

# **Getting started in... quantitative research in medical education**

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# Plan

- My Background
- What is quantitative data / quant research
- Methods for gathering quant data
- Examples of quant research in action
- Q&A



# Plan

- My Background
- What is quantitative data / quant research
- Methods for gathering quant data
- Examples of quant research in action
- Q&A / Small group activity

What this session (hopefully!) isn't

- A deep dive into statistical methodology / the maths!
- A description of every method of how to do quant work

# My background

## Academic Interests:

- **Medical Education Research** – Who choose academic careers and why?
- **Cancer Research / Bio-informatics**– Cancer genomics in the NHS, Applications of long read whole genome sequencing in cancer



# What is Quantitative Research

‘Collecting and analysing numerical data to measure, describe, or explain patterns and relationships within a population’

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Deductive (i.e. hypothesis testing)

Can tell you **what** is happening but not directly **why** a trend is in place

# Quantitative Data Sources

## Surveys

- Common!
- Low resource method to engage potentially a large sample
- Flexible to your question
- Can give quant and 'qual' data
- Can be used to build research questions for later qualitative work

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## Observational datasets

- (often) population level, longitudinal data
- Limited flexibility, difficult to set up
- Multiple pre-existing sources available:
  - Internal Medical School Data (i.e. admissions, assessments etc)
  - UKMED
  - GMC

# Analysis software

Feature	R (and R Studio)	Microsoft Excel	SPSS	Stata	Minitab	GraphPad Prism
<b>Interface</b>	Primarily coding (scripts), Graphical user interface (RStudio)	Easy GUI, formulas, limited scripting (VBA)	Easy-to-use GUI, limited syntax scripting	GUI + robust scripting	Easy-to-use GUI	User-friendly GUI
<b>Cost</b>	Free, open-source	Commercial license	Commercial license	Commercial license	Commercial license	Commercial license
<b>Learning Curve</b>	Steeper for beginners	Very easy	Easy	Moderate	Easy	Easy
<b>Visualization</b>	Highly customizable, extensive options	Moderate, good for simple charts	Moderate, limited customization	Moderate, good graphics capability	Moderate, adequate business graphics	Excellent scientific graphs
<b>Flexibility</b>	Extremely high	Moderate, via VBA/macros	Low–moderate	High	Moderate–low	Moderate–low

# Analysis software

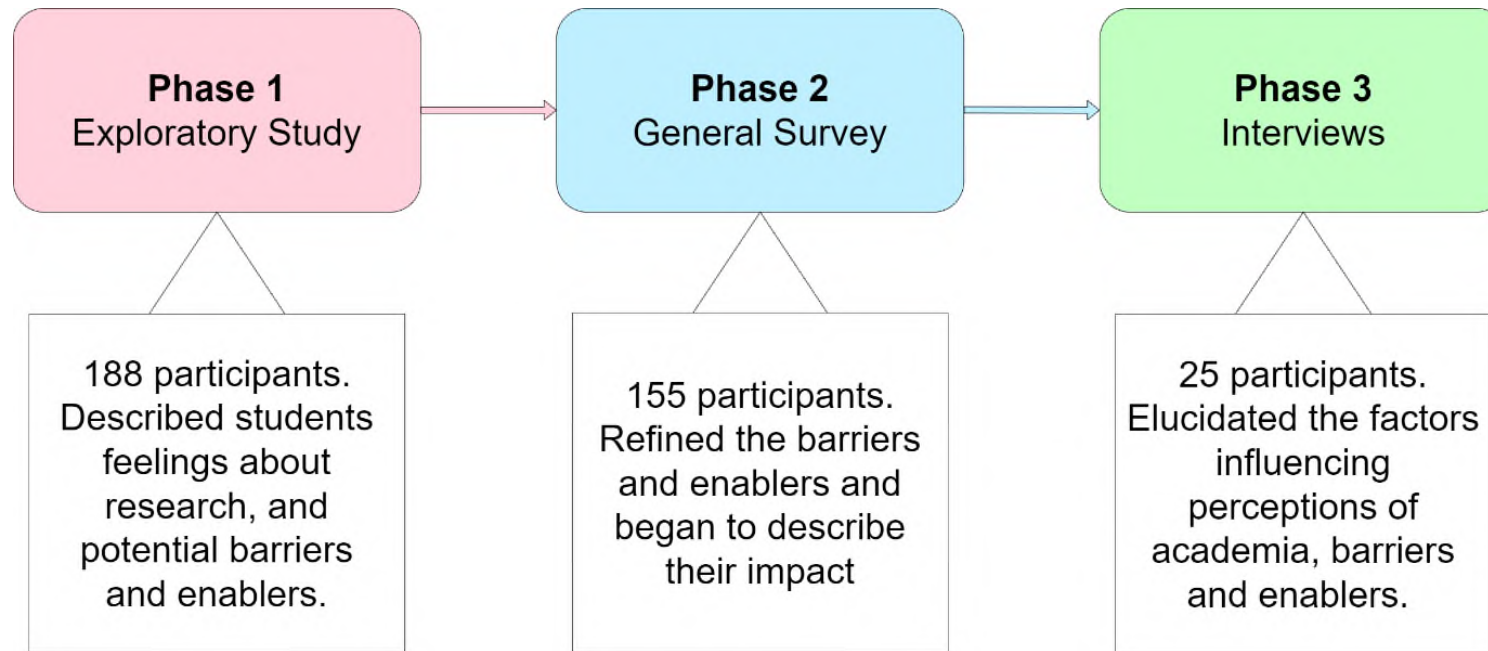
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**ChatGPT**

# An example of surveys in quant research

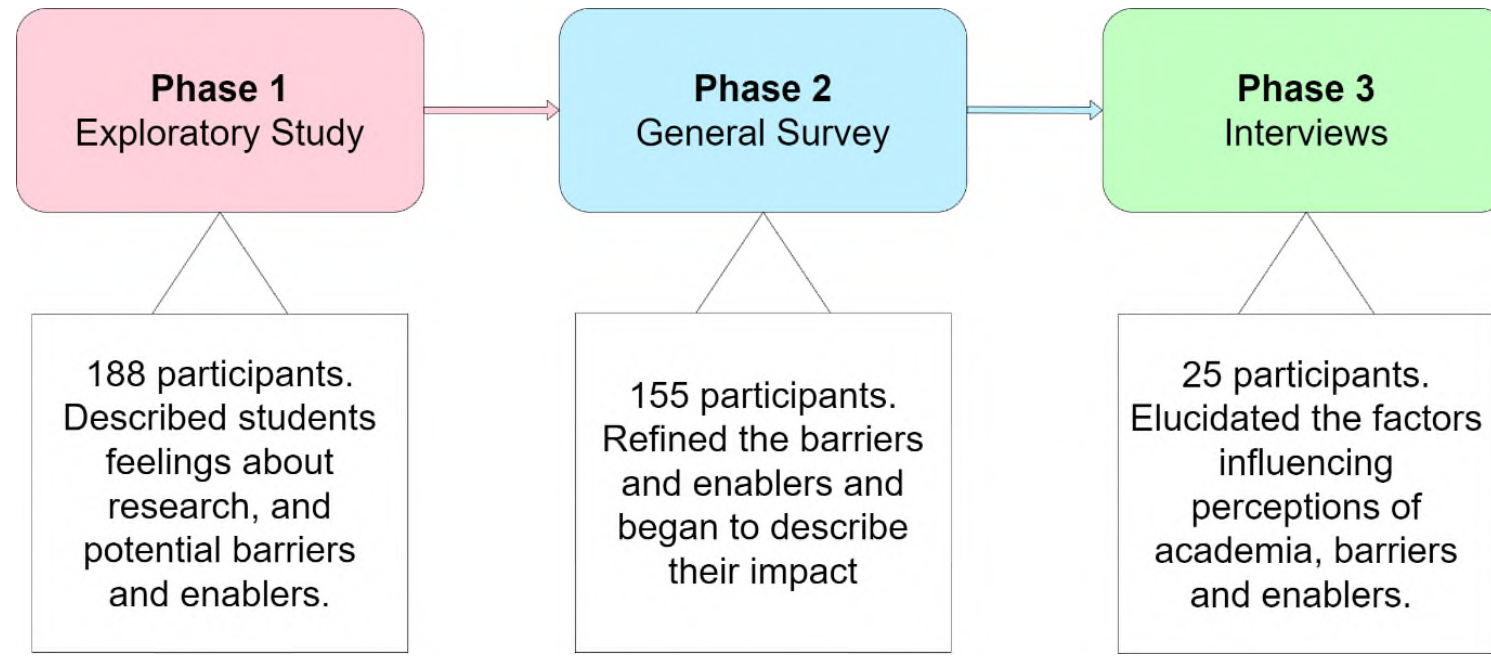
*What are the barriers and enablers which influence medical student's engagement in, and perceptions of research and clinical Career? A mixed methods study.*



Bain R, Lee J, et al. Barriers and enablers to medical students' engagement in research and clinical academic careers: a mixed-methods study. *BMJ Open*. 2025 Oct 15;15(10):e102988.

# An Example of Surveys in Quant Research

*What are the barriers and enablers which influence medical student's engagement in, and perceptions of research and clinical Career? A mixed methods study.*



**Barrier Reported**

**Number of students selecting barrier as**

**'most significant'**

Lack of advertised opportunities	30 (19%)
Lack of prior research experience	27 (17%)
Lack of confidence in their abilities to carry out common academic tasks	16 (10%)



# Example of Observational Dataset Research

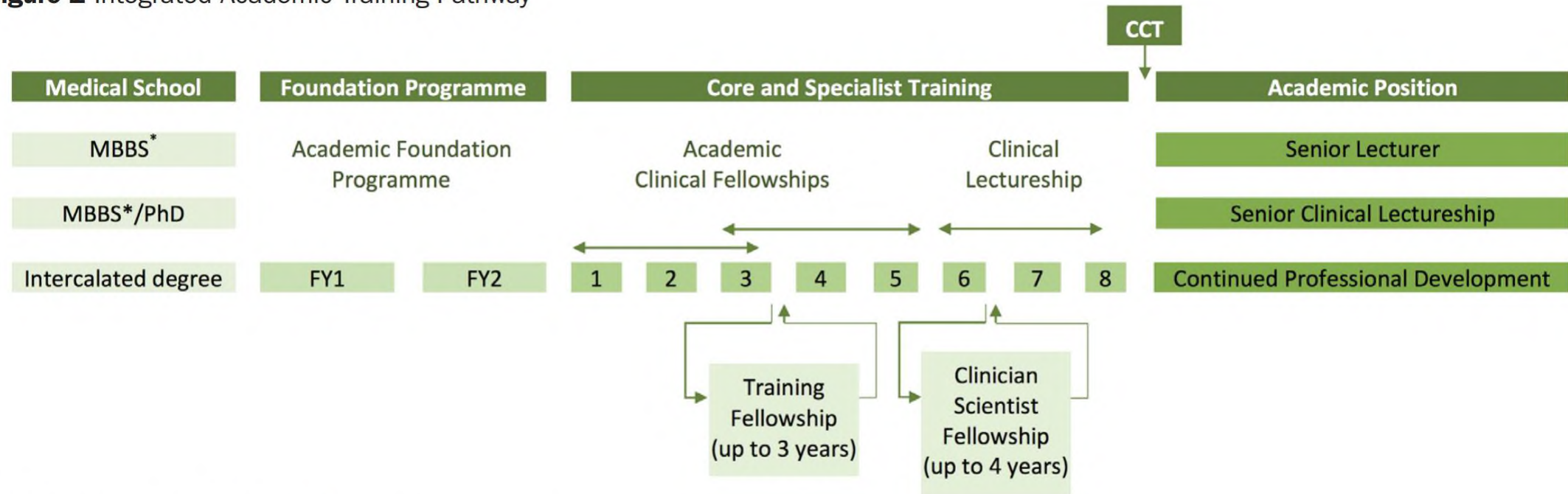
## **Who pursues academic careers?**

An analysis of the factors which determine participation in Early academic career opportunities with the UKMED.

