Exploring Awarding Gaps at UK Higher Education Institutions

First Year Presentation – Physics Education Research

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Overview

1. Introduction & Background
2. Methodology
3. Results
4. Conclusions

What are awarding gaps?

Definition

Differential degree outcomes between different demographic groups

- UK studies started at the turn of the 21st century [Smith and Naylor, 2001]
- More recent studies tend to foreground sociodemographic factors, such as ethnicity [Codiroli Mcmaster, 2021] and socioeconomic classification [Boero et al., 2022]
- Increased obstacles in higher education (HE) lead to longitudinal under-representation, widening the opportunity gap

The methodology problem

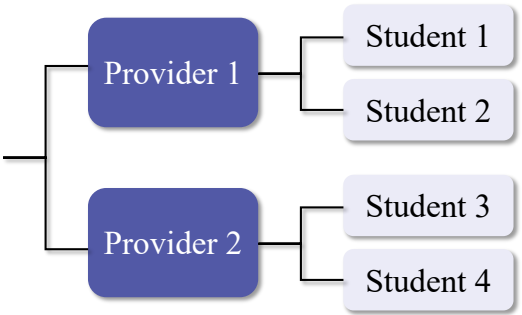

Figure 1: Example hierarchical structure of students grouped into HE providers

- Common use of data from multiple contexts for higher statistical power
- Grouping (or 'hierarchical') structure (Fig 1) is unaccounted for - model structure is not correctly identified, weakening parameter estimates
- Hierarchical logistic regression (HLR) can account for multilevel structures [Van Dusen and Nissen, 2019]

Obtaining the data

Large HESA dataset to study degree outcomes of UK physics graduates:

HESA data

- 30,185 physics and astrophysics graduates from IOP-accredited Honours degrees
- 2013/14 - 2021/22
- A-Level or equivalent qualifications only

- Dependent variable: Binary - did / did not achieve First Class Honours
- Independent variables:
  - Academic information: UCAS Tariff point score, course duration and provider
  - Sociodemographic information: disability status, sex, ethnicity, nationality

A short project overview

- Building logistic regression models of increasing complexity
- Model differing odds of achieving a First between groups of students in the data
- Utilise large dataset and hierarchical modelling (students grouped into providers)

Research questions

1. What are the predictors for achieving a First in Physics?
2. Do awarding gaps exist in Physics at UK HE institutions?
3. Does chosen methodology affect the size of observed awarding gaps?

Logistic regression (LR) models

Univariable (ULR)

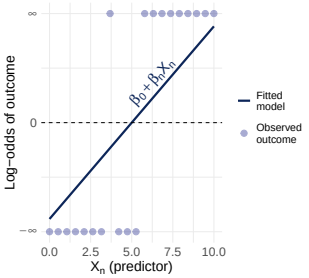

Figure 2: Visualisation of predictor effect size in ULR

Multivariable (MLR)

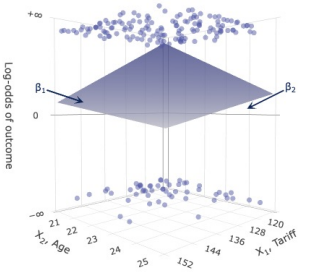

Figure 3: Visualisation of predictors' effect sizes in MLR

Hierarchical (HLR)

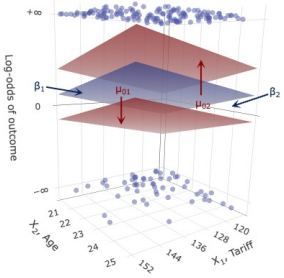

Figure 4: Visualisation of predictors' effect sizes & random intercepts in HLR

- **Odds ratio:** Magnitude difference in odds between group n and 'reference' group

RQ3 - comparing models

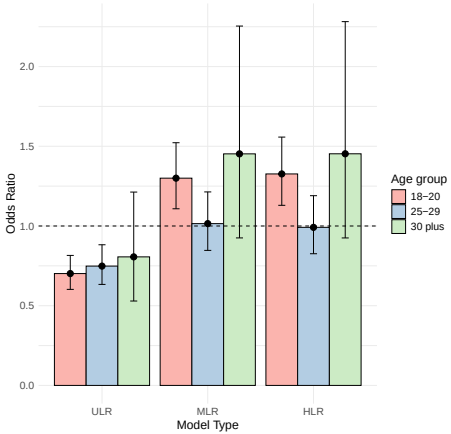

Figure 5: Difference in age odds ratios (relative to students aged 21-24) based on chosen methodology, with 95% confidence intervals

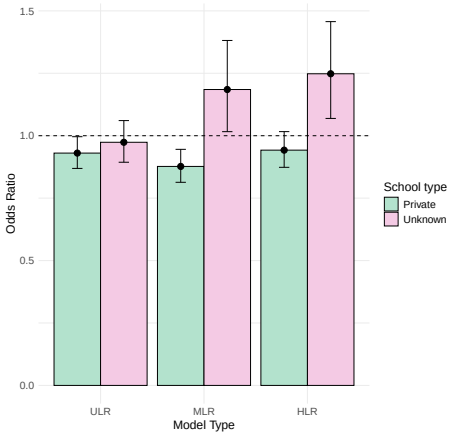

Figure 6: Difference in school type odds ratios (relative to state-educated students) based on chosen methodology, with 95% confidence intervals

