

Final analysis report Institutional Data Use: University of East Anglia – Peer Assisted Learning (PAL)

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1. Summary

Background:

Staffordshire University were commissioned by the Centre for Transforming Access and Student Outcomes in Higher Education (TASO) to act as an independent evaluator of four post-entry interventions to address inequalities in student outcomes using institutional data and quasi-experimental designs. This analysis report is the impact evaluation of the Peer Assisted Learning (PAL) programme at the University of East Anglia (UEA).

Aims:

The aim of this study is to explore whether participation in PAL increases student engagement, continuation rates and attainment.

Intervention:

PAL is open to all first-year students in participating schools of study on an opt-in basis. PAL consists of regularly scheduled mentoring sessions throughout the academic year. Prior to the academic year, schools and courses decide whether their course will deliver one to one peer mentoring or group mentoring. Group mentoring is formalised through the timetable and one to one mentoring is typically scheduled every three weeks.

Design:

This study will use a post-hoc quasi-experimental evaluation design to determine the relationship between PAL participation and the outcome measures of interest.

Outcome measures:

There are three primary outcome measures for this study: course engagement, continuation to the next level of academic study and end of stage grades. In addition, there are two secondary outcome measures for this study: course completion and final degree classification.

Analyses:

A matched control group was generated using propensity score matching to test the effect of PAL on student engagement and outcomes using ordinary least squares (OLS) or binary logistic regression (BLR) where appropriate.

Results:

We found that participation in PAL is associated with significant improvements in the likelihood of continuation after the first year of study, is significantly associated with

higher course engagement, and is associated with significant positive benefits to end of stage grades in the first year. There was no observable effect of PAL participation on final degree classification. There is evidence that some underrepresented student groups in higher education who participate in PAL have different continuation and end of stage grade outcomes than their peers.

Conclusions:

This study provides evidence that participating in PAL supports first year student outcomes and equality of opportunity aims at UEA. Our findings, while significant, produced small effects for the models tested. Further research is needed to build on these results including an understanding of how delivery mode and additional variables not captured in our models may impact the effectiveness of PAL for student mentees.

2. Introduction

2.1. Background

This project was a collaboration between the Centre for Transforming Access and Student Outcomes in Higher Education (TASO), University of East Anglia (UEA) and Staffordshire University to support the use of institutional data to implement an evaluation which delivers Type 3 evidence. Between November 2023 and March 2024:

- workshops were held to develop an enhanced theory of change;
- ethical clearance was agreed;
- a prespecified trial protocol was developed and quality assured;
- data were cleaned and analyses undertaken;
- the final report was completed.

The team from UEA was responsible for

- hosting and participating in the enhanced theory of change workshop
- achieving ethical clearance
- the provision of anonymised data

The team from Staffordshire University was responsible for

- designing and facilitating the enhanced theory of change workshop
- completing the trial protocol
- data cleaning and analyses
- completing the final impact evaluation report.

Table 1 details the project team and their roles and responsibilities.

Table 1: Project Team

Organisation	Name	Role and responsibilities
TASO	Dr Rob Summers	Project/Contract Manager
TASO	Luke Arundel	Project Assistant
University of East Anglia	Prof Fabio Arico	HEP Project co-lead - Director of the Centre for Higher Education Research Practice Policy and Scholarship (CHERPPS)
University of East Anglia	Prof Helena Gillespie	HEP Project co-lead - Associate Pro Vice Chancellor for Student Inclusion

University of East Anglia	Michelle Hawthorne	HEP coordinator - Widening Access and Participation Evidence and Evaluation Manager
Staffordshire University	Dr Sally Andrews	Project Lead. Responsible for day-to-day management of the project.
Staffordshire University	Vanessa Dodd	Project Co-Lead. Supporting the project lead on day-to-day management.
Staffordshire University	Sam Vizcaino-Vickers	Research Assistant. Responsible for data cleaning

2.2. Aims

The aim of this evaluation is to determine the effectiveness of PAL at UEA in relation to student engagement and outcomes including continuation, completion and attainment. This evaluation is being undertaken to develop the evidence base related to the use of peer mentoring to support equality of opportunity in relation to academic engagement and student outcomes. This study has been funded by TASO as part of a larger project on institutional data use and evaluation in HE to enable the sector to better understand 'what works.'

This study has seven research questions with relevant hypotheses listed below. PAL participation refers to PAL mentees only. The trial protocol initially included PAL mentors, however these were removed due to data limitations.

RQ1: What is the effect of PAL participation on student engagement on their course in the first year of study relative to students who do not engage with PAL?

H₀: PAL participation has no relationship with course engagement in the first year of study.

H₁: Students who participate in PAL have significantly different levels of course engagement in comparison to those that did not take part in PAL.

RQ2: What is the effect of PAL on student continuation on their course at the end of the first year of study relative to students who do not engage with PAL?

H₀: PAL participation has no relationship with course continuation in the first year of study.

H₁: Students who participate in PAL participation have significantly different course continuation in the first year compared to those that did not take part in PAL.

RQ3: What is the effect of PAL participation on end of stage grades relative to those that do not engage with PAL?

H₀: PAL participation has no relationship with end of stage grades in the first year.

H₁: PAL participants have significantly different end of stage grades in the first year compared to those that did not take part in PAL.

RQ4: What is the effect of PAL on student completion of their course relative to those that do not engage with PAL?

H₀: PAL participation has no relationship with successful course completion.

H₁: Students who participate in PAL participation have significantly different course completion rates in comparison to those that did not take part in PAL.

RQ5: What is the effect of PAL on good degree awarding relative to those that do not engage with PAL?

H₀: PAL participation has a relationship with the final degree award.

H₁: Students who participate in PAL have significantly different good degree outcomes in comparison to those that did not take part in PAL.

RQ6: Does variation in PAL delivery mode have an impact on student outcomes?

H₀: There is no relationship between PAL delivery mode and student outcomes.

H₁: There are significant differences between PAL delivery mode and student outcomes.

RQ7: Do underrepresented students who participate in PAL have better outcomes than underrepresented students who did not participate in PAL?

H₀: There is no relationship between underrepresented students who participate in PAL and underrepresented students who do not participate in PAL and student outcomes.

H₁: Underrepresented students who participate in PAL have significantly different student outcomes than underrepresented students who do not participate in PAL.

2.2.1. Changes to prespecified research questions

This study was unable to test the hypotheses related to two research questions including RQ4 using the dependent variable completion and RQ6 related to independent variable PAL delivery mode. This was due to data availability. Any changes

to outcome measures from the prespecified protocol are listed in Table 2 presented in Section 3.3.

2.3. Intervention

PAL is a yearlong peer mentoring programme for first year students designed to support transition into higher education. Second year students are trained as mentors and matched with first year students on their course. As part of mentoring sessions, mentors share subject-specific knowledge and knowledge about UEA more generally to help first years settle in throughout their first year.

Courses choose whether mentoring is delivered in a group or in one-to-one sessions to best fit their learner context. Once mentors and mentees are matched, one-to-one mentoring is scheduled every three weeks by the PAL link tutor. Group mentoring is timetabled as part of the curriculum at regular intervals from the beginning of each academic year.

3. Methods

3.1. Design

This study applied a post-hoc quasi-experimental design to determine the relationship of PAL participation on student outcomes. This study will use matched administrative data with localised PAL participation data from the PAL team. PAL students will form a treatment group matched to a 'non-treatment' group using UEA undergraduate population data from 2016 to 2023.

3.2. Identification strategy

A statistical comparator was identified using propensity score matching (PSM) based on the following variables:

- Academic Year of Entry
- Faculty
- Young/Mature
- Gender

Tolerance for each of these variables were set for an exact match for the nontreatment control group.

