TASO Transforming Access and Student Outcomes in Higher Education

Analysis report:
The relationship between teaching and assessment methods and student outcomes during COVID-19

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The full protocol for this study can be found on the TASO website

The study was pre-registered on the Open Science Framework (OSF) registry

1. Summary

This report summarises a data analysis project to investigate the effect of teaching and learning changes during the COVID-19 pandemic on outcomes for disadvantaged students.

Aims
The aim of the research is to use existing historical data from a single higher education provider (HEP) to investigate the relationships between measures of disadvantage, changes to teaching and assessment, and academic performance (attainment and progression).

Data
We use data from a single HEP from three years, 2018-19, 2019-20 and 2020-21. The data provides information on student characteristics, teaching and assessment, and student outcomes (attainment and progression). Our sample contained 1,011 students from two courses for three levels of study (first, second and third year).

Outcome measures
Our primary outcome measure is the module mark (which is a percentage). Our secondary outcome measure is a binary measure of whether individual students progress into their next year of study, or in the case of final year students whether they pass their degree overall.

Analyses
Analysis of our primary outcome is conducted using a linear mixed-effects model to examine the interaction between a binary indicator of disadvantage, and a three-level factor of teaching/assessment mode; that is, we seek to explore whether changes in teaching/assessment mode have a differential effect on students from disadvantaged backgrounds relative to those who are not from disadvantaged backgrounds? We repeat this analysis for the progression outcome variable with a logistic regression for each level of study.

Results
Overall, students from disadvantaged backgrounds have lower attainment and lower rates of progression than students from other backgrounds. There is some evidence that the attainment gap due to disadvantage widened significantly (by 3.2pp) between 2018-19 (when teaching/assessment was normal) and 2020-21 (when teaching/assessment was online). This widening of the attainment gap seen in this data may have resulted in up to 20% of students from disadvantaged backgrounds achieving a lower end-of-year classification.

Conclusions
Our primary analysis examines the relationship between changes in teaching and assessment methods and important student outcomes such as module marks and progression. There is some evidence in this dataset that the move to online learning is associated with a widening attainment gap.

Given the small sample size and that data was from only three courses it is difficult to draw firm conclusions from this dataset however the analyses provide a framework for other HEPs to follow when examining their own institutional data.

2. Introduction

2.1. Background

This report uses data from a single Higher Education Provider (HEP) to investigate the relationships between teaching and assessment methods and learner outcomes, specifically whether the different methods affect disadvantaged learners differently to their peers.

Organisation	Name	Role and responsibilities
TASO	Dr Robert Summers	Analysis and report writing
PABE	Paul Adams	Analytical Plan, Data cleaning
TASO	Rain Sherlock, Jessica Hunt, Zahra Boudalaoui-Buresi	Analytical Plan
University of Cambridge	Dr Sonia Illie	Analytical Plan QA
TASO	Dr Eliza Kozman	Analysis QA

2.2. Aims

Research Background

The onset of COVID-19 led to an unprecedented level of change in how HEPs organised their teaching and assessment activity. Almost overnight, staff at HEPs had to adapt previous face-to-face teaching approaches to online contexts, often mixing asynchronous modes of teaching with synchronous modes. With limitations to large in-person gatherings, assessment approaches also changed, again relying more on forms of assessment that can be taken reliably at distance. Often, despite the best intentions, at short notice some teaching types and assessment forms were abandoned altogether. These changes happened immediately at the onset of the pandemic late in the 2019-20 academic year, but also over a longer period, changing the way modules were taught in 2020-21. The aim of this research is to understand how these immediate and subsequent changes to teaching and assessment

approaches affected outcomes for students, specifically whether they had a detrimental effect on disadvantaged students.

Aims

The specific research objective was to improve our understanding of how changes in teaching and learning methods, in response to COVID-19, affected the attainment and progression gap between disadvantaged learners and their peers. Discussions with HEPs and academics have provided conflicting views on the effects of teaching and assessment choices on learner outcomes. We therefore do not have any prior hypothesis on the direction or size of relationship between teaching and assessment methods, learner outcomes and the awarding gap.

3. Methods

3.1. Data

We worked with a single anonymous HEP and collected institutional data on students and modules covering three academic years spanning before and after the COVID-19 pandemic – 2018-19, 2019-20 and 2020-21. The data was collected by the HEP as part of their normal record-keeping and limited to courses with at least 50 students enrolled on them; there were two courses overall.

In the sample there are 1,011 students across 58 modules over these three years, amounting to 8,919 student-module-year observations. The module marks provided in the data are a student's first attempt at the exam, subsequent attempts were not provided by the HEP.

In addition to attainment and progression the data provided by the HEP included demographic data (sex, ethnicity, disability status, mature student status, highest entry qualification and accommodation type) and markers of disadvantage (POLAR4, IMD and eligibility for the HEP's bursary).

The markers of disadvantage are not available for all students; of the 1,011 students in the sample, 938 have complete POLAR4 data and 777 have complete IMD data. Full tables of demographics are available in Appendix 1. The number of students contributing to each level of study and academic year can be found in Table 1.

Table 1*: Number of students in each academic year and level of study. Note, the total number of individual students is 1,011. Note that because some students appear in different levels of study (e.g. a first year student in 2018-19 will be a second year in 2019-20, etc.) the total number of any row or column or of all students in this table is not equal to 1,011.*

	Academic year			
	2018-19	2019-20	2020-21	
Student level of study	Normal	Disrupted	Online	Total
First year	204	146	189	539
Second year	218	174	158	550
Third year	195	197	181	573

Of the 1,011 students, 78% (792) of the students are female and 22% (219) are male. The student body is not ethnically diverse, 89% (901) of students are white, while 11% (110) are Black, Asian, and minority ethnic (BAME) or other. 22% (218) of students report that they have a disability. There are 169 students who are defined as being mature students, that is, they are aged 21 or over at the beginning of their studies.

3.2. Aggregation of data

Ethnicity

There are only 104 (11%) students from BAME backgrounds. Usually it would be preferable to use more granular categories to represent ethnicity. However, given that there are only 35 Asian students, 25 Black students, 32 students from a mixed background, and 12 students from other backgrounds we use a binary classification of ethnicity; white or BAME.

Additionally, the ethnic background of 6 students is unknown. Rather than drop these students from the analysis these students are included in the category BAME.

Teaching and assessment

In the trial protocol the teaching and assessment of each module was categorised on the basis that there could be up to three distinct types of teaching and assessment (primary, secondary, tertiary) according to the relative frequency of that type of teaching or assessment. The teaching of each module was categorised according to:

1. Type (Primary, Secondary and Tertiary): Lectures, seminars, other , or none if there is no secondary or tertiary type.
2. Mode (Primary, Secondary and Tertiary): Face-to-face or online.
3. Synchronicity (Primary, Secondary and Tertiary): Whether the teaching is asynchronous (pre-recorded) or synchronous (live).
4. Teaching hours (Primary, Secondary and Tertiary): number of hours given over to each teaching type.

The assessment of each module was categorised according to:

1. Type (Primary, Secondary and Tertiary): Coursework or exam,
2. Mode (Primary, Secondary and Tertiary): Face-to-face or online.
3. Synchronicity (Primary, Secondary and Tertiary): Asynchronous or synchronous - note that it is not clear from the supplied data what this means.
4. Assessment share (Primary, Secondary and Tertiary): Proportion of assessment that contributes to module mark.

This complex categorisation of teaching and assessment methods would lead to a large number (~30) of dummy variables in a regression, each of which will be part of an interaction with the measure of disadvantage adding yet more coefficients. In this case, interpretation of the regression output would be nearly impossible.

Upon examination of the data, the categorisation can be simplified by observing that there was little difference in teaching between the 2018-19 and 2019-20 academic years but some disruption to exams in the 2019-20 academic year. Teaching and assessment moved almost entirely online for the 2020-21 academic year. This way,

teaching and assessment can be collapsed into a single three-level factor with the following levels:

1. Normal: pre-pandemic, teaching and assessment were as planned (2018-19 academic year).
2. Disrupted: at the beginning of the pandemic when some teaching and assessment were affected (2019-20 academic year).
3. Online: teaching was moved online and most assessment was coursework (2020-21 academic year).

This simplification does mean that it is not possible to investigate within-year variation between teaching/assessment and module marks.

Measure of disadvantage

Measures available in this dataset are POLAR4, IMD and eligibility for the provider's bursary (which is income-based and/or targeted at disadvantaged students, including care leavers, estranged students, young adult carers).

In the protocol POLAR4 was presented as the preferred measure of disadvantage with quintiles 1 and 2 considered disadvantaged. Looking at the available data, neither POLAR4 (7% missing data) nor IMD (23% missing data) are complete. There are also broader issues with using area-based measures of disadvantage (Jerrim, 2021).

Given that the data concerning bursary eligibility is complete and eligibility is a clear marker of disadvantage such a measure would normally be the preferred measure of disadvantage. However, recent work by Moores and Burgess (2023) has shown that the receipt of a bursary can narrow the gap between students from disadvantaged and non-disadvantaged backgrounds particularly in terms of student retention.

Therefore POLAR4 is our preferred measure here, despite its limitations, because it is nearly complete. Analyses for attainment and progression will be run for each measure of disadvantage, POLAR4 and IMD, and bursary eligibility will be used as a covariate in the models.

When we use a particular marker we will only retain students for whom we have data on that marker (e.g. when we are using POLAR4, we will exclude students for whom we do not have data on their POLAR4 quintile). Only retaining data from students with POLAR4 is likely to exclude international students from consideration (see below) while for IMD it is likely to exclude both international students and all UK students with a home address outside England.

Given the relatively small amount of missing data for POLAR4 we will carry out a robustness check where the students without POLAR4 data will be added either to the disadvantaged or non-disadvantaged group.

