

UCLA

UCLA Previously Published Works

Title

Author Correction: Study of 300,486 individuals identifies 148 independent genetic loci influencing general cognitive function

Permalink

<https://escholarship.org/uc/item/512678qp>

Journal

Nature Communications, 10(1)

ISSN

2041-1723

Authors

Davies, Gail

Lam, Max

Harris, Sarah E

et al.

Publication Date

2019

DOI

10.1038/s41467-019-10160-w

Peer reviewed

<https://doi.org/10.1038/s41467-019-10160-w>

OPEN

Author Correction: Study of 300,486 individuals identifies 148 independent genetic loci influencing general cognitive function

Gail Davies¹, Max Lam et al.[#]

Correction to: *Nature Communications* <https://doi.org/10.1038/s41467-018-04362-x>, published online 29 May 2018.

Christina M. Lill, who contributed to analysis of data, was inadvertently omitted from the author list in the originally published version of this article. This has now been corrected in both the PDF and HTML versions of the article.

Published online: 01 May 2019



Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>.

© The Author(s) 2019

Correspondence and requests for materials should be addressed to I.D. (email: i.deary@ed.ac.uk).

[#]A full list of authors and their affiliations appears at the end of the paper.

Gail Davies¹, Max Lam², Sarah E. Harris^{1,3}, Joey W. Trampush^{4,5}, Michelle Luciano¹, W. David Hill¹, Saskia P. Hagenaars^{1,6}, Stuart J. Ritchie¹, Riccardo E. Marioni^{1,3}, Chloe Fawns-Ritchie¹, David C.M. Liewald¹, Judith A. Okely¹, Ari V. Ahola-Olli^{7,8}, Catriona L.K. Barnes⁹, Lars Bertram¹⁰, Joshua C. Bis¹¹, Katherine E. Burdick^{12,13,14}, Andrea Christoforou^{15,16}, Pamela DeRosse^{2,17}, Srdjan Djurovic^{15,18}, Thomas Espeseth^{19,20}, Stella Giakoumaki²¹, Sudheer Giddaluru^{15,16}, Daniel E. Gustavson^{22,23}, Caroline Hayward^{24,25}, Edith Hofer^{26,27}, M. Arfan Ikram^{28,29,30}, Robert Karlsson³¹, Emma Knowles³², Jari Lahti^{33,34}, Markus Leber³⁵, Shuo Li³⁶, Karen A. Mather³⁷, Ingrid Melle^{15,19}, Derek Morris³⁸, Christopher Oldmeadow³⁹, Teemu Palviainen⁴⁰, Antony Payton⁴¹, Raha Pazoki⁴², Katja Petrovic²⁶, Chandra A. Reynolds⁴³, Muralidharan Sargurupremraj⁴⁴, Markus Scholz^{45,46}, Jennifer A. Smith^{47,48}, Albert V. Smith^{49,50}, Natalie Terzikhan^{28,51}, Anbupalam Thalamuthu³⁷, Stella Trompet⁵², Sven J. van der Lee²⁸, Erin B. Ware⁴⁸, B. Gwen Windham⁵³, Margaret J. Wright^{54,55}, Jingyun Yang^{56,57}, Jin Yu¹⁷, David Ames^{58,59}, Najaf Amin²⁸, Philippe Amouyel⁶⁰, Ole A. Andreassen^{19,61}, Nicola J. Armstrong⁶², Amelia A. Assareh³⁷, John R. Attia⁶³, Deborah Attix^{64,65}, Dimitrios Avramopoulos^{66,67}, David A. Bennett^{56,57}, Anne C. Böhrer^{68,69}, Patricia A. Boyle^{56,70}, Henry Brodaty^{37,71}, Harry Campbell⁹, Tyrone D. Cannon⁷², Elizabeth T. Cirulli⁷³, Eliza Congdon⁷⁴, Emily Drabant Conley⁷⁵, Janie Corley¹, Simon R. Cox¹, Anders M. Dale^{22,76,77,78}, Abbas Dehghan^{42,79}, Danielle Dick⁸⁰, Dwight Dickinson⁸¹, Johan