Dr Robbie Bain,  
Professor Gillian Vance, Dr Bryan  
Burford

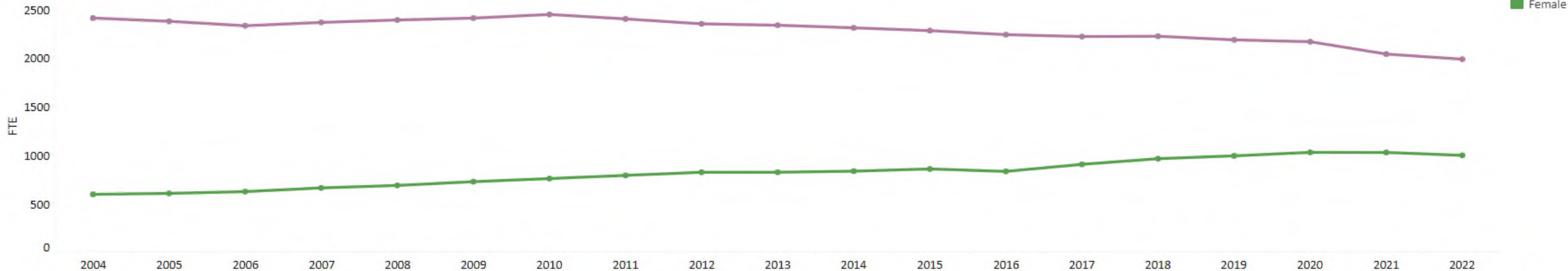
# The Clinical Early Academic Pipeline

**Figure 1** Integrated Academic Training Pathway

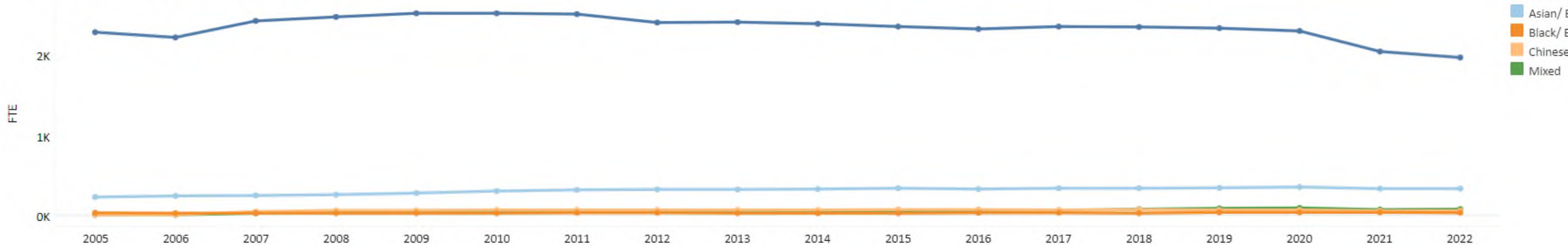


CCT: Certificate of Completion of Training  
 Personal fellowships can be undertaken at any point during training.  
 \* or equivalent medical degree (e.g. MBChB)

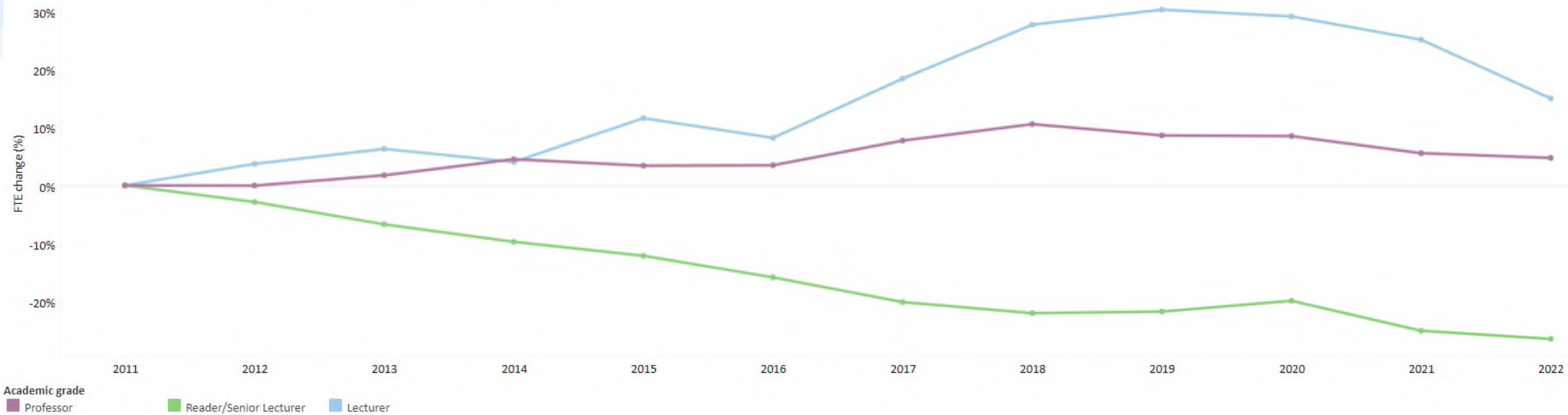
Gender profile of clinical academics (FTE)



Ethnic profile of clinical academics (FTE)



Summary of change in staffing levels by academic grade since 2011 (FTE)





## The Problem

- There is currently no work describing who intercalates, applies to the SFP, or applies to further academic training (3,4)
- Work that describes who enters the SFP or further academic training is limited (4,5)
- No work has linked the steps on the early clinical academic pipeline (i.e. intercalation, SFP and academic training) (5)



## Research Questions and Measures

### **Predictor Variable Groups:**

1. Educational Background
2. Protected Characteristics
3. Socioeconomic Background

### **Outcomes:**

1. If someone intercalates?
2. If someone applied to the SFP / academic training?\*
3. If they applied, were they successful?

\*Applications to academic training at the ST1 Level



# Study Design

Cohort 1 - RQ 1(a-d) – n ~ 43,305 individuals

## Inclusion Criteria:

Cohort 1:

- Those who entered medical school from **2010 to 2018**

and

- Entered the UK foundation programme (ergo those with the option to apply to the SFP/AFP) from **2014 to 2022**.





# Study Design

Cohort 1 - RQ 1(a-d) – n ~ 43,305 individuals

Cohort 2 - RQ2 (a-b) – n ~ 19,920 individuals

## Inclusion Criteria:

### Cohort 1:

- Those who entered medical school from **2010** to **2018**

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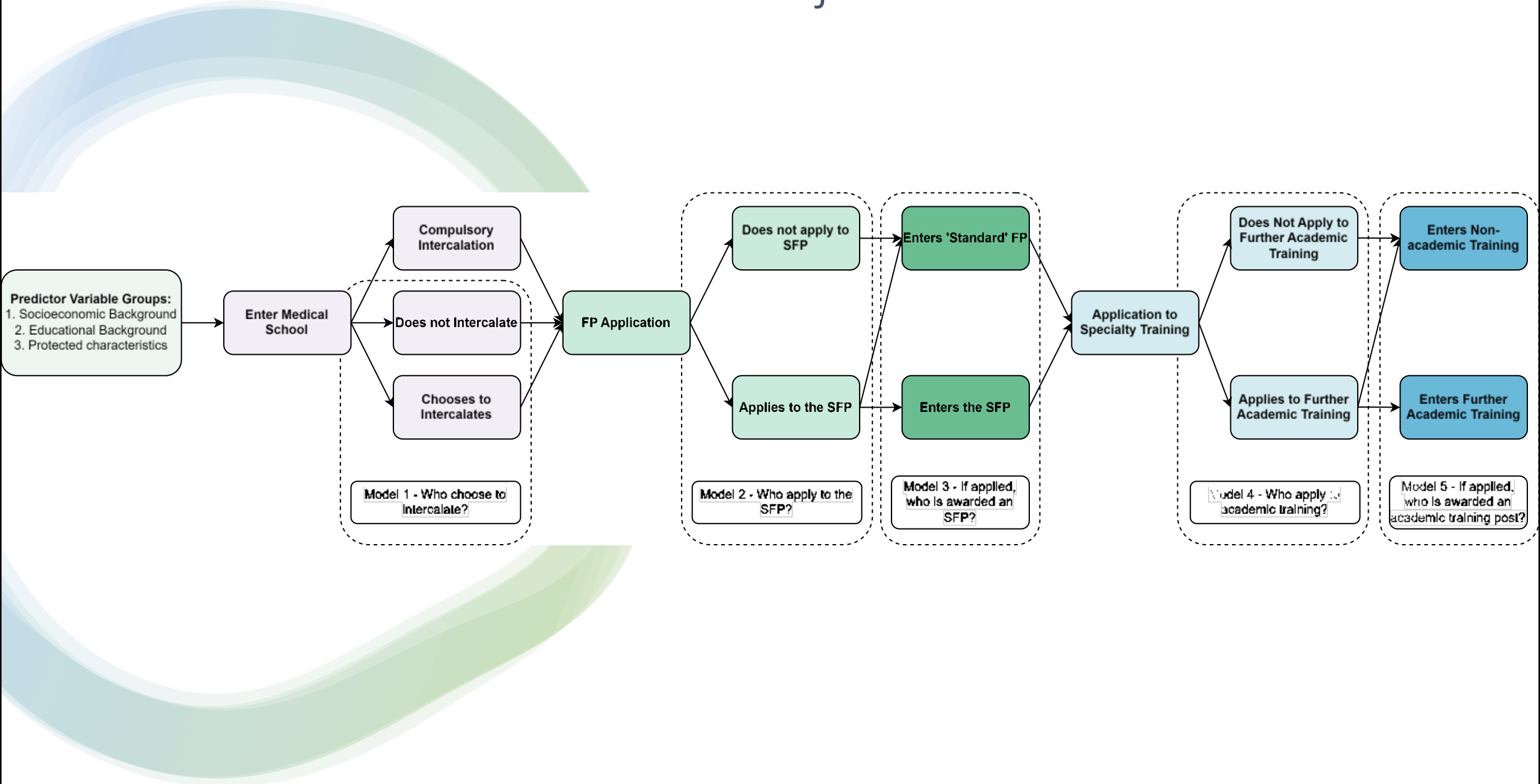
- Entered the UK foundation programme (ergo those with the option to apply to the SFP/AFP) from **2014** to **2022**.