For both POLAR4 and IMD there are three main reasons that data may not be available, the student is an international student (and therefore no quintile exists), the postcode is incorrect, or the postcode is too new to have a relevant quintile assigned to them. In addition, and unlike POLAR4 which is UK wide, IMD is a country specific measure (each constituent part of the UK has a non-comparable IMD index) and it is likely that the extra missing data is due to a substantial proportion of students with a home address outside of England.

For POLAR4 and IMD, and following Office for Students guidance, those students in quintiles 1 and 2 are defined as from disadvantaged backgrounds and students in quintiles 3 to 5 are from non-disadvantaged backgrounds.

Accommodation

There were four categories of accommodation in the trial protocol — halls, home, rental and other/unknown — but only between 6 and 9 students were in the category of other/unknown in each level of study. With such a small number of students in this category estimates of model coefficients are likely to have wide confidence intervals so these students were added to the rental category which was renamed 'rental/other'.

3.3. Outcome measures

The HEP shared data of module marks for each student in each module, as well as overall course marks for each year, progression to the next year and overall degree marks. As discussed below, we use this data as our main outcomes.

Outcome measure	Data collected	Point of collection
PRIMARY: Attainment - module marks	Pre-adjusted module marks and course/year marks as collected by HEP. The data includes first attempt resits for those students who chose to defer their exam (but not those who resat due to failing the first exam).	HEPs collect this data for the students enrolled on their courses and shared the anonymised data with TASO.
SECONDARY: Progression	Whether a student progressed to the next year of their course (binary: yes/no). For final year students, we code any pass mark on their course as progression.	HEPs collect this data for the students enrolled on their courses and shared the anonymised data with TASO

3.4. Analytical strategy

Attainment

The relationship between end of year mark, disadvantage and teaching/assessment mode will be explored with the following linear mixed-effects model:

$$Mark_{ij} = \beta_0 + \beta_1 Mode + \beta_2 Dis_i + \beta_3 \left(Dis_i\right)(Mode) + \beta_4 \chi_i + \gamma_{ij} + \epsilon_i$$

where:

- $Mark_{ij}$ is the module mark (%) of the ith student for module j;
- $Mode$ is the teaching mode and can be either Normal, Disrupted or Online;
- Dis_i is a binary marker of disadvantage (either using POLAR4 or IMD as discussed above);
- χ_i is a vector of individual-level covariates including sex (male or female), ethnicity (white, BAME/other), disability (disabled or not disabled), mature student (yes or no), type of highest qualification on entry (A/AS-level, access, BTEC or other), accommodation (halls, home, rental/other) and bursary eligibility (yes or no);
- γ_{ij} represents the random effects, a zero-mean normally distributed vector of intercepts for each student and module.
- ϵ_i represents a normally distributed zero-mean error term (the residuals).

Progression

The relationship between the likelihood of progressing to the next level of study (or graduating for third year students) and disadvantage and teaching/assessment mode will be explored with the following logistic model, separately for each level of study:

$$Y_i \sim bernoulli(p_i);\ logit(p_i) = \beta_0 + \beta_1 Mode + \beta_2 Dis_i + \beta_3 \left(Dis_i\right)(Mode) + \beta_4 \chi_i$$

where the function $logit$ is defined as the log-odds ratio

$$log\left(\frac{p}{1-p}\right)$$

and

- Y_i is a binary indication of progression (1 if the student progressed to the next year/graduated, 0 if they did not progress/graduate).
- The other terms are as for the linear model.

Unlike for the linear model where all the data from all years are entered into a single model the logistic model will be run once for each level of study. Serial data dependencies on progress mean that, for example, every student with two (or three) entries in the complete dataset has progressed at least once (or twice). Therefore, any student with more than one entry in the dataset who fails to progress will contribute the same information (disadvantage, demographics covariates) to two different outcomes.

Covariates

In order to determine the effect of the covariates on the factors of interest (disadvantage and teaching/assessment mode) three models will be run for each level of study:

- Model 1: no covariates.

- Model 2: sex and ethnicity covariates.
- Model 3: as model 2 but with disability, mature student status, prior entry qualification, accommodation and bursary eligibility as covariates.

Sex and ethnicity were chosen as the first set of covariates as there is a well-established relationship with attainment; female students tend to get higher marks than male students, and white students tend to get higher marks than those from BAME backgrounds.

Presentation

In order to simplify presentation of the model in the main body of the text, coefficients and their confidence intervals are presented as forest plots. The full model tables of coefficients are presented in the appendices.

The model estimates of interest — either attainment (end of year mark, %) or progression (% of students who entered the next academic year or graduated) — for only the full model (model 3 above) will be presented graphically.

Software

Analyses were carried out using *lmer* and *glm* in R (v 4.2.2). Estimated marginal means of the models were obtained using *emmeans*.

Deviations from the protocol

As discussed throughout this report, upon examination of the data received from the HEP it was appropriate to deviate from the pre-specified analysis in a number of places. The following are deviations from the research protocol:

- Ethnicity is treated as a binary variable: white and BAME.
- Teaching/assessment is treated as a three-factor variable: normal, disrupted and online.
- Accommodation: the category other is merged into rental to make rental/other.
- The attainment analyses are now run as a mixed-effects linear model with module and student as random effects.
- Bursary eligibility is now used as a covariate in the models for attainment and progression.
- The logistic regression for progression is now run separately for each level of study.
- Each model, whether linear or logistic, is run three times with three levels of covariates.

4. Results

4.1. Modelling attainment and interactions with measures of disadvantage and teaching mode

4.1.1. POLAR4

The estimated mean module mark and associated confidence intervals split by POLAR4 (disadvantaged and not disadvantaged) and for each teaching/assessment mode are presented in Figure 2.

In general, module marks were lower for students from disadvantaged backgrounds than non-disadvantaged backgrounds.

Overall, mean module marks during normal teaching/assessment (46.7 %) increased slightly when teaching/assessment was disrupted (47.2 %) but dropped when teaching/assessment moved online (43.6 %).

The attainment gap between students from disadvantaged and non-disadvantaged backgrounds during normal teaching/assessment (2.1pp) remained similar during disrupted teaching/assessment (2.5pp) but increased when teaching/assessment moved online (4.8pp). This widening of the attainment gap was due to a larger fall in marks for students from disadvantaged backgrounds (5.3pp) in comparison with normal teaching than those from non-disadvantaged backgrounds (2.6pp). For context, the widening of the attainment gap associated with the move to online teaching/assessment seen here is equivalent to 17% of first years, 13% of second years and 20% of third years dropping a single end of year classification (e.g., 1st to 2:1, 2:1 to 2:2, etc.).

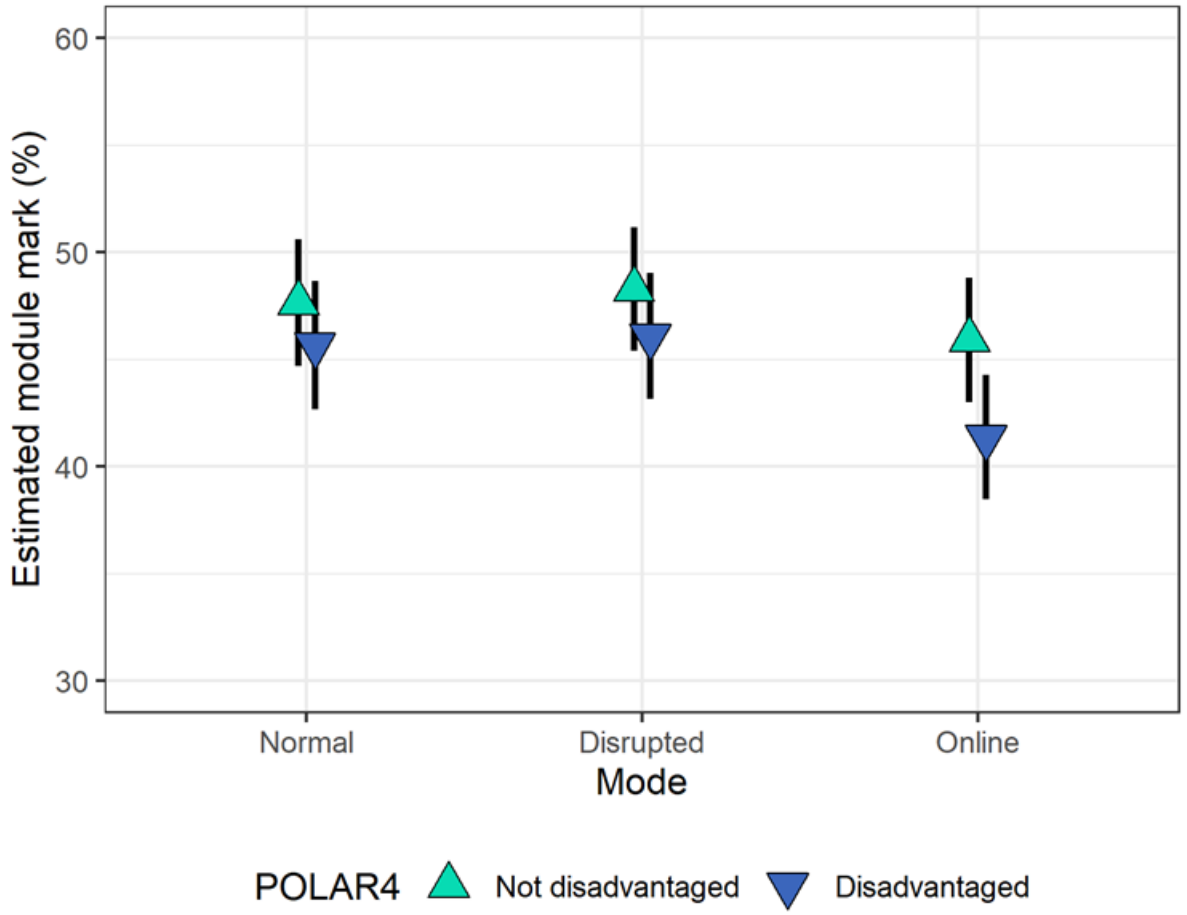

Figure 2*: Estimated module mark from a linear model with all covariates included (model 3), for the relationship between mean module mark, disadvantage (in terms of POLAR4, different symbols), mode of teaching/assessment (x-axis) and their interaction. Error bars are 95% confidence intervals.*

The coefficients of all the models for each year and their 95% confidence intervals are represented in Figure 3 and Table A4. This plot shows the effects of the factors of interest (POLAR4 and teaching/assessment mode) for each of the three models for each year group (different panels). The coefficients of the main factors differ little between the models as more covariates are added which means their estimates are largely independent of the presence or absence of the covariates. Coefficients to the left of the dashed line have a negative effect on student marks, while those to the right have a positive effect.