G. Eriksson^{82,83,84,85}, Evangelos Evangelou^{42,82}, Jessica D. Faul⁴⁸, Ian Ford⁸⁶, Nelson A. Freimer⁷⁴, He Gao⁴², Ina Giegling⁸⁷, Nathan A. Gillespie⁸⁸, Scott D. Gordon⁸⁹, Rebecca F. Gottesman^{90,91}, Michael E. Griswold⁹², Vilmundur Gudnason^{49,50}, Tamara B. Harris⁹³, Annette M. Hartmann⁸⁷, Alex Hatzimanolis^{94,95,96}, Gerardo Heiss⁹⁷, Elizabeth G. Holliday⁶³, Peter K. Joshi⁹, Mika Kähönen^{98,99,100}, Sharon L.R. Kardia⁴⁷, Ida Karlsson³¹, Luca Kleindam^{101,102,103,104}, David S. Knopman¹⁰⁵, Nicole A. Kochan^{37,106}, Bettina Konte⁸⁷, John B. Kwok^{107,108}, Stephanie Le Hellard^{15,16}, Teresa Lee^{37,106}, Terho Lehtimäki^{109,110}, Shu-Chen Li^{111,112}, Christina M. Lill¹¹³, Tian Liu^{10,111}, Marisa Koini²⁶, Edythe London⁷⁴, Will T. Longstreth Jr^{114,115}, Oscar L. Lopez¹¹⁶, Anu Loukola⁴⁰, Tobias Luck^{46,117}, Astri J. Lundervold^{118,119}, Anders Lundquist^{120,121}, Leo-Pekka Lyytikäinen^{109,110}, Nicholas G. Martin⁸⁹, Grant W. Montgomery^{89,122}, Alison D. Murray^{25,123}, Anna C. Need¹²⁴, Raymond Noordam⁵², Lars Nyberg^{120,125,126}, William Ollier¹²⁷, Goran Papenberg^{111,128}, Alison Pattie¹²⁹, Ozren Polasek^{130,131}, Russell A. Poldrack¹³², Bruce M. Psaty^{11,133,134}, Simone Reppermund^{37,135}, Steffi G. Riedel-Heller¹¹⁷, Richard J. Rose¹³⁶, Jerome I. Rotter^{137,138}, Panos Roussos^{12,139,140}, Suvi P. Rovio⁷, Yasaman Saba¹⁴¹, Fred W. Sabb¹⁴², Perminder S. Sachdev^{37,106}, Claudia L. Satizabal^{143,144}, Matthias Schmid¹⁴⁵, Rodney J. Scott⁶³, Matthew A. Scult¹⁴⁶, Jeannette Simino⁹², P. Eline Slagboom¹⁴⁷, Nikolaos Smyrnis^{94,95}, Aïcha Soumaré⁴⁴, Nikos C. Stefanis^{94,95,96}, David J. Stott¹⁴⁸, Richard E. Straub¹⁴⁹, Kjetil Sundet^{19,20}, Adele M. Taylor¹²⁹, Kent D. Taylor^{137,138}, Ioanna Tzoulaki^{42,79,150}, Christophe Tzourio^{44,151}, André Uitterlinden^{28,152}, Veronique Vitart²⁴, Aristotle N. Voineskos¹⁵³, Jaakko Kaprio^{40,82,154}, Michael Wagner^{103,104}, Holger Wagner¹⁰², Leonie Weinhold¹⁴⁵, K. Hoyan Wen²⁸, Elisabeth Widen⁴⁰, Qiong Yang³⁶, Wei Zhao⁴⁷, Hieab H.H. Adams^{28,155}, Dan E. Arking⁶⁷, Robert M. Bilder⁷⁴, Panos Bitsios¹⁵⁶, Eric Boerwinkle^{157,158}, Ornit Chiba-Falek⁶⁴, Aiden Corvin¹⁵⁹, Philip L. De Jager^{160,161}, Stéphanie Debette^{44,162}, Gary Donohoe³⁸, Paul Elliott^{42,79}, Annette L. Fitzpatrick^{115,163}, Michael Gill¹⁵⁹, David C. Glahn³², Sara Hägg³¹, Narelle K. Hansell⁵⁴, Ahmad R. Hariri¹⁴⁶, M. Kamran Ikram^{28,30}, J. Wouter Jukema¹⁶⁴, Eero Vuoksimaa^{40,154}, Matthew C. Keller¹⁶⁵, William S. Kremen^{22,23}, Lenore Launer⁹³, Ulman Lindenberger¹¹¹, Aarno Palotie^{40,166,167}, Nancy L. Pedersen³¹, Neil Pendleton¹⁶⁸, David J. Porteous^{1,3,25}, Katri Räikkönen³³, Olli T. Raitakari^{7,169}, Alfredo Ramirez^{35,68,102}, Ivar Reinvang²⁰, Igor Rudan⁹, Dan Rujescu⁸⁷, Reinhold Schmidt²⁶, Helena Schmidt¹⁴¹, Peter W. Schofield¹⁷⁰, Peter R. Schofield^{171,172}, John M. Starr^{1,173}, Vidar M. Steen^{15,16}, Julian N. Trollor^{37,135}

