

# Gibran Hemani

SENIOR RESEARCH FELLOW, UNIVERSITY OF BRISTOL

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## PRESENT APPOINTMENT

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### MRC Integrative Epidemiology Unit, University of Bristol

UK

*Associate Professor 2021, Senior Research Fellow 2018, Research Fellow 2014*

Jan-14 to present

## PREVIOUS APPOINTMENTS

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### Queensland Brain Institute, University of Queensland

Australia

*Post doctoral statistical geneticist*

Jan-12 to Dec-13

## ACADEMIC QUALIFICATIONS

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### University of Bristol

Bristol

*Fellow of the Higher Education Academy, UK*

Sep-19 to Sep-21

### University of Edinburgh

Edinburgh

*PhD in Quantitative Genetics*

Oct-07 to Aug-11

- Genetics Society 'Best PhD thesis in population and quantitative genetics' 2011

### University of Nottingham

Nottingham

*BSc (hons) 2:1*

Sep-03 to Jun-06

## SPECIAL AWARDS, HONOURS AND DISTINCTIONS

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### Sir Kenneth Mather Memorial prize

The Genetics Society

*Best PhD thesis in quantitative and population genetics*

2011

### Highly Cited Researcher Award

Clarivate / Web of Science

*Top 1% in field*

2021, 2022

### Rising Stars of Science Award

Research.com

*Ranked 2nd nationally and 137th globally for H-index within 12 years of PhD*

2022

## TEACHING AND RELATED ADMINISTRATION

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The teaching-research nexus has been central to my career, starting during my PhDz when I wrote and delivered a 2-day course on R programming for researchers at the Roslin Institute. Since then I have taught on topics relating to genetics, statistics and programming to undergraduates across disciplines in medicine, biology and psychology. There has been a major shift towards using genetic data in epidemiological research over the last several years and my academic background in statistical genetics has created opportunities and substantial demand for teaching in this field at the post-graduate and life-long learning levels. I am particularly proud of my record of writing and delivering courses on genetic epidemiology to participants who are under-represented in genomic data science. In line with this I am also co-leading the BMS Decolonising the Curriculum group, which is now piloting a curriculum review framework that we developed for Bristol Medical School.

### (i) Undergraduate and taught postgraduate (past 3 years)

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#### **Evidence Based Medicine unit in MB ChB programme**

University of Bristol

*Tutor*

2020-2022

- 15 1st year undergraduate medical students
- 5 hours prep, 10 hours contact time

#### **Genes and behaviour (PSYC30018)**

University of Bristol

*Lecturer*

2018-2021

- 100 3rd year undergraduate students
- Wrote and delivered three lectures
- 6 hours prep, 4 hours contact time

#### **Genomic Medicine iBSc**

University of Bristol

*Pastoral tutoring*

2017, 2018

- Two students on the Genomic Medicine iBSc
- 8 hours contact time

#### **Genomic Data Science unit in Genomic Medicine iBSc**

University of Bristol

*Course lead*

2016-2018, 2020

- Up to 13 intercalating 3rd year medical dentistry and veterinary students
- Led, co-wrote and delivered 4-week module (20 credits)
- Organised material for several lecturers on programming, statistics, genetic analysis
- Set formative and summative coursework assessments
- Designed and wrote exams
- Delivered lectures, tutorials, practicals, assessed debates
- Transitioned to flipped classroom format
- 50 hours prep, 20 hours contact time
- Several students publish papers each year on the subject.

### (ii) Major teaching responsibilities in previous years

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#### **Statistical genetics unit in Biomedical Capstone Course**

University of Queensland

*Course lead*

2012, 2013

- 250 3rd year undergraduate biomedical students
- Wrote four lectures and two workshops on GWAS written
- Set and marked coursework assessments
- Delivered lectures and practicals, and coordinated lecturers and tutors
- 25 hours prep, 10 hours contact time

### (iii) Innovatory units and teaching methods

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**Flipped classroom:** In the second year of the iBSc Genomic Medicine course I redesigned the R programming training section to be a flipped classroom, using online games for students to learn the basic principles of programming at home and the tutor led sessions as an opportunity to synthesise those skills into applied examples. The students were more adept at programming than in the previous year, and also more enthused about the subject. I transitioned the rest of the module to a flipped classroom in 2020 during the Covid-19 pandemic.