There is evidence of an interaction between disadvantage and mode where the confidence intervals for the coefficient when *POLAR4=Disadvantaged and Mode=Online* do not include zero nor do they include the central estimate for *POLAR4=Disadvantaged and Mode=Disrupted*. This means that the attainment gap associated with the move to online teaching/assessment described above is likely larger than the attainment gap when teaching/assessment is in person or disrupted.

A robustness check, performed by rerunning the model on all the data and assigning students with no POLAR4 information to either disadvantaged or not disadvantaged made no material difference to the results. In both cases the same interaction was

evident in the data though it was larger for when the students with missing POLAR4 data were assigned to not disadvantaged. This is consistent with the assumption that most missing data for POLAR4 is due to international students who would likely not be classified as disadvantaged.

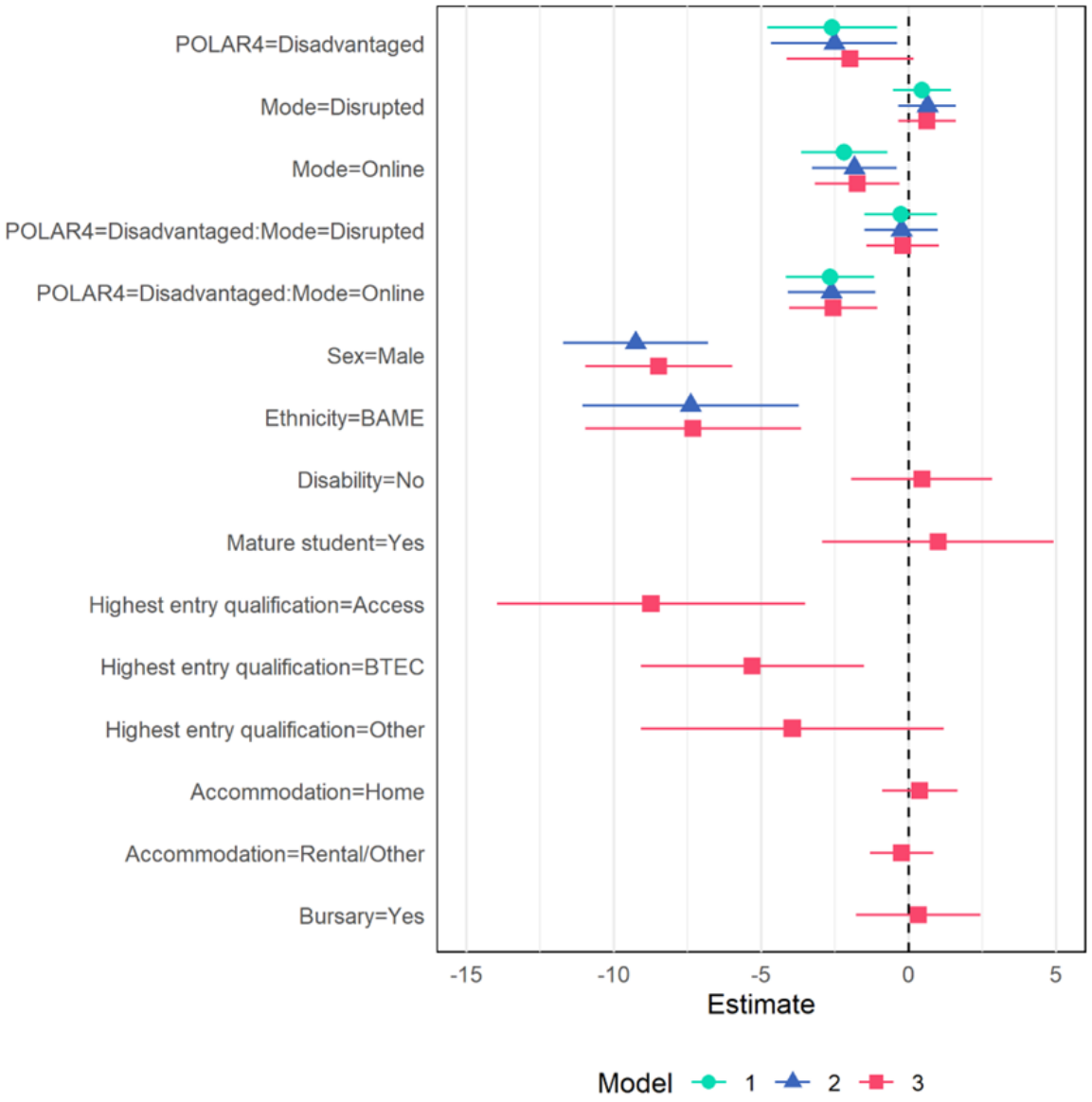

Figure 3: *Forest plot of the coefficients from three linear models (different symbols), for the relationship between end of year mark, disadvantage (POLAR4), mode of teaching/assessment and their interaction. Model refers to the models with increasing number of covariates, 1=no covariates, 2=sex and ethnicity, 3=all covariates. Values to the right of the dashed line indicate a positive effect on the mean mark relative to students from non-disadvantaged backgrounds, when teaching/assessment was normal, who are female, white, have no disability, are not a mature student, did A-levels, live in halls and are not eligible for a bursary. Error bars are 95% confidence intervals.*

4.1.2. IMD

The estimated module mark and associated confidence intervals split by IMD (disadvantaged and not disadvantaged) for each teaching/assessment mode are presented in Figure 4. There are some similarities in the pattern of data with POLAR4. In general, module marks were lower for students from disadvantaged backgrounds than non-disadvantaged backgrounds.

Overall, mean module marks during normal teaching/assessment (47.2 %) increased slightly when teaching/assessment was disrupted (47.6 %) but dropped when teaching/assessment moved online (44.5 %).

Unlike the data for POLAR4 the attainment gap between students from disadvantaged and non-disadvantaged backgrounds remained similar through all modes of teaching/assessment (normal: 2.5pp ; disrupted: 2.5pp; online: 2.7pp)

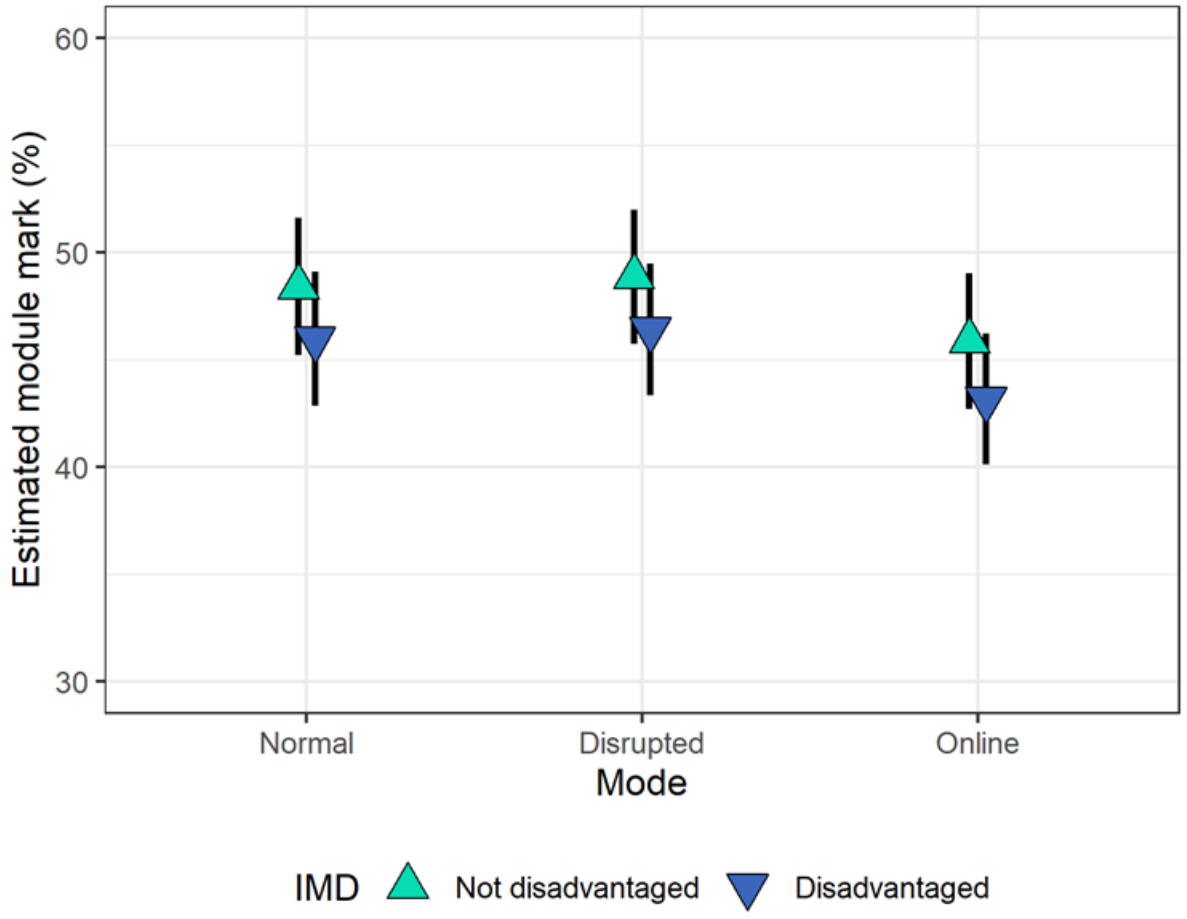

Figure 4*: Estimated module mark from a linear model with all covariates included (model 3), for the relationship between end of year mark, disadvantage (in terms of IMD, different symbols), mode of teaching/assessment (x-axis) and their interaction. Error bars are 95% confidence intervals.*

The coefficients of all the models and their 95% confidence intervals are represented in Figure 5 and Table A4. This plot shows the effects of the coefficients of the factors of interest (IMD and teaching/assessment mode) for each of the three models

(different symbols) for each year group (different panels). The coefficients of the main factors differ little between the models as more covariates are added.