3.3. Outcome measures

We have identified three primary outcome measures and three secondary outcome measures to test the hypotheses detailed in Section 2.

Primary outcome measures were identified due to their direct alignment with aims of PAL in relation to subject specific knowledge acquisition, course engagement and continuation to second year of study. Secondary outcome measures identified provide a

fuller picture of long-term outcomes that may occur because of participation. Table 2 lists the outcome variable, type, level and whether any changes were made from original analysis protocol.

Table 2: Outcome measures

Outcome measure	Type	Level	Changes to outcome measure
Primary: Course engagement	Continuous	percent attendance to teaching sessions and advisor meetings scheduled	Changed to percent teaching sessions attended only
Primary: Continuation	Categorical	Continued, Withdrawn	No change
Primary: Stage grades	Continuous	Numeric grade at the end of the first year of study	No change
Secondary: Completion	Categorical	Completed, Withdrawn	Unable to construct measure
Secondary: Degree award	Categorical	Good degree outcome, lower degree outcome	No change

3.4. Sample selection

PAL is open to all first-year students in participating schools of study on an opt-in basis. The evaluation will use secondary data collected by UEA from students who are current students or graduates of UEA between 2016 and 2023. Table 3 details mentee population participant counts alongside non-participant count for each academic year included in the study.

Table 3: Population PAL participant and non-participant counts by academic year

Academic year	Mentee count	Non-participant Count	Total
2016-17	255	2783	3038
2017-18	334	2729	3063
2018-19	166	3130	3296
2019-20	127	3335	3462
2020-21	144	3282	3426
2021-22	44	2939	2983
2022-23	38	2967	3005
Total	1108	21165	22273

3.5. Deviations from analysis protocol

We intended to conduct independent variable estimation (IVE) which is a two-stage least squares regression approach. However, we observed weak instrumentation across all models for our instrumental variable ‘UCAS points.’ As a result, we used propensity score matching (PSM) to define a statistical matched control. We interpret and report the results from this method to test our hypotheses only. In addition, we used UCAS points as a covariate rather than an instrumental variable.

4. Analytical strategy

4.1. What is the effect of PAL participation on student engagement on their course in the first year of study relative to students who do not engage with PAL?

The following model will be used to estimate the effects of the intervention on the course engagement, using the general linear model (multiple linear regression). The analysis will be conducted on an intention-to-treat basis, including all complete cases across both cohorts.

$$y_i = \beta_0 + \sum_k \beta_k x_{ki} + \epsilon$$

where,

- y_i is the continuous outcome variable (Course Engagement) for the i th student
- β_0 is the intercept term
- x_{ki} is a vector of k control covariates (Faculty, Qualification type, Programme mode, Commuter Status, IMD, Gender, Age, Ethnicity, Disability, Care leaver, Bursary, Fee Status, Role in PAL).

- β_k are the corresponding coefficients for each predictor variable x_{ki}
- ϵ is a vector of residuals

4.2. What is the effect of PAL on student continuation on their course at the end of the first year of study relative to students who do not engage with PAL?

The following model will be used to estimate the effects of the intervention on the primary outcome, using a general linear model called logistic regression. Analysis will be conducted on an intention-to-treat basis, including all complete cases across both cohorts.

$$\log\left(\frac{\theta_i}{1-\theta_i}\right) = \beta_0 + \sum_k \beta_k x_{ki}$$

where,

- $\log\left(\frac{\theta_i}{1-\theta_i}\right)$ is the logit function, or in other words, the natural logarithm of the odds ratio.
- θ_i is the probability of the outcome variable occurring for the i th student (e.g. the probability of the binary outcome variable being 1) (Continuation).
- β_0 is the intercept term
- $\sum x_{ki}$ is a vector of k control covariates (Faculty, Qualification type, Programme mode, Commuter Status, IMD, Gender, Age, Ethnicity, Disability, Care leaver, Bursary, Fee Status, Role in PAL)
- β_k are the corresponding coefficients

4.3. What is the effect of PAL participation on end of stage grades relative to those that do not engage with PAL?

The following model will be used to estimate the effects of the intervention on stage grades, using a general linear model called a multiple linear regression. Analysis will be conducted on an intention-to-treat basis, including all complete cases across both cohorts.

$$y_i = \beta_0 + \sum_k \beta_k x_{ki} + \epsilon$$

Σ where,

- y_i is the continuous outcome variable (Stage Grades) for the i th student
- β_0 is the intercept term
- Σx_{ki} is a vector of k control covariates (Faculty Qualification type, Programme mode, Commuter Status, IMD, Gender, Age, Ethnicity, Disability, Care leaver, Bursary, Fee Status, Role in PAL)
- x_{ki} is the corresponding predictors / covariates (Course engagement, Continuation, Completion, Degree Award)
- β_k are the corresponding coefficients for each predictor variable x_{ki}
- ϵ is a vector of residuals

4.4. What is the effect of PAL on student completion of their course relative to those that do not engage with PAL?

The following model will be used to estimate the effects of the intervention on the primary outcome, using a generalised linear model called logistic regression. Analysis will be conducted on an intention-to-treat basis, including all complete cases across both cohorts.

$$\log\left(\frac{\theta_i}{1-\theta_i}\right) = \beta_0 + \sum_k \beta_k x_{ki}$$

- $\log\left(\frac{\theta_i}{1-\theta_i}\right)$ is the logit function, or in other words, the natural logarithm of the odds ratio.
- θ_i is the probability of the outcome variable occurring for the i th student (e.g. the probability of the binary outcome variable being 1) (Completion).
- β_0 is the intercept term
- Σx_{ki} is a vector of k control covariates (Faculty, Qualification type, Programme mode, Commuter Status, IMD, Gender, Age, Ethnicity, Disability, Care leaver, Bursary, Fee Status, Role in PAL)
- β_k are the corresponding coefficients for each predictor variable x_{ki}

4.5. What is the effect of PAL on good degree awarding relative to those that do not engage with PAL?

The following model will be used to estimate the effects of the intervention on the primary outcome, using a generalised linear model called logistic regression. Analysis will be conducted on an intention-to-treat basis, including all complete cases across both cohorts.

$$\log\left(\frac{\theta_i}{1-\theta_i}\right) = \beta_0 + \sum_k \beta_k x_{ki}$$

- $\log\left(\frac{\theta_i}{1-\theta_i}\right)$ is the logit function, or in other words, the natural logarithm of the odds ratio.
- θ_i is the probability of the outcome variable occurring for the i th student (e.g. the probability of the binary outcome variable being 1) (Degree award).
- β_0 is the intercept term
- $\sum x_{ki}$ is a vector of control covariates (Faculty, Qualification type, Programme mode, Commuter Status, IMD, Gender, Age, Ethnicity, Disability, Care leaver, Bursary, Fee Status, Role in PAL)
- β_k are the corresponding coefficients for each predictor variable x_{ki}

4.6. Covariates and predictors

Tables 4 and 5 outline the independent variables and covariates proposed as part of the analytical strategy outlined above. The table also explains any variable level changes from the prespecified analysis protocol to the actual analysis.