### Cohort 2

- Those who completed the SFP/AFP or the 'standard' foundation programme (i.e., those who would be eligible to apply for further academic training) from **2018** to **2022**

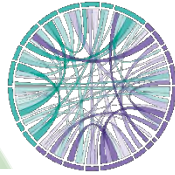


# The Project

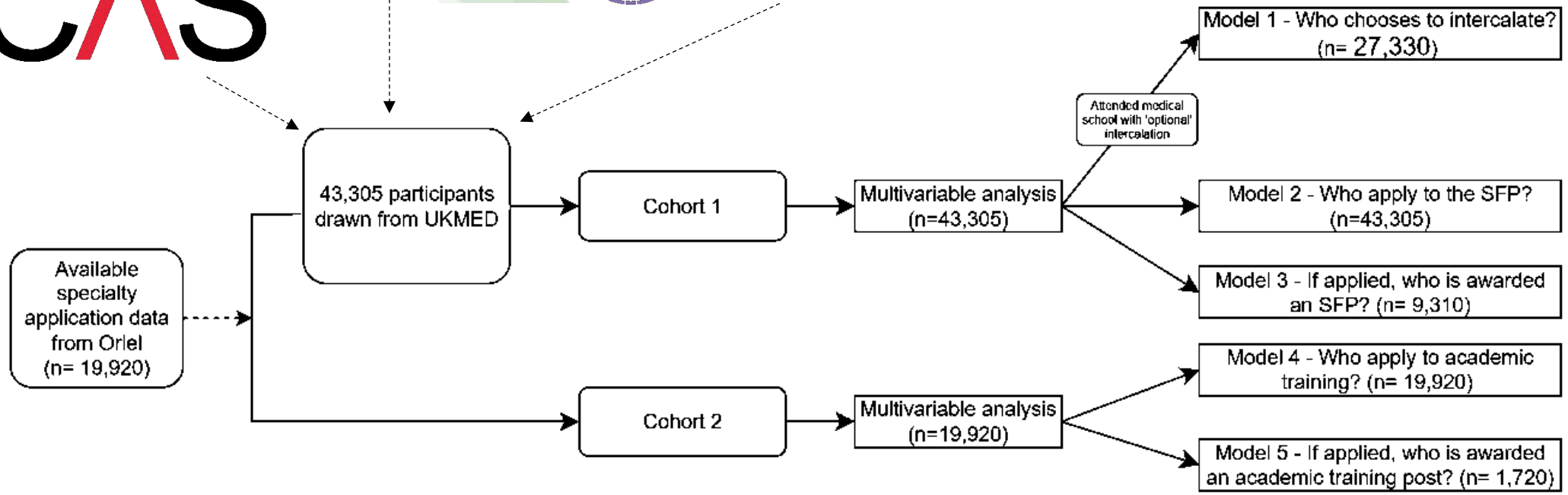


# UCAS

UK  
Foundation  
Programme



msc  
Medical  
Schools  
Council



**UKMED**  
UK Medical Education Database

# Data Analysis

**Mixed effects logistic regression models utilised**, with five models constructed.

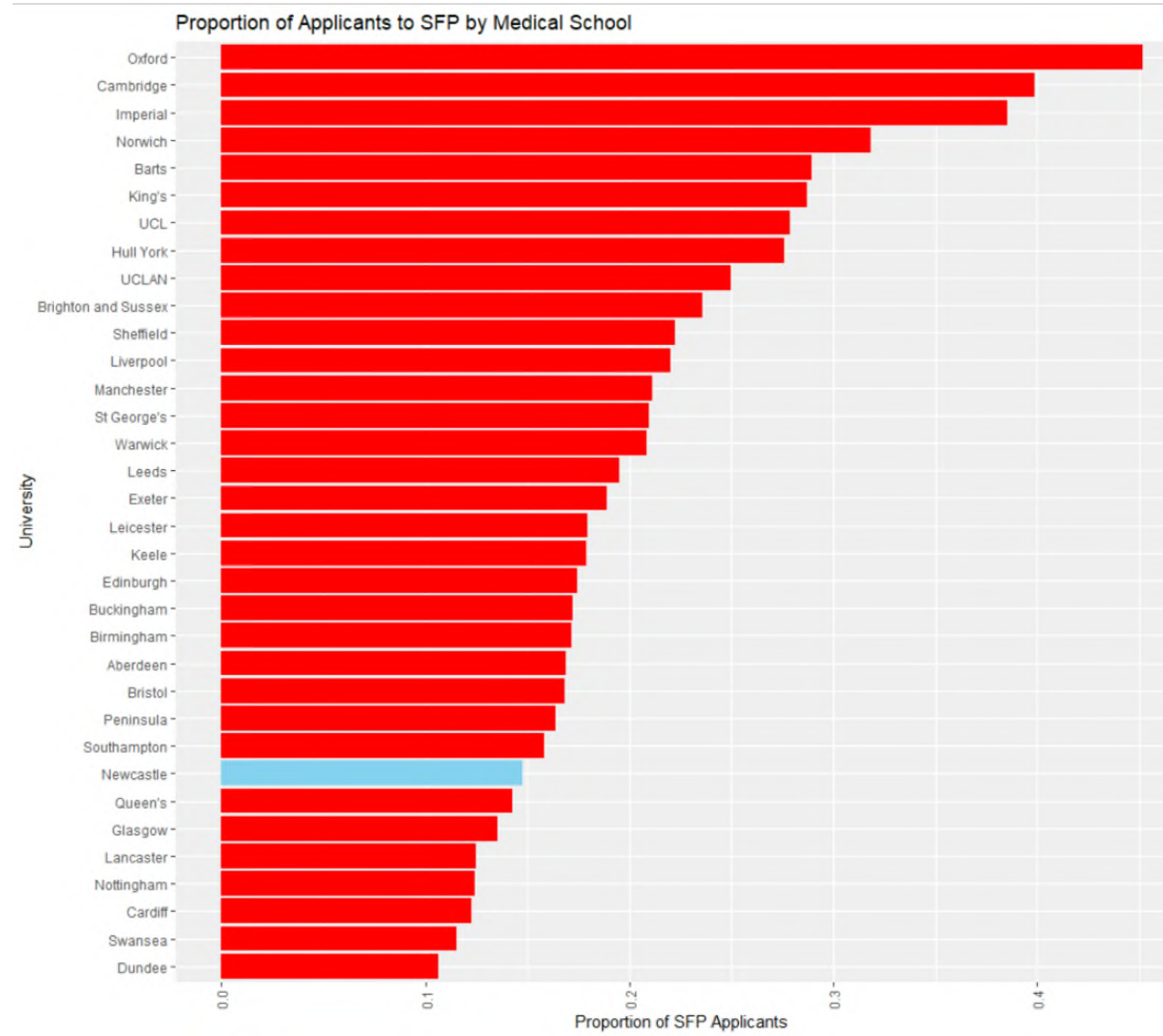
**Random effects** included:

- Location of medical school and foundation training
- Year of application

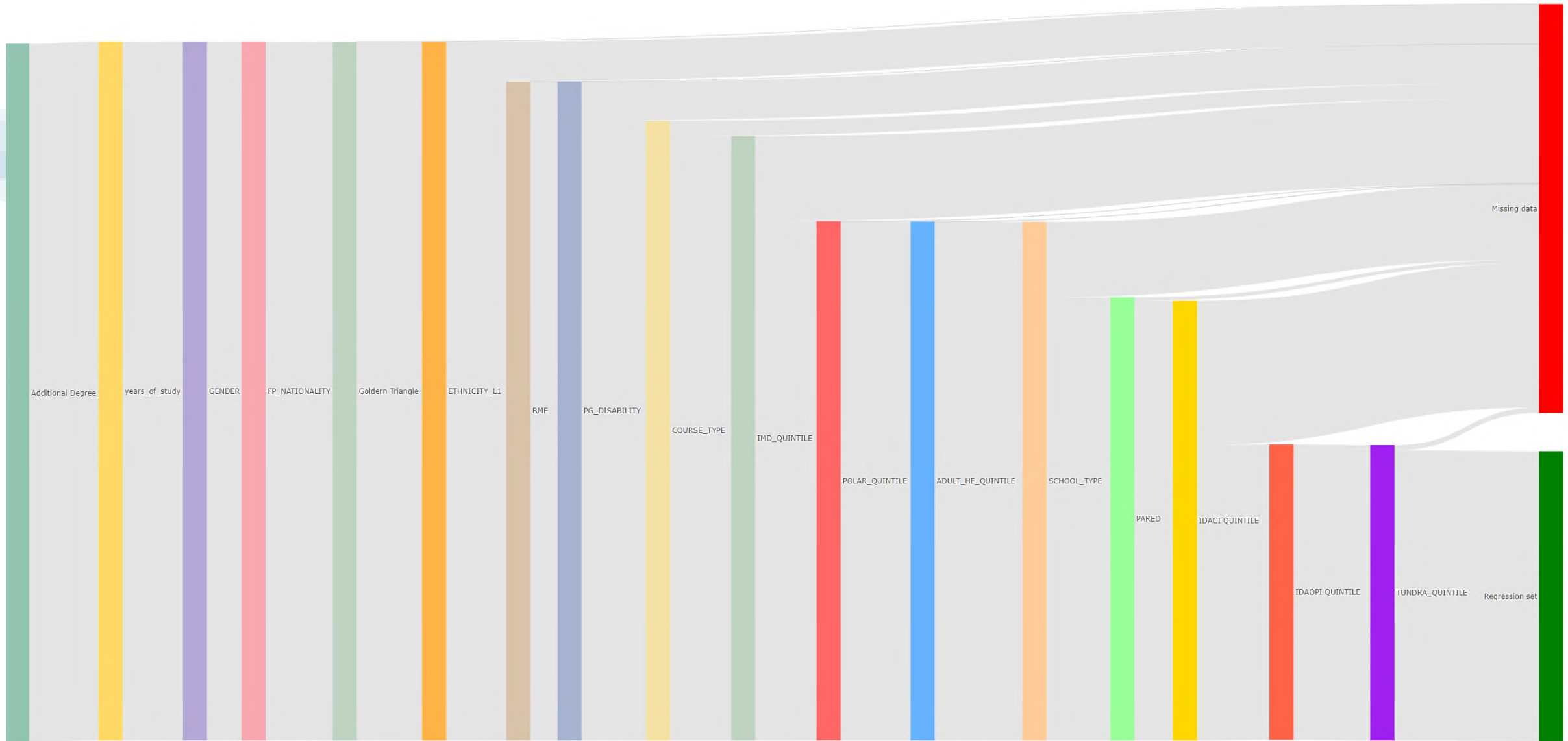
**Fixed effects** were drawn from the three predictor variable groups and were selected for each model set using **LASSO**