Unlike for POLAR4 there is no clear evidence of an interaction between disadvantage and mode in any year as all the interaction coefficients include zero in their confidence intervals; the lack of evidence for a widening attainment gap seen in third year students may be due to the reduced sample size relative to the data for POLAR4.

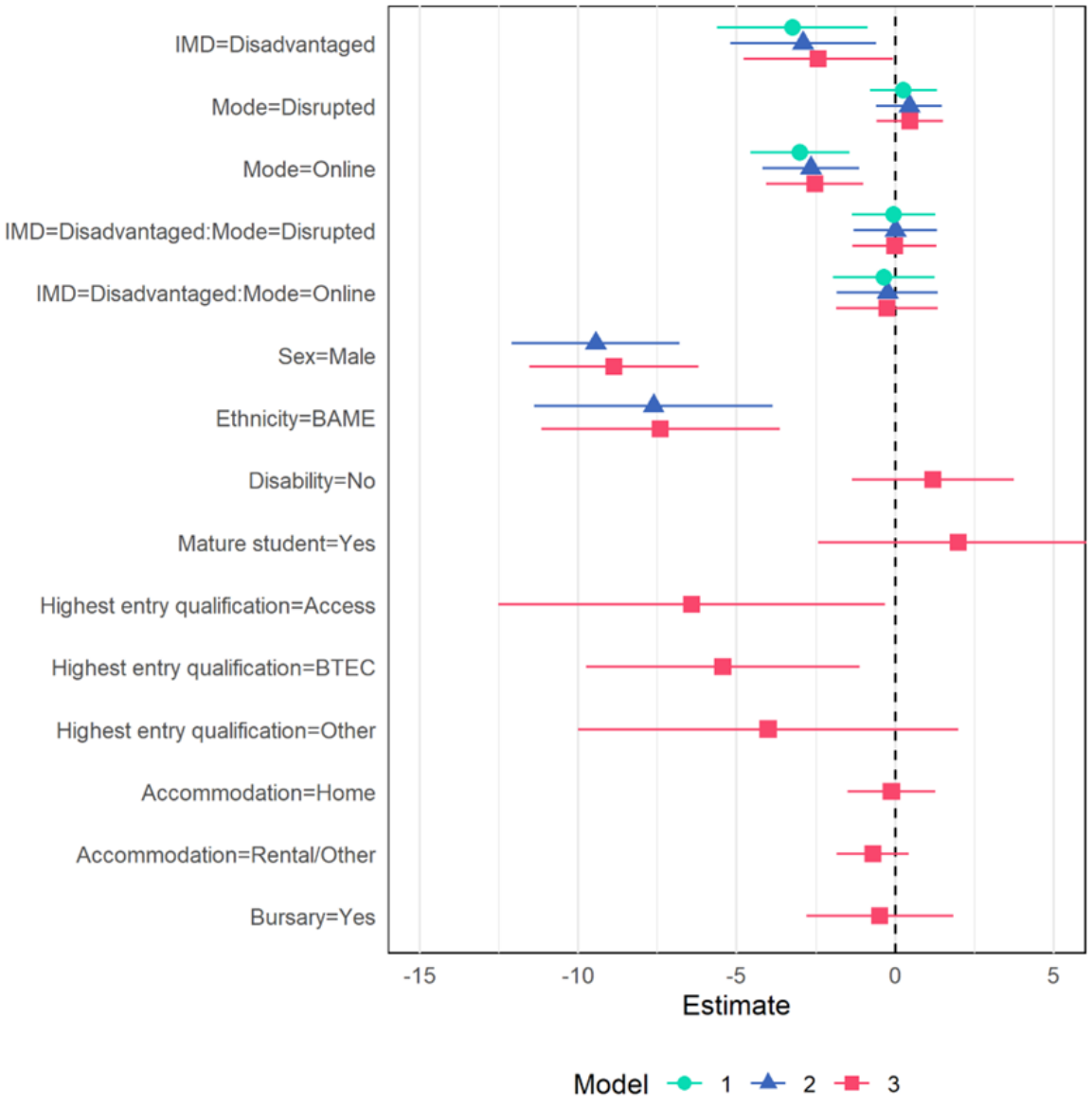

Figure 5: *Forest plot of the coefficients from three linear models (different symbols), for the relationship between end of year mark, disadvantage (IMD), mode of teaching/assessment and their interaction. Model refers to the models with increasing number of covariates, 1=no covariates, 2=sex and ethnicity, 3=all covariates. Values to the right of the dashed line indicate a positive effect on the mean mark relative to students from non-disadvantaged backgrounds, when teaching/assessment was normal, who are female, white, have no disability, are not*

a mature student, did A-levels, live in halls and are not eligible for a bursary. Error bars are 95% confidence intervals.

4.2. Modelling progression and interactions with measures of disadvantage and teaching mode

4.2.1. POLAR4

The estimated rate of progression from the full logistic model[1] (model 3) and associated confidence intervals split by POLAR4 (disadvantaged and not disadvantaged) and level of study (first, second and third year) for each teaching/assessment mode are presented in Figure 6.

When teaching/assessment was normal or online the progression was lower for students from disadvantaged backgrounds than non-disadvantaged backgrounds across all three years of study. During the phase with disrupted teaching/assessment the gap between students from disadvantaged and non-disadvantaged backgrounds disappeared.

On average progression rate increases with level of study for both students from disadvantaged backgrounds (first year = 61.5%; second year = 73.2%; third year = 90.9%) and from non-disadvantaged students (65.8%; 77.1%; 96.2%).

Within each level of study the lowest rates of progression are for students from disadvantaged backgrounds during online teaching (first year = 44.5%; second year = 52.9%; third year = 75.3%).

Perhaps due to a no-detriment policy progression rates are highest for first and second year students during disrupted teaching/assessment; 76.4% and 89.1% respectively,

[1] For third year students the full model did not converge unless the factors *mature student* and *highest entry qualification* were removed. All but 2 mature students progressed from year 3 and both of those students had completed access courses (which are only completed by mature students).

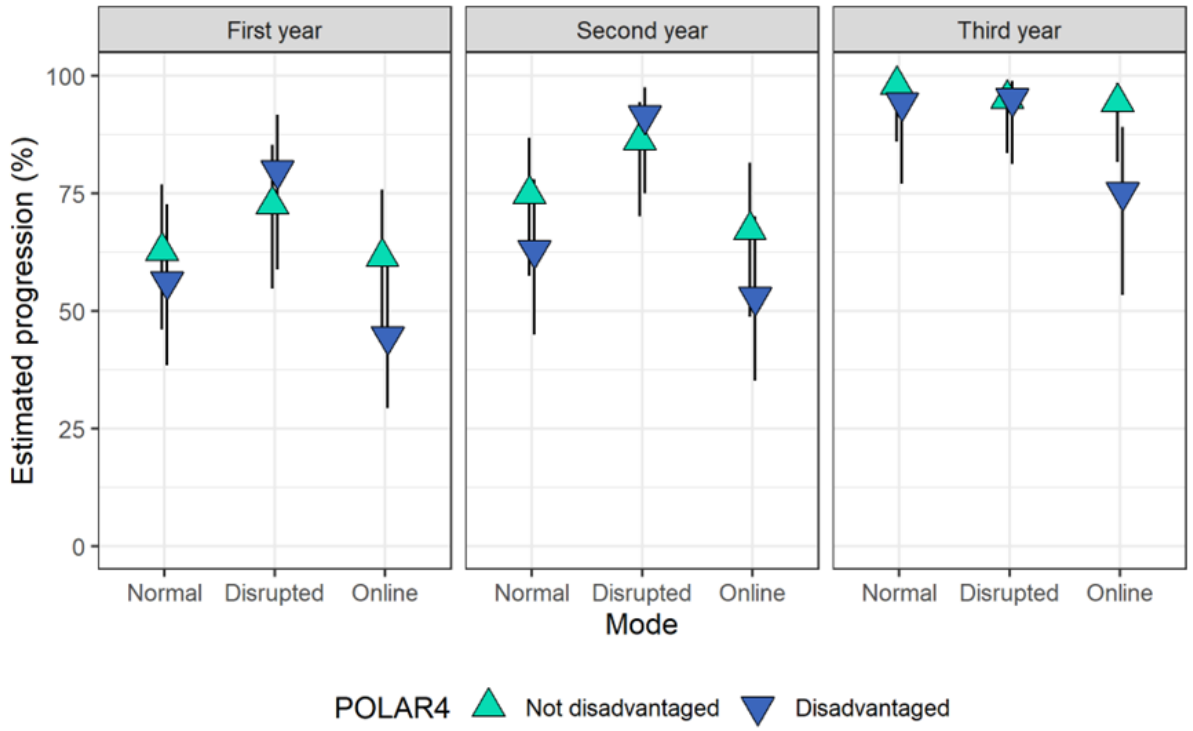

Figure 6*: Estimated progression rate from three logistic models with all covariates included, one for each level of study (different panels), for the relationship between progression, disadvantage (in terms of POLAR4, different symbols), mode of teaching/assessment (x-axis) and their interaction. Error bars are 95% confidence intervals.*

The coefficients of all the logistic models for each year and their 95% confidence intervals are represented in Figure 7 and Table A5. This plot shows the effects of the factors of interest (POLAR4 and teaching/assessment mode) for each of the three models (different symbols) for each year group (different panels). The coefficients of the main factors differ little between the models as more covariates are added. The confidence intervals for the coefficients for third year students are quite wide because these students are almost certain to progress.