Steven T. Turner¹⁷⁴, Cornelia M. Van Duijn²⁸, Arno Villringer^{175,176}, Daniel R. Weinberger¹⁴⁹, David R. Weir⁴⁸, James F. Wilson^{9,24}, Anil Malhotra^{17,177,178}, Andrew M. McIntosh^{1,179}, Catharine R. Gale^{1,180}, Sudha Seshadri^{142,143,181}, Thomas H. Mosley Jr⁵³, Jan Bressler¹⁵⁷, Todd Lencz^{17,179} & Ian J. Deary¹

¹Centre for Cognitive Ageing and Cognitive Epidemiology, Department of Psychology, School of Philosophy, Psychology and Language Sciences, The University of Edinburgh, Edinburgh EH8 9JZ, UK. ²Institute of Mental Health, Singapore 539747, Singapore. ³Medical Genetics Section, Centre for Genomic & Experimental Medicine, MRC Institute of Genetics & Molecular Medicine, University of Edinburgh, Western General Hospital, Edinburgh EH4 2XU, UK. ⁴BrainWorkup, LLC, Los Angeles 90033 CA, USA. ⁵Department of Psychiatry and Behavioral Sciences, Keck School of Medicine, University of Southern California, Los Angeles 90033 CA, USA. ⁶Social, Genetic and Developmental Psychiatry Centre, Institute of Psychiatry, Psychology & Neuroscience, King's College London, De Crespigny Park, Denmark Hill, London SE5 8AF, UK. ⁷Research Centre of Applied and Preventive Cardiovascular Medicine, University of Turku, Turku 20520, Finland. ⁸Department of Internal Medicine, Satakunta Central Hospital, Pori 28100, Finland. ⁹Centre for Global Health Research, Usher Institute of Population Health Sciences and Informatics, University of Edinburgh, Teviot Place, Edinburgh EH8 9AG, Scotland. ¹⁰Max Planck Institute for Molecular Genetics, Berlin 14195, Germany. ¹¹Cardiovascular Health Research Unit, Department of Medicine, University of Washington, Seattle 98101 Washington, USA. ¹²Department of Psychiatry, Icahn School of Medicine at Mount Sinai, New York 10029 NY, USA. ¹³Mental Illness Research, Education, and Clinical Center (VISN 3), James J. Peters VA Medical Center, Bronx 10468 NY, USA. ¹⁴Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, Boston 02115 MA, USA. ¹⁵NORMENT, K.G. Jebsen Centre for Psychosis Research, Department of Clinical Science, University of Bergen, Bergen 5021, Norway. ¹⁶Dr. Einar Martens Research Group for Biological Psychiatry, Center for Medical Genetics and Molecular Medicine, Haukeland University Hospital, Bergen 5020, Norway. ¹⁷Center for Psychiatric Neuroscience, Feinstein Institute for Medical Research, Manhasset 11030 NY, USA. ¹⁸Department of Medical Genetics, Oslo University Hospital, University of Bergen, Oslo 0424, Norway. ¹⁹Department of Psychology, University of Oslo, Oslo 0373, Norway. ²⁰Division of Mental Health and Addiction, Oslo University Hospital, Oslo 0315, Norway. ²¹Department of Psychology, University of Crete, Crete GR-74100, Greece. ²²Department of Psychiatry, University of California, San Diego 92093 CA, USA. ²³Center for Behavior Genetics of Aging, University of California, San Diego 92093 CA, USA. ²⁴Medical Research Council Human Genetics Unit, Institute of Genetics and Molecular Medicine, University of Edinburgh, Edinburgh EH4 