Table 4: List of predictor variables

Variable name	Type	Levels	Changes to predictor variables
PAL mentee	Categorical	PAL mentee, non-participant	Removed PAL mentors due to data availability
PAL attendance	Continuous	N sessions attended	Removed due to data availability
PAL delivery	Categorical	Group, One-to-one	Removed due to data availability
Instrumental variable	Continuous	UCAS points	Included in PSM as a covariate

Table 5: List of covariates

Covariate name	Type	Levels	Changes to covariates
Academic year	Categorical	7; 2016–17, 2017–18, 2018–19, 2019–20, 2020–21, 2021–22, 2022–23	No change
Faculty	Categorical	4; Faculty of Medicine and Health Sciences, Faculty of Arts & Humanities, Faculty of Sciences, Faculty of Social Sciences	No change
Qualification type	Categorical	2; A-Level, BTEC+ other	4: A-Level, BTEC, Mixture of A-Level and BTEC, other qualifications
Programme mode	Categorical	2; Full-time, Part-time	Removed due to model rejection
Commuter status	Categorical	2; Commuter, Not Commuter	No change
IMD	Categorical	5; Quintile 1, Quintile 2, Quintile 3, Quintile 4, Quintile 5	2: IMD Q1-2, IMD Q3-5 and unknown
Gender	Categorical	4; Male, Female, Non-binary, Other	2: Male, female and any other gender
Age	Categorical	2; Young, Mature	No change
Ethnicity	Categorical	5; Black/Black British, Asian/Asian British, Mixed Ethnicities, White/White British, Any other ethnicity	No change
Disability	Categorical	2; Disability declared, No disability declared	No change
Care leaver	Categorical	2; Care leaver, Not care leaver	No change
Bursary	Categorical	2; Bursary recipient/Not bursary recipient	No change
Fee status	Categorical	2; Home/International	No change

5. Results

5.1. Participant flow

Figure 1 sets out the sampling frame for each of the dependent variables tested.

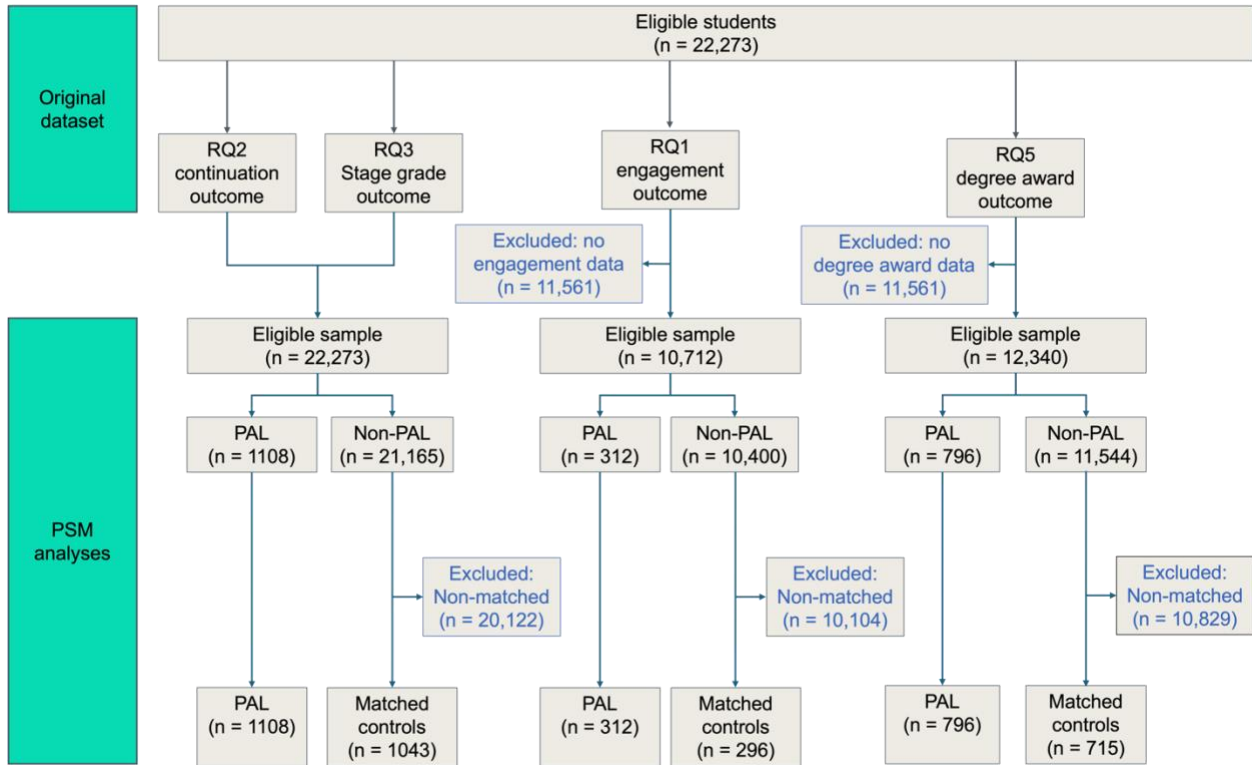


Figure 1. Matched sample diagram for the full participant sample

5.2. Description of data

Table 6 details the demographic, academic year and faculty counts of the main (i.e. largest) dataset.

Table 6: Count of student by treatment or matched control and demographic and institutional data

Academic Year	PAL mentee	Matched Control
2016-17	255	190
2017-18	334	334
2018-19	166	166
2019-20	127	127
2020-21	144	144
2021-22	44	44
2022-23	38	38
Gender	PAL mentee	Matched Control
Female	756	693
Male	351	349
Non-binary and unknown	1	1
Age on entry	PAL mentee	Matched Control
Under 21	988	925

21 or above	120	118
Ethnicity	PAL mentee	Matched Control
Asian	142	116
Black	93	59
Mixed	25	17
Other	22	16
White	807	820
Unknown	19	15
IMD quintile	PAL mentee	Matched Control
IMD 1-2	281	270
IMD 3-5	738	710
NA	89	63
Faculty	PAL mentee	Matched Control
Arts and Humanities	28	28
Medicine and Health Sciences	434	369
Science	319	319
Social Sciences	327	327
UCAS tariff	PAL mentee	Matched Control
Mean (std. dev)	141 (37)	138 (36)
Academic School	PAL mentee	Matched Control
Disability	249	205
No disability	853	832
Not known	6	6

5.3. Outcome of analysis

Table 7 summarises the main findings from our primary and secondary research questions. These are reported in more depth below.

Table 7: Evaluation outcomes summary

Outcome	Estimated Mean for Non-PAL Students	Estimated Effect	SE	p-value	Interpretation
Linear Regression Results					
RQ1: Academic engagement	68.95%	3.90	1.63	.017	Students who were a PAL mentee had significantly higher academic engagement than non-PAL students.
RQ3: End of stage grades	63.16%	1.75	0.43	<.001	PAL mentees received a significantly higher level 4 grade than their non-PAL peers.
Logistic Regression Results					

RQ2: Continuation	94.82%	2.73	0.26	<.001	Continuation was significantly higher for PAL mentees than for non-PAL students
RQ4: 'Good' degree awards	87.41%	1.06	0.17	.728	There was no difference in degree awards between PAL and non-PAL students

5.3.1. RQ1: Student engagement

Academic attendance at timetabled sessions was significantly higher for PAL students than non-PAL students after controlling for all covariates. The full regression model for student engagement can be found in Appendix A.

Engagement with PAL is associated with an increase in average attendance of 3.9 pp relative to non-PAL students. Figure 2 shows the estimated marginal mean of academic engagement by PAL participation fitted from a reduced model using significant independent variables from the full regression only.