### (iv) Contribution to Life-long learning and continuing professional development courses

**Genetic Analysis of Population-based Association Studies short course** Wellcome Genome Campus  
*Course co-lead* 2018-2022

- 40+ international post-graduate students and researchers
- Invited to co-lead a course that has been running for 12 years, approx
- Contribute to course design, and recent redesign for online teaching
- Delivering lectures and practicals
- 24 hours prep, 10 hours contact time

**MR-Base workshop, MR conference** Bristol  
*Course lead* 2017, 2019

- 60 International post-graduate students and researchers
- Wrote and delivered lectures and tutorials on how to use the MR-Base database and R packages
- 12 hours prep, 6 hours contact time

**Statistical methods for mediation short course** University of Bristol  
*Lecturer* 2017, 2018

- 40 post-graduate students and researchers
- Wrote and delivered one lecture + practical
- 8 hours prep, 3 hours contact time

**Genetic Epidemiology short course at EEPE** Florence, Italy  
*Course co-lead* 2016-2019, 2022

- 20 international post-graduate students and researchers
- Co-wrote and delivered (with Prof Dave Evans) 5-day course
- Prepared and delivered lectures + practicals
- 40 hours prep, 12 hours contact time

**Genomic medicine iBSc** University of Bristol  
*Lecturer* 2016-2018, 2020

- Up to 13 intercalating 3rd year medical, dentistry and veterinary students
- Wrote and delivered three lectures to other units
- 8 hours prep, 3 hours contact time

**Statistical genetics short course** University of Bristol  
*Lecturer* 2015-2019

- 40 post-graduate students and researchers
- Wrote and delivered two lectures + practicals
- 16 hours prep, 6 hours contact time

## **UNIX and Genetic epidemiology**

Pelotas, Brazil

*Course co-lead*

2015

- 30 researchers and post-graduate students
- Co-wrote and delivered 7-day course
- Lectures and practicals
- Setup cloud-based computing system for practical sessions
- 40 hours prep, 15 hours contact time

## **Mendelian randomisation short course**

University of Bristol

*Lecturer*

2014-2020

- 40 post-graduate students and researchers
- Wrote and delivered two lectures + practicals
- 16 hours prep, 6 hours contact time

## **Genetic epidemiology, H3Africa project**

Johannesburg, South Africa

*Course co-lead*

2014

- 30 researchers and post-graduate students
- Co-wrote and delivered (with Dr Nic Timpson) 5-day course
- Delivered lectures and practicals
- 50 hours prep, 20 hours contact time

## **18th Summer Institute in Statistical Genetics**

Seattle USA

*Teaching assistant*

2013

- 40+ international post-graduate students and researchers
- Teaching assistant for: “Human Complex Traits” and “Animal Genetic Data Analysis”
- 20 hours prep, 10 hours contact time

## **Introduction to git and programming workflows**

University of Queensland

*Workshop lead*

2013

- 15 researchers
- Wrote and delivered one-day workshop
- 12 hours prep, 6 hours contact time

## **Introduction to Statistics**

University of Queensland

*Lecturer*

2012

- 40+ post-graduate students and researchers
- Wrote and delivered one lecture for a professional Development Course
- 3 hours prep, 1 hour contact time

## **Introduction to R**

University of Edinburgh

*Course co-lead*

2009

- 30 researchers and post-graduate students
- Co-wrote and delivered (with Joseph Powell) 2-day short course on R programming
- 15 hours prep, 6 hours contact time

## **(v) Collaborative teaching projects**

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Developed external speaker programmes for iBSc medical students, involving Jeff Barrett from OpenTargets and the Sanger Institute; Rob Scott from GlaxoSmithKlein; and Jonathan Ives from the Centre for Ethics in Medicine.

