

Research protocol

Aston University - RCT of the Healthcare Progression Pathways programme

| 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 | | |
| 1.0 [original] | 23/9/21 | |
| Pre-registration | | This design has been pre-registered on the Open Science Framework (OSF) registry . ¹ |

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

| QA | Comments | Rating (out of 5) |
|-----------------|---|-------------------|
| Design | Straightforward 2-armed randomised controlled trial | 5 |
| Sample size | Between 140-190 estimated total sample for randomisation; a small but adequate sample, particularly given the intensity of the intervention | 2 |
| Outcome measure | Behavioural outcomes measures, supported by proxies and survey outcomes | 5 |
| Attrition | High potential attrition on proxy and survey outcomes; however, low attrition on behavioural outcomes which will be tracked via administrative data. | 3.5 |
| Validity | Aside from attrition, the major risk to validity here is that students in the control group have access to other programmes so are, in fact 'treated' in some way. This is a perennial problem in this sort of evaluation and opportunities to leverage administrative tracking data to mitigate this issue will be explored. | 3 |

¹ <https://osf.io/k5zh4>

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

| | | |
|----------------|--|------------|
| Overall | | 3.7 |
|----------------|--|------------|

1. Summary

Background

TASO has funded Aston University (Aston) to participate in a project designed to help us understand evaluation of multi-intervention outreach programmes for widening participation at university.

Aims

This project concerns measuring the impact of the Aston Pathway to Healthcare widening participation programme using an RCT (randomised controlled trial).

Intervention

The primary aim of the Pathway to Healthcare programme is to encourage year 12 (Y12) students from widening participation backgrounds in the West Midlands area to consider studying Medicine or Healthcare-related subjects at University. The 18-month programme comprises an induction session, healthcare subject taster days, attainment-raising activities, careers advice sessions, university interview preparation, work experience, UCAS personal statement day, summer school, and a graduation and transition event (a table of events is given in Section 4).

Design

The pilot trial is a two-armed RCT, run over two cycles of the pathway, with a treatment group (pathway participants) and a control group who receive no intervention. The pathway is historically oversubscribed (~150-180 applicants for approximately 110 places per cycle) and eligible applicants will be randomly allocated to the treatment or control group subject to the constraint that each cycle of the programme is filled to capacity.

Outcome measures

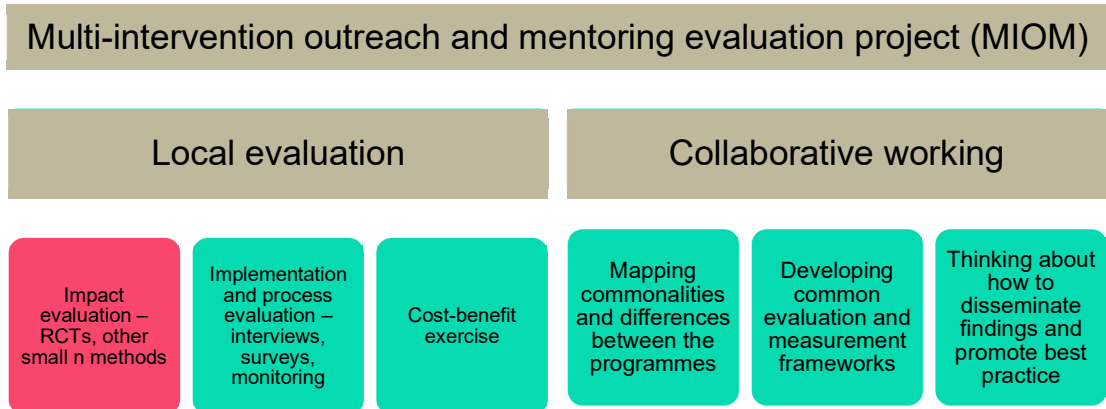
The primary outcome measure is whether a student enrolls in a medicine or healthcare-related course in university at the academic year post programme (binary: yes/no). Other outcome measures include whether a student enrolls in Higher Education (HE), the number of applications made, the number of offers received, self-reported knowledge/confidence in applying to and funding university, and their perception of belonging in HE.

