# ISABELLE FOOTE

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## Research Summary

I am a UK qualified adult nurse and genetic epidemiologist with research experience in neuroscience, psychiatry, epidemiology and statistical genetics. My multidisciplinary training with a clinical foundation means that I always endeavour to conduct research that has a genuine translational benefit. My research uses genomic methods to better understand the biological underpinnings of early prodromal symptoms and modifiable risk factors of dementia to identify ways to prevent or delay its onset.

## Education

**PhD in Epidemiology,** Queen Mary University of London (UK) **Oct 2022**
Thesis: "The shared genetic architecture of modifiable risk for dementia and its influence on brain health".
Supervisors: Professor Ania Korszun, Professor Charles Marshall and Professor Kamaldeep Bhui.

**MSc in Neuroscience,** King's College London (UK) **Sep 2018**
Thesis: "Preventing inflammation-induced reduction of neurogenesis".
Supervisors: Dr Patricia Zunszain and Dr Alessandra Borsini
Passed with Merit (69).

**Bachelor of Nursing,** University of Birmingham (UK) **Aug 2017**
Dissertation: "An integrative review of how adverse effects of anti-epileptic drugs affect adherence in adults with epilepsy".
Supervisors: Professor Fiona Irvine and Dr Amelia Swift.
Graduated with 1st class honours.

## Current and Previous Positions

**Postdoctoral Associate**, University of Colorado Boulder, Institute for Behavioral Genetics **May 2022-Current**
*Advisor:* Dr Andrew Grotzinger (Assistant Professor of Psychology & Neuroscience).
*Main project:* Postdoc on the National Institute on Aging grant (RF1AG073593) titled "Large-scale genomic analysis of aging-related cognitive change prior to dementia onset." My role is to: assist the core team in developing a new GWAS method based on latent growth curve modelling, apply this method to measure within-individual cognitive change over time and act as the main support for analysts from >30 collaborating cohorts who are providing data for this project.

**Honorary Research Fellow**, Centre for Preventive Neurology, Queen Mary University of London **2022-Current**

## Teaching & Supervision

**PhD Project Mentor**, Institute for Behavioral Genetics, University of Colorado Boulder **2023**

- I am advising a graduate student (Lydia Rader) at the Institute of Behavioral Genetics on conducting PRS analyses as part of a project that we are collaborating on with UK-based colleagues from Bristol and UCL titled '*Childhood Body Size Underlies Numerous Differences in Adult Brain Volumes Commonly Attributed to Midlife Obesity: A Lifecourse Mendelian Randomisation Study*'.

**PhD Project Mentor**, Queen Mary University of London **2021-2024**

- I have been advising a PhD student (Jonggeol Jeffrey Kim) based between Queen Mary University of London and the Laboratory of Neurogenetics at NIH (USA) on the conceptual and methodological aspects of one of his main PhD projects titled 'Latent genetic architecture of Parkinson's disease risk factors and comorbidities'.

**BSc Project Supervisor**, Barts & The London School of Medicine & Dentistry, QMUL **Jan-June 2021**

- I designed and wrote a competitive proposal for an intercalated BSc dissertation project looking at the shared genetics between psychosis and dementia using genomic SEM.
- I supported my student (Inês Almeida e Sousa) in how to perform the relevant coding and data analysis steps to complete her project, for which she was awarded 89%. She has recently submitted the paper for publication.

**PBL Facilitator**, Barts & The London School of Medicine & Dentistry, QMUL **Mar 2020-2021**

- Facilitator for problem-based learning (PBL) sessions for the Year 1 and 2 Medicine students.
- Marking of critical appraisal assignments at the end of each session block.

## CLINICAL EXPERIENCE

**Volunteer Nurse**, Himalayan Health Exchange, Himachal Pradesh (India) **Summer 2017**

I was a member of a multidisciplinary team of doctors, nurses and dentists that travelled to India as part of a charity programme that provides remote healthcare to villages in the Himalayas. Duties included:

- Assisted with triage, setting up temporary clinics & teaching medical students' clinical skills
- Worked with local Tibetan nurses to provide school nursing care, health education & worming treatment to a school of >1000 Tibetan refugee children.

**Nursing Student**, University of Birmingham, Birmingham (UK) **2011-2017**

- **General:** Neurosurgery; Neurosciences Critical Care Unit; Acute Older Adult; Emergency Department; Ambulatory Care; Cardiothoracic Surgery; Urology; Complex Discharge Unit (all Queen Elizabeth Hospital Birmingham); District nursing (Yardley Wood team).
- **Psychiatric:** North Birmingham Home Treatment Team (acute community care) and inpatient acute male ward (Oleaster Hospital, Birmingham).
- **Research:** Trauma Research Team (Queen Elizabeth Hospital Birmingham).