## (iv) Postgraduate advising

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### **Liza Darrous**

*University of Lausanne, PhD student*

2022-2023

- Visiting PhD student

### **Lily Andrews**

*CRUK, PhD student*

2020-2024

- Secondary supervisor

### **Amanda Forde**

*Science Foundation Ireland, PhD student*

2020-2024

- Secondary supervisor
- Co-supervising with international colleague (John Ferguson), Republic of Ireland

### **Giulio Centorame**

*NHMRC, PhD student*

2020-2024

- Secondary supervisor
- Co-supervising with international colleague (Dave Evans), Australia

### **Huiling Zhao**

*Wellcome Trust, PhD student*

2020-2024

- Secondary supervisor

### **Chris Moreno-Stokoe**

*BBSRC, PhD student*

2018-2022

- Secondary supervisor

### **Hannah Wilson**

*BBSRC and GSK, PhD student*

2017-2021

- Primary supervisor

### **Thomas Battram**

*Wellcome Trust, PhD student*

2016-2020

- Primary supervisor
- Passed viva with distinction

### **Laurence Howe**

*Wellcome Trust, PhD student*

2014-2018

- Secondary supervisor
- Passed viva with distinction
- Awarded best doctoral research prize 2018/2019 in Faculty of Health Sciences

## (vii) Major achievements in teaching administration

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**International short courses on statistical genetics:** I have organised, developed and delivered short courses (typically week-long, in collaboration with internal and/or external colleagues) to researchers at institutes in South Africa, Italy, Brazil and at the Wellcome Genome Centre in Cambridge.

**Genomic Data Science module:** I designed, organised and delivered a 20 credit module for medical students that involves teaching them programming and genomic data analysis from scratch. This has run for 4 years, and consistently gets very positive feedback, and the students achieve a high standard.

**Decolonising the curriculum:** I lead the Medical Anti-Racism Taskforce Special Interest Group on decolonising the

curriculum in the Bristol Medical School (11 members). We are developing a curriculum review framework that is now being piloted in five modules across the school (<http://decolbms.org.uk>). I also liaise with numerous related groups across the university.

**MR-Base software course:** I developed a course to teach researchers how to use my own software (MR-Base), with the course being heavily over-subscribed and gaining very positive feedback and increased usage of the software.

## RESEARCH AND RELATED ADMINISTRATION

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During my PhD I developed statistical and computational methods to detect genetic interactions influencing complex traits. This work led to my first post-doctoral position that expanded my work into determining genetic architectures of complex disease, and developing expertise in handling high dimensional genomic data. My fellowship work lies at the interface between statistical genetics, causal inference and high performance computing. A major output that integrates these fields has been the development of the MR-Base and OpenGWAS causal inference analytical platform. These software platforms are used by researchers globally and has led directly to funding for five post-doctoral positions from three private companies (GSK, Biogen, CHDI). I currently lead or co-lead three major international collaborations. These activities will continue and expand in 2023 as co-lead of the Mendelian randomisation programme in MRC IEU 3.0.

### (i) Publications

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Selected publications organised by category are listed below. Full publication list on [google scholar](#).

- H-index: **63**
- i10-index: **124**
- Number of publications: **206**

### Chapters in Edited Books

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1. Hemani, G. Meta-analysis in genetic association studies. Systematic Reviews in Health Research: Meta-Analysis in Context (2022) Contrib.: 100% (main author).

### Academic journal papers (refereed)

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1. Howe, L., Nivard, M., Morris, T., Hansen, A., Rasheed, H., et al. Within-sibship genome-wide association analyses decrease bias in estimates of direct genetic effects. Nature genetics (2022) Contrib.: 20% (senior author). International co-authors. Position: 99/100 (joint last).
2. Min, J., Hemani, G., Hannon, E., Dekkers, K., Castillo-Fernandez, J., et al. Genomic and phenotypic insights from an atlas of genetic effects on DNA methylation. Nature genetics (2021) Contrib.: 30% (main author). International co-authors. Position: 2/150 (joint first).
3. Lyon, M., Andrews, S., Elsworth, B., Gaunt, T., Hemani, G. & Marcora, E. The variant call format provides efficient and robust storage of GWAS summary statistics. Genome biology (2021) Contrib.: 30% (senior author). International co-authors. Position: 5/6 (joint last).
4. Hemani, G., Powell, J., Wang, H., Shakhbazov, K., Westra, H.-J., et al. Phantom epistasis between unlinked loci. Nature (2021) Contrib.: 40% (main author). International co-authors. Position: 1/16.
5. Griffith, G., Morris, T., Tudball, M., Herbert, A., Mancano, G., et al. Collider bias undermines our understanding of COVID-19 disease risk and severity. Nature communications (2020) Contrib.: 40% (senior author). Position: 14/14.