**Multiple imputation** was used to handle missing data

# Mixed effect modelling 101 – Dealing with clustering!

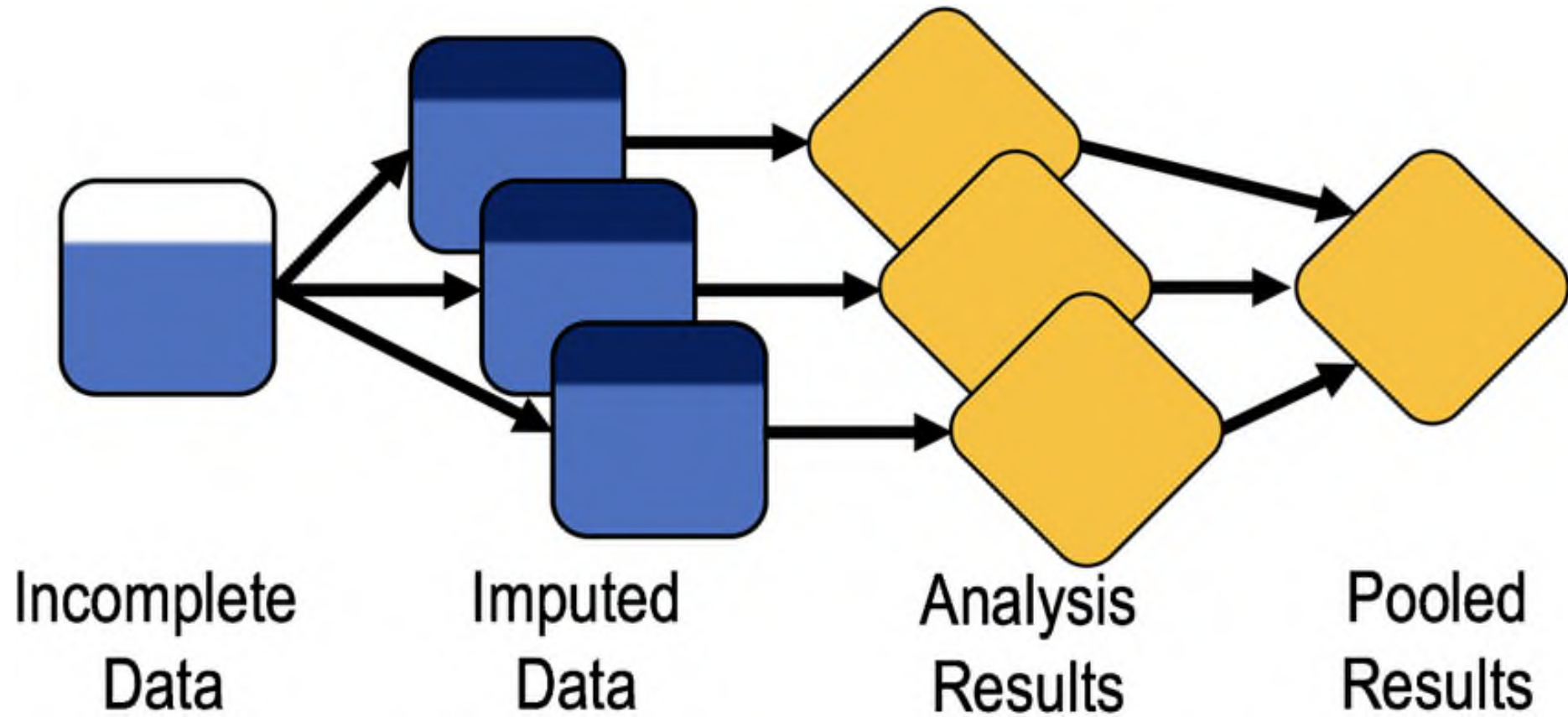


# Handling missing data and multiple imputation



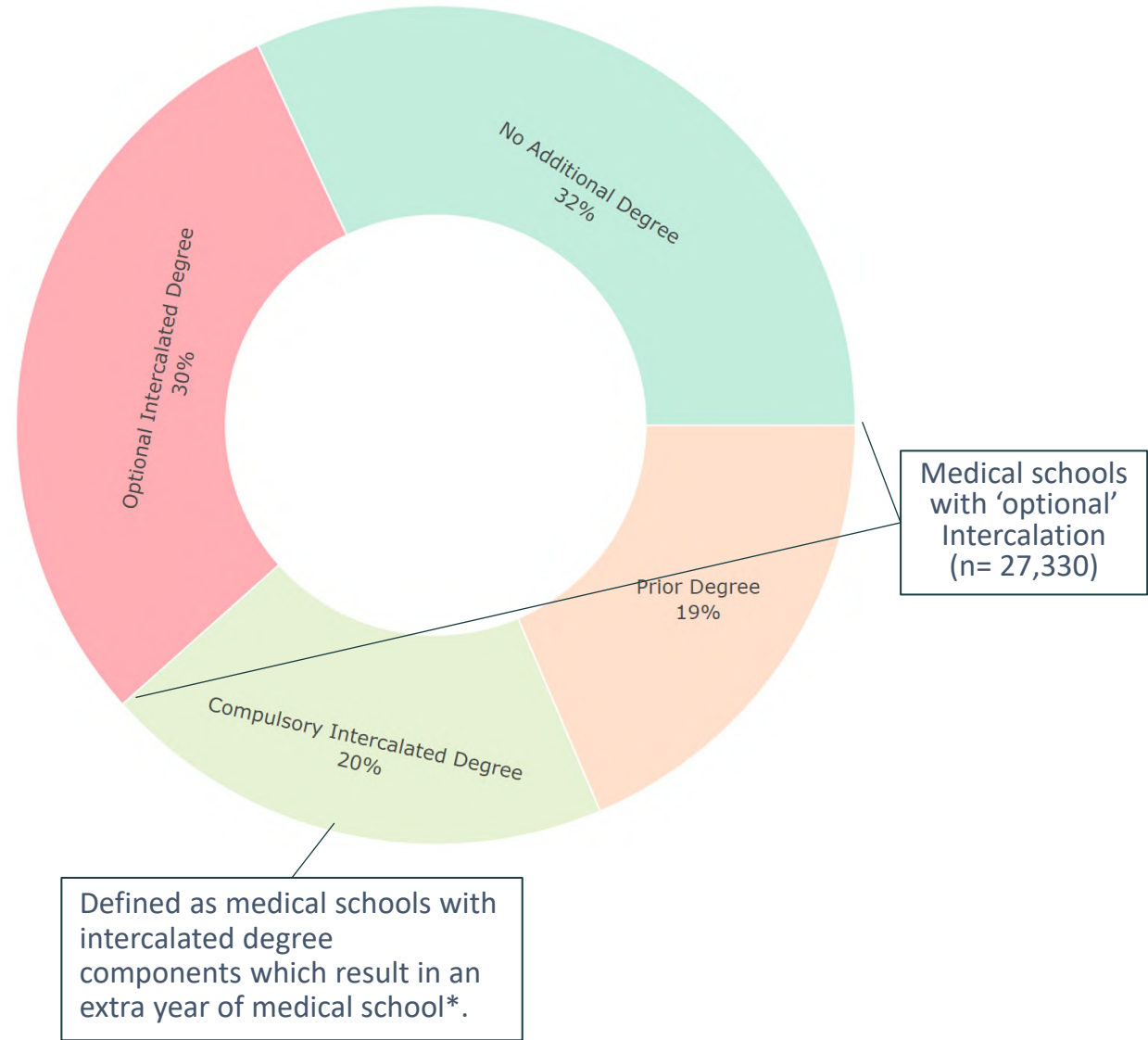
Total Sample Size – 19996, Regression set with all\* variables – 8299 (42% of total)

# Imputation



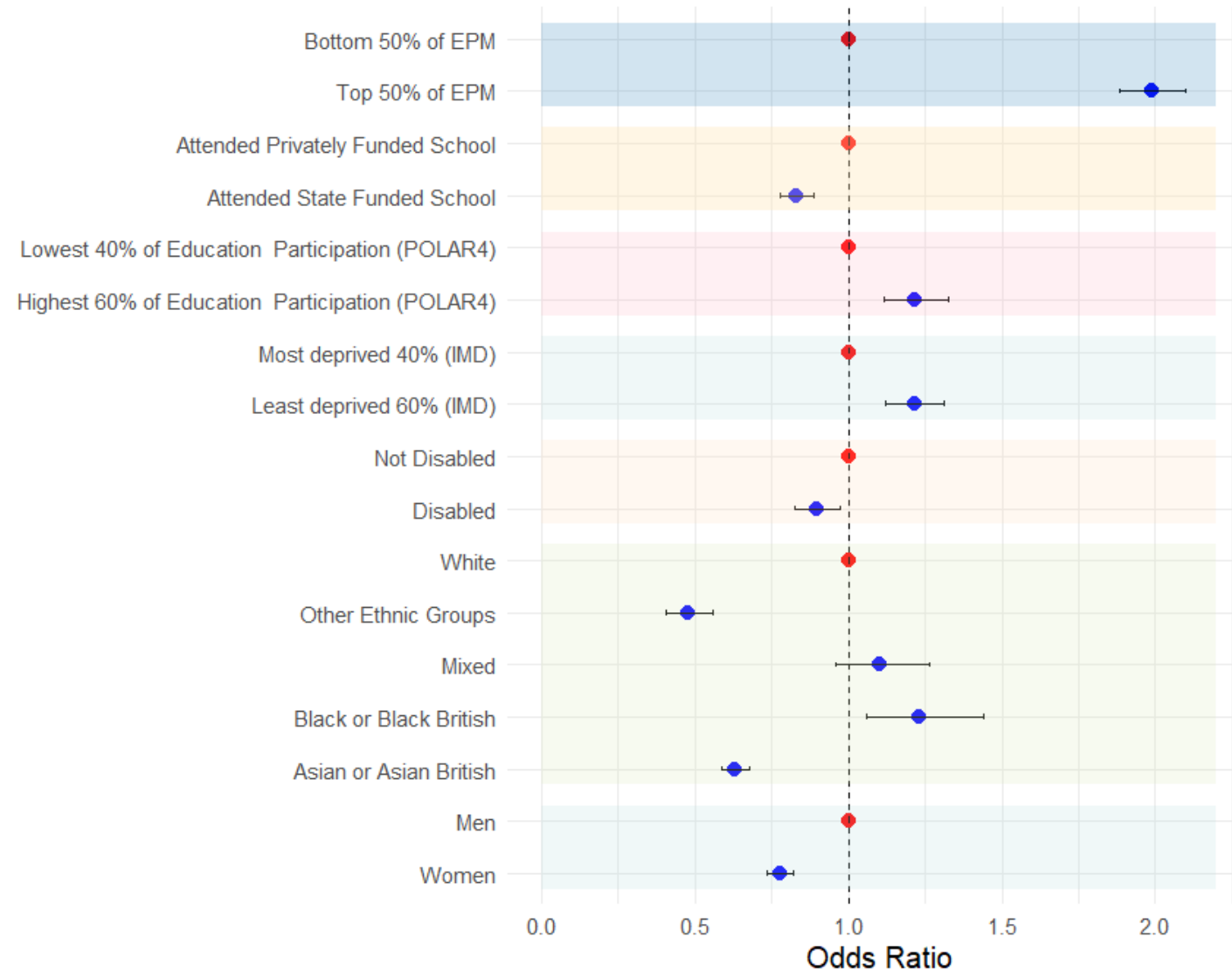
# Who Intercalates?

