

Research protocol

Mature learners online experiment

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VERSION	DATE	REASON FOR REVISION/NOTES
<i>Any changes to the design to be agreed between the implementation partner(s), evaluator and TASO. Note any agreed changes in the table below.</i>		
1.1	24/02/21	Small QA comments responded to ACE survey items added Pre-registration link added
1.0 [original]	07/01/20	
Pre-registration		This design has been pre-registered on OSF Registries. ¹

QA completed by the TASO Academic Lead before project launch.

The QA rating system is based on the Evaluation Security tool presented in the TASO Monitoring and Evaluation Framework.²

QA	Comments	Rating (out of 5)
Design	Survey experiment using conjoint analysis	5
Sample size	2000-2500 participants. "Per arm" less useful in this kind of analysis than usual	3
Outcome measure	Self-reported intentions	2
Attrition	Likely to be 0% given experiment type	5
Validity	Internal validity likely to be high, external validity is uncertain	4
Overall		3.8

¹ <https://osf.io/3dq5g>

² <https://taso.org.uk/evidence/evaluation/>

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2. Summary

Background

The TASO Theme 1 evidence review found that there was not enough research on how to support mature students into HE.³ TASO's Theme Working Group recommended TASO undertake more research on this topic and TASO commissioned this trial accordingly.

Aims

This trial aims to conduct an online experiment testing which institutional features are attractive to adult learners, in order to help inform policy and practice at HEPs with respect to widening participation for mature learners.

Intervention and Design

This project consists of a survey experiment using conjoint analysis, which is a survey experiment method that allows researchers to measure the value respondents place on different attributes of a given set of options. The attributes being varied in this experiment will be features of an HE course (e.g. size of course, timetabling options), in order to better understand which features matter to mature learners in higher education.

Outcome measures

The outcome measure will be the relative probability that a participant chooses a course with a given attribute as compared to choosing a course without that given attribute.

Analyses

The analytical strategy will be a linear probability model to find Y_{it} , in which Y_{it} is the probability that individual i will select Profile A at task t , where $t \in (1:5)$, given the attributes of Profile A and Profile B.

Secondary analysis will focus on the likelihood of selecting a profile given its characteristics regardless of the characteristics of the other profile, reported likelihood of enrolling in course, and demographic predictors of attitudes toward continuing education.

³ <https://epi.org.uk/publications-and-research/impact-of-interventions-for-widening-access-to-he/>

3. Background

Team

Organisation	Name	Role and responsibilities
King's College London	Susannah Hume	Principal Investigator
TASO	Dr Eliza Kozman	Co-Investigator
King's College London	Salome Gongadze	Research assistant

Preliminary Work

King's has undertaken a review of existing academic and practitioner literature on access and success for mature learners in UK higher education (HE) on behalf of TASO. The review⁴ found that there are few rigorously evaluated intervention studies relating to mature learners. However, research into the experience of mature learners and barriers to uptake suggest some avenues for further exploration.

The findings from the literature review, along with discussion and guidance from the TASO Theme Working Group 1, feed into the next stage of the project, which is to conduct one or more online experiments testing different approaches to messaging for the recruitment of mature students onto HE courses.

4. Aims

The aim of this trial is to do an online experiment testing which institutional features are attractive to adult learners, in order to help inform policy and practice at HEPs with respect to widening participation for mature learners.

This project consists of a survey experiment using conjoint analysis which is a survey experiment method that allows researchers to measure the value respondents place on different attributes of a given set of options. The attributes being varied in this experiment will be features of a HEP course (e.g. size of course, timetabling options, entry qualifications), in order to better understand which features matter to mature learners in higher education.

⁴ [Can cite once we post it somewhere.]

5. Intervention

This trial will be run as an online survey experiment on the digital survey platform Prolific. This project will be using conjoint analysis to compare preferences for HEP recruitment messaging. More detail on design is given in Section 1.

The attributes and possible values, which will be sampled with equal probabilities within each attribute, are given in the table below.

