

CURRICULUM VITAE

Personal information

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Education

- Bachelor, Public Health, Shandong (Medical) University, China
- Master, Medical Statistics (courses including Linear Algebra/Design of Experiment/Medical Statistics/Multivariate Analysis/Epidemiology at Fudan, and Mathematical Statistics/Optimization Methods/Numerical Methods at Shanghai Jiaotong University), Fudan (Shanghai Medical) University, China
- PhD, Statistical Genetics, King's College London, UK

Professional positions

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| 1994.8-1996.5 | Visiting scientist, Department of Environmental Science, School of Public Health & Channing Laboratory, Medical School, Harvard University |
| 1996.5-2002.8 | PostDoc & Lecturer (2001.3-2002.8), Section of Genetic Epidemiology and Biostatistics, Division of Psychological Medicine, Institute of Psychiatry, King's College London |
| 2002.9-2005.9 | Statistician, Social and Genetic Epidemiology, Department of Epidemiology and Public Health, University College London |
| 2005.9-2018.7 | Investigator scientist in Genetics, MRC Epidemiology Unit |
| 2018.8- | Genetic Analyst / Senior Research Associate, Cardiovascular Epidemiology Unit, Department of Public Health and Primary Care, University of Cambridge |

Research interests

My work relates to human health-related research, which over years include familial aggregation, segregation analysis, candidate genes and genomewide association studies (GWASs). The most recent work is proteogenomics within the SCALLOP consortium using the Olink as well as mass spectrometry (MS) panels measured for the INTERVAL samples. I have led collaborative analysis to the SCALLOP-Seq(ue), both WES and NGS) consortium and Host Genetics Initiative.

I have promoted reproducible research through CRAN (<https://cran.r-project.org>), GitHub (<https://github.com>) and websites <https://jinghuazhao.github.io/> with curations such as <https://jinghuazhao.github.io/Computational-Statistics/>, <https://jinghuazhao.github.io/software-notes/> and <https://jinghuazhao.github.io/Omics-analysis/>. I developed genetic analysis package (gap) and recently pQTLtools for proteogenomic analysis. I have kept up to date with developments in computational statistics, machine learning and artificial intelligence, making computing and omics analysis tools available from the University HPC, <https://cambridge-ceu.github.io/csd3/>, whose AI counterparts include Ollama, llama.cpp, BitNet, featuring AI implementations for MS data with InstaNovo & DIA-NN, molecule optimization with DrugAssist, single-cell omics coupled with Seurat, scp, scanpy, scvi-tools, scGPT and C2S-Scale under HPC, e.g., <https://cambridge-ceu.github.io/csd3/systems/setup.html#fn:C2S>.



Key publications

Zhao JH, et al. Mapping pQTLs of circulating inflammatory proteins identifies drivers of immune-mediated disease risk and novel therapeutic targets. *Nat Immunol* 2023, **24**(9):1540-1551, 10.1038/s41590-023-01588-w, <https://www.nature.com/articles/s41590-023-01588-w>.

COVID-19 Host Genetics Initiative. Mapping the human genetic architecture of COVID-19. *Nature* **600**:472–477 (2021); Pathak, G.A. et al. A first update on mapping the human genetic architecture of COVID-19. *Nature* **608**:E1-E10 (2022); The Host Genetics Initiative. A second update on mapping the human genetic architecture of COVID-19. *Nature* **621**:E7–E26 (2023).

Zhao JH, Luan JA, Congdon P. Bayesian linear mixed model of polygenic effects. *J Stat Soft.* 2018, **85**(6):1-27. doi: 10.18637/jss.v085.i06

Zhao JH, Luan JA. Mixed modeling with whole genome data. *J Prob Stat.* 2012. doi: 10.1155/2012.485174.

Xue F, Li S, Luan J, Yuan Z, Luben RN, Khaw K-T, Wareham NJ, Loos RJF, **Zhao JH**. A latent variable partial least squares path modeling approach to regional association and polygenic effect with applications to a human obesity study. *PLoS ONE* 2012, **7**(2): e31927

Loos RJ, et al. Common variants near MC4R are associated with fat mass, weight and risk of obesity. *Nat Genet* 2008; **40**(6):768-75

Zhao JH. gap: genetic analysis package. *J Stat Soft* 2007, **23** (8):1-18. doi: 10.18637/jss.v023.i08.

Zhao JH, Brunner EJ, Kumari M, Singh-Manoux A, Hawe E, Talmud PJ, Marmot MG, Humphries SE. APOE polymorphism, socioeconomic status and cognitive function in later mid-life: The Whitehall II longitudinal study. *Soc Psychiatr and Psychiatr Epidemiol* 2005, **40**:557-563

Zhao JH, D Curtis, PC Sham. Model-free and permutation tests for allelic associations. *Hum Hered* 2000, **50**(2), 133-139.