## Results

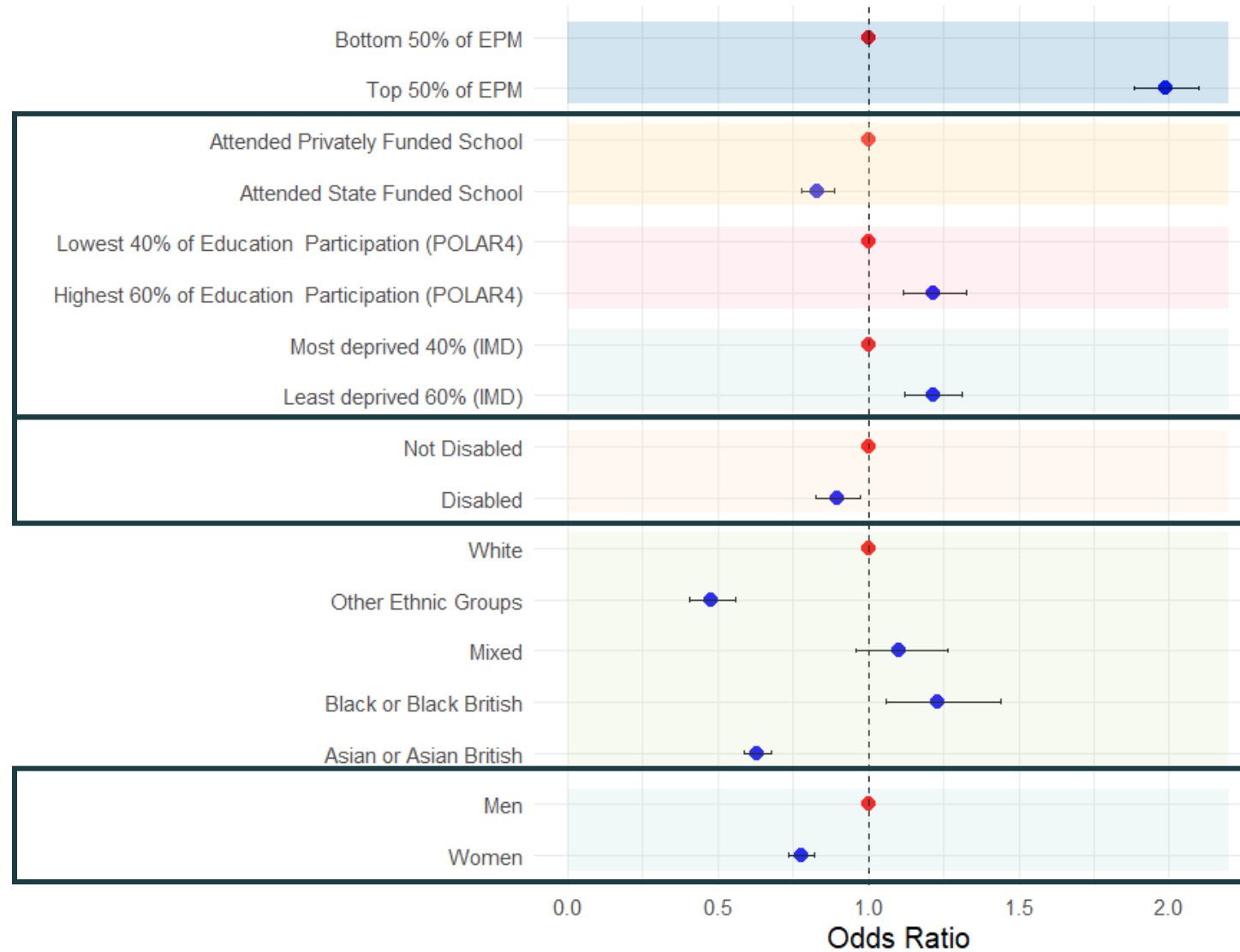


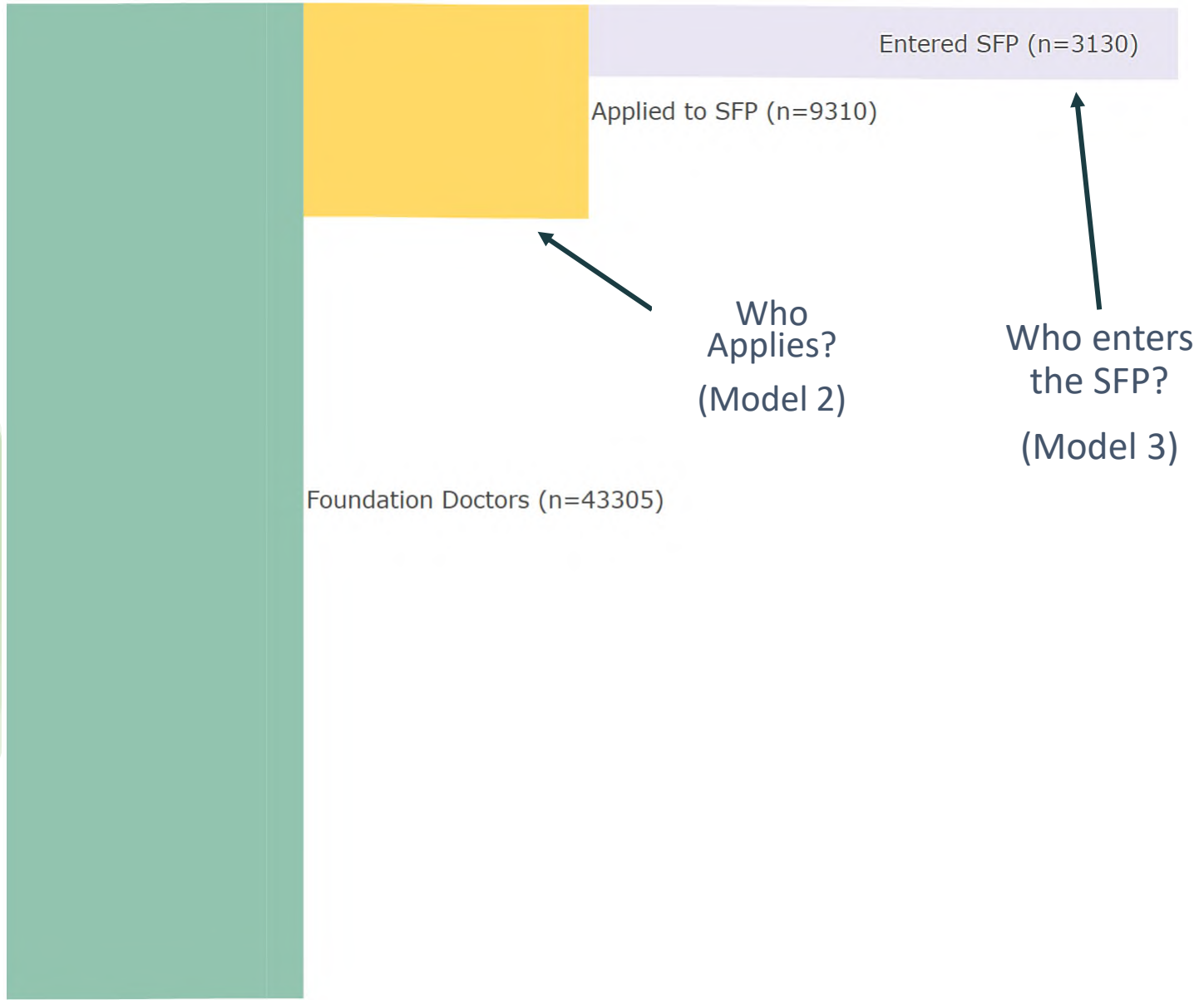
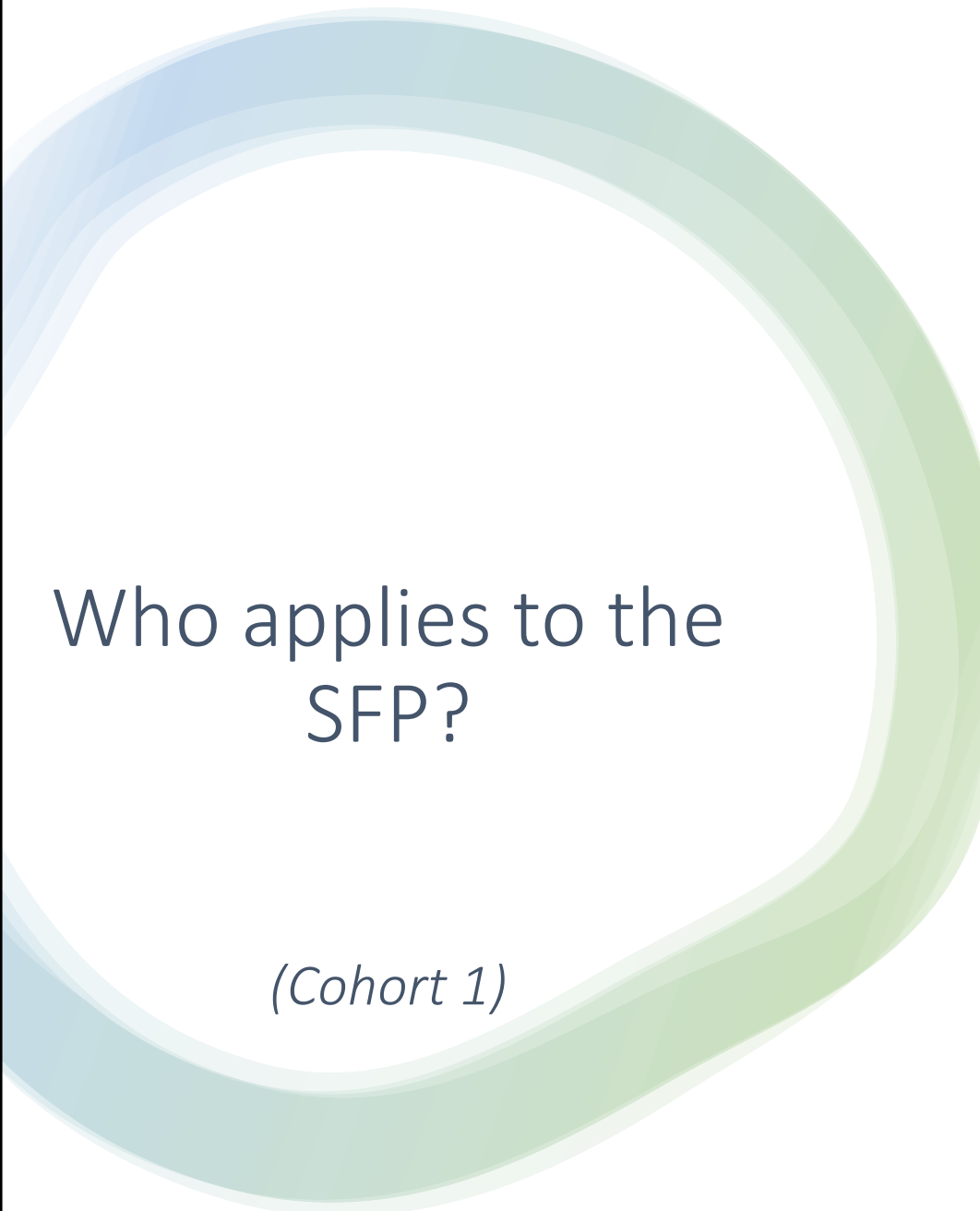
\*Cambridge, Edinburgh, Imperial, Oxford, St Andrews, UCL medical schools