Attributes	Description	Value
Institution Ranking	How the university is ranked in major university rankings lists (such as the Complete University Guide league tables or Times Higher Education rankings); rankings score universities on entry requirements, research activities, graduate outcomes and student satisfaction.	Coded from 1 – 4 representing: "151st - 400th in the UK" "51st - 150th in the UK" "10th - 50th in the UK" "Top 10 in the UK"
Travel time	How long it would take you to get to the university, using your preferred means of transport (e.g. by car, public transport)	Continuous, ranging from 5 to 400 minutes, converted to hours/mins for presentation. For purpose of analysis, recoded uniformly from 1 – 8.
Course size	How many students are on the course.	Continuous, ranging from 10 to 500 students. For purpose of analysis, recoded into octiles, from 1 – 8.
Class timing	When the classes are scheduled, either during working hours or outside them.	Coded from – 1 to 1, representing: "All during working hours (8am - 5pm weekdays)", "A mix of during and outside working hours" "All outside working hours (5pm - 10pm weekdays)"
Student satisfaction	The percentage of last year's graduates of the course who stated that they were satisfied overall with the quality of the course.	Continuous, from 50% – 99% For purpose of analysis, recoded uniformly from 1 – 8.

Attributes	Description	Value
Proportion of graduates in a graduate-level job after 12 months	The proportion of graduates who found a graduate-level job within a year of graduating from the course.	Continuous, from 40% – 80%. For purpose of analysis, recoded uniformly from 1 – 8.
Proportion of mature students	The percentage of students in the course who are over the age of 25	Continuous, from 5% – 60%. For purpose of analysis, recoded uniformly from 1 – 8.
Online or blended learning available	Whether the course can be taken online or as a combination of online and in-person instruction.	"Yes" (1) "No" (0)
Academic skills training or study support for mature learners	Whether the university offers training or support for mature learners to develop their study skills in preparation for the course.	"Yes" (1) "No" (0)
Dedicated mature student support staff member	Whether the university has a specific staff member whose job it is to advise and support mature students to get the most out of their course.	"Yes" (1) "No" (0)
Nursery or childcare available on/near campus	Whether there is childcare available either at the university or within a short walk	"Yes" (1) "No" (0)
Social opportunities for mature students	Whether the university organises social opportunities that are specifically for mature students, to provide networking opportunities and shared support.	"Yes" (1) "No" (0)

6. Design

Survey experiments and Prolific

Survey experiments combine the low cost and ease of use of surveys with the experimental design's ability to draw causal inferences through randomisation.

For this study, we will run an online experiment using the platform Prolific. Online survey experiments are becoming widespread in social science research.⁵ Beyond gaining the ability to access a more diverse range of participants than traditional lab-based studies, this mode is practical and feasible in the current context of COVID-19 and limitations on travel and in-person interaction.

The online experiment will recruit participants from the public opinion platform [Prolific](#), onto a survey experiment hosted on a King's Qualtrics account. Prolific is a dedicated online experiment platform with 150,000 participants internationally, including a UK representative sample, and is considered one of the more robust platforms for online experiments.⁶ Prolific's interface will allow us to screen for participants who meet our inclusion criteria and to seek a good balance of age groups, genders and geographic spread.

Prolific respondents are remunerated at a level set by the researcher, based on the expected duration of the study. Prolific require remuneration to be set above £5/hour, and the typical level is around £6-7/hour, with the typical study running for 5 - 15 minutes.

The key limitation of online experiments is that the level of time and attention it is realistic to expect from participants. This means that both the interventions and the treatment effects are likely to be modest, and the format is best used to test how different types of messages, messengers or activities influence attitudes towards the target behaviour (in this case, applying to higher education).

Background on conjoint experiments

Conjoint analysis is a model of survey experimentation that seeks to facilitate the analysis of 'multidimensional **causal** relations'.⁷ While traditional survey experiments

⁵ Palan, S. & Schitter, C. (2017) 'Prolific.ac—A subject pool for online experiments', *Journal of Behavioural and experimental finance*, Vol 17, 22-27.

⁶ Peer, E., Brandimarte, L., Samat, S., Acquisti, A. (2017) 'Beyond the Turk: Alternative platforms for crowdsourcing behavioural research.' *Journal of Experimental Social Psychology*, Vol 70, 153-163.

⁷ Hainmuller, J., Hopkins, D. J., Yamamoto, T. (2014) Causal Inference in Conjoint Analysis: Understanding Multidimensional Choices via Stated Preference Experiments. *Political Analysis*, Vol 22(1), 1-30.

Knudsen, E. & Johansson, M. P. (2018) Beyond the Limits of Survey Experiments: How Conjoint Designs Advance Causal Inference in Political Communication Research. *Political Communication*, Vol 36(2).

only allow for the analysis of causal effects of a single attribute, conjoint analysis allows researchers to test out the casual impact of several attributes at once, making it useful for understanding how people make choices in the face of multiple options.⁸ Given that we are interested in understanding which type of HE recruitment messaging is more appealing to adults without a degree – testing their preferences in terms of what kind of recruitment is more appealing – a conjoint analysis is appropriate for this experiment.