Analyses

We will use multiple (logistic or linear) regression analysis to examine whether allocation to treatment has a positive impact on the dependent variables specified when controlling for a vector of demographic covariates.

2. Background

This pilot RCT is part of the TASO-funded project to develop our understanding of multi-intervention outreach and mentoring (MIOM) – that is, programmes which combine multiple outreach strategies into sustained support for learners over a course of months or years. The trial forms one part of a broader evaluation, as shown in the red part of the figure below. The parts of the figure in green are covered in other planning documents.



The key stakeholders involved in the trial are outlined in the table below.

| Organisation | Name | Role and responsibilities |
|------------------|---|--|
| Aston University | Liz Moores - Deputy Dean College of Health and Life Sciences | <ul style="list-style-type: none"> Principal Investigator |
| Aston University | Robert Summers - Research assistant | <ul style="list-style-type: none"> Overseeing collection of data Data storage protocols (using HEAT³) Recording data on HEAT Evaluation plans |
| Aston University | Sarah Fullwood - Pathways Manager | <ul style="list-style-type: none"> Running the Pathway to Healthcare programme Recording data on HEAT |
| Aston University | Lucy Gregory - Pathways Assistant (2020/1 academic year) Lydia Runham - Pathways Assistant | <ul style="list-style-type: none"> Assisting Running the Pathway to Healthcare programme Recording data on HEAT |

³ The [Higher Education Access Tracker](#) (HEAT) works closely with government agencies such as the Office for Students (OfS), the Department for Education (DfE) and data custodians including the Higher Education Statistics Agency (HESA) to provide members with a broad range of services to help them monitor and evaluate outreach delivery.

| | | |
|------|--|---|
| | (2021/2 academic year onwards) | |
| TASO | Eliza Kozman - Deputy Director of Research | <ul style="list-style-type: none"> Deputy Director of Research Quality assure the design and implementation of the trial from the TASO side |
| TASO | Helen Lawson - Research Programme Manager | <ul style="list-style-type: none"> Research Programmes Manager Lead project management on the broader MIOM project |
| TASO | Rain Sherlock - Evaluation Manager | <ul style="list-style-type: none"> Evaluation Manager Oversee the design and implementation of the trial from the TASO side |
| TASO | Sarah Chappell - Senior Research Officer | <ul style="list-style-type: none"> Research Officer Support on design and implementation of trial from TASO side |

3. Aims

The aim of widening participation is to increase higher education (HE) attendance among students from under-represented groups, such as those from areas with lower than average progression rates to HE or individuals who would be first in their family to attend. One approach is the use of multi-intervention outreach which combines multiple outreach activities into a sustained programme of support for learners. These programmes typically include components such as mentoring, summer schools, campus visits, subject taster sessions, and information, advice and guidance (IAG) workshops.

A recent literature review into the evidence base of UK widening participation activities has identified multi-intervention outreach as among one of the most common approaches used by HE providers (Education Policy Institute, 2019). While the review found evidence that these programmes are associated with positive outcomes for participants (see for example Chilosi et al, 2010; Emmerson et al, 2005, Kettlewell & Aston, 2012), the literature has two key limitations. First, most of the existing evidence is focused on whether these programmes impact student aspirations/attitudes rather than long-term behavioural outcomes such as HE attendance. Second, due to the methodologies used, the current literature provides correlational and contextual evidence on the efficacy of these programmes, particularly in a UK context.

Multi-intervention outreach is a resource-intensive activity and requires significant investment of time and effort from HE providers and students alike. Therefore, there is a need to establish clear causal evidence on the efficacy of this approach. To this end, we plan to measure the efficacy of the Aston Pathway to Healthcare Progression Pathways programme via a pilot randomised controlled trial (RCT). The primary aim of the Pathway to Healthcare is to increase applications to higher

education for medicine or healthcare-related courses from WP students. The primary aim of this trial is to investigate whether such a widening participation programme significantly enhances the chances of participating students enrolling on a Medicine or Healthcare-related HE course (see [Annex 3](#)) compared with those students who are not on the programme.