The plot indicates that the coefficients for either mode or disadvantage are compatible with being zero, meaning that we cannot be sure there is an effect of them. Though, for second year students the confidence intervals for *Mode=Disrupted* does not include the central estimate for *Mode=Online* (and vice versa) and indicates there are differences in progression between these teaching/assessment modes.

Despite the appearance of an interaction between Mode and POLAR4 for third year students (see Figure 6) the confidence intervals for *POLAR=Disadvantaged:Mode=Online* include both zero and the central estimate for *POLAR4=Disadvantaged:Mode=Disrupted*.

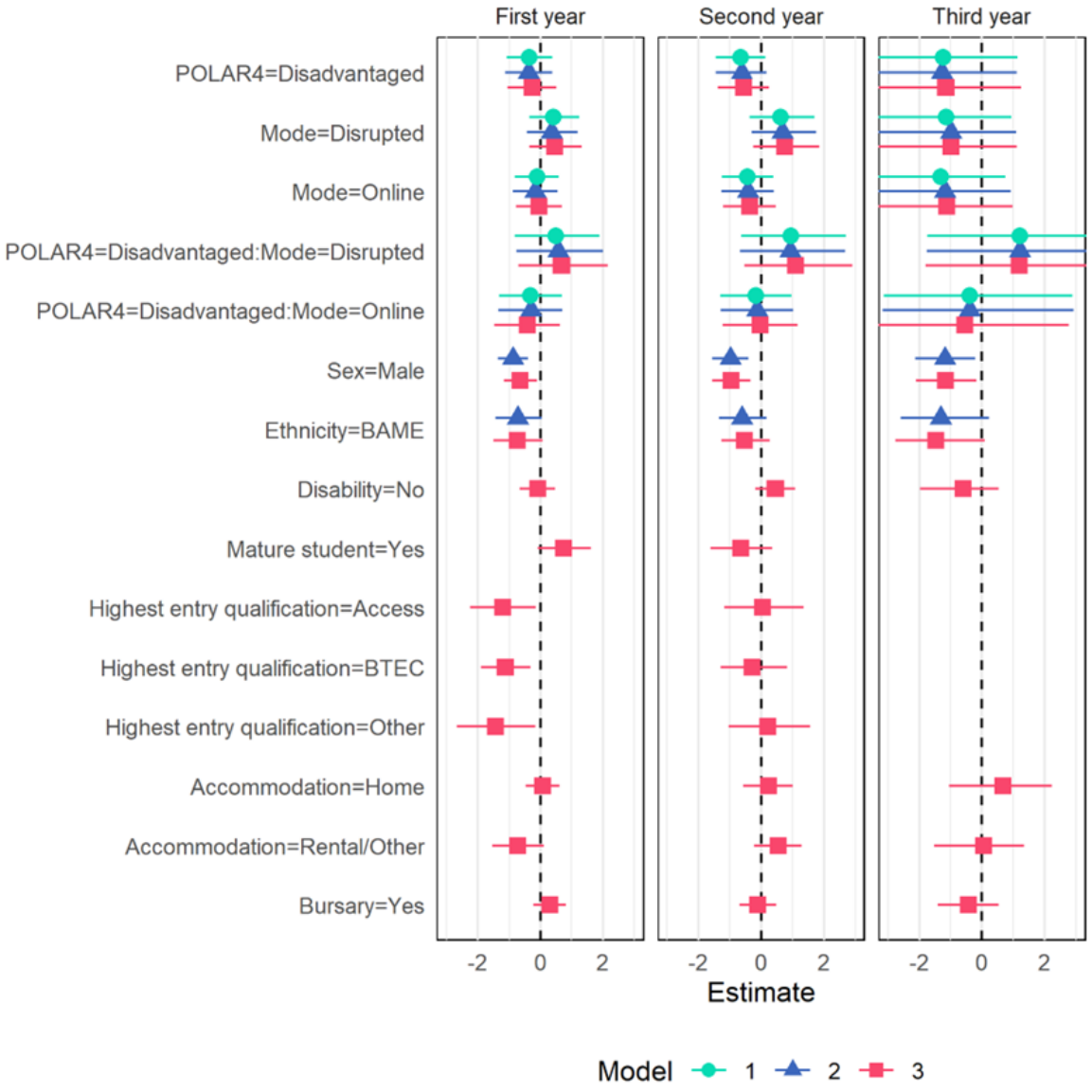

Figure 7: *Forest plot of the coefficients from nine logistic models, three for each level of study (different panels), for the relationship between progression, disadvantage (POLAR4), mode of teaching/assessment and their interaction. Model (different symbols) refers to the models with increasing number of covariates, 1=no covariates, 2=sex and ethnicity, 3=all covariates (except third year students, see text for details). The estimates are the change in log odds associated with each coefficient in the model. Values to the right of the dashed line indicate a positive effect on the progression rate relative to students from non-disadvantaged backgrounds, when teaching/assessment was normal, who are female, white, have no disability, are not a mature student, did A-levels, live in halls and are not eligible for a bursary. Error bars are 95% confidence intervals.*

4.2.2. IMD

The estimated rate of progression from the full logistic model[2] (model 3) and associated confidence intervals split by IMD (disadvantaged and not disadvantaged) and level of study (first, second and third year) for each teaching/assessment mode are presented in Figure 8. As for POLAR4, when teaching/assessment was normal or online progression was lower for students from disadvantaged backgrounds than non-disadvantaged backgrounds across all three levels of study. During the phase with disrupted teaching/assessment the gap between students from disadvantaged and non-disadvantaged backgrounds disappeared.

On average, the progression rate increases with the level of study for students from disadvantaged backgrounds (first year = 61.6%; second year = 76.4%; third year = 90.8%) and non-disadvantaged students (69.9%; 74.2%; 96.4%).

Within each year the lowest rates of progression are for students from disadvantaged backgrounds during online teaching (first year = 52.2%; second year = 54.3%; third year = 80.3%).

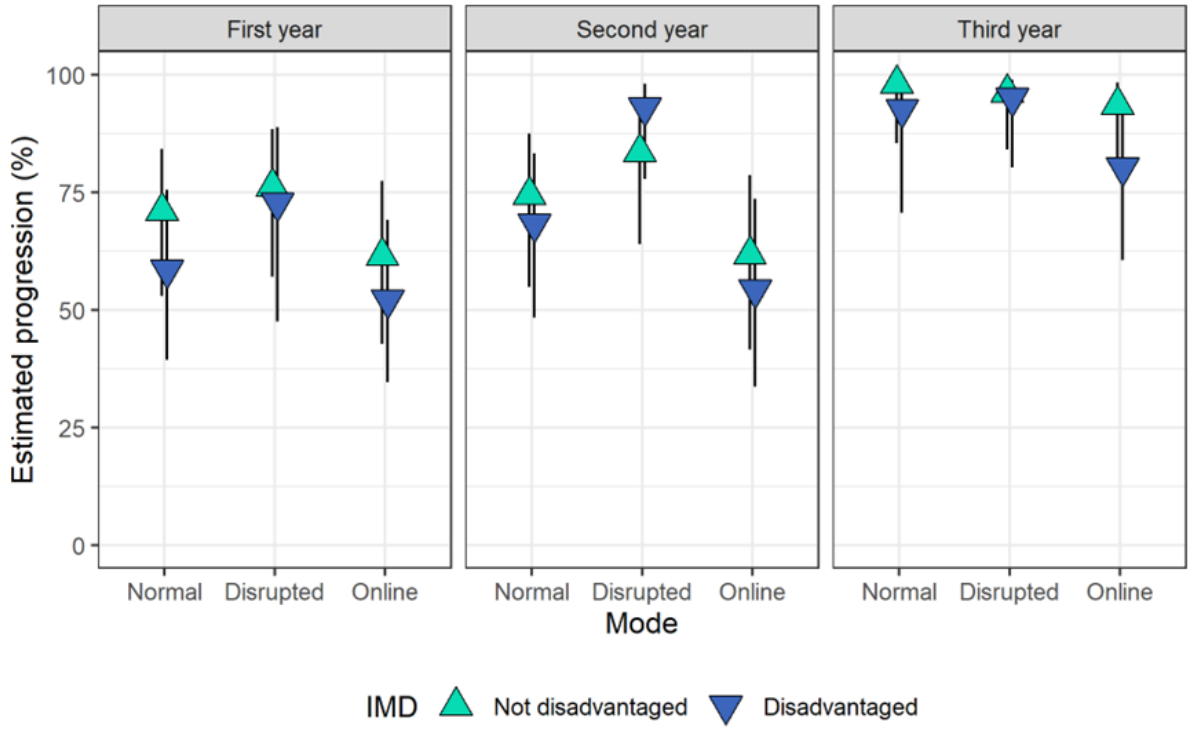

Figure 8: *Estimated progression rate from three logistic models with all covariates included, one for each level of study (different panels), for the relationship between progression, disadvantage (in terms of IMD, different symbols), mode of teaching/assessment (x-axis) and their interaction. Error bars are 95% confidence intervals.*

[2] For third year students the full model did not converge unless the factors *mature student* and *highest entry qualification* were removed. For the IMD dataset only 1 mature student did not progress from year 3 and this student had completed an access course (which are only completed by mature students).