# Who Choose To Intercalate? – Model 1 (n= 27,330)



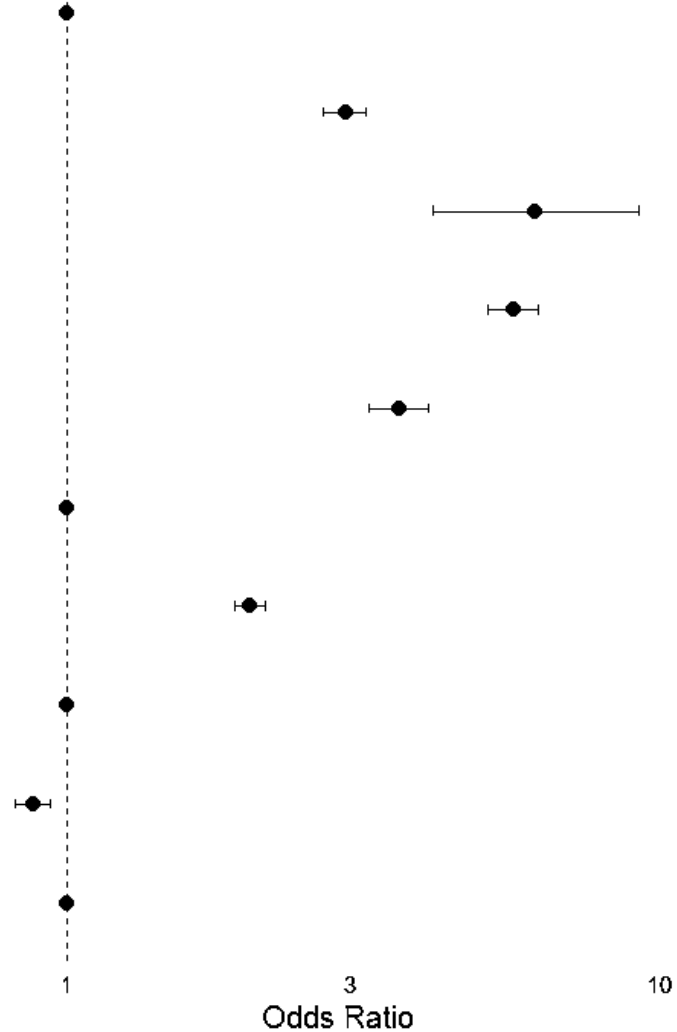
# Who Choose To Intercalate? – Model 1 (n= 27,330)





