chief Executive of Children in Scotland, and Maureen O'Neill, Director of Faith in Older People. After

these presentations there was a long and lively discussion led by Shulah Allan, Convenor of the Scottish Council for Voluntary Organisations. Ian said,

*“This was a new audience for the LBC studies’ findings and for cognitive and general ageing work more broadly. There was a great appetite for robust results and their application toward a healthy older age. People were fascinated by the studies themselves, and there was a clear appreciation that health and wellbeing in older age is a life-course affair, and for the relevance of the early years.”*



**Ian Deary with Claire Stevens,  
Chief Officer of Voluntary Health  
Scotland.**

### Latest Results

With the data from five waves of the study now available to analyse and publish on, 2014 has been another highly productive year. At the last count, almost 20 research papers from the LBC1921 study have been published this year, or are due to be published in early 2015. Some of the most recent publications are listed at the end of the newsletter.

### Occupational complexity and lifetime cognitive abilities

A new paper by Dr Alan Gow and Emily Smart has discovered that people who worked in more complex occupations throughout their lives (involving working with data and with people) had better cognitive ability in later life, even after

controlling for how intelligent they were in childhood. A person’s job is a major part of their life, and these results, published in *Neurology*, imply the ‘right job’ might protect cognitive abilities in older age.

The article was covered by:

BBC News

(<http://www.bbc.co.uk/news/health-30115497>).

Wall Street Journal

(<http://blogs.wsj.com/atwork/2014/11/19/the-best-careers-for-your-brain-in-retirement/>).

Mail Online

(<http://www.dailymail.co.uk/health/article-2852779/Do-feel-challenged-work-Exercising-mind-complex-jobs-boosts-memory-protects-brain-ageing.html>).

### Thanks again

As a member of the LBC1921 you are helping to further our knowledge and understanding of how our thinking skills change over time, and the factors that might slow these changes. From all of the LBC1921 research team, we send a big thank you. We look forward to seeing you in 2015 and beyond.

Yours sincerely,



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### Would you like to talk to us?

We are here:



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<https://twitter.com/CCACE>

### Newly 'in press'

Murray, A.L., Johnson, W., Gow, A.J. & Deary, I.J., (in press).

Disentangling wording and substantive factors in the Spiritual Well-being Scale. *Psychology of Religion and Spirituality*.

### Newly 'in print'

Christoforou, A., Espeseth, T., Davies, G., Fernandes, C. P. D., Giddaluru, S., Mattheisen, M., ... Le Hellard, S. (2014). GWAS-based pathway analysis differentiates between fluid and crystallized intelligence. *Genes, Brain, and Behavior*, 13, 663–674.

Davies, G., Harris, S. E., Reynolds, C. A., Payton, A., Knight, H. M., Liewald, D. C. ... Deary, I. J. (2014). A genome-wide association study implicates the APOE locus in nonpathological cognitive ageing. *Molecular Psychiatry*, 19, 76–87.

Deary I. J. The stability of intelligence from childhood to old age (2014). *Current Directions In Psychological Science*, 23, 239-245.

Gardner, M., 16 authors, Deary, I. J., 35 authors, Ben-Shlomo, Y., ... Halcyon study team. (2014). Gender and telomere length: Systematic review and meta-analysis. *Experimental Gerontology*, 51, 15–27.

Hill, W. D., de Leeuw, C., Davies, G., Liewald, D. C. M., Payton, A., Craig, L. C. A., ... Deary, I. J. (2014). Functional Gene Group Analysis Indicates No Role for Heterotrimeric G Proteins in Cognitive Ability. *PLoS ONE*, 9, e91690.

Laukka, E. J., Starr, J. M., & Deary, I. J. (2014). Lower ankle-brachial index is related to worse cognitive performance in old age. *Neuropsychology*, 28, 281–289.

Luciano, M., Möttus, R., Harris, S. E., Davies, G., Payton, A., Ollier, W. E. R., ... Deary, I. J. (2014). Predicting cognitive ability in ageing cohorts using Type 2 diabetes genetic risk. *Diabetic Medicine: A Journal of the British Diabetic Association*, 31, 714–720.

Loth, D. W., 134 authors, Deary, I. J., 24 authors. (2014). Genome-wide association

analysis identifies six new loci associated with forced vital capacity. *Nature Genetics*, 46, 669–677.