Publications since 2018

1. Demenais F, et al. Multi-ancestry genome-wide association study identifies new asthma susceptibility loci that co-localize with immune cell enhancer histone marks. *Nat Genet* 2018; **50**(1):42-53
2. Medina-Gomez C, et al. Life-course genome-wide association study meta-analysis of total body BMD and assessment of age-specific effects. *Am J Hum Genet* 2018; **102**(1):88-102
3. Sung YJ, et al. A large-scale multi-ancestry genome-wide study accounting for smoking behavior identifies multiple significant loci for blood pressure. *Am J Hum Genet* 2018, **102**(3):375-400. doi: 10.1016/j.ajhg.2018.01.015.
4. Turcot V, et al. (2018). Protein-altering variants associated with body mass index implicate pathways that control energy intake and expenditure underpinning obesity. *Nat Genet* **50**:26-41
5. **Zhao JH**, Luan JA, Congdon P. Bayesian linear mixed model of polygenic effects. *J Stat Soft* 2018, **85**(6):1-27. doi: 10.18637/jss.v085.i06
6. Feitosa MF, et al. Novel genetic associations for blood pressure identified via gene-alcohol interaction in up to 570K individuals across multiple ancestries. *PLoS One* 2018, **13**(6):e0198166. doi: 10.1371/journal.pone.0198166.

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7. Lee JJ, et al. Gene discovery and polygenic prediction from a genome-wide association study of educational attainment in 1.1 million individuals. *Nat Genet* 2018, 50:1112–1121, <https://doi.org/10.1038/s41588-018-0147-3>.
8. Ligthart S, et al. Genome analyses of >200,000 individuals identify 58 loci for chronic inflammation and highlight pathways that link inflammation and complex disorders. *Am J Hum Genet* 2018, 103(5):691-706. doi: 10.1016/j.ajhg.2018.09.009.
9. Evangelou E, et al. Genetic analysis of over 1 million people identifies 535 new loci for blood pressure traits. *Nat Genet* 2018, 50(10):1412-1425. doi: 10.1038/s41588-018-0205-x.
10. Merino J, et al. Genome-wide meta-analysis of macronutrient intake of 91,114 European ancestry participants from the cohorts for heart and aging research in genomic epidemiology consortium. *Mol Psychiatr* 2018 Jul 9. doi: 10.1038/s41380-018-0079-4.
11. Kilpeläinen TO, et al. Multi-ancestry study of blood lipid levels identifies four loci interacting with physical activity. *Nat Comm* 2019, 10, 376, <https://doi.org/10.1038/s41467-018-08008-w>.
12. Giri A, et al. Trans-ethnic association study of blood pressure determinants in over 750,000 individuals. *Nat Genet* 2019, 51:51-62
13. Karasik D, et al. Disentangling the genetics of lean mass. *Am J Clin Nutr* 2019, 109(2): 276-287, <https://doi.org/10.1093/ajcn/nqy272>.
14. de Vries PS, et al. Multi-ancestry genome-wide association study of lipid levels incorporating gene-alcohol interactions. *Am J Epidemiol* 2019, 188(6):1033-1054, <https://doi.org/10.1093/aje/kwz005>.
15. Justice AE, et al. Protein-coding variants highlight the importance of lipolysis in adipocytes for body fat distribution. *Nat Genet* 2019, <https://doi.org/10.1038/s41588-018-0334-2>.
16. Shrine N, et al. New genetic signals for lung function highlight pathways and chronic obstructive pulmonary disease associations across multiple ancestries, *Nat Genet* 2019, <https://doi.org/10.1038/s41588-018-0321-7>.
17. Zhao J, et al. Meta-analysis of genome-wide association studies provides insights into genetic control of tomato flavor. *Nat Comm* 2019, 10, Article number: 1534 (2019), <https://www.nature.com/articles/s41467-019-09462-w>
18. Sung YJ, et al. A multi-ancestry genome-wide study incorporating gene–smoking interactions identifies multiple new loci for pulse pressure and mean arterial pressure. *Hum Mol Genet* 2019, doi: 10.1093/hmg/ddz070
19. Clark DW, et al. Associations of autozygosity with a broad range of human phenotypes. *Nat Comm* 2019, NCOMMS-18-33232A-Z
20. Bentley A.R., et al. Multi-ancestry genome-wide gene–smoking interaction study of 387,272 individuals identifies new loci associated with serum lipids. *Nat Genet* **51**, 636–648 (2019). <https://doi.org/10.1038/s41588-019-0378-y>
21. Shah S, et al. Genome-wide association and Mendelian randomisation analysis provide insights into the pathogenesis of heart failure. *Nat Comm* 2020, 11(1):163. Published 2020 Jan 9. doi:10.1038/s41467-019-13690-5
22. Surendran P, et al. Discovery of rare variants associated with blood pressure regulation through meta-analysis of 1.3 million individuals. *Nat Genet* 2020, 52(12):1314-1332, doi: 10.1038/s41588-020-00713-x.
23. Lin W, Ji J, Zhu Y, Li M, Zhao J, Xue F, Yuan Z. PMINR: pointwise mutual information-based network regression – with application to studies of lung cancer and Alzheimer’s disease. *Front Genet* 2020, 11:556259, <https://doi.org/10.3389/fgene.2020.556259>
24. Cuellar-Partide G, et al. Genome-wide association study identifies 48 common genetic variants associated with handedness. *Nat Hum Behaviour* 2021, 5: 59–70.
25. Gaziano L, et al. Actionable druggable genome-wide Mendelian randomization identifies repurposing opportunities for COVID-19. *Nat Med* 2021, 27:668–676.