6. Brumpton, B., Sanderson, E., Heilbron, K., Hartwig, F., Harrison, S., et al. Avoiding dynastic, assortative mating, and population stratification biases in mendelian randomization through within-family analyses. Nature communications (2020) Contrib.: 30% (senior author). Position: 32/33 (joint last).
7. Zheng, J., Haberland, V., Baird, D., Walker, V., Haycock, P., et al. Phenome-wide mendelian randomization mapping the influence of the plasma proteome on complex diseases. Nature genetics (2020) Contrib.: 20% (senior author). Non-academic co-authors. Position: 32/34 (joint last).
8. Anderson, E., Howe, L., Wade, K., Ben-Shlomo, Y., Hill, W., et al. Education, intelligence and alzheimer's disease: Evidence from a multivariable two-sample mendelian randomization study. International journal of epidemiology (2020) Contrib.: 30% (senior author). Position: 13/13 (last author).
9. Cho, Y., Haycock, P., Sanderson, E., Gaunt, T., Zheng, J., et al. Exploiting horizontal pleiotropy to search for causal pathways within a mendelian randomization framework. Nature communications (2020) Contrib.: 40% (senior author). Position: 8/8 (last author).
10. Hemani, G., Zheng, J., Elsworth, B., Wade, K., Haberland, V., et al. The MR-base platform supports systematic causal inference across the human phenome. elife (2018) Contrib.: 30% (main author). International co-authors. Position: 1/20.
11. Richardson, T., Haycock, P., Zheng, J., Timpson, N., Gaunt, T., et al. Systematic mendelian randomization framework elucidates hundreds of CpG sites which may mediate the influence of genetic variants on disease. Human molecular genetics (2018) Contrib.: 30% (senior author). Position: 8/8.
12. Hemani, G., Tilling, K. & Smith, G. Orienting the causal relationship between imprecisely measured traits using GWAS summary data. PLoS genetics (2017) Contrib.: 70% (main author).
13. Richardson, T., Zheng, J., Smith, G., Timpson, N., Gaunt, T., Relton, C. & Hemani, G. Mendelian randomization analysis identifies CpG sites as putative mediators for genetic influences on cardiovascular disease risk. The American Journal of Human Genetics (2017) Contrib.: 30% (senior author). Position: 7/7.
14. Gaunt, T., Shihab, H., Hemani, G., Min, J., Woodward, G., et al. Systematic identification of genetic influences on methylation across the human life course. Genome biology (2016) Contrib.: 20% (main author). Position: 3/14 (joint first).
15. Hemani, G., Knott, S. & Haley, C. An evolutionary perspective on epistasis and the missing heritability. PLoS genetics (2013) Contrib.: 80% (main author).
16. Hemani, G., Yang, J., Vinkhuyzen, A., Powell, J., Willemsen, G., et al. Inference of the genetic architecture underlying BMI and height with the use of 20,240 sibling pairs. The American Journal of Human Genetics (2013) Contrib.: 40% (main author). International co-authors. Position: 1/23.
17. Hemani, G., Theocharidis, A., Wei, W. & Haley, C. EpiGPU: Exhaustive pairwise epistasis scans parallelized on consumer level graphics cards. Bioinformatics (2011) Contrib.: 80% (main author).

## Review articles .....

1. Smith, G. & Hemani, G. Mendelian randomization: Genetic anchors for causal inference in epidemiological studies. Human molecular genetics (2014) Contrib.: 50% (main author).
2. Wei, W.-H., Hemani, G. & Haley, C. Detecting epistasis in human complex traits. Nature Reviews Genetics (2014) Contrib.: 40% (main author). International co-authors.