The coefficients of all the logistic models for each year and their 95% confidence intervals are represented in Figure 9. This plot shows the effects of the factors of interest (IMD and teaching/assessment mode) for each of the three models (different symbols) for each year group (different panels). The coefficients of the main factors differ little between the models as more covariates are added. The confidence intervals for the coefficients for third year students are quite wide due to such students being almost certain of progressing.

Overall, using IMD as a measure of disadvantage, there seem to be no effects of disadvantage on progression or interactions with teaching mode.

4.3. Covariates

4.3.1. POLAR4

There was no evidence of differential outcomes in terms of attainment or progression for students with disabilities; confidence intervals for the coefficients for disability always included zero.

4.3.2. Mature students

There was no evidence of differential outcomes in terms of attainment or progression for mature students; confidence intervals for the coefficients always included zero.

4.3.3. Highest entry qualifications

There was evidence for differential outcomes dependent on the type of highest entry qualification; students who studied A-levels had higher attainment than those who did not. For the linear model with attainment and POLAR4 as the measure of disadvantage the coefficients for access and BTEC were negative and their confidence intervals did not include zero. In comparison with students who completed A-levels, the reduction in end of year mark was 8.7pp for access courses and 5.2pp for BTECs. The equivalent figures for when IMD was the measure of disadvantage were 6.6pp for access courses and 5.4pp for BTECs.

Similarly, for progression, while 81.8% of first year students who took A-levels progressed to second year, the progression rates for students who took access courses, BTECs or had other qualifications were 57.4%, 59.4% and 51.7% respectively. The confidence intervals for these coefficients also lay entirely below zero.

4.3.4. Accommodation

There was no evidence of differential outcomes in terms of attainment or progression for different accommodation types; confidence intervals for the coefficients always included zero.

4.3.5. Bursary eligibility

There was no evidence of differential outcomes in terms of attainment or progression between students eligible for bursaries and those who were not.

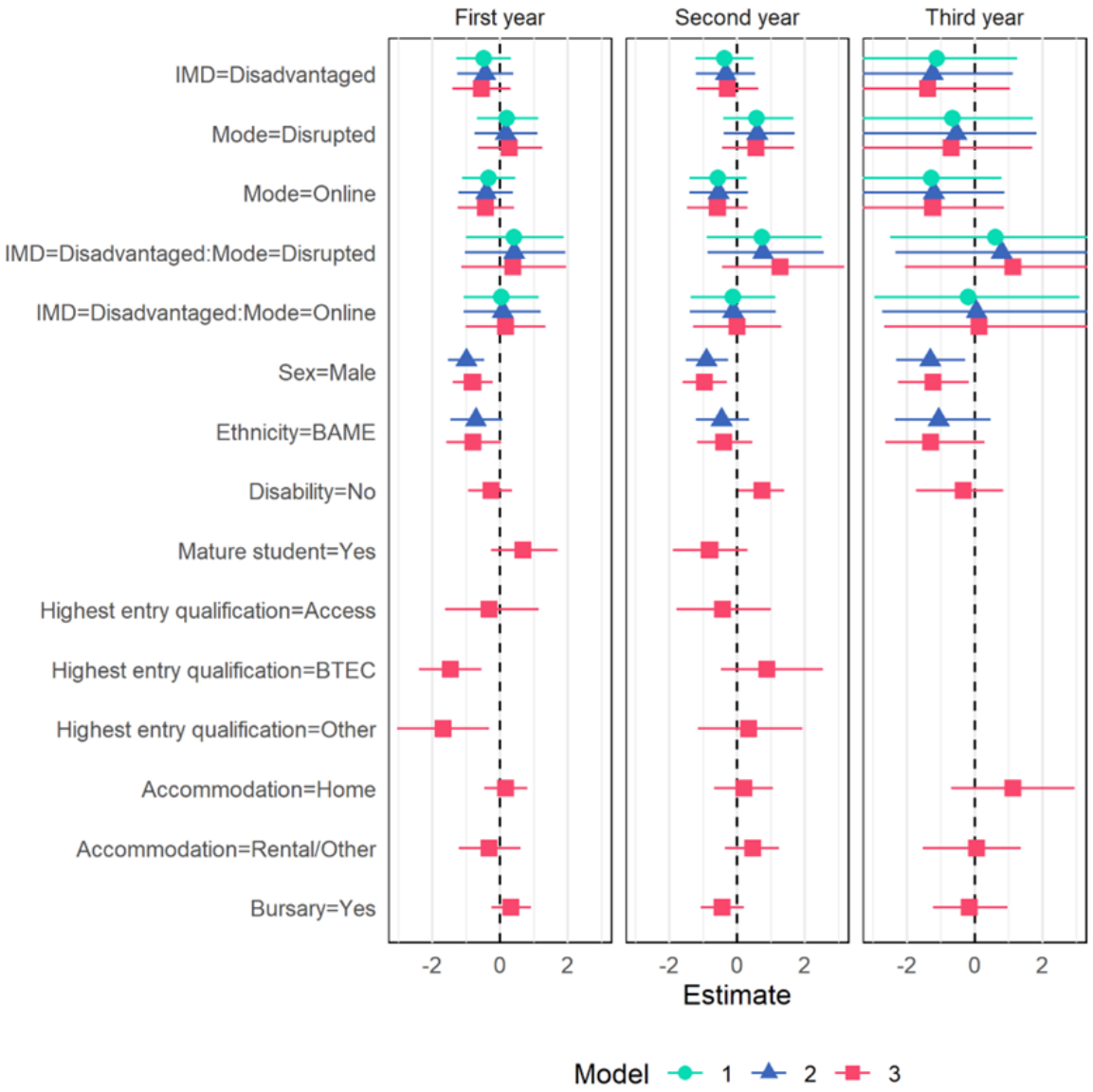

Figure 9: *Forest plot of the coefficients from nine logistic models, three for each level of study (different panels), for the relationship between progression, disadvantage (IMD), mode of teaching/assessment and their interaction. Model (different symbols) refers to the models with increasing number of covariates, 1=no covariates, 2=sex and ethnicity, 3=all covariates (except third year students, see text for details). The estimates are the change in log odds associated with each coefficient in the model. Values to the right of the dashed line indicate a positive effect on the progression rate relative to students from non-disadvantaged backgrounds, when teaching/assessment was normal, who are female, white, have no disability, are not a mature student, did A-levels, live in halls and are not eligible for a bursary. Error bars are 95% confidence intervals.*

5. Discussion

When teaching/assessment was initially disrupted by the pandemic such that most teaching had occurred as normal but some assessments moved online then little change in attainment and progression was seen. This may have been due to 'no-detriment' policies which were enacted to ensure that students were not materially disadvantaged by the lockdown which prevented face-to-face contact with staff and other students, disrupted the submission of coursework and prevented in-person exams being run.

The subsequent move to online teaching/assessment is consistent with reduced attainment and lower rates of progression compared with normal teaching/assessment In this data, the reduction in attainment for disadvantaged students is roughly twice that for their non-disadvantaged peers resulting in a widening attainment gap.

Unfortunately, there is not sufficient data to determine whether the widening attainment gap is due to the move to online teaching/assessment or due to COVID itself. For example, with a sufficient number of modules with different strands of teaching and assessment it might have been possible to tease apart the effects of the move to online teaching from the effects of the pandemic. Future work should look at coding of teaching and assessment of modules to enable finer grain analysis of online/blended provision following the pandemic.

It is important to note that the measure of disadvantage used here was POLAR4 which is, unfortunately, prone to false positives (Jerrim, 2021) — i.e., a high proportion of apparently non-disadvantaged students are actually disadvantaged and vice versa. While IMD would normally be preferred to POLAR4 as a measure of disadvantage (Jerrim, 2021) it was less useful here because there was such a high proportion of missing data. IMD is measured differently for each constituent member of the UK and the measures are not directly comparable. The amount of missing data for IMD here could be due to the inclusion of postcodes from more than one country. Adjustments to the raw IMD scores from each part of the UK can be made to facilitate cross-border comparisons (Abel et al, 2016) and these adjustments should be used when the sample in question is made of people from different countries within the UK. Adjusted data is available for the latest iteration of IMD (Parsons, 2021) and this adjustment could help address the issue of the sort reported here.

One important lesson from this work is that it is important to simplify the data prior to analysis to aid interpretation. For example, several layers of categorisation of teaching and assessment would have resulted in a large number of coefficients in the modelling rendering interpretation of any effects difficult. Any effects that need further investigation can be explored with the more complex data.

Missing from the institutional data provided here are measures of student engagement with the course such as attendance and interactions with virtual learning environments. Data such as this have been shown to explain a significant proportion of the variance in attainment, and their inclusion would enable a more detailed exploration of why any gaps in student outcomes occur (Summers et al, 2021).