**Bank Healthcare Assistant**, Addenbrooke's Hospital, Cambridge (UK) **2013-2014**

- Provision of basic nursing care and 1:1 care for 'at risk' patients with dementia, delirium or trauma.

## LEADERSHIP & ACADEMIC SERVICE

**Session Chair**, Behavior Genetics Association Annual Meeting **2023**

- I chaired and led the organisation of a competitive symposium session at the BGA Annual Meeting 2023 titled '*Applications of Multivariate Genomics in Cognitive Aging*,' which featured talks by early career researchers from the US, UK and The Netherlands.

**Student Liaison**, ISCEP Program, Institute for Behavioral Genetics **2023**

- I was on the organising committee of the first year of the new ISCEP Program hosted by the Institute of Behavioral Genetics (University of Colorado Boulder) and funded by Regeneron, which enables 3 students from low-income countries to visit Boulder to attend our residential Statistical Genetics Workshop and then stay for an additional lab rotation with one of the PIs in our department.
- Roles included: interviewing & shortlisting candidates, acting as liaison to my designated student before, during & after their visit, leading the organisation of a cultural and academic program for their visit.

**Organising Committee Member**, DEMON Network Mendelian Randomisation Conference **2022-Present**

- I am a member of the organising committee for the Annual Mendelian randomisation conference that is hosted by the Deep Dementia Phenotyping (DEMON) Network.
- We hosted a virtual conference in 2022 and an in-person conference at the Turing Institute in London (UK) in December 2023.

**Prevention Working Group Co-Lead**, DEMON Network **2021-Present**

- The DEMON Network is an international network of >1000 members that aims to improve the application of data science and AI approaches in dementia research (https://demondementia.com).
- I co-host the monthly working group meetings, organise seminars and training workshops for members, co-author/lead collaborative systematic reviews/consensus papers, work with the leadership team to promote and enhance the DEMON Network in line with its key aims.

**WISE@QMUL Committee Member**, Queen Mary University of London **2019-2021**

- Assisted with planning and writing successful applications for funding to cover academic and public engagement events (GradFest, Festival of Communities).
- Worked on the Technical and Evaluation sub-committees to organise a 2-day virtual conference (took place in March 2021) focusing on current issues facing women in STEMM disciplines.

**PhD Student Representative (Wolfson Institute)**, Queen Mary University of London **2019-2022**

- Leading and co-ordinating staff-student liaison meetings.
- Creating virtual peer support groups for PhD students during the COVID-19 pandemic.
- Organising training events for PhD students including an in-person multivariate methods training workshop with internal and external speakers. There were >100 attendees to this event from multiple London universities.

**Guest Podcast Panellist**, NIHR Dementia Researcher Podcast **2019-2020**

- Neuropsychiatric Symptoms in Dementia (March 2020).
- Prediction and Prevention in Neurodegenerative Diseases (December 2019).

## FUNDING

**ECIP Travel Award Winner (2020)** - I won a travel award from the International Society of Psychiatric Genetics to attend the World Congress of Psychiatric Genetics conference based on my PhD work using genomic SEM.

**Student Led Activity Funding (2019)** – Myself and a fellow PhD student won an award of £2500 from the London Interdisciplinary Social Science Doctoral Training Partnership (LISS-DTP) to host a Multivariate Methods training workshop at Queen Mary University of London.

**George Henry Woolf Legacy Fund (Dec 2018 to March 2022)** – I was awarded this 3-year studentship funding through Barts and the London Medical School at Queen Mary University of London to cover the tuition, stipend and research costs for the duration of my PhD.

## CONFERENCE PRESENTATIONS

### Oral Presentations

1. *Moving beyond the frailty index as a single aggregate measure: genomic analyses reveal clinically relevant subclusters across frailty indicators.* Behavior Genetics Association Annual Meeting (London, UK), June 2024.
2. *Uncovering the multivariate genetic architecture of frailty using genomic structural equation modelling.* Integrating Genetics and the Social Sciences Conference (Boulder, Colorado, USA), October 2023.

3. *Large-Scale Genome-Wide Association Study of Aging-Related Cognitive Change Prior to Dementia Onset.* NeuroCHARGE Working Group Meeting at the CHARGE Consortium Conference (San Antonio, Texas, USA), October 2023.
4. *Uncovering the multivariate genetic architecture of frailty using genomic structural equation modelling.* Behavior Genetics Association Annual Meeting (Murcia, Spain), June 2023.
5. *An update on the GWAS of aging-related cognitive decline.* NeuroCHARGE Working Group Meeting at the CHARGE Consortium conference (Virtual), May 2023.
6. *The shared genetic architecture of modifiable risk for Alzheimer's disease and its influence on brain health.* AD/PD conference (Barcelona, Spain), March 2022.
7. *A multivariate genome-wide association study of modifiable risk for Alzheimer's disease identifies shared genetic pathways linked to brain health.* Health Research in East London Annual Conference (St Bartholomew's Hospital, London, UK), October 2021.