## Selected published open source software .....

<i>CAMERA</i>	2022
<ul style="list-style-type: none"><li>• Cross-Ancestry Mendelian Randomisation R package</li><li>• <a href="https://github.com/yoonsucho/CAMERA">https://github.com/yoonsucho/CAMERA</a></li></ul>	
<i>AscRtain</i>	2020
<ul style="list-style-type: none"><li>• Sensitivity analysis for collider bias in observational data</li><li>• <a href="https://github.com/explodecomputer/epigpu">https://github.com/explodecomputer/epigpu</a></li></ul>	
<i>GoDMC</i>	2019
<ul style="list-style-type: none"><li>• Website and API for querying genetic associations with DNA methylation</li><li>• <a href="http://mqtlldb.godmc.org.uk/">http://mqtlldb.godmc.org.uk/</a></li></ul>	
<i>MR-TRYX</i>	2019
<ul style="list-style-type: none"><li>• Exploiting horizontal pleiotropy in Mendelian randomization</li><li>• <a href="https://explodecomputer.github.io/tryx/">https://explodecomputer.github.io/tryx/</a></li></ul>	
<i>OpenGWAS</i>	2019
<ul style="list-style-type: none"><li>• The OpenGWAS data infrastructure</li><li>• <a href="https://gwas.mrcieu.ac.uk/">https://gwas.mrcieu.ac.uk/</a></li></ul>	
<i>babytime</i>	2018
<ul style="list-style-type: none"><li>• R package to calculate costs and scheduling for people going on shared parental leave</li><li>• <a href="https://github.com/explodecomputer/shared-parental-leave">https://github.com/explodecomputer/shared-parental-leave</a></li></ul>	
<i>USS pension model</i>	2018
<ul style="list-style-type: none"><li>• Web-app for projected pensions across different valuations</li><li>• <a href="http://www.uss-pension-model.com/">http://www.uss-pension-model.com/</a></li></ul>	
<i>ALSPAC data dictionary</i>	2017
<ul style="list-style-type: none"><li>• R package and web-app for searching for ALSPAC variables</li><li>• <a href="http://variables.alspac.bris.ac.uk/">http://variables.alspac.bris.ac.uk/</a></li></ul>	
<i>MR-Base</i>	2016
<ul style="list-style-type: none"><li>• Automated Mendelian randomization</li><li>• <a href="https://www.mrbase.org/">https://www.mrbase.org/</a></li></ul>	
<i>simulateGP</i>	2016
<ul style="list-style-type: none"><li>• Simulation methods for genotype-phenotype associations</li><li>• <a href="https://explodecomputer.github.io/simulateGP/">https://explodecomputer.github.io/simulateGP/</a></li></ul>	
<i>gctaPower</i>	2013
<ul style="list-style-type: none"><li>• Power calculations for genomic REML analysis</li><li>• <a href="https://shiny.cnsgenomics.com/gctaPower/">https://shiny.cnsgenomics.com/gctaPower/</a></li></ul>	
<i>epiGPU</i>	2012
<ul style="list-style-type: none"><li>• Exhaustive searches for genetic interactions parallelised across graphics cards</li><li>• <a href="https://github.com/explodecomputer/epigpu">https://github.com/explodecomputer/epigpu</a></li></ul>	



## (ii) Forthcoming publications

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1. Battram, T., Gaunt, T., Relton, C., Timpson, N. & Hemani, G. A comparison of the genes and genesets identified by EWAS and GWAS of fourteen complex traits. medRxiv (2022) Contrib.: 40% (senior author). Accepted in Nature Communications.
2. Sadreev, I., Elsworth, B., Mitchell, R., Paternoster, L., Sanderson, E., et al. Navigating sample overlap, winner's curse and weak instrument bias in mendelian randomization studies using the UK biobank. medRxiv (2021) Contrib.: 40% (senior author). Position: 12/12 (last author).
3. Elsworth, B., Lyon, M., Alexander, T., Liu, Y., Matthews, P., et al. The MRC IEU OpenGWAS data infrastructure. BioRxiv (2020) Contrib.: 30% (senior author). Non-academic co-authors. Position: 14/14 (joint last).

## (iii) Research grants

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Total income as PI, from 6 grant(s): **4,156,077 GBP**

Total income as CI, from 7 grant(s): **4,021,252 GBP**

Current income as PI, from 3 grant(s): **3,934,997 GBP**

Current income as CI, from 2 grant(s): **2,540,580 GBP**

### **IEU3 - Programme 1 Mendelian randomisation**

*MRC*

2022

- Amount: 1,971,091 GBP ; Role: PI ; Dates: 2023-04-01 to 2028-03-31 ; Proportion: 100%

### **Genetic architecture of Huntington's disease progression (Contracts pending)**

*Cure Huntington's Disease Initiative*

2022

- Amount: 607,328 GBP ; Role: PI ; Dates: 2023-02-01 to 2025-01-31 ; Proportion: 10%

### **BRC2 - Translational Population Science Theme**

*NIHR*

2022

- Amount: 1,912,067 GBP ; Role: Co-I ; Dates: 2022-12-01 to 2027-11-30 ; Proportion: 0%