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Appendix 1 - Tables of demographics

Overall

Table A1: *Student characteristics of the whole sample for each level of study and overall.*

	First year		Second year		Third year		Overall	
Category	n	p	n	p	n	p	n	p
Sex								
Female	400	0.74	436	0.79	469	0.82	792	0.78
Male	139	0.26	114	0.21	104	0.18	219	0.22
Ethnicity								
White	470	0.87	480	0.87	525	0.92	901	0.89
BAME	69	0.13	70	0.13	48	0.08	110	0.11
Disability								
Yes	120	0.22	113	0.21	118	0.21	218	0.22
No	419	0.78	437	0.79	455	0.79	793	0.78
Mature student								
No	432	0.80	474	0.86	505	0.88	842	0.83
Yes	107	0.20	76	0.14	68	0.12	169	0.17
Highest entry qualification								
A/AS level	393	0.73	432	0.79	466	0.81	762	0.75

	First year		Second year		Third year		Overall	
Category	n	p	n	p	n	p	n	p
Access	36	0.07	24	0.04	20	0.03	57	0.06
BTEC	54	0.10	37	0.07	36	0.06	84	0.08
Other	56	0.10	57	0.10	51	0.09	108	0.11
Accommodation								
Halls	283	0.53	97	0.18	57	0.10	351	0.29
Home	204	0.38	173	0.31	195	0.34	405	0.33
Rental/Other	52	0.10	280	0.51	321	0.56	475	0.39
Bursary								
No	352	0.65	363	0.66	384	0.67	669	0.66
Yes	187	0.35	187	0.34	189	0.33	342	0.34
IMD quintile								
1	81	0.15	89	0.16	103	0.18	167	0.17
2	83	0.15	79	0.14	84	0.15	148	0.15
3	67	0.12	72	0.13	75	0.13	130	0.13
4	84	0.16	88	0.16	95	0.17	160	0.16
5	86	0.16	95	0.17	103	0.18	172	0.17
N/A	138	0.26	127	0.23	113	0.20	234	0.23

	First year		Second year		Third year		Overall	
Category	n	p	n	p	n	p	n	p
POLAR4 quintile								
1	88	0.16	97	0.18	99	0.17	177	0.18
2	110	0.20	108	0.20	113	0.20	199	0.20
3	100	0.19	86	0.16	95	0.17	182	0.18
4	105	0.19	120	0.22	123	0.21	206	0.20
5	92	0.17	94	0.17	106	0.18	174	0.17
N/A	44	0.08	45	0.08	37	0.06	73	0.07

Demographics for models with POLAR4 as the measure of disadvantage

Table A2: *Student characteristics of the sample with complete POLAR4 data for each level of study and overall.*

	First year		Second year		Third year		Overall	
Category	n	p	n	p	n	p	n	p
Sex								
Female	377	0.76	405	0.80	443	0.83	746	0.80
Male	118	0.24	100	0.20	93	0.17	192	0.20
Ethnicity								
White	453	0.92	457	0.90	502	0.94	865	0.92
BAME	42	0.08	48	0.10	34	0.06	73	0.08
Disability								
Yes	113	0.23	107	0.21	114	0.21	209	0.22
No	382	0.77	398	0.79	422	0.79	729	0.78
Mature student								
No	404	0.82	442	0.88	477	0.89	793	0.85
Yes	91	0.18	63	0.12	59	0.11	145	0.15
Highest entry qualification								
A/AS level	387	0.78	423	0.84	455	0.85	747	0.80
Access	36	0.07	24	0.05	20	0.04	57	0.06

	First year		Second year		Third year		Overall	
Category	n	p	n	p	n	p	n	p
BTEC	51	0.10	33	0.07	34	0.06	80	0.09
Other	21	0.04	25	0.05	27	0.05	54	0.06
Accommodation								
Halls	258	0.52	80	0.16	48	0.09	315	0.28
Home	199	0.40	168	0.33	191	0.36	394	0.35
Rental/Other	38	0.08	257	0.51	297	0.55	429	0.38
Bursary								
No	309	0.62	319	0.63	347	0.65	597	0.64
Yes	186	0.38	186	0.37	189	0.35	341	0.36
IMD quintile								
1	81	0.16	89	0.18	103	0.19	167	0.18
2	82	0.17	79	0.16	84	0.16	147	0.16
3	66	0.13	70	0.14	73	0.14	128	0.14
4	84	0.17	88	0.17	95	0.18	160	0.17
5	84	0.17	93	0.18	103	0.19	170	0.18
N/A	98	0.20	86	0.17	78	0.15	166	0.18
POLAR4 quintile								

	First year		Second year		Third year		Overall	
Category	n	p	n	p	n	p	n	p
1	88	0.18	97	0.19	99	0.18	177	0.19
2	110	0.22	108	0.21	113	0.21	199	0.21
3	100	0.20	86	0.17	95	0.18	182	0.19
4	105	0.21	120	0.24	123	0.23	206	0.22
5	92	0.19	94	0.19	106	0.20	174	0.19

Demographics for models with IMD as the measure of disadvantage

Table A3: *Student characteristics of the sample with complete IMD data for each level of study and overall.*

	First year		Second year		Third year		Overall	
Category	n	p	n	p	n	p	n	p
Sex								
Female	306	0.76	336	0.79	377	0.82	617	0.79
Male	95	0.24	87	0.21	83	0.18	160	0.21
Ethnicity								
White	361	0.90	377	0.89	428	0.93	709	0.91
BAME	40	0.10	46	0.11	32	0.07	68	0.09
Disability								
Yes	96	0.24	93	0.22	98	0.21	180	0.23
No	305	0.76	330	0.78	362	0.79	597	0.77
Mature student								
No	331	0.83	378	0.89	417	0.91	668	0.86
Yes	70	0.17	45	0.11	43	0.09	109	0.14
Highest entry qualification								
A/AS level	321	0.80	369	0.87	402	0.87	639	0.82
Access	22	0.05	15	0.04	14	0.03	38	0.05

	First year		Second year		Third year		Overall	
Category	n	p	n	p	n	p	n	p
BTEC	39	0.10	22	0.05	26	0.06	61	0.08
Other	19	0.05	17	0.04	18	0.04	39	0.05
Accommodation								
Halls	222	0.55	70	0.17	44	0.10	275	0.29
Home	146	0.36	125	0.30	156	0.34	305	0.32
Rental/Other	33	0.08	228	0.54	260	0.57	375	0.39
Bursary								
No	246	0.61	272	0.64	306	0.67	497	0.64
Yes	155	0.39	151	0.36	154	0.33	280	0.36
IMD quintile								
1	81	0.20	89	0.21	103	0.22	167	0.21
2	83	0.21	79	0.19	84	0.18	148	0.19
3	67	0.17	72	0.17	75	0.16	130	0.17
4	84	0.21	88	0.21	95	0.21	160	0.21
5	86	0.21	95	0.22	103	0.22	172	0.22
POLAR4 quintile								
1	72	0.18	79	0.19	85	0.18	149	0.19

	First year		Second year		Third year		Overall	
Category	n	p	n	p	n	p	n	p
2	79	0.20	83	0.20	88	0.19	146	0.19
3	78	0.19	69	0.16	78	0.17	146	0.19
4	83	0.21	100	0.24	108	0.23	169	0.22
5	85	0.21	88	0.21	99	0.22	162	0.21
N/A	4	0.01	4	0.01	2	0.00	5	0.01

Appendix 2 - Tables of coefficients for linear models of attainment

POLAR4

Table A4: *Coefficients and 95% confidence intervals (within square brackets) for 3 linear models (with increasing numbers of covariates) for the relationship between attainment, disadvantage (POLAR4) and teaching/assessment mode.*

	Model		
	1	2	3
(Intercept)	56.718 [54.770, 58.665]	59.032 [57.072, 60.992]	59.117 [56.184, 62.049]
POLAR4=Disadvantaged	-2.594 [-4.798, -0.389]	-2.528 [-4.664, -0.393]	-1.984 [-4.136, 0.169]
Mode=Disrupted	0.460 [-0.527, 1.446]	0.636 [-0.339, 1.610]	0.624 [-0.354, 1.603]
Mode=Online	-2.186 [-3.647, -0.726]	-1.843 [-3.272, -0.414]	-1.739 [-3.166, -0.312]
POLAR4=Disadvantaged: Mode=Disrupted	-0.267 [-1.504, 0.970]	-0.252 [-1.488, 0.984]	-0.203 [-1.443, 1.036]
POLAR4=Disadvantaged: Mode=Online	-2.657 [-4.149, -1.165]	-2.616 [-4.105, -1.128]	-2.561 [-4.054, -1.068]

	Model		
	1	2	3
Sex=Male		-9.261 [-11.720, -6.802]	-8.477 [-10.968, -5.987]
Ethnicity=BAME		-7.393 [-11.064, -3.721]	-7.311 [-10.967, -3.655]
Disability=No			0.444 [-1.939, 2.827]
Mature student=Yes			1.000 [-2.920, 4.920]
Highest entry qualification=Access			-8.739 [-13.965, -3.513]
Highest entry qualification=BTEC			-5.301 [-9.083, -1.520]
Highest entry qualification=Other			-3.945 [-9.071, 1.181]
Accommodation=Home			0.376 [-0.909, 1.661]

	Model		
	1	2	3
Accommodation=Rental/Other			-0.240 [-1.315, 0.835]
Bursary=Yes			0.330 [-1.788, 2.448]
Num.Obs.	8227	8227	8227
R^2 Marg.	0.017	0.068	0.080
R^2 Cond.	0.744	0.743	0.743
AIC	63628.7	63560.2	63537.1

IMD

Table A5: *Coefficients and 95% confidence intervals (within square brackets) for 3 linear models (with increasing numbers of covariates) for the relationship between attainment, disadvantage (IMD) and teaching/assessment mode.*

	Model		
	1	2	3
(Intercept)	57.238 [55.212, 59.264]	59.599 [57.562, 61.636]	59.466 [56.402, 62.530]
IMD=Disadvantaged	-3.240 [-5.614, -0.866]	-2.908 [-5.209, -0.607]	-2.434 [-4.788, -0.081]
Mode=Disrupted	0.257 [-0.797, 1.311]	0.433 [-0.607, 1.473]	0.460 [-0.585, 1.505]
Mode=Online	-3.007 [-4.576, -1.437]	-2.664 [-4.197, -1.131]	-2.538 [-4.077, -0.999]
IMD=Disadvantaged: Mode=Disrupted	-0.062 [-1.377, 1.254]	0.000 [-1.314, 1.314]	-0.024 [-1.341, 1.293]

IMD=Disadvantaged: Mode=Online	-0.355 [-1.955, 1.244]	-0.250 [-1.845, 1.345]	-0.269 [-1.873, 1.335]
Sex=Male		-9.449 [-12.094, -6.805]	-8.885 [-11.555, -6.214]
Ethnicity=BAME		-7.629 [-11.399, -3.860]	-7.405 [-11.169, -3.642]
Disability=No			1.183 [-1.372, 3.739]
Mature student=Yes			1.979 [-2.428, 6.386]
Highest entry qualification=Access			-6.419 [-12.514, -0.323]
Highest entry qualification=BTEC			-5.439 [-9.750, -1.127]
Highest entry qualification=Other			-4.009 [-9.996, 1.977]