2XU, UK. ²⁵Generation Scotland, Centre for Genomic and Experimental Medicine, University of Edinburgh, Edinburgh EH4 2XU, UK. ²⁶Department of Neurology, Clinical Division of Neurogeriatrics, Medical University of Graz, Graz 8036, Austria. ²⁷Institute of Medical Informatics Statistics and Documentation, Medical University of Graz, Graz 8036, Austria. ²⁸Department of Epidemiology, Erasmus University Medical Center, Rotterdam 3015, The Netherlands. ²⁹Department of Radiology and Nuclear Medicine, Erasmus University Medical Center, Rotterdam 3015, The Netherlands. ³⁰Department of Neurology, Erasmus University Medical Center, Rotterdam xxxxxx, The Netherlands. ³¹Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm SE-171 77, Sweden. ³²Department of Psychiatry, Yale University School of Medicine, New Haven 06511 CT, USA. ³³Department of Psychology and Logopedics, Faculty of Medicine, University of Helsinki, Helsinki 00014, Finland. ³⁴Helsinki Collegium for Advanced Studies, University of Helsinki, Helsinki 00014, Finland. ³⁵Department of Psychiatry and Psychotherapy, University of Cologne, Cologne D-50937, Germany. ³⁶Department of Biostatistics, Boston University School of Public Health, Boston 02118 MA, USA. ³⁷Centre for Healthy Brain Ageing, School of Psychiatry, University of New South Wales, Sydney 2031, Australia. ³⁸Neuroimaging, Cognition & Genomics (NICOG) Centre, School of Psychology and Discipline of Biochemistry, National University of Ireland Galway, Galway H91 TK33, Ireland. ³⁹Medical Research Institute and Faculty of Health, University of Newcastle, New South Wales 2308, Australia. ⁴⁰Institute for Molecular Medicine Finland (FIMM), University of Helsinki, Helsinki FI-00014, Finland. ⁴¹Centre for Epidemiology Division of Population Health, Health Services Research & Primary Care, The University of Manchester, Manchester M13 9PL, UK. ⁴²Department of Epidemiology and Biostatistics, School of Public Health, Imperial College London, London W2 1PG, UK. ⁴³Department of Psychology, University of California Riverside, Riverside 92521 CA, USA. ⁴⁴University of Bordeaux, Bordeaux Population Health Research Center, INSERM UMR 1219, F-33000 Bordeaux, France. ⁴⁵Institute for Medical Informatics, Statistics and Epidemiology, University of Leipzig, Leipzig 04107, Germany. ⁴⁶LIFE—Leipzig Research Center for Civilization Diseases, University of Leipzig, Leipzig 04107, Germany. ⁴⁷Department of Epidemiology, School of Public Health, University of Michigan, Ann Arbor, MI 48109, USA. ⁴⁸Survey Research Center, Institute for Social Research, University of Michigan, Ann Arbor, MI 48104, USA. ⁴⁹Icelandic Heart Association, Kopavogur IS-201, Iceland. ⁵⁰University of Iceland, Reykjavik 101, Iceland. ⁵¹Department of Respiratory Medicine, Ghent University Hospital, De Pintelaan 185, 9000 Ghent, Belgium. ⁵²Section of Gerontology and Geriatrics, Department of Internal Medicine, Leiden University Medical Center, Leiden 2333, The Netherlands. ⁵³Department of Medicine, Division of Geriatrics, University of