### **Causes and consequences of mental disorders: The environmental and genetic influences of parents on offspring.**

*NIH*

2022

- Amount: 766,480 USD ; Role: Co-I ; Dates: 2022-07-15 to 2027-05-31 ; Proportion: 5%

### **Aetiological Epidemiology**

*Biogen*

2020

- Amount: 284,525 GBP ; Role: Co-I ; Dates: 2020-09-01 to 2022-08-31 ; Proportion: 5%

### **The causal map of the human phenome**

*Wellcome Trust and Royal Society, Sir Henry Dale Fellowship*

2017

- Amount: 1,356,578 GBP ; Role: PI ; Dates: 2018-01-04 to 2023-06-30 ; Proportion: 100%

### **Classifying mechanisms of pleiotropy to improve causal modelling**

*BBSRC and GlaxoSmithKline, CASE studentship*

2017

- Amount: 100,000 GBP ; Role: PI ; Dates: 2017-10-01 to 2021-09-30 ; Proportion: 5%

## **Pathways to self-harm: Biological mechanisms and genetic contribution**

*Medical Research Council and Medical Research Foundation*

2017

- Amount: 372,334 GBP ; Role: Co-I ; Dates: 2017-10-01 to 2019-10-01 ; Proportion: 5%

## **Identification of Traits and Biomarkers for Prediction of Huntington's Disease Phenotypes using Novel causal analysis Methodologies**

*Cure Huntington's Disease Initiative*

2017

- Amount: 117,059 GBP ; Role: Co-I ; Dates: 2017-04-01 to 2019-03-31 ; Proportion: 10%

## **Translation of MR for drug target identification**

*GlaxoSmithKline*

2017

- Amount: 349,099 GBP ; Role: Co-I ; Dates: 2017-01-01 to 2020-01-01 ; Proportion: 5%

## **Translation of MR for drug target identification**

*Biogen*

2017

- Amount: 436,165 USD ; Role: Co-I ; Dates: 2017-01-01 to 2020-01-01 ; Proportion: 5%

## **Dissecting genetic interactions in gene expression**

*University of Queensland, Early Career Research Grant*

2013

- Amount: 34,000 AUD ; Role: PI ; Dates: 2013-01-01 to 2013-12-31 ; Proportion: 2%

## **Dissecting genetic interactions in complex traits**

*CASE Studentship, BBSRC and Monsanto*

2007

- Amount: 100,000 GBP ; Role: PI ; Dates: 2007-09-01 to 2011-08-30 ; Proportion: 100%

## **(iv) Indications of external recognition**

### **Editorships**

### **PLoS Computational Biology**

*Invited guest editor*

2017

### **Appointment to national or international bodies**

### **PLoS Computational Biology**

*Expert evaluation panel for the Our Future Health study*

2021

*Invited member of the Genotype Chip Design Committee for the Our Future Health Study, that will be used to genotype up to 5 million people in the UK*

2019 - 2021

### **Invitations for degree examinations**

#### **Richard Packer**

University of Leicester

*PhD thesis external examiner*

2022

#### **Jisu Shin**

University of South  
Australia

*Dissertation of Master of precision medicine external examiner*

2020

#### **Edward Steere**

Witswatersrand University,  
SA

*Dissertation of Master of Science in Engineering external examiner*

2016

## Invited lectures (last 3 years) .....

<b>BenevolentAI seminar series</b>	Invited talk
<i>The MR-Base and OpenGWAS projects</i>	2022
<b>Cure Huntington's Disease Initiative seminar series</b>	Invited talk
<i>Exploring the assumptions in Mendelian randomisation</i>	2022
<b>BILT Compassionate Conference</b>	Conference plenary
<i>Decolonising the Bristol medical school curriculum</i>	2022
<b>Mendel @ 200 conference, Bristol</b>	Conference plenary
<i>Contemporary genome-wide association studies in the light of Mendelian inheritance</i>	2022
<b>Broad Institute (Harvard and MIT) methods seminar</b>	Invited talk
<i>Within-sibship GWAS for Mendelian randomisation</i>	2022
<b>DECOLWEEK, Bristol</b>	Invited panel member
<i>Decolonising your discipline</i>	2021
<b>Mendelian Randomization conference, Bristol</b>	Invited session chair
<i>Results from large scale consortia</i>	2021
<b>GSK seminar series</b>	Invited talk
<i>Mendelian randomisation for molecular exposures</i>	2021
<b>Channing Network seminar series, Harvard University</b>	Invited talk
<i>Using Mendelian randomisation to detect causal influences of molecular features on complex traits</i>	2021
<b>The Trøndelag Health Study, Norway</b>	Invited workshop lead
<i>Multi-omics in longitudinal cohorts</i>	2020
<b>International Agency for Research on Cancer, France</b>	Invited talk
<i>Collider bias in Covid-19 research</i>	2020
<b>Elizabeth Blackwell Institute data week keynote</b>	Invited talk
<i>New data on Covid-19 is undermined by old statistical problems</i>	2020
<b>GRC Quantitative Genetics conference, Italy</b>	Invited session chair
<i>Genetic architecture of complex traits</i>	2019
<b>Mendelian Randomization conference, Bristol</b>	Conference plenary
<i>Genetics of DNA methylation</i>	2019