### Poster Presentations

1. *Multivariate genomic analyses of frailty reveal the unique importance of cognitive and multimorbidity pathways for aging-related health outcomes.* Alzheimer's Association International Conference (Philadelphia, US), July 2024.
2. *Large-Scale Genome-Wide Association Study of Aging-Related Cognitive Change Prior to Dementia Onset.* CHARGE Consortium Main Conference (San Antonio, Texas, USA), October 2023 **[shortlisted for lightning talk]**.
3. *A Multivariate Genome-Wide Association Study of the Shared Genetic Architecture Among Modifiable Risk Factors for Dementia.* Alzheimer's Association International Conference (Amsterdam, The Netherlands), July 2023.
4. *A multivariate genome-wide association study of modifiable risk for Alzheimer's disease: 269 loci associated with brain health.* World Congress of Psychiatric Genetics (Virtual), October 2021 **[poster competition finalist]**.
5. *The genetic architecture of Alzheimer's disease risk and the challenge of oligogenicity.* Genomics of Brain Disorders conference (Wellcome Genome Campus, Cambridge, UK), March 2021.
6. *More than a bivariate relationship: Exploring the shared genetic architecture of depression, Alzheimer's disease and related risk factors using genomic structural equation modelling.* World Congress of Psychiatric Genetics (Virtual), October 2020.
7. *Exploring the shared genetic architecture of modifiable risk factors and related endophenotypes of Alzheimer's disease: a Genomic SEM study*. Alzheimer's Association International Conference (Virtual), July 2020.

## PUBLICATIONS

### Journal Articles

1. Ward D, Flint J, Littlejohns T, **Foote I**, Canevelli M, Wallace L, Gordon E, Llewellyn D, Ranson J, Hubbard R, Rockwood K and Stolz E. (2024) Frailty Trajectories Preceding Dementia in the US and UK. JAMA Neurology, https://doi.org/10.1001/jamaneurol.2024.3774.
2. Fürtjes AE, **Foote IF**, Xia C, Davies G, Moodie J, Taylor A, Liewald DC, Redmond P, Corley J, McIntosh AM, Whalley HC, Maniega SM, Hernández MV, Backhouse E, Ferguson K, Bastin ME, Wardlow J, de la Fuente J, Grotzinger AD, Luciano M, Hill WD, Deary IJ, Tucker-Drob E and Cox SR. (2024) Lifetime brain atrophy estimated from a single MRI: measurement characteristics and genome-wide correlates [preprint]. bioRxiv, https://doi.org/10.1101/2024.11.06.622274.
3. Lawrence JM, **Foote IF**, Breunig S, Schaffer LS, Mallard TT and Grotzinger AD. (2024) Shared Genetic Liability across Systems of Psychiatric and Physical Illness [preprint]. medRxiv, https://doi.org/10.1101/2024.08.02.24311427.
4. **Foote IF**, Flint JP, Fürtjes AE, Mullin DS, Fisk JD, Karakach TK, Rutenberg A, Martin NG, Lupton MK, Llewellyn DJ, Ranson JM, Cox SR, Luciano M, Rockwood K and Grotzinger AD. (2024) Uncovering the multivariate genetic architecture of frailty with genomic structural equation modelling [preprint]. medRxiv, https://doi.org/10.1101/2024.07.24.24310923.