Accommodation=Home			-0.121 [-1.504, 1.261]
Accommodation=Rental/Other			-0.708 [-1.841, 0.424]
Bursary=Yes			-0.488 [-2.799, 1.824]
Num.Obs.	6882	6882	6882
R^2 Marg.	0.015	0.073	0.081
R^2 Cond.	0.745	0.745	0.745
AIC	52951.0	52887.7	52870.4

Appendix 3

POLAR4

Table A6: *Coefficients (log odds) and 95% confidence intervals (within square brackets) for 9 logistic models, 3 models (with increasing numbers of covariates) for each level of study, for the relationship between progression, disadvantage (POLAR4) and teaching/assessment mode.*

	First year			Second year			Third year		
	1	2	3	1	2	3	1	2	3
(Intercept)	1.526	1.895	1.902	2.089	2.386	1.751	4.745	5.125	5.541
	[1.065, 2.038]	[1.382, 2.460]	[1.194, 2.666]	[1.551, 2.714]	[1.809, 3.049]	[0.778, 2.811]	[3.249, 7.613]	[3.575, 8.013]	[3.262, 8.799]
POLAR4= Disadvantaged	-0.352	-0.376	-0.269	-0.646	-0.625	-0.560	-1.233	-1.273	-1.153
	[-1.080, 0.384]	[-1.120, 0.375]	[-1.046, 0.517]	[-1.444, 0.132]	[-1.435, 0.165]	[-1.383, 0.244]	[-4.313, 1.130]	[-4.359, 1.101]	[-4.258, 1.253]
Mode= Disrupted	0.420	0.353	0.452	0.608	0.668	0.748	-1.143	-0.998	-0.983
	[-0.360, 1.245]	[-0.443, 1.192]	[-0.364, 1.313]	[-0.364, 1.688]	[-0.316, 1.760]	[-0.249, 1.853]	[-4.158, 0.929]	[-4.022, 1.097]	[-4.011, 1.118]

Mode=Online	-0.114	-0.174	-0.054	-0.438	-0.429	-0.373	-1.322	-1.176	-1.132
	[-0.813, 0.588]	[-0.887, 0.540]	[-0.782, 0.677]	[-1.260, 0.378]	[-1.265, 0.400]	[-1.221, 0.469]	[-4.337, 0.752]	[-4.203, 0.925]	[-4.161, 0.973]
POLAR4= Disadvantaged: Mode=Disrupted	0.485	0.572	0.672	0.944	0.920	1.095	1.201	1.199	1.186
	[-0.825, 1.884]	[-0.768, 2.001]	[-0.712, 2.144]	[-0.635, 2.696]	[-0.677, 2.686]	[-0.546, 2.904]	[-1.743, 4.704]	[-1.764, 4.715]	[-1.802, 4.718]
POLAR4= Disadvantaged: Mode=Online	-0.311	-0.305	-0.415	-0.168	-0.134	-0.040	-0.398	-0.393	-0.545
	[-1.318, 0.685]	[-1.331, 0.711]	[-1.474, 0.630]	[-1.303, 0.971]	[-1.293, 1.028]	[-1.230, 1.157]	[-3.136, 2.883]	[-3.174, 2.914]	[-3.351, 2.776]
Sex=Male		-0.884	-0.643		-0.989	-0.969		-1.187	-1.160
		[-1.367, -0.395]	[-1.169, -0.106]		[-1.565, -0.398]	[-1.569, -0.356]		[-2.121, -0.221]	[-2.105, -0.182]
Ethnicity=BAME		-0.720	-0.739		-0.614	-0.536		-1.324	-1.471
		[-1.444, 0.052]	[-1.495, 0.062]		[-1.342, 0.172]	[-1.278, 0.265]		[-2.596, 0.224]	[-2.767, 0.091]

Disability=No	-0.089	0.454	-0.605
	[-0.675, 0.466]	[-0.198, 1.077]	[-1.979, 0.529]
Mature student= Yes	0.734	-0.652	
	[-0.086, 1.608]	[-1.618, 0.343]	
Highest entry qualification= Access	-1.204	0.043	
	[-2.248, -0.155]	[-1.172, 1.344]	
Highest entry qualification= BTEC	-1.120	-0.285	
	[-1.904, -0.329]	[-1.294, 0.823]	
Highest entry qualification= Other	-1.432	0.206	

			[-2.674, -0.164]			[-1.047, 1.569]			
Accommodation= Home			0.064			0.226			0.671
			[-0.468, 0.606]			[-0.577, 1.001]			[-1.039, 2.219]
Accommodation= Rental/Other			-0.723			0.547			0.048
			[-1.527, 0.109]			[-0.224, 1.285]			[-1.539, 1.335]
Bursary=Yes			0.292			-0.117			-0.439
			[-0.214, 0.815]			[-0.701, 0.483]			[-1.407, 0.529]
Num.Obs.	495	495	495	505	505	505	536	536	536
AIC	491.1	479.4	479.8	391.2	381.8	389.1	171.7	167.4	172.1
BIC	516.4	513.0	547.1	416.6	415.6	456.7	197.4	201.7	223.5

IMD

Table A7: *Coefficients (log odds) and 95% confidence intervals (within square brackets) for 9 logistic models, 3 models (with increasing numbers of covariates) for each level of study, for the relationship between progression, disadvantage (IMD) and teaching/assessment mode.*

	First year			Second year			Third year		
	1	2	3	1	2	3	1	2	3
(Intercept)	1.661	2.064	2.259	1.978	2.250	1.633	4.533	4.965	5.034
	[1.140, 2.252]	[1.484, 2.717]	[1.432, 3.162]	[1.436, 2.606]	[1.666, 2.921]	[0.635, 2.714]	[3.033, 7.402]	[3.392, 7.861]	[2.733, 8.317]
IMD= Disadvantaged	-0.478	-0.441	-0.550	-0.386	-0.356	-0.299	-1.115	-1.249	-1.398
	[-1.284, 0.327]	[-1.266, 0.383]	[-1.413, 0.310]	[-1.240, 0.475]	[-1.227, 0.521]	[-1.210, 0.620]	[-4.197, 1.251]	[-4.338, 1.128]	[-4.523, 1.036]
Mode=Disrupted	0.202	0.156	0.265	0.561	0.585	0.552	-0.651	-0.547	-0.697
	[-0.677, 1.130]	[-0.745, 1.103]	[-0.666, 1.249]	[-0.417, 1.646]	[-0.404, 1.680]	[-0.456, 1.662]	[-3.730, 1.711]	[-3.635, 1.832]	[-3.795, 1.697]
Mode=Online	-0.340	-0.421	-0.424	-0.573	-0.555	-0.590	-1.287	-1.216	-1.238

	[-1.128, 0.443]	[-1.231, 0.381]	[-1.259, 0.405]	[-1.421, 0.273]	[-1.417, 0.306]	[-1.484, 0.302]	[-4.305, 0.790]	[-4.242, 0.882]	[-4.266, 0.863]
IMD= Disadvantaged: Mode=Disrupted	0.406	0.404	0.374	0.718	0.750	1.263	0.618	0.791	1.129
	[-0.999, 1.880]	[-1.042, 1.920]	[-1.136, 1.951]	[-0.904, 2.500]	[-0.892, 2.548]	[-0.449, 3.147]	[-2.493, 4.184]	[-2.341, 4.375]	[-2.058, 4.756]
IMD= Disadvantaged: Mode=Online	0.040	0.066	0.166	-0.137	-0.132	-0.006	-0.202	0.046	0.121
	[-1.074, 1.150]	[-1.075, 1.204]	[-1.013, 1.343]	[-1.385, 1.109]	[-1.400, 1.135]	[-1.314, 1.302]	[-2.960, 3.094]	[-2.733, 3.359]	[-2.683, 3.452]
Sex=Male		-1.007	-0.814		-0.916	-0.969		-1.318	-1.232
		[-1.543, -0.466]	[-1.399, -0.220]		[-1.535, -0.280]	[-1.617, -0.306]		[-2.327, -0.286]	[-2.261, -0.173]
Ethnicity=BAME		-0.724	-0.798		-0.470	-0.408		-1.076	-1.305
		[-1.474, 0.070]	[-1.588, 0.032]		[-1.228, 0.350]	[-1.191, 0.439]		[-2.347, 0.475]	[-2.637, 0.282]
Disability=No			-0.273			0.718			-0.334

	[-0.951, 0.362]	[0.029, 1.385]	[-1.722, 0.834]
Mature student=Yes	0.682	-0.821	
	[-0.271, 1.692]	[-1.897, 0.301]	
Highest entry qualification= Access	-0.322	-0.442	
	[-1.626, 1.147]	[-1.800, 0.984]	
Highest entry qualification= BTEC	-1.473	0.865	
	[-2.402, -0.556]	[-0.493, 2.521]	
Highest entry qualification= Other	-1.682	0.329	
	[-3.044, -0.327]	[-1.169, 1.922]	

Accommodation= Home			0.162			0.189			1.130
			[-0.463, 0.808]			[-0.687, 1.046]			[-0.697, 2.952]
Accommodation= Rental/Other			-0.330			0.450			0.061
			[-1.216, 0.613]			[-0.369, 1.229]			[-1.535, 1.368]
Bursary=Yes			0.324			-0.451			-0.154
			[-0.249, 0.916]			[-1.088, 0.196]			[-1.236, 0.962]
Num.Obs.	401	401	401	423	423	423	460	460	460
AIC	402.6	390.3	391.5	337.1	331.7	333.1	151.5	148.0	152.3
BIC	426.5	422.3	455.4	361.3	364.1	397.8	176.3	181.1	201.9