Keira Johnston, Ph.D

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Biography

I am an Associate Research Scientist (junior faculty) in the Psychiatry department of Yale School of Medicine, having completed my PhD in the UK in 2021 followed by postdoctoral training in the USA. I have a strong background in quantitative genetics and have worked on interdisciplinary teams throughout my PhD and postdoctoral training. My research is primarily focused on genetic study of chronic pain as a complex disease trait, beyond traditional chronic pain condition diagnostic boundaries. I believe studying the genetics of chronic pain as a complex disease in this way is not only a powerful and tractable way to understand how chronic pain develops, but also contributes to validating individual chronic pain experiences, reducing stigma, and improving treatment.

Employment

Current — **Associate Research Scientist**, *Huckins Lab, Department of Psychiatry, Yale University*, CT
Continuing postdoctoral work, additionally coordinating projects incorporating premenstrual dysphoric disorder, PTSD, eating disorders

August 2022 - July 2025 — **Postdoctoral Associate**, *Huckins Lab, Department of Psychiatry, Yale University*, CT
Working with biobank, genotyping, EHR data to carry out genetic and transcriptomic-imputation investigations of chronic pain phenotypes

Sep 2021 - Aug 2022 — **Postdoctoral Fellow**, *Huckins Lab, Icahn School of Medicine, Mount Sinai*, NYC
Working with biobank, genotyping, EHR data to carry out genetic and transcriptomic-imputation investigations of chronic pain phenotypes

2017 (Mar-Aug) — **Research Assistant**, *Institute of Health and Wellbeing/ University of Glasgow*, Glasgow
Working to construct polygenic risk scores for cardiometabolic diseases using UK Biobank data, testing the efficacy of these scores as a component of binomial regression models, in terms of prevalent disease classification, in UKB via Net Reclassification Indices amongst other metrics. Assisting in data organisation and write-up.

2014 — **Vacation Scholarship recipient**, *The Wellcome Trust and SCRM*, Edinburgh
Funded summer student at the Scottish Centre for Regenerative Medicine working under supervision of Dr Morrison, carrying out laboratory-based work involving mouse embryonic stem cells, qPCR, DNA/ RNA extraction and preparation.

Education

2011–2015 **BSc Biological Sciences Hons Evolutionary Biology**, *The University of Edinburgh*

2015–2016 **MSc Quantitative Genetics and Genome Analysis**, *The University of Edinburgh*

2017–2021 **PhD (Medical Research Council Doctoral Training Programme, Precision Medicine)**, *The University of Glasgow, The University of Edinburgh*

Recent Publications and Preprints

click for articles

The impact of chronic pain on brain gene expression, *PAIN*

Genetically-regulated gene expression in the brain associated with chronic pain: relationships with clinical traits and potential for drug repurposing, *Biological Psychiatry*

(named International Association for the Study of Pain 'Paper of the week', and solicited commentary)

Chronic overlapping pain conditions and nociplastic pain, *Human Genetics and Genomics Advances*

A computational genetic- and transcriptomics-based study nominates drug repurposing candidates for the treatment of chronic pain, *medRxiv*

Conferences

Oral Presentation — The Challenge of Chronic Pain 2019, Cambridge UK

Oral Presentation — World Conference of Psychiatric Genetics 2019, Anaheim USA (selected for Early Career Investigator Programme)

Poster — American Society of Human Genetics 2024, Denver USA

Poster — Society of Biological Psychiatry 2022, New Orleans USA

Invited Talks

Washington Academy of Pain Management Conference 2020

European Pain Federation (EFIC) 14th Congress 2025 Early Career Plenary

Supervision and Mentorship

Summer 2023 **Kelly Deng, High School Intern**, *Huckins Lab, Department of Psychiatry, Yale University*, CT

Working with a large post-mortem brain tissue gene expression dataset to find genes relevant to post-traumatic stress disorder, carrying out differentially expressed gene (DEG) analysis, weighted gene co-expression network analyses and polygenic risk score-DEG analysis, supporting student in first-time HPC use and in developing coding and figure production skills in R. Kelly received 1st prize in the 2024 Westchester Association of Chinese Americans Dr. Sun Student Science Award for this work, and was additionally named in the top 300 entrants for the 2024 Regeneron Science Talent Search.

September 2022-Present **Lily Collier, Columbia Undergraduate/ Research Assistant**, *Huckins Lab, Department of Psychiatry, Yale University*, CT

Working with a large post-mortem brain tissue gene expression dataset to find genes relevant to chronic pain, carrying out polygenic risk score-DEG analysis and genotype data quality control filtering, preparing and presenting conference poster (World Congress of Psychiatric Genetics, Montreal, 2023). Manuscript related to this work accepted for publication in PAIN.

Teaching

Spring 2024 **Interdepartmental Neuroscience Program 560 R Statistics for Neuroscience**, *Yale University*, CT
Delivered lecture on theory and application in Genome Wide Association Studies (GWAS) for Yale PhD students.