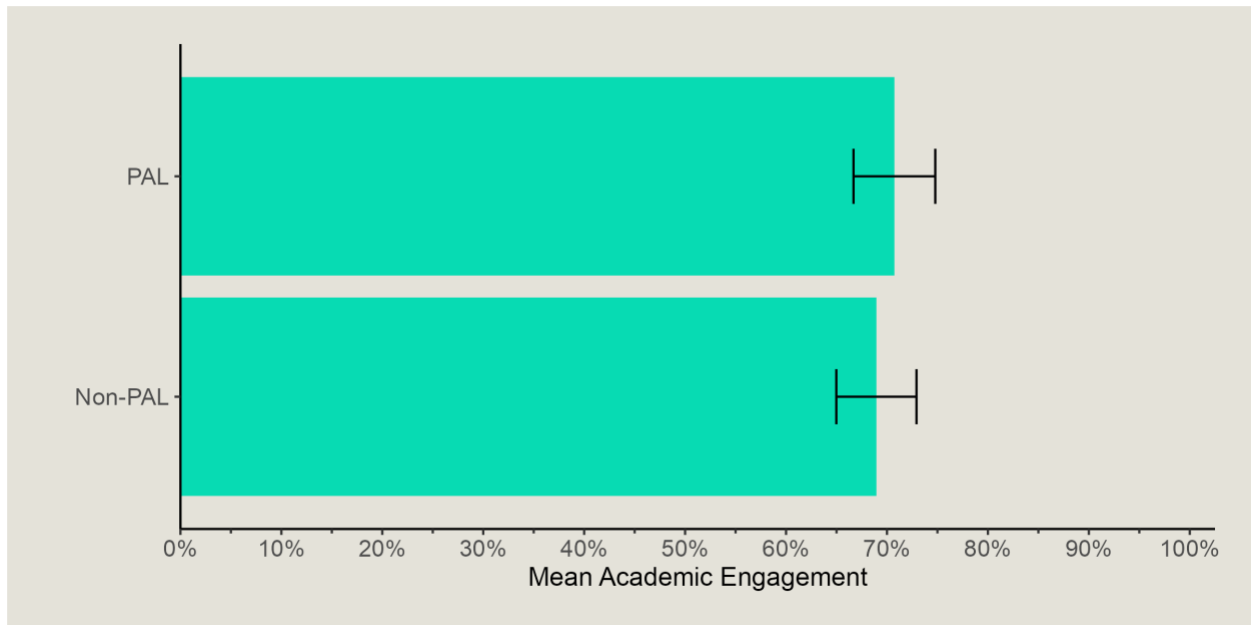


Figure 2. Mean academic engagement by PAL participation (error bars show 95% confidence intervals)

5.3.2. RQ2: Continuation

Results of the fitted model can be found in Appendix B. Figure 3 shows the mean predicted probability of continuation by PAL participation. The mean predicted continuation for PAL mentees was 97.9% with a standard deviation of 1.7 percentage points (pp). The mean predicted probability of continuation for students not engaged in PAL was 94.8% with a standard deviation of 4.2 pp. This represents an absolute effect

of 3.1 pp. In terms of relative effect, engagement in PAL reduced the rate of dropout by 60%.

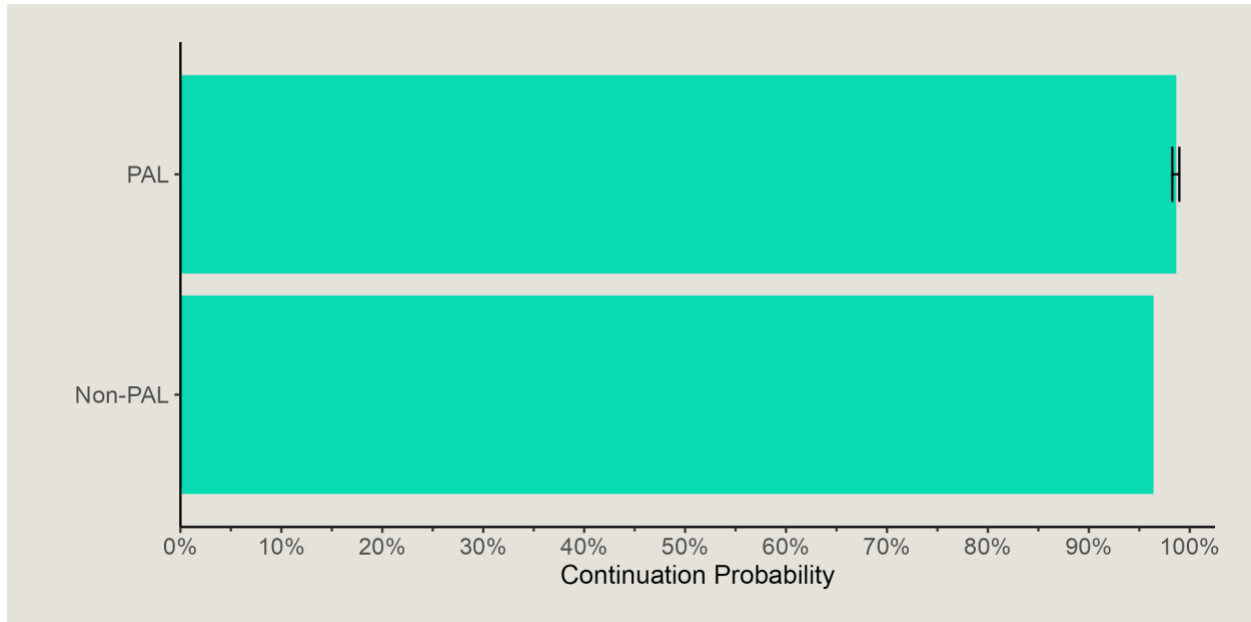


Figure 3. Probability of continuation by PAL participation after controlling for covariates (error bars show 95% confidence intervals)

5.3.3. RQ3: End of stage grades

Results of the fitted model for end of stage grades can be found in Appendix C. The model results indicated a positive, significant effect of PAL engagement on end of stage grades. PAL mentees' stage grades were 1.75 points higher than students that did not engage with PAL, after controlling for all other covariates in the model. We fitted a reduced model using significant independent variables from the full regression only to estimate the marginal means of end of stage grades by PAL participation in Figure 4.

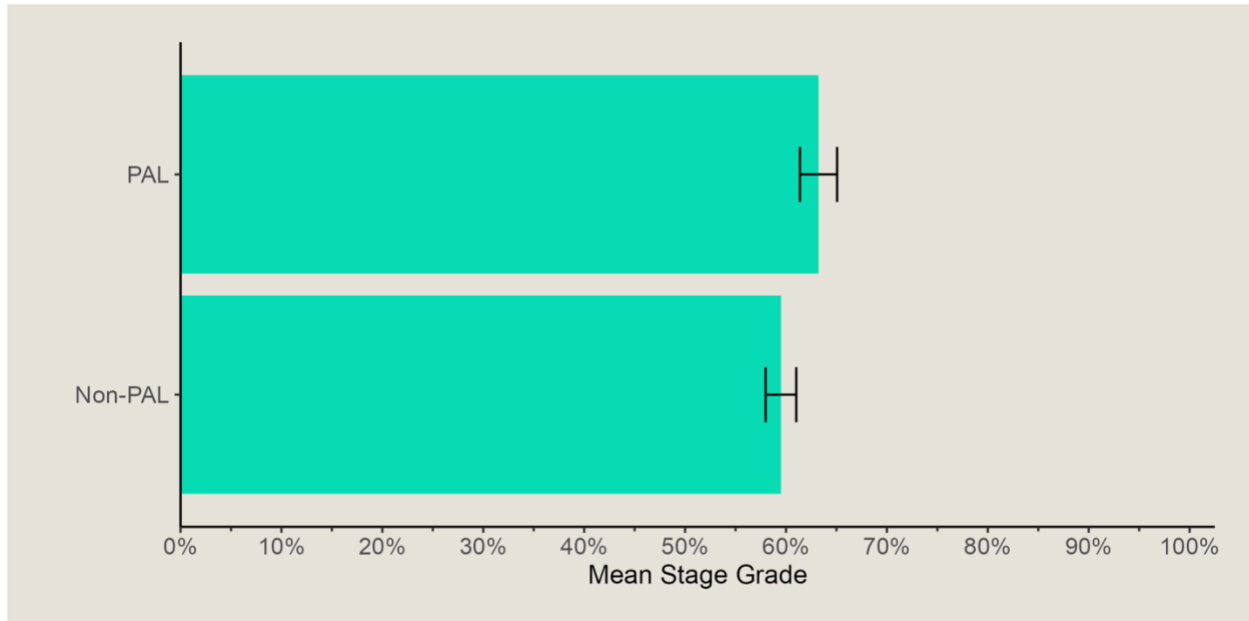


Figure 4. Mean end of stage grades by PAL participation (error bar shows 95% confidence interval)

We explored the natural effect of PAL engagement by classifying the end of level 4 stage grades into hypothetical degree awards based on UEA's most recent grading and marking policy (see Appendix Table C2). Using this approach, we estimate that, 6.10 pp more students would have achieved the equivalent grade of an Upper 2nd or 1st class stage grade in their first year had they engaged with PAL.