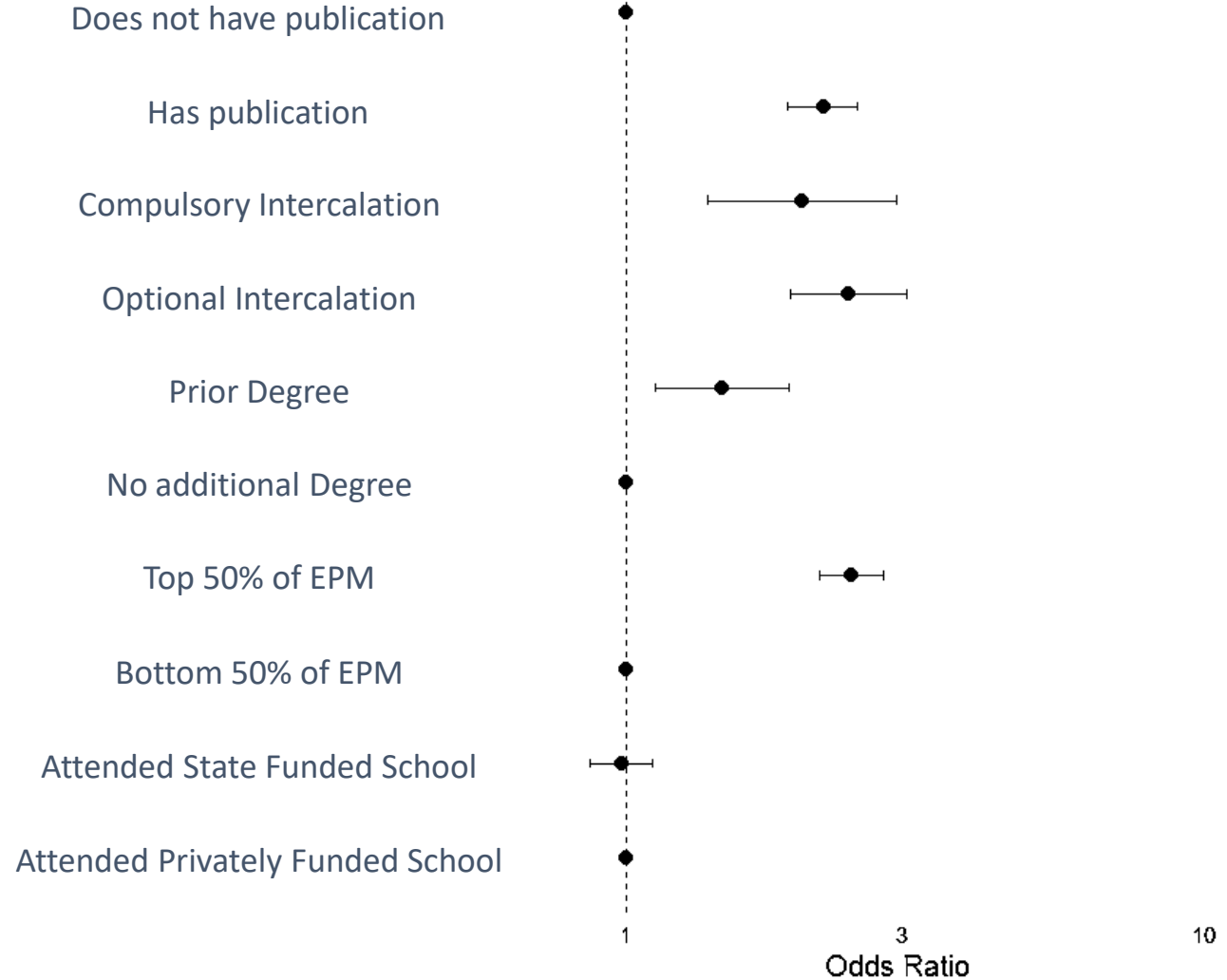
# Educational Background

## Application to the SFP



Model 2 n= 43,305

## Entry into the SFP

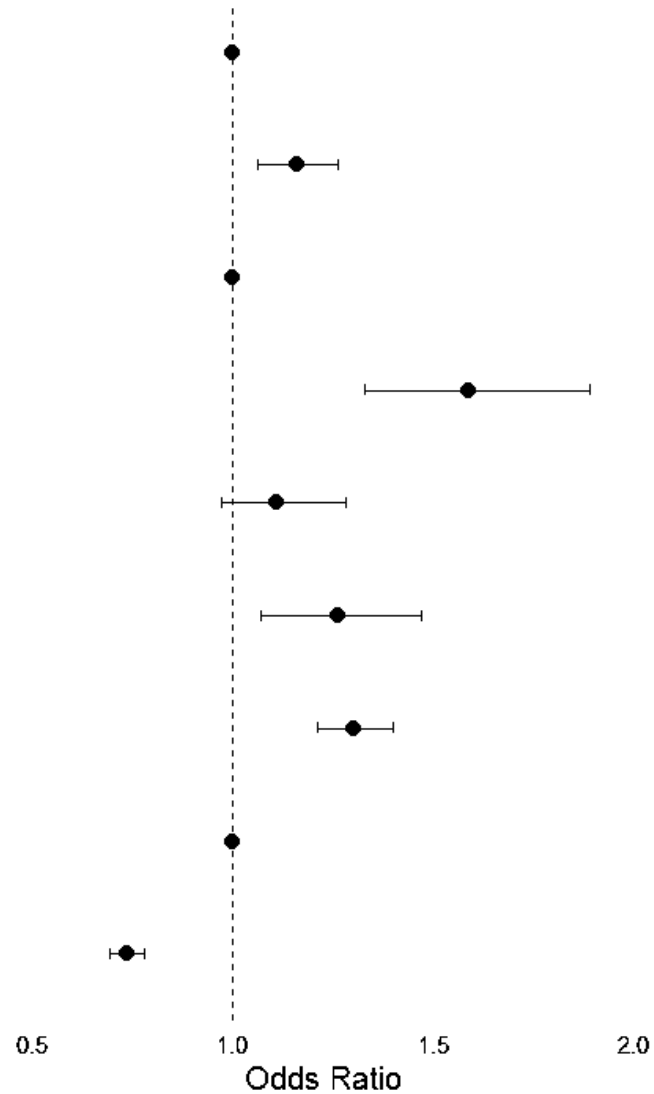


Model 3 n= 9,310

\*Note log(10) scales

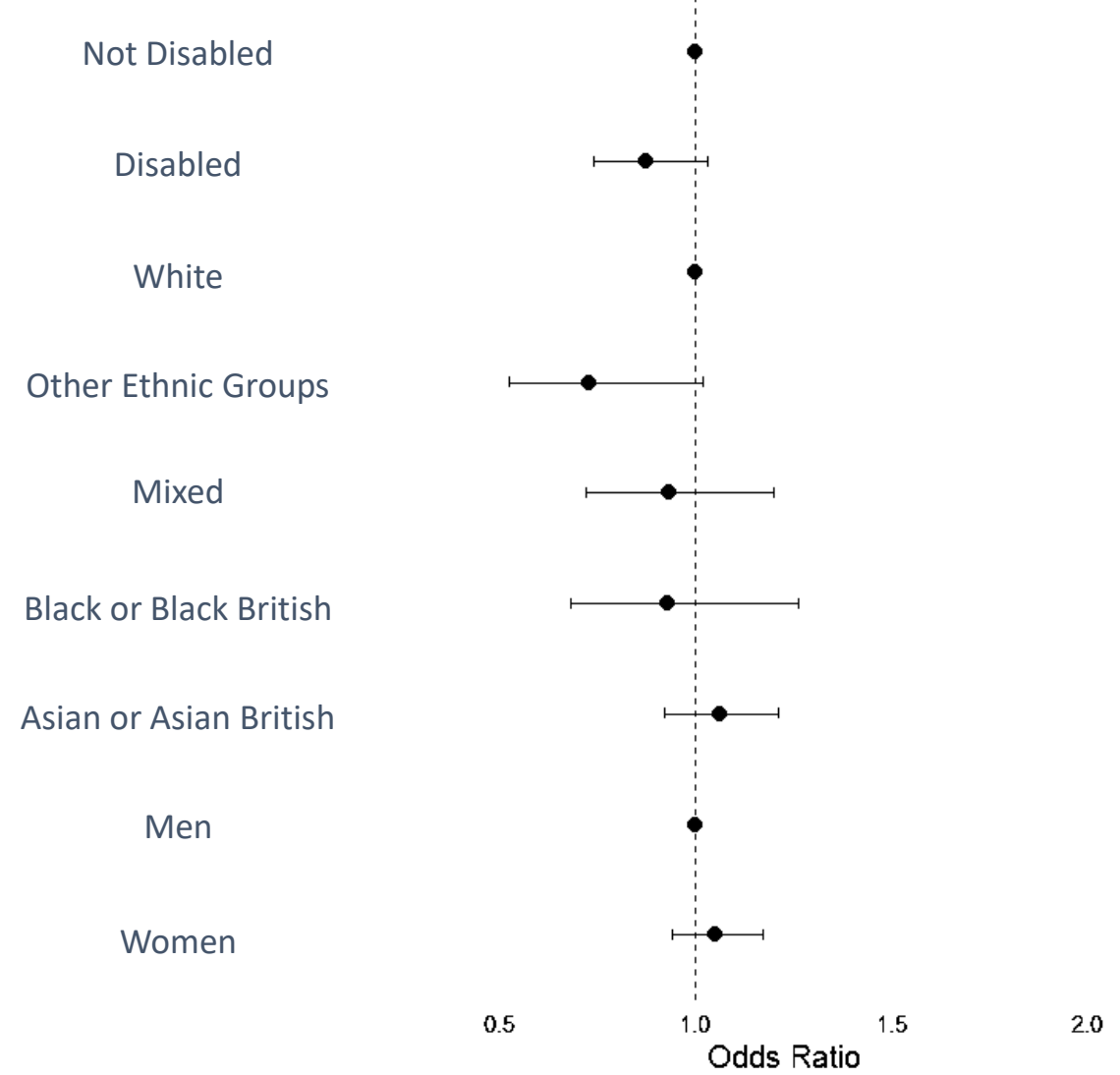
# Protected Characteristics

## Application to the SFP



Model 2 n= 43,305

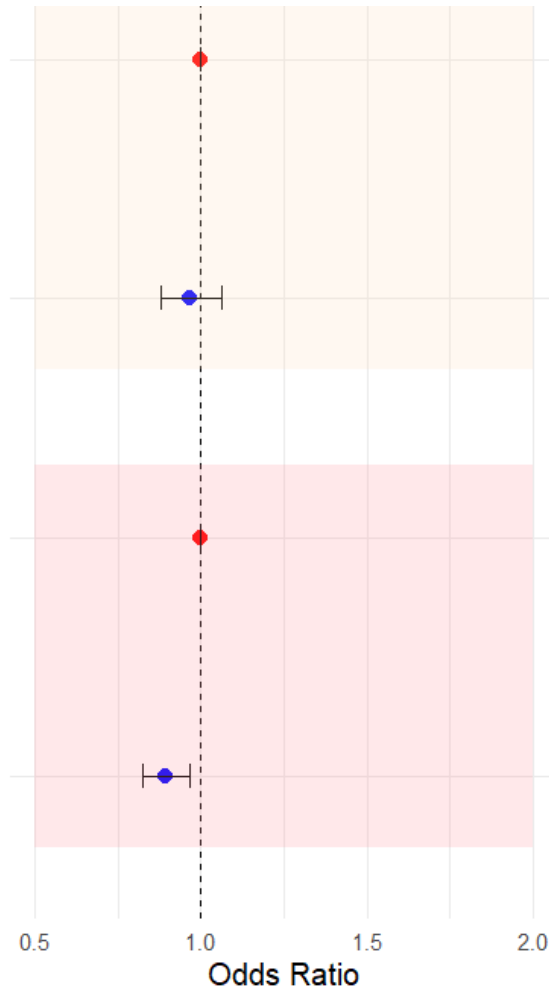
## Entry into the SFP



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# Socioeconomic Background

## Application to the SFP



Model 2 n= 43,305

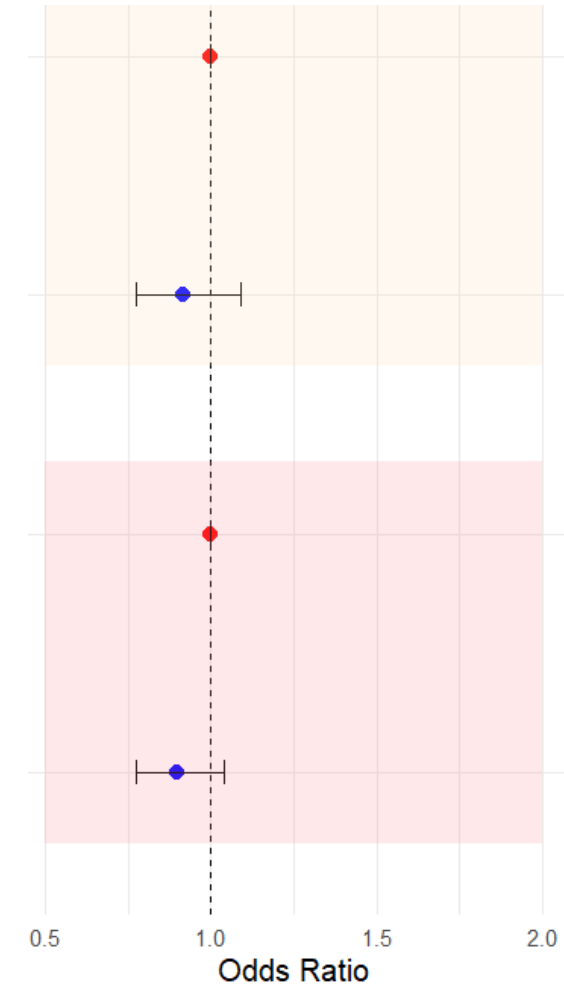
## Entry into the SFP

Highest 60% of Education Participation (POLAR4)

Lowest 40% of Education Participation (POLAR4)

Least deprived 60% (IMD)

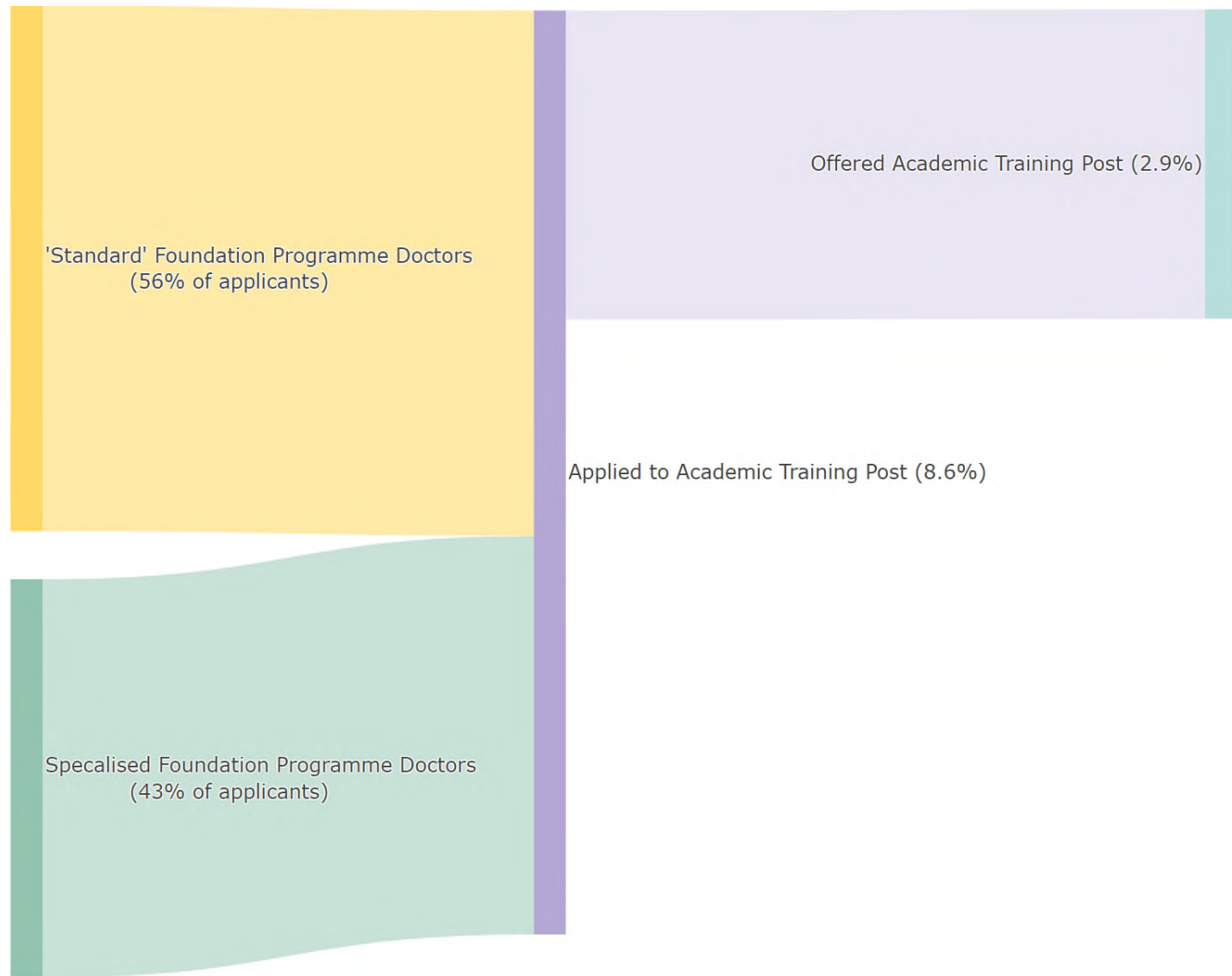
Most deprived 40% (IMD)