Mississippi Medical Center, Jackson 39216 MS, USA. ⁵⁴Queensland Brain Institute, University of Queensland, Brisbane 4072, Australia. ⁵⁵Centre for Advanced Imaging, University of Queensland, Brisbane 4072, Australia. ⁵⁶Rush Alzheimer's Disease Center, Rush University Medical Center, Chicago 60612 IL, USA. ⁵⁷Department of Neurological Sciences, Rush University Medical Center, Chicago 60612 IL, USA. ⁵⁸National Ageing Research Institute, Royal Melbourne Hospital, Victoria 3052, Australia. ⁵⁹Academic Unit for Psychiatry of Old Age, University of Melbourne, St George's Hospital, Kew 3010, Australia. ⁶⁰Univ. Lille, Inserm, CHU Lille, Institut Pasteur de Lille, U1167-LabEx DISTALZ, F-59000 Lille, France. ⁶¹Norwegian Centre for Mental Disorders Research (NORMENT), Institute of Clinical Medicine, University of Oslo, Oslo 0372, Norway. ⁶²Mathematics and Statistics, Murdoch University, Perth 6150, Australia. ⁶³Hunter Medical Research Institute and Faculty of Health, University of Newcastle, New South Wales 2305, Australia. ⁶⁴Department of Neurology/Bryan Alzheimer's Disease Research Center, and Center for Genomic and Computational Biology, Duke University Medical Center, Durham 27708 NC, USA. ⁶⁵Psychiatry and Behavioral Sciences, Division of Medical Psychology, and Department of Neurology, Duke University Medical Center, Durham 27708 NC, USA. ⁶⁶Department of Psychiatry, Johns Hopkins University School of Medicine, MD Baltimore 21287, USA. ⁶⁷McKusick-Nathans Institute of Genetic Medicine, Johns Hopkins University School of Medicine, MD Baltimore 21287, USA. ⁶⁸Institute of Human Genetics, University of Bonn, Bonn 53113, Germany. ⁶⁹Department of Genomics, Life and Brain Center, University of Bonn, Bonn 53113, Germany. ⁷⁰Departments of Behavioral Sciences, Rush University Medical Center, Chicago 60612 IL, USA. ⁷¹Dementia Centre for Research Collaboration, University of New South Wales, Sydney 2031 NSW, Australia. ⁷²Department of Psychology, Yale University, New Haven 06520 CT, USA. ⁷³Human Longevity Inc, Durham 27709 NC, USA. ⁷⁴UCLA Semel Institute for Neuroscience and Human Behavior, Los Angeles 90024 CA, USA. ⁷⁵23andMe, Inc., Mountain View 94041 CA, USA. ⁷⁶Department of Cognitive Science, University of California, San Diego, La Jolla 92093 CA, USA. ⁷⁷Department of Neurosciences, University of California, San Diego, La Jolla 92093 CA, USA. ⁷⁸Department of Radiology, University of California, San Diego, La Jolla 92093 CA, USA. ⁷⁹MRC-PHE Centre for Environment, School of Public Health, Imperial College London, London W2 1PG, UK. ⁸⁰Department of Psychology, Virginia Commonwealth University, Richmond 23284 VA, USA. ⁸¹Clinical and Translational Neuroscience Branch, Intramural Research Program, National Institute of Mental Health, National Institute of Health, Bethesda 20892 MD, USA. ⁸²National Institute for Health and Welfare, Helsinki FI-00271, Finland. ⁸³Department of General Practice and Primary Health Care, University of Helsinki, Helsinki 00290, Finland. ⁸⁴Helsinki University Central Hospital,