5.3.4. RQ4: Degree classification

We analysed the relationship between PAL engagement and the probability of achieving a higher degree classification (Appendix D). We found no significant association between PAL participation and 'good' degree classifications after controlling for all covariates in the model (see Figure 5).

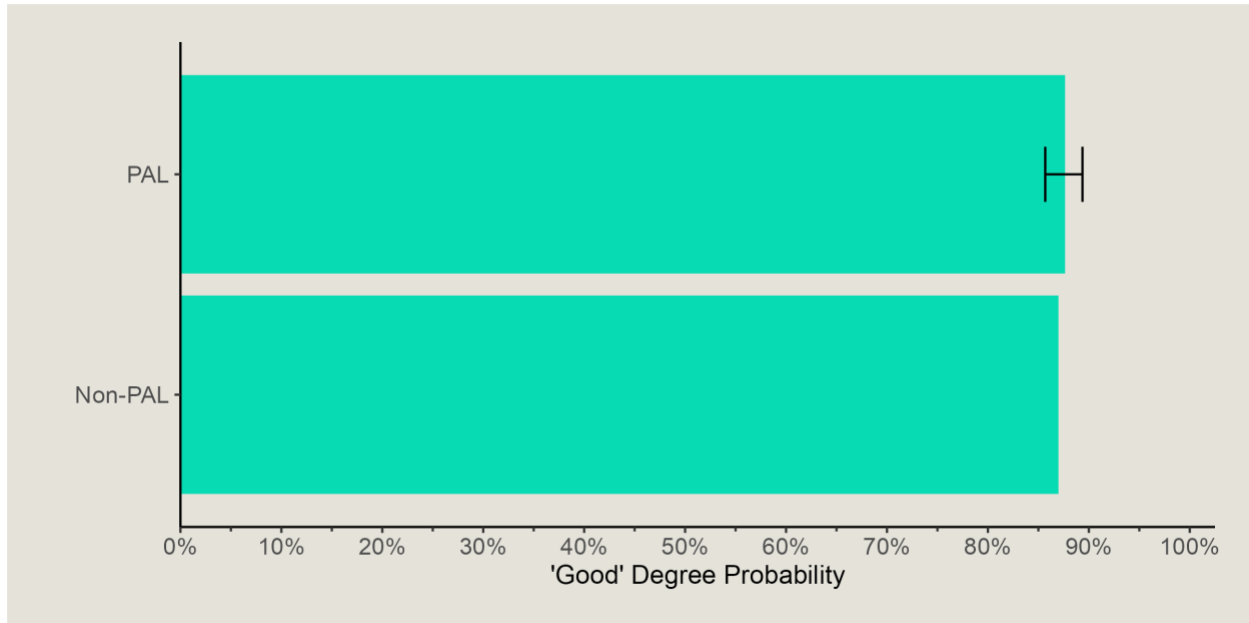


Figure 5. Probability of graduating with a 'good' honours degree by PAL participation after controlling for covariates (error bar shows 95% confidence interval)

6. Discussion

6.1. Interpretation

PAL is a yearlong programme designed to support level 4 students transition and develop subject specific knowledge from trained peer mentors. PAL aims to increase continuation (students progressing from level 4 to level 5), academic engagement, stage grades (students' aggregate grades at the end of each academic year), and ultimately degree classification.

Positive effects on the transition into the first year of study were observed, but longer-term effects on secondary outcomes such as degree outcomes were not observable in the analysis. We found that PAL engagement had significant, positive effects for all primary outcomes articulated in the study; engagement, continuation to the next level of study and end of stage grades. This demonstrates its effectiveness as an intervention within the context of the University of East Anglia.

We found that students who participated in PAL were 60% less likely to withdraw during their first year of study. We explored the natural effect of PAL on end of stage grades using the mean effect size (1.75 stage grades) of PAL. If non-PAL engaged students had taken part, an estimated 64 (6.1 pp) additional students would have received an equivalent end of stage grade associated with a 'good' outcome (i.e. an Upper 2nd or 1st class grade). We also tested the effect of PAL on final degree classification using a

reduced sample size. The effect of PAL was not observable on final degree classification.

Whilst not the aim of the study, entry qualifications – most notably A-Levels and BTECs – were significant covariates with the models produced. It would be useful to explore this in further research and evaluations at UEA.

6.1.1. Short- versus long-term outcomes

The observed effect of PAL on students' short-term outcomes suggests its efficacy as an intervention for students transitioning into higher education. However, the lack of observed efficacy on long-term outcomes may be explained by two reasons; that the effects of PAL do not extend beyond the year that they are experienced, and/or that the factors contributing to degree classification extend beyond the impact of PAL on students in their first year. It is likely that the true reason is a combination of these two explanations. Further exploration should aim to unpick the longevity and generalisability of PAL on students, and the contributing factors to overall degree outcomes.

6.1.2. Implementation differences

PAL is implemented in different ways so individual academic courses can tailor the intervention to their needs. This means that there is not one standard version of the programme throughout the institution. The overall efficacy of PAL across these academic disciplines appears to suggest that a tailored approach is advantageous in this context. While there is currently inadequate sample size to conduct robust comparisons, we suggest that future evaluations may want to explore the different types of implementation (for example group-based vs one-to-one PAL implementation) and the efficacy on student outcomes.

6.2. Generalisability

We used a QED approach to test hypotheses which means we can make some causal inferences about the effectiveness of the programme. The findings are generalisable to UEA and to the students enrolled on their courses. However, higher education providers vary considerably in their geographic place, the size and shape of their course portfolio and additionally the demographics of students they enrol to study on their courses. PAL was designed as an intervention based on its own identified contextual needs; whilst it is possible that PAL may generalised to providers that are similar to UEA, this is not directly supported by this evaluation, and therefore does not generalise these findings to the wider sector. The enhanced Theory of Change (EToC) for PAL uncovered important change mechanisms and assumptions that enable effective implementation at UEA.

The sample size for the research question related to the probability of degree outcomes was reduced to exclude students who were enrolled on courses with unclassified degree qualifications. As a result we excluded students on medicine courses who

received Bachelor of Medicine, Bachelor of Surgery (MBBS) degree qualifications. As such, while medicine courses participated in PAL, findings on degree outcomes may not generalise to this cohort at UEA.

6.3. Limitations

Given the timing and nature of the secondary data used throughout this evaluation, there are several limitations that are important to consider and factor in when interpreting the findings from this evaluation, and in considering the robustness of the findings.

6.3.1. Quasi-experimental design

PAL is an opt-in intervention offered to all students starting their first year of study participating schools of study at UEA. There are no eligibility requirements to engagement and students self-select to take part. As a quasi-experimental design, there are qualitative differences between those students who opted-in to PAL, and those who opted-out.