5. Schaffer LS, Breunig S, Lawrence JM, **Foote IF**, Grotzinger AD. (2024) Characterizing genetic pathways unique to autism spectrum disorder at multiple levels of biological analysis. Molecular Autism 15(46), https://doi.org/10.1186/s13229-024-00624-2.
6. Chiesa S, Rader L, Garfield V, **Foote I**, Suri S, Davey Smith G, Hughes AD and Richardson TG. (2024) Childhood adiposity underlies numerous adult brain traits commonly attributed to midlife obesity. Brain, https://doi.org/10.1093/brain/awae198.
7. Breunig S, Lawrence JM, **Foote IF**, Gebhardt HJ, Willcutt EG and Grotzinger AD. (2024) Examining Differences in the Genetic and Functional Architecture of Attention-Deficit/Hyperactivity Disorder Diagnosed in Childhood and Adulthood. Biological Psychiatry Global Open Science 4(3): 100307, https://doi.org/10.1016/j.bpsgos.2024.100307.
8. Bettencourt C, Skene N, Bandres-Ciga S, Anderson E, Winchester LM, **Foote IF**, Schwartzentruber J, Botia JA, Nalls M, Singleton A, Schilder BM, Humphrey J, Marzi SJ, Toomey CE, Al Kleifat A, Harshfield EL, Garfield V, Sandor C, Keat S, Tamburin S, Frigero CS, Lourida I, the Deep Dementia Phenotyping (DEMON) Network, Ranson JM and Llewellyn DJ. (2023) Artificial intelligence for dementia genetics and omics. Alzheimer's & Dementia 19(12): 5905-5921, https://doi.org/10.1002/alz.13427.
9. Newby D, Orgeta V, Marshall CR, Lourida I, Albertyn CP, Tamburin S, Raymont V, Veldsman M, Koychev I, Bauermeister S, Weisman D, **Foote IF**, Bucholc M, Leist AK, Tang EYH, Tai XY, the Deep Dementia Phenotyping (DEMON) Network, Llewellyn DJ and Ranson JM. (2023) Artificial intelligence for dementia prevention. Alzheimer's & Dementia 19(12): 5952-5969, https://doi.org/10.1002/alz.13463.
10. Sleiman PM, Qu H, Connolly JJ, Mentch F, Pereira A, Lotufo PA, Tollman S, Choudhury A, Ramsay M, Kato N, Ozaki K, Mitsumori R, Jeon J, Hong CH, Son S, Roh HW, Lee D, Mukadam N, **Foote IF**, Marshall CR, Butterworth A, Prins B, Glessner J, Hakonarson H, DAC and IHCC consortium (2023) Trans-ethnic genomic informed risk assessment for Alzheimer's disease: An International Hundred K+ Cohorts Consortium Study. Alzheimer's & Dementia 19(12): 5765-5772, https://doi.org/10.1002/alz.13378.
11. Lawrence JM, Breunig S, **Foote IF**, Tallis CB and Grotzinger AD. (2023) Genomic SEM applied to explore etiological divergences in bipolar subtypes. Psychological Medicine 1-8, https://doi.org/10.1017/S0033291723002957.
12. Ranson J, Bucholc M, Lyall D, Newby D, Winchester L, Oxtoby N, Veldsman M, Rittman T, Marzi S, Skene N, Al Khleifat A, **Foote IF**, Orgeta V, Kormilitzin A, Lourida I, Llewellyn DJ (2023) Harnessing the potential of machine learning and artificial intelligence for dementia research. Brain Informatics 10(6), https://doi.org/10.1186/s40708-022-00183-3.
13. Leonard HL, Murtadha R, Martinez-Carrasco A, Jama A, Muller-Nedebock A, […] **Foote IF** et al. (2023) The IPDGC/GP2 Hackathon – an open science event for training in data science, genomics and collaboration using Parkinson's disease data. npj Parkinson's Disease 9(33), https://doi.org/10.1038/s41531-023-00472-6.
14. **Foote IF**, Jacobs BM, Mathlin G, Watson CJ, Bothongo PLK, Waters S, Dobson R, Noyce AJ, Bhui KS, Korszun A and Marshall CR. (2022) The shared genetic architecture of modifiable risk for Alzheimer's disease: a genomic structural equation modelling study. Neurobiology of Aging 117:222-235, https://doi.org/10.1016/j.neurobiolaging.2022.02.016.
15. Liu H, Dehestani M, Blauwendraat C, Makarious MB, Leonard H, Kim JJ, Schulte C, Noyce A, Jacobs BM, **Foote I**, Sharma M, International Parkinson's Disease Genetics Consortium, Comprehensive Unbiased Risk Factor Assessment for Genetics and Environment in Parkinson's Disease Consortium, Nalls M, Singleton A, Gasser T and Bandres-Ciga S. (2022) Polygenic resilience modulates penetrance of Parkinson's disease genetic risk. Annals of Neurology 92(2):270-278, https://doi.org/10.1002/ana.26416.
16. Bothongo PLK, Jitlal M, Parry E, Waters S, **Foote IF**, Watson CJ, Cuzick J, Giovannoni G, Dobson R, Noyce AJ, Mukadam N, Bestwick JP and Marshall CR. (2022) Dementia risk in a diverse population: A single-region nested case-control study in the East End of London. Lancet Regional Health-Europe 15:100321, https://doi.org/10.1016/j.lanepe.2022.100321.
17. Elsayed I and **Foote IF** (2021) Improving diversity in Parkinson's disease genetics: findings from the first-ever GWAS in Latinos. Movement Disorders 36(11):2505-2505, https://doi.org/10.1002/mds.28782.

Book Chapter

1. Ranson JM, Bucholc M, Lyall D, Newby D, Winchester L, Oxtoby N, Veldsman M, Rittman T, Marzi S, Skene N, Al Khleifat A, **Foote I**, Orgeta V, Kormilitzin A and Llewellyn DJ (2022). *The Emerging Role of AI in Dementia Research and Healthcare*. In: Chen T, Carter J, Mahmud M and Khuman AD (eds.) Artificial Intelligence in Healthcare: Brain Informatics and Health. Springer, Singapore. https://doi.org/10.1007/978-981-19-5272-2_4.