RQ1&2 - predictors & awarding gaps

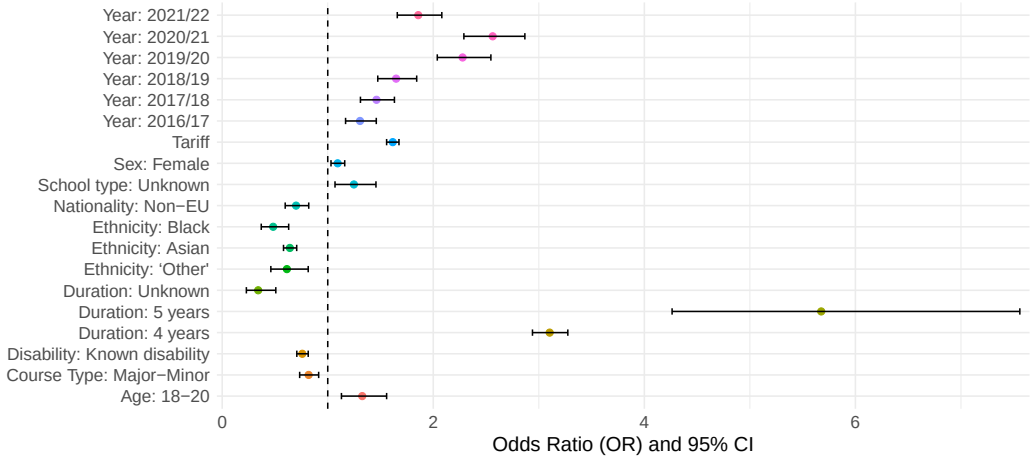

Figure 7: Forest plot of odds ratios for HLR-predicted significant model predictors, relative to reference levels, with 95% confidence intervals

RQ1&2 - predictors & awarding gaps

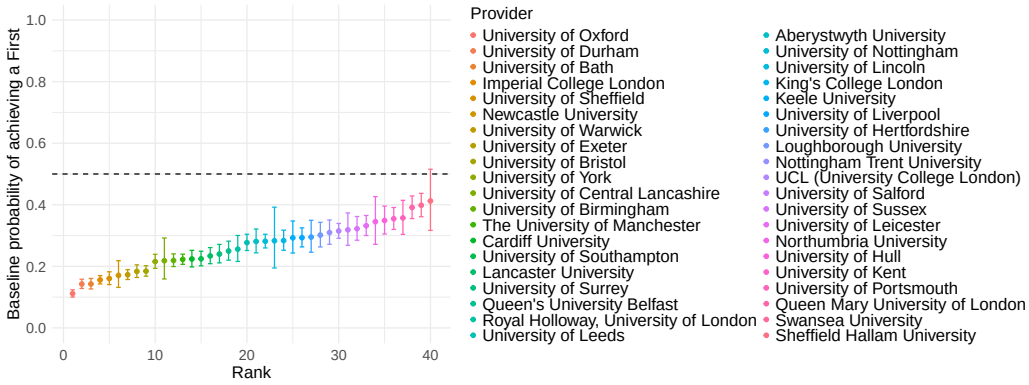

Figure 8: Predicted baseline probability $\hat{p}_j$ at each provider in the data, based on random intercepts μ_{0_j}, for a student belonging to the reference level of every fixed effect - 95% confidence intervals shown

RQ2 - predicted probabilities

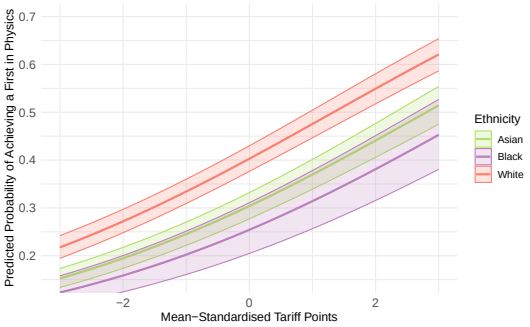

Figure 9: Predicted probability of achieving a First across UCAS tariff scores for students of different ethnicities - based on MLR model, with 95% confidence intervals

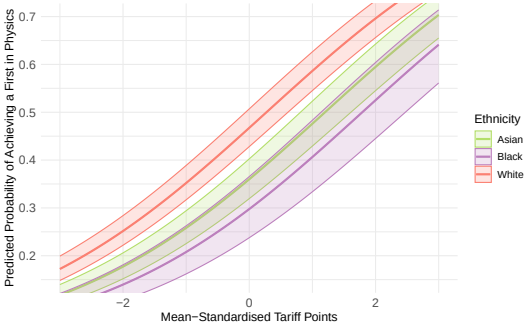

Figure 10: Predicted probability of achieving a First across UCAS tariff scores for students of different ethnicities - based on HLR model, with 95% confidence intervals

Conclusions & next steps

Research questions:

1. **Predictors** - HE provider, year, UCAS tariff points, sex, school type, nationality, ethnicity, degree duration, disability status, course type, graduating age
2. **Awarding gaps** - male students, non-EU students, students with ethnicity 'Asian', 'Black', or 'Other', students with a declared disability
3. **Methodology** - significant clustering observed

Next steps

- Intersectionality
- Longitudinal analysis
- Methodology
- Intervention

Thank you!

References

Boero, G., Karanja, B., Naylor, R., and Thiele, T. (2022).
Awarding gaps in higher education by ethnicity, schooling and family.
Technical Report 1410, Univeristy of Warwick.

Codiroli Mcmaster, N. (2021).
Ethnicity awarding gaps in UK higher education in 2019/20.
Research briefing, Advance HE.

Smith, J. and Naylor, R. (2001).
Determinants of Degree Performance in UK Universities: A Statistical Analysis of the 1993 Student Cohort.
Oxford Bulletin of Economics and Statistics, 63(1):29–60.
Number: 1.

Van Dusen, B. and Nissen, J. (2019).
Modernizing use of regression models in physics education research: A review of hierarchical linear modeling.
Physical Review Physics Education Research, 15(2):020108.
Publisher: American Physical Society.