Reasons for non-participation may include time availability for extra-curricular engagement, perceived value of the programme, and prior help seeking behaviour. Controlling for student characteristics in matching and OLS models aims to account for proxy variables underlying these reasons; for example students with little time to dedicate to extra-curricular activities may be those from more disadvantaged backgrounds who undertake high levels of paid employment alongside full-time study. However, consideration should be given to the potentiality that these available proxy measurements do not wholly capture the differences between students who opt-in and those who opt-out of participating in PAL.

6.3.2. Instrumental Variable Estimation and Propensity Score Matching

The issue of self-selection bias was addressed in the original analytical strategy through the use of instrumental variable estimation with a two-stage least squares regression. This was the most optimal approach to account for PAL self-selection and reduce bias caused by endogeneity. However, the instrument tested – UCAS points – had weak instrumentation. As a result we were unable to interpret the findings of this original analysis. PSM was therefore introduced to attempt to account for bias that may occur due to unobserved bias present within PAL self-selection. PSM is a widely accepted technique to overcome challenges related to endogeneity.

6.3.3. Covid-19

PAL is a long-running programme, during which the effects of Covid-19 were felt acutely by many in the higher education sector. Some of the data in this evaluation are from academic years where students were directly impacted by Covid-19 (i.e. 2019-20 and

2020-21), while in subsequent years, indirect challenges persist. Findings from these years may therefore have less generalisability than other years.

7. Appendices

Appendix A. RQ1 : What is the effect of PAL participation on student engagement on their course in the first year of study relative to students who do not engage with PAL?

Table A1. Regression results for course engagement

	PSM OLS	SE	Low CI	High CI	p-value
(Intercept)	79.28	8.67	62.25	96.31	<.001
PAL Mentee (Ref=non-participant)	3.90	1.63	0.70	7.10	.017
Academic Year: 2022-23 (Ref=2021-22)	4.78	2.37	0.13	9.42	.044
Commuter (Ref=non-commuter)	5.73	2.13	1.55	9.91	.007
IMD Q1 or Q2 (Ref=IMD Q3-5)	-0.45	1.85	-4.08	3.17	.806
Mature (Ref=Young)	5.90	2.61	0.78	11.02	.024
Declared disability (Ref=no declared disability)	-5.75	1.77	-9.22	-2.28	.001
Bursary student (Ref=no Bursary given)	-2.25	2.04	-6.26	1.75	.270
Care experienced (Ref= not care experienced)	-6.60	2.72	-11.95	-1.25	.016
Male student (Ref=female or any other gender)	-9.04	1.74	-12.46	-5.63	<.001
Black/Black British ethnicity (Ref=white ethnicity)	0.40	3.20	-5.89	6.68	.902
Asian/Asian British ethnicity (Ref=white ethnicity)	-0.44	2.23	-4.81	3.93	.844
Mixed heritage ethnicity (Ref=white ethnicity)	-8.08	3.98	-15.89	-0.27	.043
Any other ethnicity (Ref=white ethnicity)	0.40	3.20	-5.89	6.68	.902
Home domiciled (Ref= not home domiciled)	0.18	2.16	-4.06	4.42	.934
Faculty of Arts and Humanities (Ref=Faculty of Medicine and Health Sciences)	-13.06	3.04	-19.02	-7.09	<.001
Faculty of Science (Ref=Faculty of Medicine and Health Sciences)	-3.31	2.03	-7.29	0.67	.103
Faculty of Social Sciences (Ref=Faculty of Medicine and Health Sciences)	-5.37	2.35	-9.98	-0.76	.022
A-Levels only (Ref=any other qualification)	-1.47	2.65	-6.67	3.73	.580
A-Level and BTEC (Ref=any other qualification)	-2.19	4.40	-10.84	6.45	.619
BTEC (Ref=any other qualification)	3.23	3.75	-4.14	10.60	.389
UCAS Points	0.01	0.02	-0.03	0.06	.622
N	610				
R ²	0.16				

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: TeachingSessionsAttended

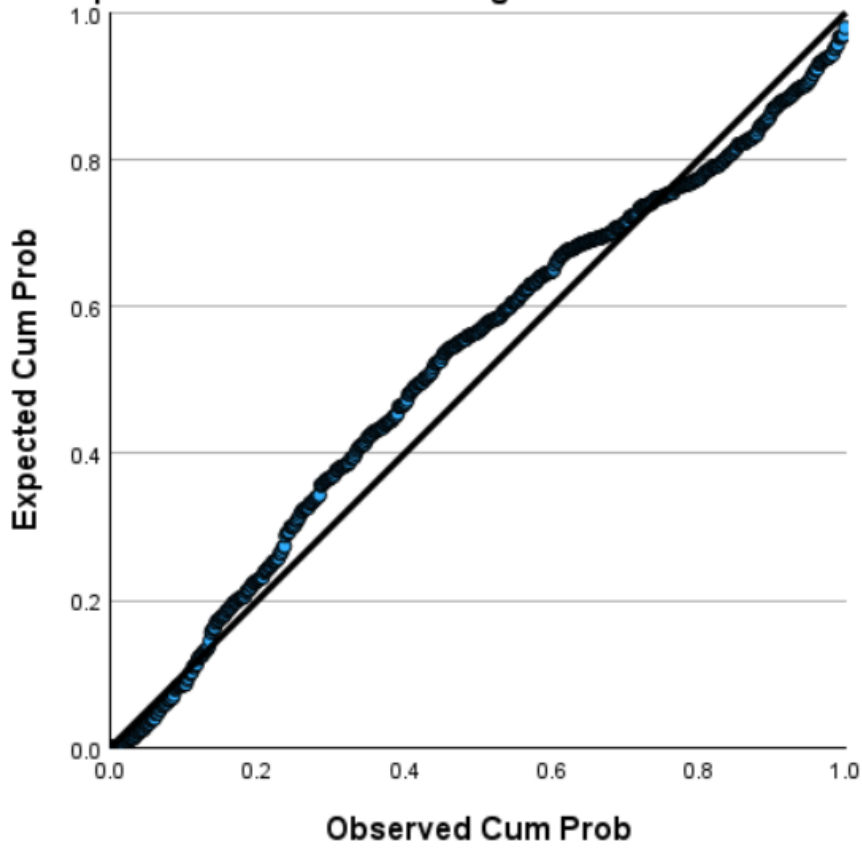


Figure A1. P-P plot showing expected and observed cumulative probabilities for student engagement

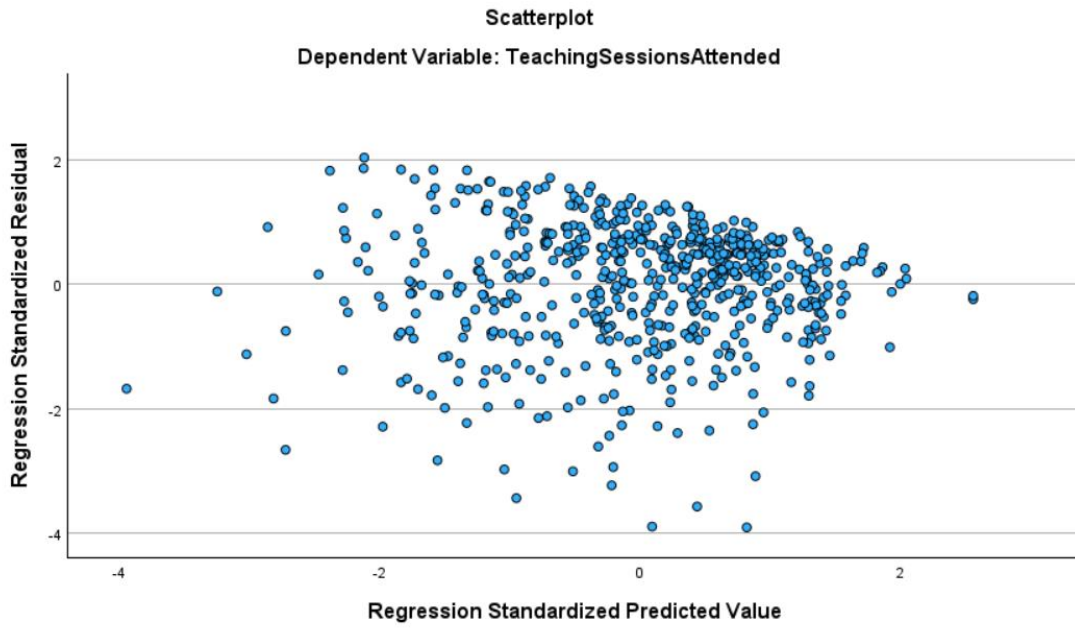


Figure A2. Scatterplot showing residuals and predicted values for student engagement

Appendix B. RQ2: What is the effect of PAL on student continuation on their course at the end of the first year of study relative to students who do not engage with PAL?