Unit of General Practice, Helsinki FI-00029, Finland. ⁸⁵Folkhälsan Research Centre, Helsinki 2018, Finland. ⁸⁶Robertson Centre for Biostatistics, University of Glasgow, Glasgow G12 8QQ, United Kingdom. ⁸⁷Department of Psychiatry, Martin Luther University of Halle-Wittenberg, Halle 06108, Germany. ⁸⁸Virginia Institute for Psychiatric and Behavioral Genetics, Virginia Commonwealth University, Richmond 23298 VA, USA. ⁸⁹QIMR Berghofer Medical Research Institute, Brisbane 4029, Australia. ⁹⁰Department of Neurology, Johns Hopkins University School of Medicine, Baltimore 21287 MD, USA. ⁹¹Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore 21205 MD, USA. ⁹²Department of Data Science, University of Mississippi Medical Center, Jackson 39216 MS, USA. ⁹³Intramural Research Program National Institutes on Aging, National Institutes of Health, Bethesda 20892 MD, USA. ⁹⁴Department of Psychiatry, National and Kapodistrian University of Athens Medical School, Eginition Hospital, Athens 11528, Greece. ⁹⁵University Mental Health Research Institute, Athens GR-156 01, Greece. ⁹⁶Neurobiology Research Institute, Theodor-Theohari Cozzika Foundation, Athens 11521, Greece. ⁹⁷Department of Epidemiology, University of North Carolina Gillings School of Global Public Health, Chapel Hill 27599 NC, USA. ⁹⁸Department of Clinical Physiology, Tampere University Hospital, and Finnish Cardiovascular Research Center, Tampere FI-33014, Finland. ⁹⁹Faculty of Medicine and Life Sciences, University of Tampere, Tampere 33521, Finland. ¹⁰⁰Department of Clinical Physiology, Finnish Cardiovascular Research Center—Tampere, Faculty of Medicine and Life Sciences, University of Tampere, Tampere 33014, Finland. ¹⁰¹Department of Psychiatry Medical Faculty, University of Cologne, Cologne 50923, Germany. ¹⁰²Department of Psychiatry and Psychotherapy, University of Bonn, Bonn 53127, Germany. ¹⁰³German Center for Neurodegenerative Diseases (DZNE), Bonn 53127, Germany. ¹⁰⁴Department for Neurodegenerative Diseases and Geriatric Psychiatry, University of Bonn, Bonn 53127, Germany. ¹⁰⁵Department of Neurology, Mayo Clinic, Rochester 55905 MN, USA. ¹⁰⁶Neuropsychiatric Institute, Prince of Wales Hospital, Sydney 2031, Australia. ¹⁰⁷Brain and Mind Centre—The University of Sydney, Camperdown, NSW 2050, Australia. ¹⁰⁸School of Medical Sciences, University of New South Wales, Sydney 2052, Australia. ¹⁰⁹Department of Clinical Chemistry, Fimlab Laboratories, Finnish Cardiovascular Research Center—Tampere, Faculty of Medicine and Life Sciences, University of Tampere, Tampere 33014, Finland. ¹¹⁰Department of Clinical Chemistry, Finnish Cardiovascular Research Center—Tampere, Faculty of Medicine and Life Sciences, University of Tampere, Tampere 33014, Finland. ¹¹¹Max Planck Institute for Human Development, Berlin 14195, Germany. ¹¹²Technische Universität Dresden, Dresden 01187, Germany. ¹¹³Genetic and Molecular Epidemiology Group, Lübeck Interdisciplinary Platform for Genome Analytics, Institutes of Neurogenetics & Cardiogenetics, University of Lübeck, Lübeck, Germany. ¹¹⁴Department of Neurology, School of Medicine, University of Washington, Seattle 98195-6465 WA, USA. ¹¹⁵Department of Epidemiology, University of Washington, Seattle 98195 WA, USA. ¹¹⁶Department of Neurology and Psychiatry, University of Pittsburgh, Pittsburgh 15213 PA, USA. ¹¹⁷Institute of Social Medicine, Occupational Health and Public