Conjoint experiments allow for analysis of multidimensional causal relations by randomising multiple attributes in a set of options. A typical conjoint experiment would display multiple options for a given choice (e.g. a candidate in an election) which each list a set of attributes (e.g. views on immigration, level of experience, age) in a display called a ‘conjoint table’.⁹ The experiment then randomly varies which attributes are displayed.

Tasks and attributes

Participants will complete five comparison tasks, meaning they will view five conjoint tables of two profiles each and, for each one, be asked first to indicate which option they prefer (forced-choice question) and to rate each choice on a scale of one through ten (individual ranking question). Including both individual rating and forced choice questions are in line with typical practice in conjoint experiments as outlined by Bansak et al. (2018)¹⁰, in order to capture the advantages of each question outcome measure. They write that forced-choice questions have the benefit of possibly ‘compel[ling] respondents to think more carefully about trade-offs’, while individual ranking allows for the expression of ‘approval or disapproval of each profile without constraints’.

The number of tasks and attributes chosen in this experiment has been informed by the methodological literature on conjoint experiments. A major concern with conjoint experiments is the well-documented tendency of survey respondents to satisfice – getting fatigued as a survey gets longer and beginning to produce less-effortful answers, reducing the quality of the survey.¹¹ Two studies from 2018 and 2019 respectively indicate that, by testing numbers of tasks and attributes above conventional practice, conjoint experiments allow for a fairly high number of tasks and attributes to be tested without inducing satisficing behaviour. Bansak et al (2018)¹² showed that participants could complete 30 tasks with conjoint tables of seven attributes each, in this

⁸ Bansak, K. et al (2019) “Conjoint Survey Experiments” in: J. N. Durckman & D. P. Green, eds. Cambridge Handbook of Advances in Experimental Political Science, New York: Cambridge University Press.

⁹ See Bansak et al (2019) for an example.

¹⁰ Bansak et al (2019).

¹¹ Bansak, K., et al (2018) The Number of Choice Tasks and Survey Satisficing in Conjoint Experiments. *Political Analysis*, 26(1), 112-119.

¹² Ibid.

case, hypothetical election candidates without meaningfully reducing answer effort, as measured by the consistency of the Average Marginal Component Effects (AMCE) of two selected core attributes. A 2019 study from the same authors,¹³ in which a two-stage design was used to randomly assign filler attributes in order to measure their impact on the AMCE of core attributes, found the predictive power of core attributes reduced with more filler attributes, but as many as 18 attributes could be used successfully.

Given the number of tasks in the above study was purposefully above-average, this experiment has five tasks, each requiring the evaluation of two course profiles with 12 attributes each. We believe this number achieves a balance between having enough tasks and attributes to suit analytical needs without over-burdening subjects.

Outcome measures

Primary outcome	The primary outcome measure will be the likelihood that an individual chose Profile A, given the differences between Profile A and Profile B.
Secondary outcome 1	The secondary outcome measure will be whether a given profile, with a particular set of attributes, was selected, regardless of the characteristics of the comparator module. This will be coded as 1 if the respondent chose that profile and 0 otherwise.
Secondary outcome 2	The secondary outcome will be how likely respondents considered they were to enrol in a course with a given profile with given attributes, regardless of the characteristics of the comparator module. This will be coded on a scale from 1 to 7 where 1 represents 'Extremely Unlikely' and 7 represents 'Extremely Likely'.

7. Sample selection

We anticipate that around 2,000-2,500 participants will be involved in the experiment, depending on the number of Prolific users that respond to our recruitment. Prolific currently has around 6,500 participants who are in England, not currently students, do not have a tertiary qualification and have been active in the past 90 days.

¹³ Bansak, K., et al (2019) Beyond the breaking point? Survey satisficing in conjoint experiments. *Political Science Research and Methods*, 1-19.

The Prolific platform allows us to generate a set of inclusion and exclusion criteria for participant demographics and will then recruit them on our behalf. The below table lists our expected inclusion and exclusion criteria:

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> • Age > 18 • Not currently a student • Not in possession of a tertiary qualification • In England 	There are no additional exclusion criteria

Participants will receive an incentive of £1.35 for their participation. This is considered a good incentive level for a study of approximately 10 minutes' duration.