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26. Chen J, et al. The trans-ancestral genomic architecture of glycemic traits. *Nat Genet* 2021, 53:840–860.
27. COVID-19 Host Genetics Initiative. Mapping the human genetic architecture of COVID-19. *Nature* 2021.
28. Zhang Y, et al. Mendelian randomisation highlights hypothyroidism as a causal determinant of idiopathic pulmonary fibrosis. *EBiomed.* 2021, <https://doi.org/10.1016/j.ebiom.2021.103669>
29. Graham SE, et al. The power of genetically diverse individuals in genome-wide association studies of blood lipid levels. *Nature* 2021, **600**: 675–679, DOI:10.1038/s41586-021-04064-3
30. Jin X, Zhang L, Ji J, Ju T, Zhao JH, Yuan Z. NeRiT -- Network regression in transcriptome-wide association studies. *BMC Genomics* (2022) 23:562, <https://doi.org/10.1186/s12864-022-08809-w>
31. Pathak, G.A. *et al.* A first update on mapping the human genetic architecture of COVID-19. *Nature* **608**, E1-E10 (2022).
32. Ramdas S, et al. A multi-layer functional genomic analysis to understand noncoding genetic variation in lipids. *Am J Hum Genet.* 2022 Aug 4;**109**(8):1366-1387. doi: 10.1016/j.ajhg.2022.06.012.
33. Wang Z, et al. Genome-wide association analyses of physical activity and sedentary behavior provide insights into underlying mechanisms and roles in disease prevention *Nat Genet.* 2022, **54**:1332–1344
34. Yengo L, et al. A saturated map of common genetic variants associated with human height from 5.4 million individuals of diverse ancestries. *Nature* 2022, **610**:704–712.
35. Kanoni, S., et al. Implicating genes, pleiotropy, and sexual dimorphism at blood lipid loci through multi-ancestry meta-analysis. *Genome Biology* 2022, **23**(1): 268 (medRxiv, DOI:10.1101/2021.12.15.21267852).
36. Shrine N, et al. Multi-ancestry genome-wide association study improves resolution of genes, pathways and pleiotropy for lung function and chronic obstructive pulmonary disease. *Nat Genet* 2023, **55**:410–422
37. van de Vegte JY, et al. Genetic insights into resting heart rate and its role in cardiovascular disease. *Nat Comm* **14**:4646 (2023), <https://www.nature.com/articles/s41467-023-39521-2>
38. Zhao JH, et al. Mapping pQTLs of circulating inflammatory proteins identifies drivers of immune-mediated disease risk and novel therapeutic targets. *Nat Immunol* 2023, **24**(9):1540-1551, 10.1038/s41590-023-01588-w, <https://www.nature.com/articles/s41590-023-01588-w>.
39. Lagou V, et al. GWAS of random glucose in 476,326 individuals provide insights into diabetes pathophysiology, complications and treatment stratification. *Nat Genet* **55**:1448–1461 (2023), <https://www.nature.com/articles/s41588-023-01462-3>, medRxiv, DOI: 10.1101/2021.04.17.21255471.
40. The Host Genetics Initiative. A second update on mapping the human genetic architecture of COVID-19. *Nature* **621**:E7–E26 (2023).
41. Macdonald-Dunlop E, et al. Mapping genetic determinants of 184 circulating proteins in 26,494 individuals to connect proteins and diseases. *medRxiv*, DOI:10.1101/2021.08.03.21261494.
42. Klaric L, et al. Mendelian randomisation identifies alternative splicing of the FAS death receptor as a mediator of severe COVID-19. *medRxiv*, doi: <https://doi.org/10.1101/2021.04.01.21254789>.
43. Gaziano L, et al. Transcriptome- and proteome-wide Mendelian randomization to prioritize therapeutic targets for coronary heart disease. *medRxiv*, DOI: 10.1101/2024.06.27.24309406v1.
44. Kelemen M, et al. Performance of deep-learning based approaches to improve polygenic scores. *MedRxiv*, DOI: 10.1101/2024.10.23.24315973, *Nat Comm*.
45. Koprulu M, et al. Proteogenomics 2.0: Multi-cohort analyses to characterise genetic effects across the proteome and phenotype
46. Zhao JH. Genetic association analysis with R (II). *The Biomedical & Life Sciences Collection* **2025**, (2025).

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47. Smit RAJ, et al. Polygenic scores to predict body mass index and obesity across populations and through the life course powered by data from 5.1 million individuals, *Nat Med*.