## (vi) Related administration \_\_\_\_\_

<b>Leading group on Covid-19 epidemiology</b>	
<i>MRC IEU</i>	2020-2021
<ul style="list-style-type: none"> <li>• Initiated project, and recruited group of 12 researchers</li> <li>• Provided analysis of ZOE symptom tracker app for external collaborators</li> <li>• Culminated in four publications, numerous presentations including to SAGE and HDRUK</li> </ul>	
<b>Member of the UoB Covid modelling subgroup</b>	
<i>University of Bristol</i>	2020-2021

## **Initiating the OpenGWAS consortium**

*MRC IEU*

2020 to present

- The OpenGWAS data infrastructure receives 2 million queries per week
- The consortium brings together researchers who develop software for GWAS summary data
- Plans to expand the invitation to international collaborators

## **SEGEg conference organiser**

*South of England Genetic Epidemiology Group*

2019

- Organised the long-running SEGEg conference to be held in Bristol for the first time

## **Leading work package on MR method development (programme 1)**

*MRC IEU*

2018-2023

- Line managing one post doctoral scientist

## **Leading statistics and informatics theme in epigenetics programme 4**

*MRC IEU*

2018-2022

## **Leading Hemani research group**

*MRC IEU*

2018 to present

- Four post-docs and four PhD students
- Weekly group meetings including pastoral and career support

## **ALSPAC Board of Directors**

*ALSPAC*

2017 to present

## **Leading genetics work package**

*ALSPAC*

2017 to present

- Line managing one post doctoral scientist

## **ACADEMIC LEADERSHIP AND CITIZENSHIP**

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### **(i) Academic leadership in the discipline**

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I orchestrate the collection and harmonisation of summary data from genome-wide association studies (GWAS) across hundreds of international research groups through the OpenGWAS project. GWAS summary data is vitally important to a wide range of genetic and epidemiological research activities, and the OpenGWAS infrastructure is the largest of its kind comprising approximately 125 billion genetic associations. It has more than 1000 unique users a month and receives more than 2 million queries per week from all over the world.

I design analytical pipelines by unifying and developing statistical methods with researchers from multiple international groups. For example I developed the MR-Base software platform, which has now been cited over 2200 times since being published in 2018.

I co-lead three international collaborative research efforts: the GoDMC consortium comprising 56 cohorts analysing the genetics of DNA methylation; the OpenGWAS consortium that combines the resources of over 100 groups and consortia; and the Within-Families consortium which brings together 21 family cohorts with genetic and phenotypic data for improved genetic association meta-analyses

I contributed to the design of the Our Future Health Project, which will genotype 5 million individuals in the UK, as a member of the chip design committee and as an expert reviewer in the procurement stage of the project.

## (ii) Academic leadership in the University

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### **MRC Integrative Epidemiology Unit 3.0**

*Programme Leader Track*

University of Bristol

2023-2028

- Co-leading (with George Davey Smith) Programme 1 of seven programmes within the unit

### **Medical Anti-Racism Taskforce**

*Group member*

University of Bristol

2020 to present

- Leading Special interest group on decolonising the curriculum

### **UoB Covid-19 Situation Report**

*Software developer*

University of Bristol

2020 to present

- Web app developed for internal use that provides daily updates and case mapping
- Used daily by the Incident Management Team in targeting Covid-19 actions