Health (ISAP), University of Leipzig, Leipzig 04103, Germany. ¹¹⁸Department of Biological and Medical Psychology, University of Bergen, Bergen 5009, Norway. ¹¹⁹K. G. Jebsen Center for Neuropsychiatry, University of Bergen, Bergen N-5009, Norway. ¹²⁰Umeå Center for Functional Brain Imaging (UFBI), Umeå University, Umeå SE-901 87, Sweden. ¹²¹Department of Statistics, USBE Umeå University, S-907 97 Umeå, Sweden. ¹²²Institute for Molecular Bioscience, University of Queensland, Brisbane 4072, Australia. ¹²³The Institute of Medical Sciences, Aberdeen Biomedical Imaging Centre, University of Aberdeen, Aberdeen AB25 2ZD, UK. ¹²⁴Division of Brain Sciences, Department of Medicine, Imperial College, London SW7 2AZ, UK. ¹²⁵Department of Radiation Sciences, Umeå University, Umeå SE-901 87, Sweden. ¹²⁶Department of Integrative Medical Biology, Umeå University, Umeå SE-901 87, Sweden. ¹²⁷Centre for Integrated Genomic Medical Research, Institute of Population Health, University of Manchester, Manchester M13 9PT, UK. ¹²⁸Karolinska Institutet, Aging Research Center, Stockholm University, Stockholm SE-113 30, Sweden. ¹²⁹Department of Psychology, School of Philosophy, Psychology and Language Sciences, The University of Edinburgh, Edinburgh EH8 9JZ, UK. ¹³⁰Gen-Info LLC, Zagreb 10000, Croatia. ¹³¹Faculty of Medicine, University of Split, Split 21000, Croatia. ¹³²Department of Psychology, Stanford University, Palo Alto 94305-2130 CA, USA. ¹³³Department of Health Services, University of Washington, Seattle 98195-7660 WA, USA. ¹³⁴Kaiser Permanente Washington Health Research Institute, Seattle 98101 WA, USA. ¹³⁵Department of Developmental Disability Neuropsychiatry, School of Psychiatry, University of New South Wales, Sydney 2052, Australia. ¹³⁶Department of Psychological and Brain Sciences, Indiana University, Bloomington, IN 47405-7007, USA. ¹³⁷Institute for Translational Genomics and Population Sciences, Los Angeles Biomedical Research Institute at Harbor-UCLA Medical Center, Torrance, CA 90502, USA. ¹³⁸Department of Pediatrics, Harbor-UCLA Medical Center, Torrance 90509 CA, USA. ¹³⁹Department of Genetics and Genomic Science and Institute for Multiscale Biology, Icahn School of Medicine at Mount Sinai, New York 10029 NY, USA. ¹⁴⁰Mental Illness Research, Education, and Clinical Center (VISN 2), James J. Peters VA Medical Center, Bronx 10468 NY, USA. ¹⁴¹Institute of Molecular Biology and Biochemistry, Centre for Molecular Medicine, Medical University of Graz, Graz 8036, Austria. ¹⁴²Robert and Beverly Lewis Center for Neuroimaging, University of Oregon, Eugene 97403 OR, USA. ¹⁴³Department of Neurology, Boston University School of Medicine, Boston 02118 MA, USA. ¹⁴⁴The National Heart, Lung, and Blood Institute's Framingham Heart Study, Framingham 01702-5827 MA, USA. ¹⁴⁵Department of Medical Biometry, Informatics and Epidemiology, University Hospital, Bonn D-53012, Germany. ¹⁴⁶Laboratory of NeuroGenetics, Department of Psychology & Neuroscience, Duke University, Durham 27708-0086 NC, USA. ¹⁴⁷Department of Molecular Epidemiology, Leiden University Medical Center, Leiden 2333, The Netherlands. ¹⁴⁸Institute of Cardiovascular and Medical Sciences, University of Glasgow, Glasgow G12 8QQ, United Kingdom. ¹⁴⁹Lieber Institute for Brain Development, Johns Hopkins University Medical Campus, Baltimore 21205 MD, USA. ¹⁵⁰Department of Hygiene and Epidemiology, University of Ioannina