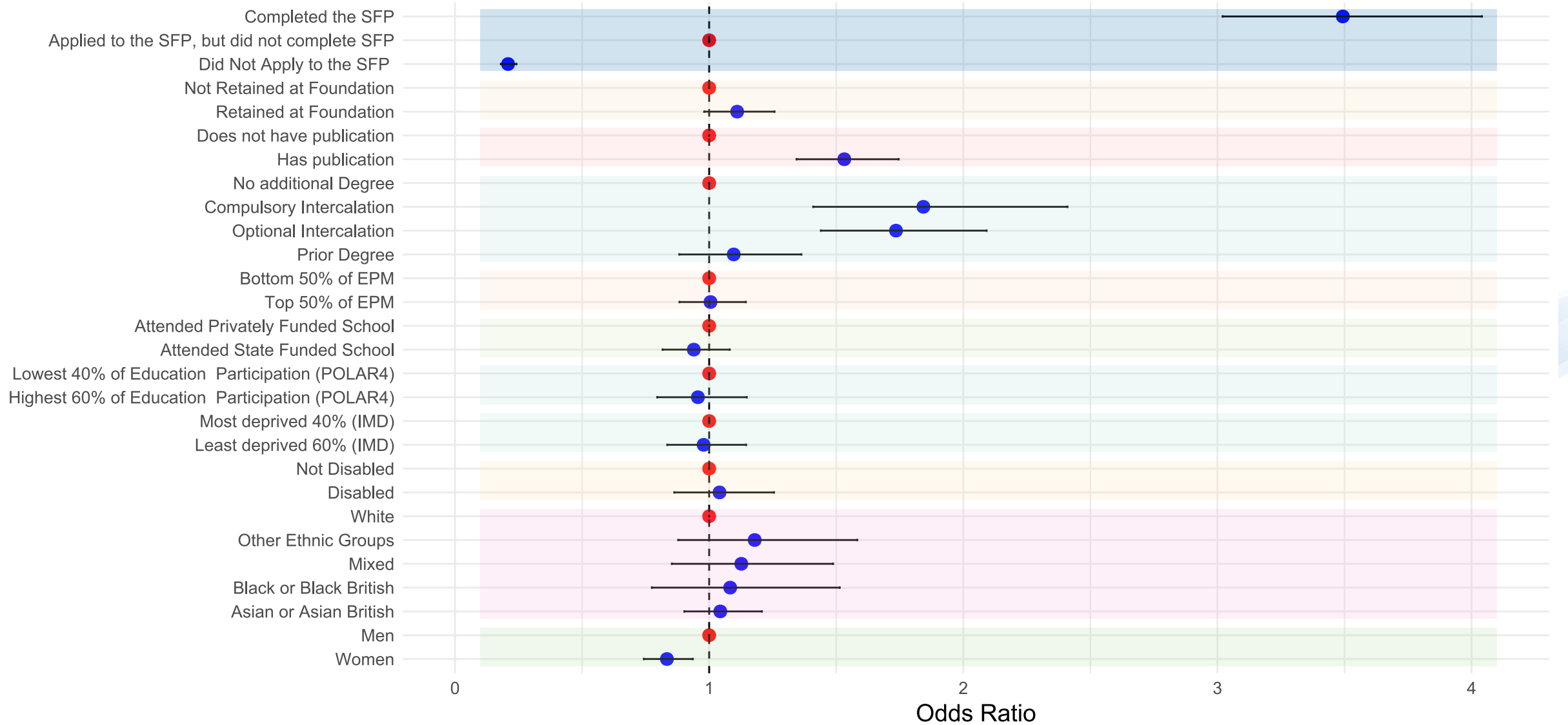
Model 3 n= 9,310

# Who pursues further academic training?

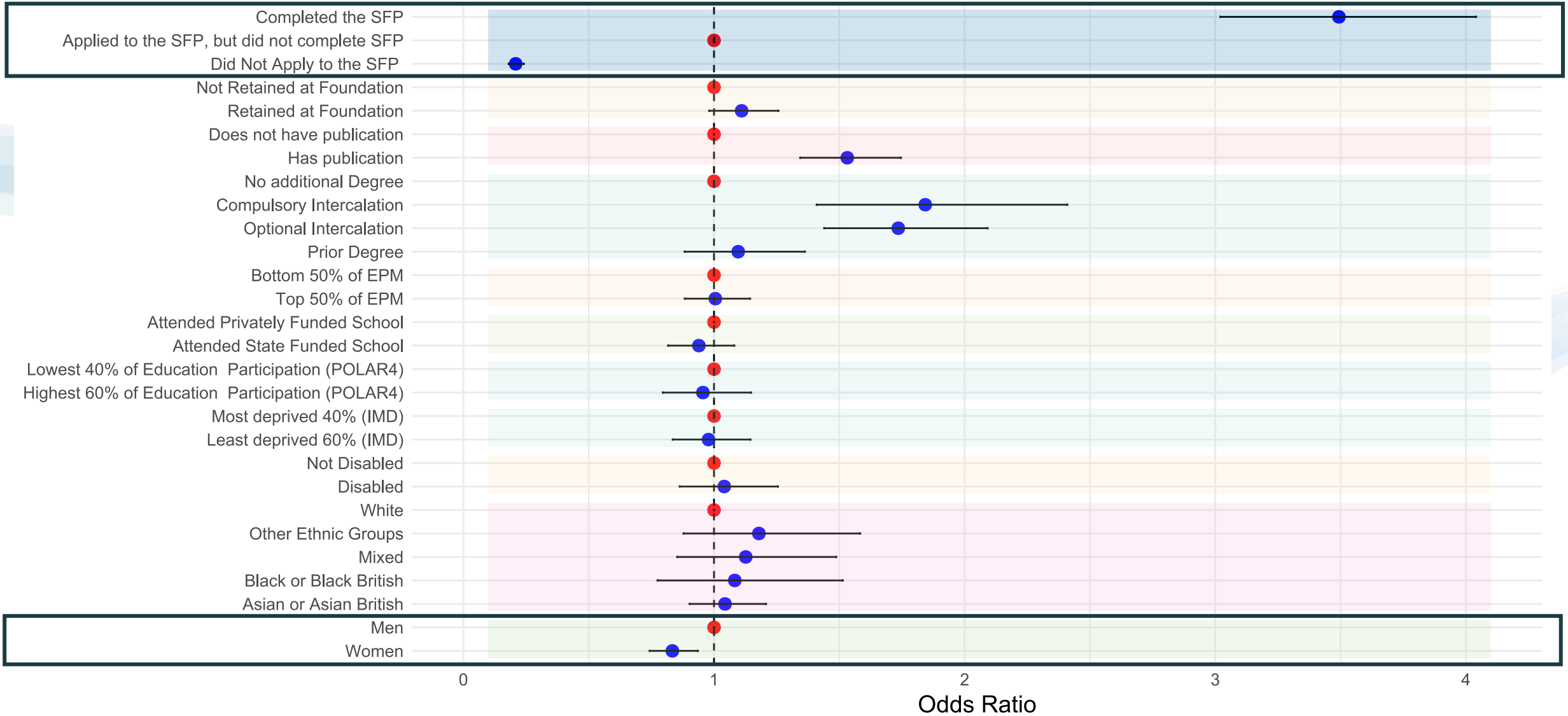
*(Cohort 2)*



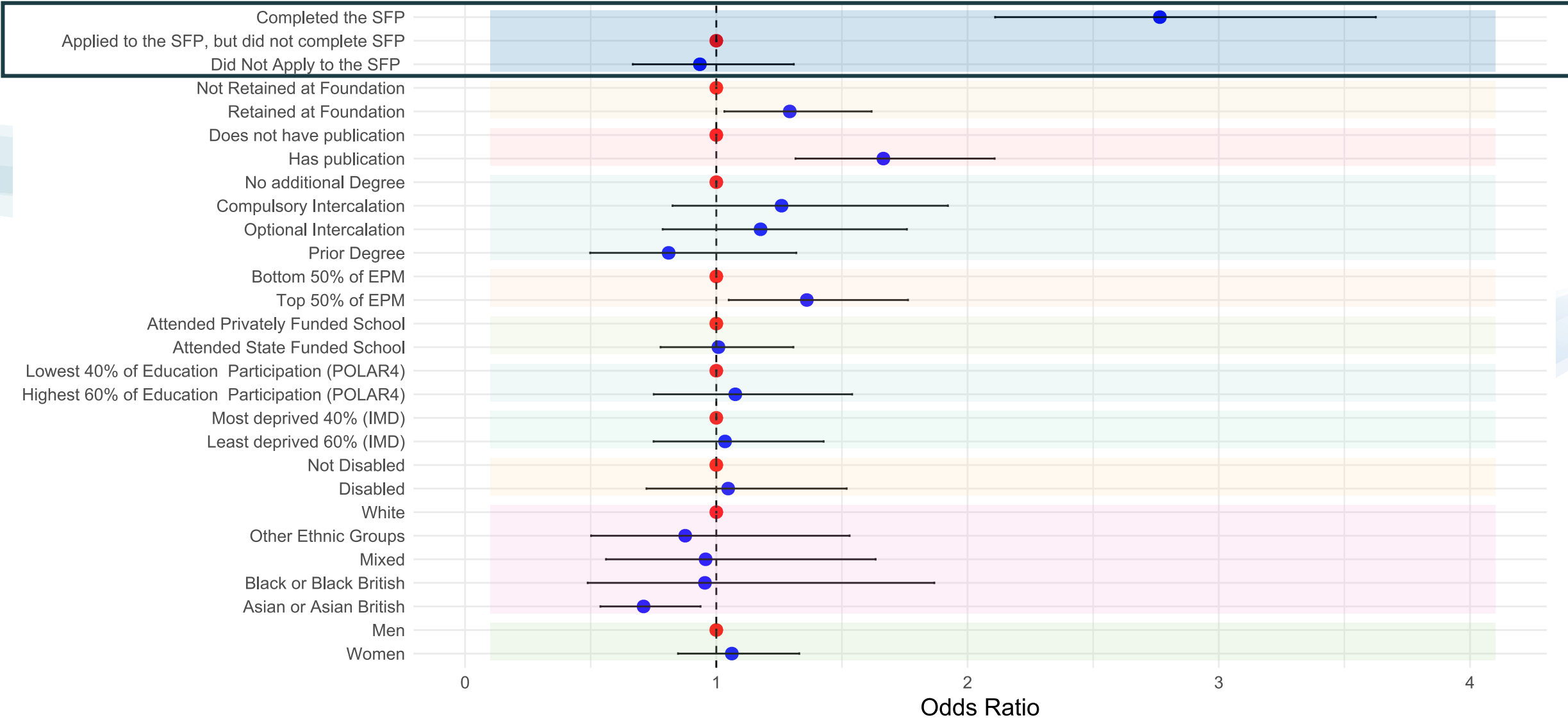
## Model 4 - Who Apply to Academic Training? (n= 19,920)



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# Model 5 - If Applied, Who is Awarded an Academic Training Post? (n= 1,720)



# Key Findings

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2. Largest study (by sample) to describe who enters the SFP and further academic training
3. Links together the early clinical academic pipeline
4. Highlights the importance of intercalation and additional degrees, but demonstrates inequities of access to intercalated degrees
5. Women are consistently under-represented in those who apply for early academic career opportunities



## Limitations and Future Work

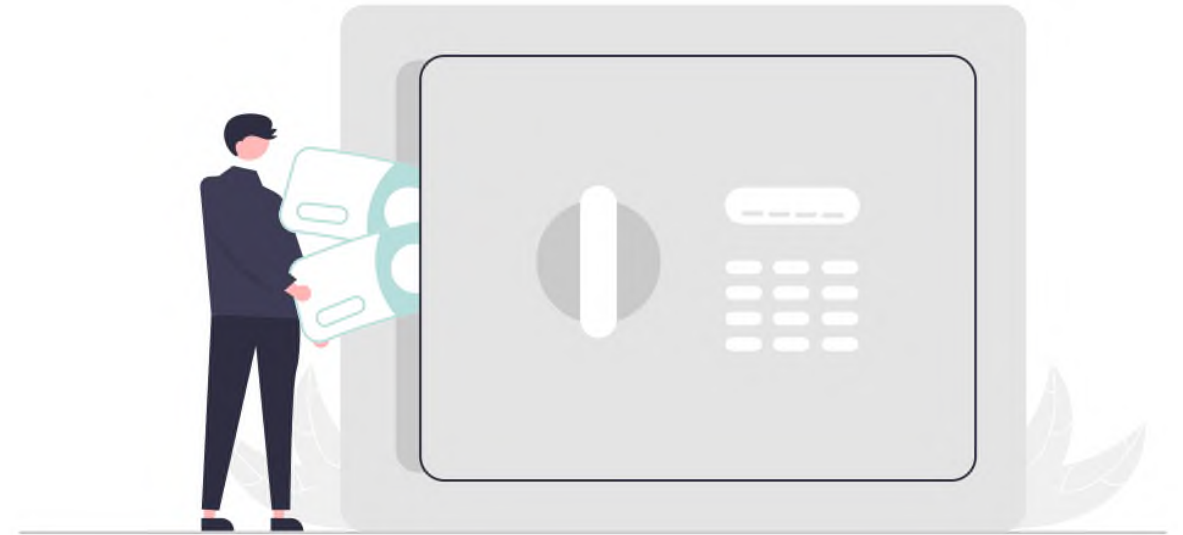
1. Does not directly answer why people are pursuing early clinical academic opportunities
2. Coding of binary gender is incomplete
3. Description of socioeconomic 'disadvantage' is incomplete here



## Further questions

- How can we support students, and resident doctors pursue research opportunities?
- Why are some groups less likely to pursue research?


# Support for early academic career opportunities



- Funding (6)
- Research 'culture' (6,7)
- Signposting opportunities (7)



Why are some groups less likely to pursue research?



Why are some groups less likely to pursue research?

Most literature describes postgraduate level barriers / enablers

Relatively little exploratory work at the undergraduate level (8)

Area for future groups to explore

Questions?

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# References

1. Ologunde R, Sismey G, Kelley T. The UK Academic Foundation Programmes: are the objectives being met? *J R Coll Physicians Edinb*. 2018 Mar;48(1):54-61.
2. Medical Schools Council. *Clinical Academic Survey, 2023*.
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8. Raine G, Evans C, Uphoff EP, et al. Strengthening the clinical academic pathway: a systematic review of interventions to support clinical academic careers for doctors and dentists. *BMJ Open* 2022; 12(9): e060281.

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