8. Randomisation

The randomisation will be conducted via Javascript, embedded into the Qualtrics form. It will be a simple random sampling of all attributes, with no stratification. As the randomisation is conducted at the point of intervention, it will not be possible to check balance ex ante.

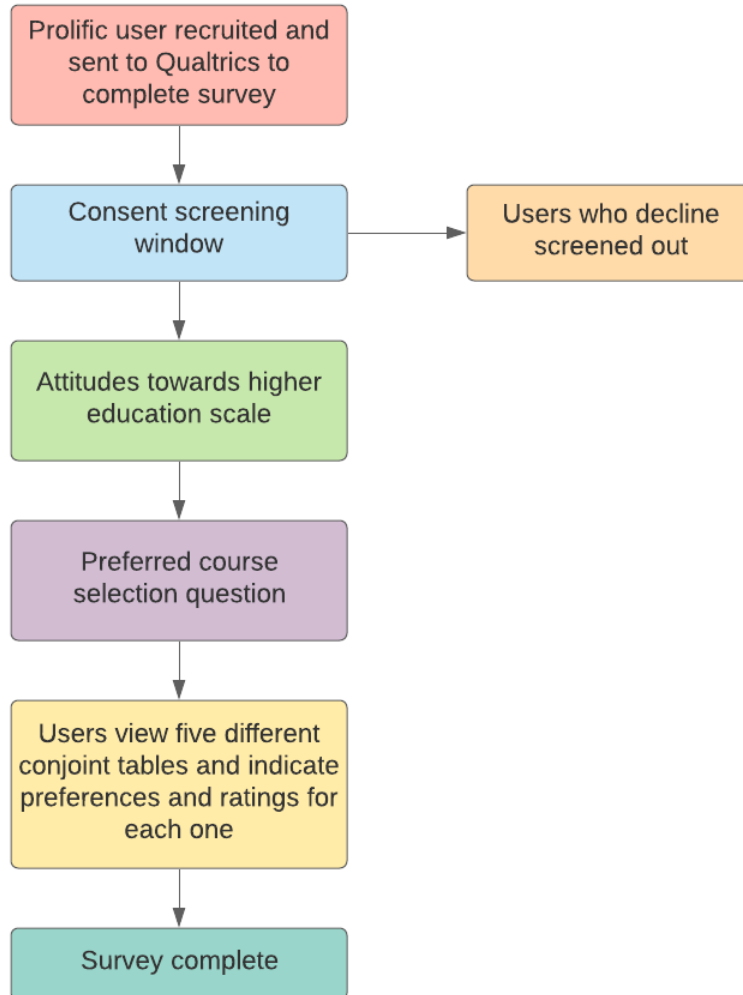
9. Data collection

All data will be collected via Prolific pre-screening and Qualtrics.

Data item	Timeframe	Collector
Age	As reported at time of survey	Prolific pre-screening
Country of Birth		
Nationality		
First language		
Ethnic group		
Gender		
Parental status		
Household income		
Geographic region of England		
Highest level of education completed		
Employment status (full/part-time, not in paid work, unemployed)		
Current student status	As at survey administration	Survey
Highest qualification held		
Occupational sector		

Revised Attitudes to Continuing Education Scale¹⁴		
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10. Procedure



¹⁴ Blunt, A. & Yang, B. (2002) Factor structure of the attitudes toward adult and continuing education scale and its capacity to predict participation behaviour: evidence for the adoption of a revised scale. *Adult Education Quarterly*, 52(3), 399-214.

11. Power calculations

Our assumptions are:

- Significance level: 0.05
- Power: 0.8
- Maximum number of levels per attribute: 8

Sample size	Number of tasks	AMCE ¹⁵
1,000	3	6%
1,000	4	5.5%
1,000	5	5%
1,250	3	5.5%
1,250	4	5%
1,250	5	4.5%
1,500	3	5%
1,500	4	4.5%
1,500	5	4.5%
1,750	3	5%
1,750	4	4.5%
1,750	5	4%
2,000	3	4.5%
2,000	4	4%
2,000	5	3.5%
2,250	3	4.5%
2,250	4	4%
2,250	5	3.5%

Based on the above, we propose to aim to recruit at least 2,000 respondents and assign them 5 tasks each. We are mindful of the need for sufficient power in the partitioned secondary analyses.

