Unraveling the genetic potentiators of modern human migration

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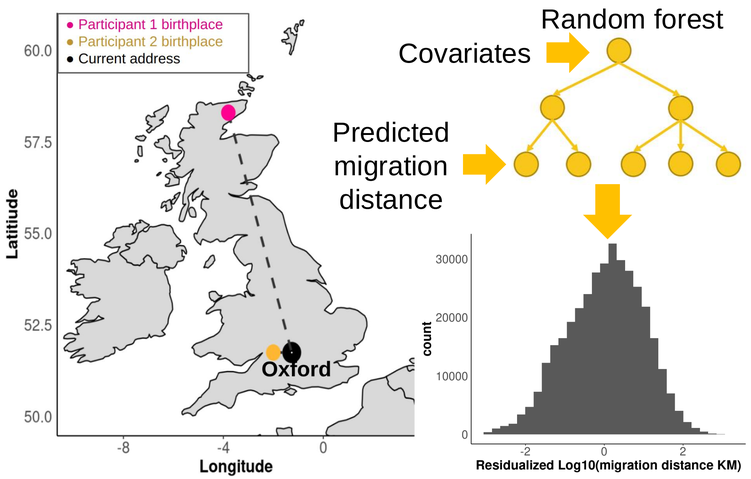
How far have you moved?

Background

- Migration is the backbone of human progress
- Research has focused on the effects of ancient migrations on genetic diversity
- Little is known about how genetic variation influences individual-level migratory behavior

Methods

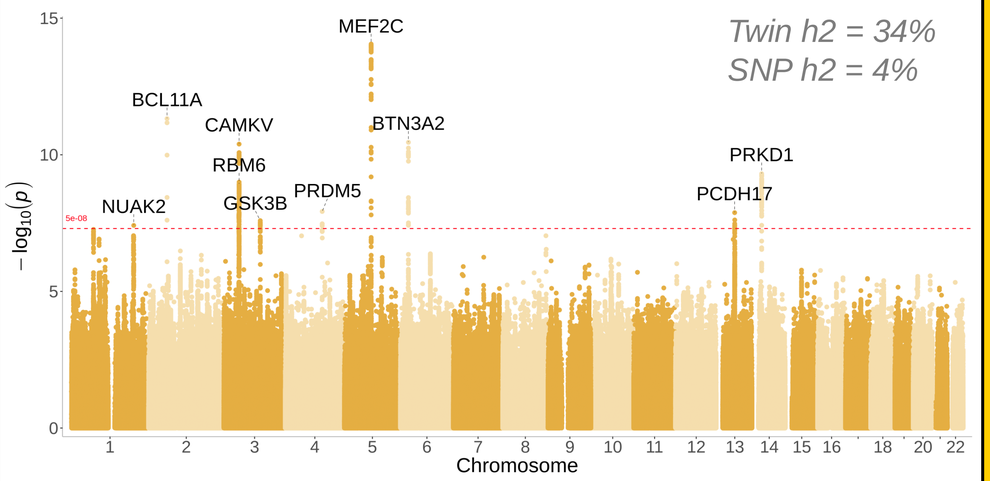
- UK Biobank (N > 280,000 unrelated adults)
- **GWAS** on a **quantitative** migration trait: distance between birthplace and current residence
  - Adjusted for: area, SES at birth, adoption, etc.

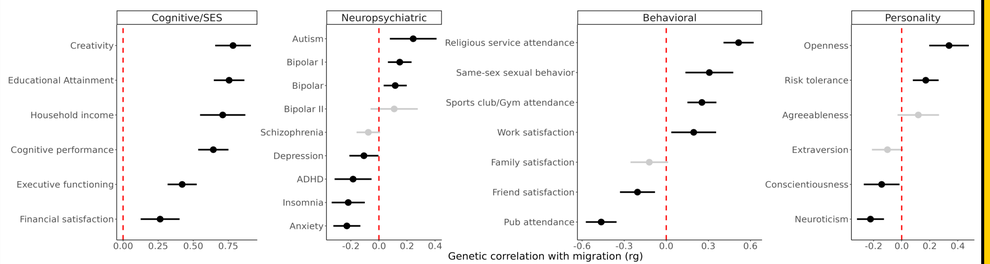


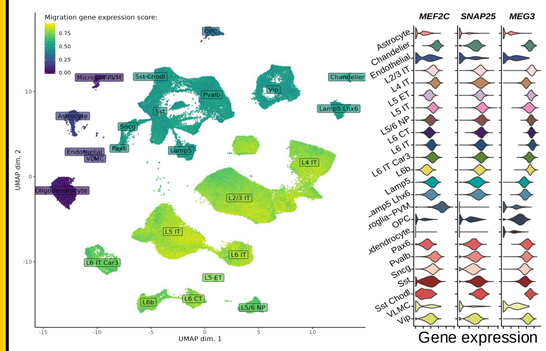
Migration has a genetic basis.

Migration genes are associated with education, risk-taking, bipolar, and are expressed in excitatory neurons.

The genetic basis of migration



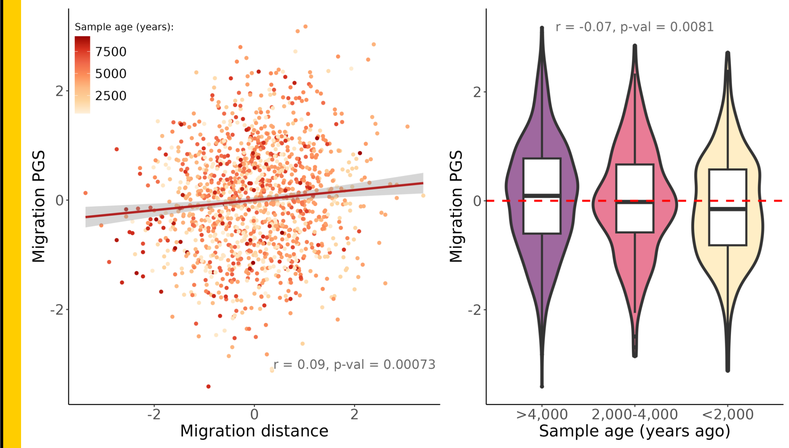




- Migration is **heritable**
- Migration is strongly linked with **education**
- Migration overlaps with cognition and behavior
- Migration genes are expressed in **excitatory neurons**

Ancient DNA provides insights into selective pressures of migration

- Allen Ancient DNA Resource (AADR)
  - N = 1,339 with estimated migration distance
- Genetic influences on migratory behavior are **conserved** between ancient and modern humans
- Migration PGS has **decreased** over time



Conclusions and future directions

- Common genetic variation impacts how far people move away from home
- People migrating further are highly educated, more open to experience, take risks, and carry genetic risk for bipolar
- Genetic factors influencing migration are **shared** between ancient and modern humans
- Next steps:
  - Disentangle the relationship with education
  - Determine how migration associated genes influence behaviors **across species**
  - Expand analysis to other countries

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