Autumn 2023 **Interdepartmental Neuroscience Program GENE 680 Advanced Topics in Neurogenomics**, *Yale University*, CT
Delivered lecture and facilitated journal-club style discussion session for Yale PhD students.

2019 **MSc Bioinformatics Identification of Disease-Causing Genetic Variants**, *University of Glasgow*, Glasgow, UK
Assisted in computing lab sessions for this course.

2018-2019 **UoG Medical Student Journal Clubs**, *University of Glasgow*, Glasgow, UK
Facilitated several journal clubs for medical students on genetics and genomics topics.

Service

2025 **American Society of Human Genetics (ASHG)**, *Annual Meeting: Abstract Review*

Continuous **Journal of Headache and Pain, Scientific Reports, European Journal of Health Psychology, BMC Genomics, Complex Psychiatry, Nature Human Behaviour, BMC Psychiatry, The Journal of Pain, Molecular Psychiatry, Nature Communications, and more**, *Manuscript Review*

Programming, Packages and Software

bash	Proficient	*Python*	Intermediate
LaTeX	Proficient	*R*	Proficient

Highly proficient in standard statistical genetics software, packages, and toolsets; SAIGE, BOLT-LMM, PRS-cs, PRSice, KING, ADMIXTURE, PLINK, LDSC etc., with in-depth experience in high performance computing environments.

Society Memberships

American Society of Human Genetics (ASHG)

European Society of Human Genetics (ESHG)

International Society of Psychiatric Genetics (ISPG)

PhD

Thesis Investigating causal relationships between major depression and chronic pain using UK general-population datasets with whole-genome genotyping

Supervisors Professor Daniel Smith, Professor Mark Bailey, Dr Barbara Nicholl, Professor Andrew McIntosh

PhD First-Author Publications

- Genome-wide association study of multisite chronic pain in UK Biobank, *PLOS Genetics*
- Identification of novel common variants associated with chronic pain using conditional false discovery rate analysis with major depressive disorder and assessment of pleiotropic effects of LRFN5, *Translational Psychiatry*
- Sex-stratified genome-wide association study of multisite chronic pain in UK Biobank, *PLOS Genetics*

Other Publications

2025 **Protocol for finding genetic variation associated with unmeasured traits through GenomicSEM common-factor GWAS**, *STAR Protocols*,
Keira J.A. Johnston, Rebecca Signer, Laura M. Huckins

2024 **Comorbidity profiles of posttraumatic stress disorder across the medical phenome**, *Biological Psychiatry Global Open Science*,
Emily M. Hicks, Maria Niarchou, Slavina Goleva, Dia Kabir, Jessica Johnson, **Keira J.A. Johnston,** Julia Ciarcia, Gita A. Pathak, Jordan W. Smoller, Lea K. Davis, Caroline M. Nievergelt, Karestan C. Koenen, Laura M. Huckins, Karmel W. Choi on behalf of the PGC/PsycheMERGE PTSD and Trauma EHR Working Group

2023 **Multi-ancestry study of the genetics of problematic alcohol use in over 1 million individuals**, *Nature Medicine*,
Hang Zhou, Rachel L. Kember, Joseph D. Deak, Heng Xu, Sylvanus Toikumo, Kai Yuan, Penelope A. Lind, Leila Farajzadeh, Lu Wang, Alexander S. Hatoum, Jessica Johnson, Hyunjoon Lee, Travis T. Mallard, Jiayi Xu, **Keira J. A. Johnston**, Emma C. Johnson, Trine Tollerup Nielsen, Marco Galimberti, Cecilia Dao, Daniel F. Levey, Cassie Overstreet, Enda M. Byrne, Nathan A. Gillespie, Scott Gordon, Ian B. Hickie, John B. Whitfield, Ke Xu, Hongyu Zhao, Laura M. Huckins, Lea K. Davis, Sandra Sanchez-Roige, Pamela A. F. Madden, Andrew C. Heath, Sarah E. Medland, Nicholas G. Martin, Tian Ge, Jordan W. Smoller, David M. Hougaard, Anders D. Børglum, Ditte Demontis, John H. Krystal, J. Michael Gaziano, Howard J. Edenberg, Arpana Agrawal, Million Veteran Program, Amy C. Justice, Murray B. Stein, Henry R. Kranzler, Joel Gelernter

2022 **Chronic pain and psychiatric conditions**, *Complex Psychiatry*,
Keira JA Johnston, Laura M. Huckins

(named in 'high impact articles in psychiatry and psychology')

2021 **Genetic variation in the ASTN2 locus in cardiovascular, metabolic and psychiatric traits: evidence for pleiotropy rather than shared biology**, *Genes*,
Olivia Burt, **Keira JA Johnston**, Nicholas Graham, Breda Cullen, Donald M Lyall, Laura M Lyall, Jill P Pell, Joey Ward, Daniel J Smith, Rona J Strawbridge