¹⁵ AVERAGE MARGINAL COMPONENT EFFECT: <https://www.cambridge.org/core/services/aop-cambridge-core/content/view/414DA03BAA2ACE060FFE005F53EFF8C8/S1047198700013589a.pdf/causal-inference-in-conjoint-analysis-understanding-multidimensional-choices-via-stated-preference-experiments.pdf>

12. Analytical strategy

Primary analysis

The analytical strategy will be a linear probability model with the following specification:

$$Y_{it} = \alpha + \beta_{1:12}\Delta\mathbf{A}_{it} + \beta_{13:47}\mathbf{X}_i + \epsilon_i$$

Where:

- Y_{it} is the probability that individual i will select Profile A at task t , where $t \in (1:5)$, given the attributes of Profile A and Profile B.
- $\Delta\mathbf{A}_{it}$ is a vector of the difference in the attributes Profiles A and B, as specified in Section 1.
- \mathbf{X}_i is a vector of demographic characteristics of individual i ; specifically their age (continuous), gender (two levels), geographic region (nine levels), ethnicity (four levels), employment status (four levels), and employment sector (19 levels).
- ϵ_i is a robust standard error clustered at the individual level.

Secondary analysis

1. Likelihood of selecting a profile given its characteristics, regardless of the characteristics of the other profile

In this analysis, the unit of analysis will be the profile p , rather than the task t . It will have the following analytical form:

$$Y_{ipt} = \alpha + \beta_{1:12}\mathbf{A}_{ipt} + \beta_{13:47}\mathbf{X}_i + \epsilon_i$$

Where:

- Y_{ipt} is the probability that individual i will select Profile p at task t
- \mathbf{A}_{ipt} is a vector of the attributes Profile p , as specified in Section 1.
- \mathbf{X}_i and ϵ_i are as specified in the primary analysis.

2. Reported likelihood of enrolling in course

This will be as specified in secondary analysis 1, except that Y_{ipt} will refer to the participant's self-reported likelihood of enrolling in the course, which will be coded from 1 – 7, representing responses from Extremely Unlikely to Extremely Likely.

Subgroups of interest

Partitioned analysis will be undertaken on both the primary analysis and the secondary analysis, for the following partitioned samples:

- Respondents aged 25 and under
- Respondents aged over 25
- Respondents with children

- Respondents whose reported household income is below £30,000, which is the median household income in the UK as of 2019
- Respondents whose highest qualifications are equivalent to Level 2
- Respondents whose highest qualifications are lower than Level 2

Demographic predictors of attitudes towards continuing education

We are interested in which demographics predict more positive responses on the Attitudes to Continuing Education Scale. The following specification will be used:

$$Y_i = \alpha + \beta_{1:n}X_i + \epsilon_i$$

Where

- Y_i refers to individual i 's overall score out of 45 on the Attitudes to Continuing Education scale¹⁶
- X_i is a vector of demographic characteristics, comprising age, gender, ethnicity, employment sector, employment status, household income, parental status, highest qualification achieved, and region of England.
- ϵ_i is a robust individual error term.

Exploratory analysis

In addition, we will conduct exploratory analysis on other partitions if sample size permits, e.g. for other demographic variables outlined in Section 9.

Correction for multiple comparisons

As there will be over 40 variables in the analytical specification (of which the profile attributes are of primary interest), we will apply an adjustment for multiple comparisons to the p-values of the coefficients of all variables in A_{ipt} for primary and secondary analysis, using the Hochberg Step-up procedure.

13. Ethical considerations

There are minimal ethical concerns with this experiment, as participants will be fully anonymous and will be briefed on the purpose of the research before they choose to participate. The research has been registered with the King's College London College Research Ethics Committee, reference MRA-20/21-21715.

¹⁶ The survey items are given in Annex A. Each item is scored on a Likert scale of 1-5 and summed to produce a score out of 45. Negatively worded items are reverse-scored.

14.Risks

Risk	Mitigation strategy	Risk owner
Coding error in the survey resulting in attributes not being saved	Piloting	SH
Poor data quality arising from incomplete questions (e.g. categories not MECE)	Piloting	SG
Under-recruitment	Piloting/generous incentivisation	SH

Annex A: Attitudes to Continuing Education survey items

1. Continuing education is mostly for people with little else to do
2. I dislike studying
3. Successful people do not need continuing education
4. I am fed up with teachers and classes
5. Money spent on continuing education for employees is money well spent
6. Continuing my education would make me feel better about myself
7. I enjoy educational activities that allow me to learn with others
8. Continuing education is an important way to help people cope with changes in their lives
9. Continuing education helps people make better use of their lives