### **Decolonising the medical school curriculum**

*Co-lead*

University of Bristol

2020 to present

- Co-leading (with Jo Hartland) a group of 10 volunteers to develop, pilot and deploy a curriculum review framework for the medical school (<http://decolbms.org.uk>)

### **BRMS Equality Diversity Inclusion group**

*Group member*

University of Bristol

2018 to present

- Working in career progression subgroup

### **USS pension calculator**

*Software developer*

University of Bristol

2018 to present

- Developed a web-app that allows members of the USS pension scheme to calculate changes to the pension under proposed valuation changes
- Used widely by universities across the country
- <http://www.uss-pension-model.com/>

### **Teaching peer review**

*Reviewer*

University of Bristol

2018

- Causal inference short course, University of Bristol

## (iii) Professional activities outside the University

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|--------|--|
| 2021 - | Expert evaluation panel for the Our Future Health study  |
| 2019 - | Invited member of the Genotype Chip Design Committee for the Our Future Health Study, that will be used to genotype up to 5 million people in the UK   |
| 2017 - | Regular peer review for various grant bodies including the MRC, Wellcome Trust, Cancer Research UK   |
| 2012 - | Regular contributor to open source software projects (e.g. see <a href="https://github.com/explodecomputer/random-metal">https://github.com/explodecomputer/random-metal</a> and <a href="https://github.com/explodecomputer/ldsc/">https://github.com/explodecomputer/ldsc/</a> ) |
| 2011 - | Regular peer review for 20+ academic journals  |

#### **(iv) Contributions to society**

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- 2017 - 2019     Hosting asylum seekers and refugees, working with Bristol City Council and the \*Refugees at Home\* charity
- 2015 -         Contributing member to the charity \*Statisticians Without Borders\*
- 2014 -         Provide web and software support to local vegan organisations

#### **(v) Entrepreneurship, enterprise and partnerships**

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- 2015 -         I have formal partnerships with GlaxoSmithKlein, Biogen, Pfizer and CHDI that arose through developing the MR-Base platform. This has led to five post-doctoral positions and one PhD position being funded by these organisations, and the development of a standardised contract system to enable future such collaborations to occur.

#### **(vi) Good citizenship**

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- 2020 -         Leading a Special Interest Group on Decolonising the Curriculum, which will bring in a framework for all courses across the medical school for dealing with implicit bias within their learning materials
- 2020 -         Member of the Bristol Clear mentoring scheme (currently mentoring two early career researchers)
- 2020             Developed software for the University's Incident Management Team which maps new Covid-19 cases amongst students across the region in real time. This software is used in daily team management meetings
- 2016 -         Participated in numerous mock interview panels for research fellowships
- 2015 -         Extensive software development for the MRC IEU research community, most notably the MR-Base and OpenGWAS software platforms which I created and maintain for others to use. I am pleased that this has grown to be a platform for numerous research papers, and contributed substantially to research grants, many of which I am not named on
- 2014 -         Voluntary curation and documentation of shared data resources
- 2014 -         Web and software development for the ALSPAC project (e.g. see <http://variables.alspac.bris.ac.uk/> and <https://github.com/explodecomputer/alspac>)
- 2014 -         Throughout my time in Bristol I have made it a priority to provide informal training to early career researchers, particularly in genetics, software development and reproducible research.

#### **FUTURE PLANS**

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I am committed to grow as an academic by understanding, refining and improving the impact of my work.

**Teaching:** I plan to develop a new professional development course that guides junior researchers and post-graduate students through best practices in code and data management and reproducible digital research. This reflects an important direction for me, of building a teaching-research nexus which I will continue to explore in my decolonisation activities and contributions to life-long learning courses.

**Administration:** Team science is key to how I work, and though I have had a number of opportunities to lead teams thus far, I will seek opportunities to build my skills in this area, in terms of best serving the projects and people involved.

**Research:** I co-developed an extensive research plan for the next 5 years of the IEU relating to method development for causal inference and application to the ever changing landscape of genetic and genomic data. However, the structure of MRC units will change after this period, towards one which appears to be more goal oriented around applied research, and on a much longer time horizon than my work has previously worked towards. I will spend this time building ideas and plans for this next phase. I am interested in integrating my decolonisation work, for example by understanding how public and patient involvement may operate with the new wave of deep learning approaches that are yet to make a large impact in participatory genetic epidemiology.