Marioni, R. E., Penke, L., Davies, G., Huffman, J. E., Hayward, C., & Deary, I. J. (2014). The total burden of rare, non-synonymous exome genetic variants is not associated with childhood or late-life cognitive ability. *Proceedings. Biological Sciences / The Royal Society*, 281, 20140117.

Rietveld, C. A., Esko, T., Davies, G., 50 authors, Deary, I. J., 5 authors, & Koellinger, P. D. (2014). Common genetic variants associated with cognitive performance identified using the proxy-phenotype method. *Proceedings of the National Academy of Sciences of the United States of America*, 111, 13790–13794.

Ritchie, S. J., Gow, A. J., & Deary, I. J. (2014). Religiosity is negatively associated with later-life intelligence, but not with age-related cognitive decline. *Intelligence*, 46, 9–17.

Shah, S., McRae, A. F., Marioni, R. E., Harris, S. E., Gibson, J., Henders, A. K., Redmond, P., Cox, S. R., Pattie, A., Corley, J., Murphy, L., Martin, N. G., Montgomery, G. W., Starr, J. M., Wray, N. R., Deary, I. J., & Visscher, P. M. (2014). Genetic and environmental exposures constrain epigenetic drift over the human life course. *Genome Research*, 24, 1725-33.

Tang, W., 23 authors, Deary, I. J., 55 authors, Cassano, P. A. (2014). Large-scale genome-wide association studies and meta-analyses of longitudinal change in adult lung function. *PLoS One*, 9, e100776.

Van den Berg, S., 74 authors, Deary, I. J., 10 authors, Martin, N. G. (2014). Harmonization of Neuroticism and Extraversion phenotypes across inventories and cohorts in the Genetics of Personality Consortium: an application of Item Response Theory. *Behavior Genetics*, 44, 295–313.

Here's the opening page of the paper in which you were established as the longest-running study of human development:

## The Stability of Intelligence From Childhood to Old Age

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### Abstract

Intelligence is an important human trait on which people differ. Few studies have examined the stability of intelligence differences from childhood or youth to older age using the same test. The longest such studies are those that have followed up on some of the participants of the Scottish Mental Surveys of 1932 and 1947. Their results suggest that around half of the individual differences in intelligence are stable across most of the human life course. This is valuable information because it can be used as a guide to how much of people's cognitive-aging differences might be amenable to alleviation.

### Keywords

intelligence, IQ, aging, stability, cognitive aging

People differ in their ability to solve mental problems. This ability has associations with success in life. People who are more cognitively able—more intelligent—tend to stay longer in full-time education, to have more professional and higher-income occupations, and to be healthier and live longer (Deary, 2000, 2012, 2013; Deary, Weiss, & Batty, 2010; Strenze, 2007). In the present article, I address why it is important to know the long-term stability of individual differences in this important human trait.

### Two Meanings of Stability

One type of stability is that of mean levels. Some cognitive skills show a steady decline in average scores after young adulthood (Salthouse, 2010). These include processing speed, reasoning, spatial ability, and some aspects of memory. Other cognitive skills' mean levels decline later and less, if at all, before very old age. These include vocabulary and other verbal abilities, general knowledge, and some number skills. Research on the stability of mean cognitive levels is based on cross-sectional, longitudinal, and cross-sequential designs (Schaie, 2005). The field has lively debates about how much, whether, and when certain cognitive abilities change with age (Salthouse, 2009).

The present article is based on a second type of stability: the stability of individual differences. Think about any human trait that is distributed along a continuum, such as height, weight, extraversion, or intelligence. We

can ask whether people retain their relative ranks in the continuum as they change with age: Are heavier people in a group at one age still heavier in that group later on? A simple way to visualize this stability is by using a scatter plot. This is a plot in which the values of the trait for each person at Time 1 are placed on the *x*-axis and the values measured at Time 2 are placed on the *y*-axis. A numerical value can be given to this type of stability using a correlation coefficient (Deary, 2000). This is a statistic whose values can range from  $-1$  through  $0$  to  $+1$ . Perfect stability of individual differences—that is, the retention of everyone's relative position in a group—from one time to the next would be indicated by a value of  $+1$ , and no stability at all by a value of  $0$ .

It is important to know how stable intelligence differences are across the human life course. If we find out that intelligence differences are somewhat unstable between youth and old age, it could mean, for example, that some people who start off scoring low on cognitive tests do better later, and vice versa, or that people who have the same cognitive scores as youngsters diverge over time as they age. Next, we should want to discover variables that

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