Table B1. Regression table for continuation outcome variable and covariates

	PSM BLR	SE	p-value
(Intercept)	21.23	40192.5	1.000
PAL Mentee (ref=non-participant)	2.73	0.26	<.001
Academic Year: 2017-18 (ref=2016-17)	1.40	0.32	.294
Academic Year: 2018-19 (ref=2016-17)	1.16	0.37	.685
Academic Year: 2019-20 (ref=2016-17)	2.52	0.73	.207
Academic Year: 2020-21 (ref=2016-17)	1.99	0.62	.263
Academic Year: 2021-22 (ref=2016-17)	0.84	0.72	.811
Academic Year: 2022-23 (ref=2016-17)	1.40	0.94	.721
Commuter (ref=non-commuter)	1.18	0.71	.815
IMD Q1 or Q2 (ref=IMD Q3-5)	0.81	0.28	.445
Mature (ref=young)	2.25	0.42	.052
Declared disability (ref=no declared disability)	0.89	0.30	.682
Bursary student (ref=no Bursary given)	1.39	0.31	.296
Care experienced (ref= not care experienced)	0.47	0.38	.045
Male student (ref=female or any other gender)	0.51	0.27	.012
Other ethnicity (ref=white ethnicity)	0.84	0.54	.744
Black/Black British ethnicity (ref=white ethnicity)	0.70	0.45	.435
Asian/Asian British ethnicity (ref=white ethnicity)	1.24	0.44	.621
Mixed heritage ethnicity (ref=white ethnicity)	1.03	0.75	.967
Home domiciled (ref= not home domiciled)	0.85	0.39	.668
Faculty of Arts and Humanities (ref=Faculty of Medicine and Health Sciences)	0.45	0.78	.310
Faculty of Science (ref=Faculty of Medicine and Health Sciences)	0.82	0.36	.573
Faculty of Social Sciences (ref=Faculty of Medicine and Health Sciences)	0.77	0.33	.436
A-Levels only (Ref=any other qualification)	1.35	0.42	.478
A-Level and BTEC (Ref=any other qualification)	0.60	0.59	.382
BTEC (Ref=any other qualification)	0.47	0.45	.093
UCAS Points	1.00	0.00	.218
N	2151		
R ²	0.11		
Chi-square	12.05		

Appendix C. RQ3: What is the effect of PAL participation on end of stage grades relative to those that do not engage with PAL?

Table C1. Regression table for end of stage grade outcome variable and covariates

	PSM OLS	SE	Low CI	High CI	P-value
(Intercept)	58.98	10.02	39.32	78.63	<.001
PAL Mentee (ref=non-participant)	1.75	0.43	0.91	2.59	<.001
Academic Year: 2017-18 (ref=2016-17)	-0.03	0.63	-1.27	1.21	.965
Academic Year: 2018-19 (ref=2016-17)	-1.13	0.74	-2.58	0.32	.127
Academic Year: 2019-20 (ref=2016-17)	1.36	0.84	-0.29	3.02	.107
Academic Year: 2020-21 (ref=2016-17)	1.59	0.82	-0.02	3.20	.052
Academic Year: 2021-22 (ref=2016-17)	0.59	1.26	-1.88	3.07	.639
Academic Year: 2022-23 (ref=2016-17)	0.29	1.30	-2.26	2.84	.824
Commuter (ref=non-commuter)	1.50	1.05	-0.56	3.56	.152
IMD Q1-Q2 (ref=IMD Q3-5)	-0.26	0.54	-1.32	0.79	.626
Mature (ref=young)	-0.72	0.88	-2.45	1.01	.415
Declared disability (ref=no declared disability)	-1.38	0.54	-2.42	-0.33	.010
Bursary student (ref=no Bursary given)	0.07	0.57	-1.04	1.19	.899
Care experienced (ref= not care experienced)	-0.77	5.80	-12.15	10.60	.894
Gender Male student (ref=female or any other gender)	-0.67	0.49	-1.63	0.30	.174
Other ethnicity (ref=white ethnicity)	1.08	0.98	-3.01	0.85	.274
Black/Black British ethnicity (ref=white ethnicity)	1.51	0.90	-2.55	0.97	.377
Asian/Asian British ethnicity (ref=white ethnicity)	0.28	0.73	-0.99	1.87	.550
Mixed heritage ethnicity (ref=white ethnicity)	0.20	1.25	-3.33	1.57	.481
Home domiciled (ref=not home domiciled)	-0.43	0.98	-2.34	1.49	.662
Faculty of Arts and Humanities (ref=Faculty of Medicine and Health Sciences)	-6.12	1.54	-9.14	-3.10	<.001
Faculty of Science (ref=Faculty of Medicine and Health Sciences)	-1.44	0.63	-2.68	-0.21	.021
Faculty of Social Sciences (ref=Faculty of Medicine and Health Sciences)	-5.87	0.59	-7.02	-4.71	<.001
A-Levels only (Ref=any other qualification)	5.44	0.84	3.80	7.07	<.001
A-Level and BTEC (ref=any other qualification)	-1.98	1.24	-4.41	0.46	.112
BTEC (ref=any other qualification)	-6.00	0.96	-7.89	-4.11	<.001
UCAS Points	0.07	0.01	0.06	0.08	<.001
N	2151				
R ²	0.18				