Medical School, Ioannina 45110, Greece. ¹⁵¹Department of Public Health, University Hospital of Bordeaux, Bordeaux 33076, France. ¹⁵²Department of Internal Medicine, Erasmus Medical Center, Rotterdam 3015, The Netherlands. ¹⁵³Campbell Family Mental Health Institute, Centre for Addiction and Mental Health, University of Toronto, Toronto M5T 1L8, Canada. ¹⁵⁴Department of Public Health, University of Helsinki, Helsinki 00014, Finland. ¹⁵⁵Department of Radiology, Erasmus MC, Rotterdam 3015, The Netherlands. ¹⁵⁶Department of Psychiatry and Behavioral Sciences, Faculty of Medicine, University of Crete, Heraklion GR-71003, Greece. ¹⁵⁷Human Genetics Center, School of Public Health, University of Texas Health Science Center at Houston, Houston 77030 TX, USA. ¹⁵⁸Human Genome Sequencing Center, Baylor College of Medicine, Houston 77030-3411 TX, USA. ¹⁵⁹Neuropsychiatric Genetics Research Group, Department of Psychiatry and Trinity College Institute of Neuroscience, Trinity College Dublin, Dublin DO2 AY89, Ireland. ¹⁶⁰Center for Translational and Systems Neuroimmunology, Department of Neurology, Columbia University Medical Center, New York 10032 NY, USA. ¹⁶¹Program in Medical and Population Genetics, Broad Institute, Cambridge 02142 MA, USA. ¹⁶²Department of Neurology, University Hospital of Bordeaux, Bordeaux 33000, France. ¹⁶³Department of Global Health, University of Washington, Seattle 98104 WA, USA. ¹⁶⁴Department of Cardiology, Leiden University Medical Center, Leiden 2333, The Netherlands. ¹⁶⁵Institute for Behavioral Genetics, University of Colorado, Boulder 80309 CO, USA. ¹⁶⁶Wellcome Trust Sanger Institute, Wellcome Trust Genome Campus, Cambridge CB10 1SA, UK. ¹⁶⁷Department of Medical Genetics, University of Helsinki and University Central Hospital, Helsinki 00014, Finland. ¹⁶⁸Division of Neuroscience and Experimental Psychology, School of Biological Sciences, Manchester Academic Health Science Centre, and Manchester Medical School, Institute of Brain, Behaviour, and Mental Health, University of Manchester, Manchester M13 9PL, UK. ¹⁶⁹Department of Clinical Physiology and Nuclear Medicine, Turku University Hospital, Turku 20520, Finland. ¹⁷⁰School of Medicine and Public Health, University of Newcastle, New South Wales 2308, Australia. ¹⁷¹Neuroscience Research Australia, Sydney 2031, Australia. ¹⁷²Faculty of Medicine, University of New South Wales, Sydney 2052, Australia. ¹⁷³Alzheimer Scotland Dementia Research Centre, University of Edinburgh, Edinburgh EH8 9JZ, UK. ¹⁷⁴Division of Nephrology and Hypertension, Department of Internal Medicine, Mayo Clinic, Rochester, MN 55905, USA. ¹⁷⁵Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig 04103, Germany. ¹⁷⁶Day Clinic for Cognitive Neurology,

University Hospital Leipzig, Leipzig 04103, Germany. ¹⁷⁷Division of Psychiatry Research, Zucker Hillside Hospital, Glen Oaks 11004 NY, USA. ¹⁷⁸Department of Psychiatry, Hofstra Northwell School of Medicine, Hempstead 11549 NY, USA. ¹⁷⁹Division of Psychiatry, University of Edinburgh, Edinburgh EH10 5HF, UK. ¹⁸⁰MRC Lifecourse Epidemiology Unit, University of Southampton, Southampton SO16 6YD, UK. ¹⁸¹Glenn Biggs Institute for Alzheimer's and Neurodegenerative Diseases, University of Texas Health Sciences Center, San Antonio 78229 TX, USA. These authors contributed equally: Gail Davies, Max Lam. These authors jointly supervised this work: Todd Lencz, Ian J. Deary.