2021 **The overlap of genetic susceptibility to schizophrenia and cardiometabolic disease can be used to identify metabolically different groups of individuals**, *Scientific Reports*,
Rona J Strawbridge, **Keira JA Johnston**, Mark ES Bailey, Damiano Baldassarre, Breda Cullen, Per Eriksson, Ulf DeFaire, Amy Ferguson, Bruna Gigante, Philippe Giral, Nicholas Graham, Anders Hamsten, Steve E Humphries, Sudhir Kurl, Donald M Lyall, Laura M Lyall, Jill P Pell, Matteo Pirro, Kai Savonen, Andries J Smit, Elena Tremoli, Tomi-Pekka Tomainen, Fabrizio Veglia, Joey Ward, Bengt Sennblad, Daniel J Smith

2020 **Carotid intima-media thickness: novel loci, sex-specific effects, and genetic correlations with obesity and glucometabolic traits in UK Biobank**, *Arteriosclerosis, thrombosis, and vascular biology*,
Rona J Strawbridge, Joey Ward, Mark ES Bailey, Breda Cullen, Amy Ferguson, Nicholas Graham, **Keira JA Johnston**, Laura M Lyall, Robert Pearsall, Jill Pell, Richard J Shaw, Rachana Tank, Donald M Lyall, Daniel J Smith

2020 **The genomic basis of mood instability: identification of 46 loci in 363,705 UK Biobank participants, genetic correlation with psychiatric disorders, and association with gene expression and function**, *Molecular Psychiatry*,
Joey Ward, Elizabeth M Tunbridge, Cynthia Sandor, Laura M Lyall, Amy Ferguson, Rona J Strawbridge, Donald M Lyall, Breda Cullen, Nicholas Graham, **Keira JA Johnston**, Caleb Webber, Valentina Escott-Price, Michael O'Donovan, Jill P Pell, Mark ES Bailey, Paul J Harrison, Daniel J Smith

2020 **Exploring the role of contactins across psychological, psychiatric and cardiometabolic traits within UK Biobank**, *Genes*,
Julia Morris, Soddy Sau Yu Leung, Mark ES Bailey, Breda Cullen, Amy Ferguson, Nicholas Graham, **Keira JA Johnston,** Donald M Lyall, Laura M Lyall, Joey Ward, Daniel J Smith, Rona J Strawbridge

2019 **Genetic variation in CADM2 as a link between psychological traits and obesity**, *Scientific Reports*,
Julia Morris, Mark ES Bailey, Damiano Baldassarre, Breda Cullen, Ulf de Faire, Amy Ferguson, Bruna Gigante, Philippe Giral, Anuj Goel, Nicholas Graham, Anders Hamsten, Steve E Humphries, **Keira JA Johnston**, Donald M Lyall, Laura M Lyall, Bengt Sennblad, Angela Silveira, Andries J Smit, Elena Tremoli, Fabrizio Veglia, Joey Ward, Hugh Watkins, Daniel J Smith, Rona J Strawbridge

2019 **Identification of novel genome-wide associations for suicidality in UK Biobank, genetic correlation with psychiatric disorders and polygenic association with completed suicide**, *EBioMedicine*,
Rona J Strawbridge, Joey Ward, Amy Ferguson, Nicholas Graham, Richard J Shaw, Breda Cullen, Robert Pearsall, Laura M Lyall, **Keira JA Johnston**, Claire L Niedzwiedz, Jill P Pell, Daniel Mackay, Julie Langan Martin, Donald M Lyall, Mark ES Bailey, Daniel J Smith

2019 **Novel genome-wide associations for anhedonia, genetic correlation with psychiatric disorders, and polygenic association with brain structure**, *Translational Psychiatry*,
Joey Ward, Laura M Lyall, Richard AI Bethlehem, Amy Ferguson, Rona J Strawbridge, Donald M Lyall, Breda Cullen, Nicholas Graham, **Keira JA Johnston**, Mark ES Bailey, Graham K Murray, Daniel J Smith

2018 **Genome-wide association study of circadian rhythmicity in 71,500 UK biobank participants and polygenic association with mood instability**, *EBioMedicine*,
Amy Ferguson, Laura M Lyall, Joey Ward, Rona J Strawbridge, Breda Cullen, Nicholas Graham, Claire L Niedzwiedz, **Keira JA Johnston**, Daniel MacKay, Stephany M Biello, Jill P Pell, Jonathan Cavanagh, Andrew M McIntosh, Aiden Doherty, Mark ES Bailey, Donald M Lyall, Cathy A Wyse, Daniel J Smith

2018 **Genetics of self-reported risk-taking behaviour, trans-ethnic consistency and relevance to brain gene expression**, *Translational Psychiatry*,
Rona J Strawbridge, Joey Ward, Laura M Lyall, Elizabeth M Tunbridge, Breda Cullen, Nicholas Graham, Amy Ferguson, **Keira JA Johnston**, Donald M Lyall, Daniel Mackay, Jonathan Cavanagh, David M Howard, Mark J Adams, Ian Deary, Valentina Escott-Price, Michael O'Donovan, Andrew M McIntosh, Mark ES Bailey, Jill P Pell, Paul J Harrison, Daniel J Smith