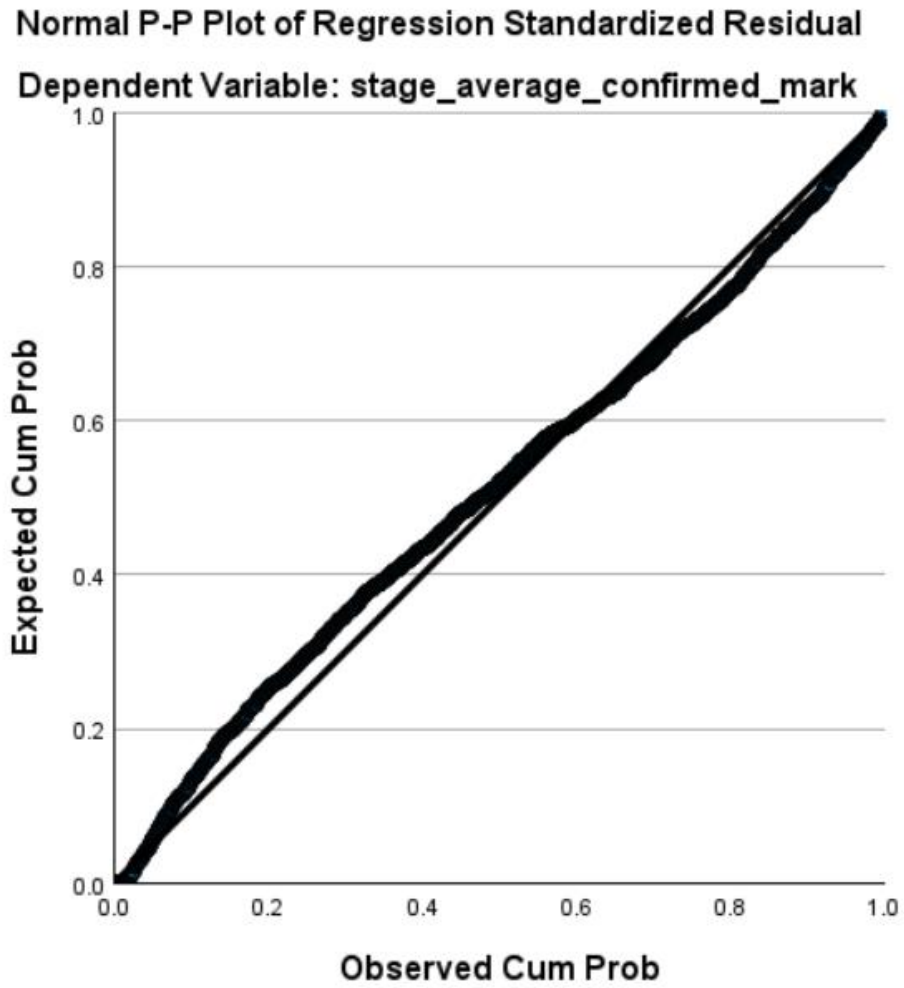


Figure C1. P-P plot showing expected and observed cumulative probabilities for stage grade

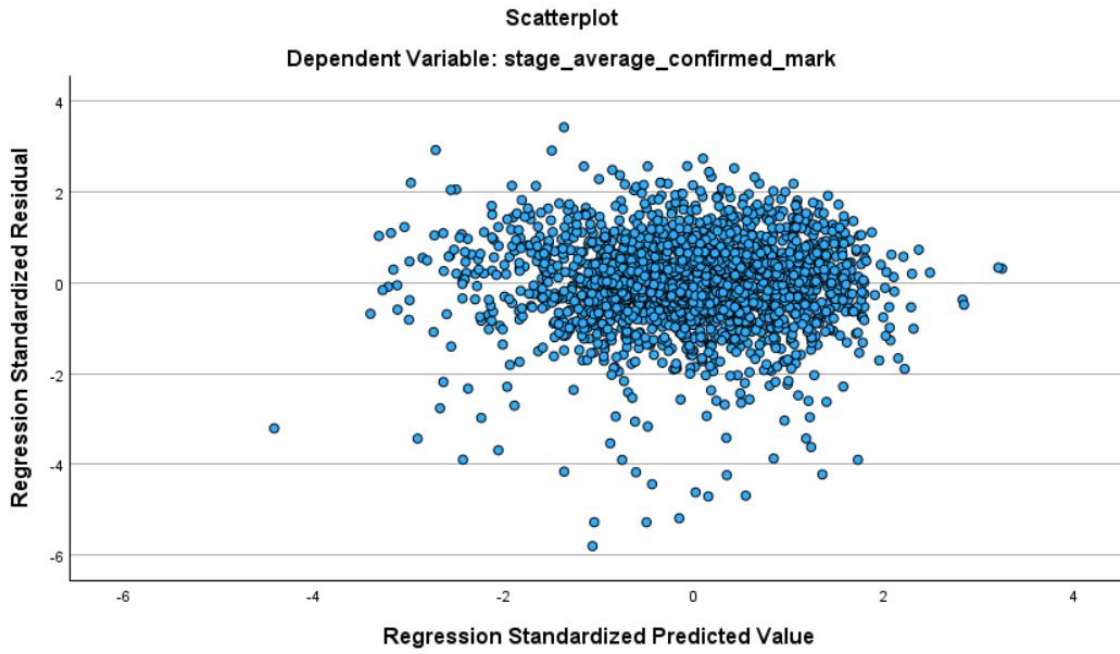


Figure C2. Scatterplot showing residuals and predicted values for stage grade

Table C2. UEA Regulations for bachelors, integrated masters awards and certificates

Classification	Abbreviation	Final Award Mark
First Class Honours	I	70-100%
Upper Second Class Honours	II (1)	60-69%
Lower Second Class Honours	II (2)	50-59%
Third Class Honours	III	40-49%

Appendix D. RQ4: Results for What is the effect of PAL participation on end of stage grades relative to those that do not engage with PAL?

Table D1. Regression table for degree award outcome variable and covariates

	PSM BLR	SE	p- value
(Intercept)	17.76	40193.34	1.000
PAL Mentee (ref=non-participant)	1.06	0.17	.728
Academic Year: 2017-18 (ref=2016-17)	2.18	0.22	<.001
Academic Year: 2018-19 (ref=2016-17)	2.50	0.27	.001
Academic Year: 2019-20 (ref=2016-17)	2.44	0.34	.008
Academic Year: 2020-21 (ref=2016-17)	1.56	0.33	.175
Commuter (ref=non-commuter)	0.76	0.46	.557
IMD Q1 or Q2 (ref=IMD Q3-5)	0.75	0.19	.137
Mature (ref=young)	0.54	0.34	.069
Declared disability (ref=no declared disability)	0.70	0.20	.081
Bursary (ref=no bursary given)	0.59	0.22	.016
Care experienced (ref= not care experienced)	0.33	1.49	.454
Male student (ref=female or any other gender)	0.66	0.20	.039
Other ethnicity (ref=white ethnicity)	0.71	0.36	.346
Black/Black British ethnicity (ref=white ethnicity)	0.70	0.30	.245
Asian/Asian British ethnicity (ref=white ethnicity)	0.59	0.27	.054
Mixed heritage ethnicity (ref=white ethnicity)	1.33	0.64	.656
Home domiciled (ref=not home domiciled)	1.20	0.20	.364
Faculty of Arts and Humanities (ref=Faculty of Medicine and Health Sciences)	2.32	0.28	.003
Faculty of Science (ref=Faculty of Medicine and Health Sciences)	0.60	0.39	.179
Faculty of Social Sciences (ref=Faculty of Medicine and Health Sciences)	0.33	0.30	.000
A-Levels only (Ref=any other qualification)	3.06	1.12	.320
A-Level and BTEC (Ref=any other qualification)	1.29	0.27	.339
BTEC (Ref=any other qualification)	1.42	0.24	.136
UCAS Points	1.02	0.00	<.001
N	1511		
R square	0.19		
Chi-square statistic	5.34		

Appendix E. Impact table

Outcome	Sample size	P Value	Effect	Estimated 'real world' effect	Evaluation security (1 = not at all secure 5 = very secure)	Type of evidence
<i>What is the outcome measure? (include primary and secondary outcomes)</i>	<i>How many participants were included in the study relating to this outcome?</i>	<i>Report the p-value derived from the statistical tests</i>	<i>Report the size of the effect - confidence intervals/Cohen's d / Cohen's h</i>	<i>Where possible, please translate the effect size into a tangible example of the size of the effect - e.g., 13 more students apply to HE</i>	<i>See evaluation security note¹</i>	<i>Is it Type 1,2 or 3 evidence - according to the <u>OfS standard of evidence?</u></i>
Primary: Course engagement	608	0.017	0.14	-	2.2	2
Primary: Continuation	2151	<.001	0.32	-	3.6	2
Primary: Stage grades	2151	<.001	0.12	-	3.6	2
Secondary: Degree award	1511	.728	0.22	-	2.6	2

¹ Based on the decisions made around the evaluation, you will be able to assess the security of your evaluation – that is, how confident you can be when making claims about the findings. The most robust evaluations with large samples, low attrition levels and no threats to validity will receive the highest score of 5/5.