The specific hypotheses for this study are:

- H1: The Pathway to Healthcare increases enrolment on a medicine or healthcare-related course at university amongst participants.
- H2: The Pathway to Healthcare increases enrolment at university amongst participants.
- H3: The Pathway to Healthcare increases the number of applications made by participants to study medicine or healthcare-related courses at university.
- H4: The Pathway to Healthcare increases the number of offers made to participants to study medicine or healthcare-related courses at university.
- H5: At the end of the programme students report greater confidence that they can make a successful application to university.
- H6: At the end of the programme students report greater confidence that they can fund university.
- H7: At the end of the programme students report greater belief that university is a place for them.

As the study is a pilot RCT, the research aims above are accompanied by a series of pilot objectives outlining the insight we hope to gain in order to assess the feasibility of running a full efficacy trial with future cohorts. The list of pilot objectives can be found in [Annex 6](#).

4. Intervention

A broad outline of the interventions in each of the programmes for 2020/21 pathway entry is in the table below with more detail concerning the aims and activities of each event in [Annex 2](#). In addition to the events listed here students will also be encouraged to attend other non-pathway events run by the outreach team and the Medical Schools Council (e.g., additional masterclasses and IAG sessions) and where possible attendance at these events will be recorded.

| Year Group | Date | Event |
|------------|--------------------|-----------------------|
| 12 | October 2020 | Launch |
| 12 | January 2021 | Medicine Taster Day |
| 12 | January – May 2021 | Academic Tutoring [*] |

| | | |
|----|---|---|
| | (8 sessions) | |
| 12 | March 2021 | NHS & Allied Professions Day |
| 12 | April 2021 (2 days) | A-level revision boot camp |
| 12 | April 2021 | UCAS application day |
| 12 | May 2021 | Work Experience Prep Day |
| 12 | July 2021 | Summer School Parents Evening |
| 12 | August 2021 (3 days) | Summer School Residential |
| 12 | August 2021 | Work Experience [#] |
| 13 | October 2021 | University Interviews and MMI prep day [+] |
| 13 | February 2021 – May 2022 (8 sessions) | Academic Tutoring [*] |
| 13 | February 2021 (2 days) | A-level revision boot camp |
| 13 | June 2021 | Graduation Event |
| | [*] Optional event. [#] Placements limited in number so not all students participate. NB: Work experience prep day is compulsory [+] Compulsory event with optional MMI component. | |

With the exception of Academic Tutoring the events are compulsory and students in Y12 are expected to attend at least 80% of the timetabled events in order to progress to the next year.

5. Design

We will run a pilot randomised controlled trial (RCT) to examine the impact of the Pathway to Healthcare programme on university enrolment and other intended programme outcomes. This 18-month programme begins every year, launching in October of Y12 and ending in June/July of Y13. Due to the capacity of the programme (approximately 110 students/cycle) we will embed the RCT into two cycles of the programme, the 2020/1 cycle (i.e., students who enter Y12 in 2020/1) and the 2021/22 cycle (i.e., students who enter Y12 in 2021/2). Based on historical data, the programme will be oversubscribed by between 30 and 80 students per cycle. The process of restricted randomisation will be used such that for each cycle we will randomly allocate places to students from the pool of eligible applicants such that the programme is filled to capacity (the treatment group) and the remainder (the control group) will receive no intervention from the healthcare pathway; note that students in the control group are not prevented from applying to other widening-participation pathways or outreach events (either at Aston or elsewhere). No student is disadvantaged in this approach as they will all have an equal chance of being accepted on the programme. This way we are taking advantage of existing over-subscription to test the impact of this activity. This approach is often seen as the fairest and least biased approach to selecting participants under resource constraints (Jensen, 2020). For each cycle of the programme the allocation ratio for randomisation to the treatment group compared with the control group is $n: (N-n)$,

where n (~110) is the capacity of the programme and N is the number of eligible applicants.

6. Outcome measures

The outcome measures for this trial have been selected based on the Theory of Change presented in [Annex 1](#). Given that the main aim of the programme is to increase progression to universities, this guides our choice of primary outcome measure.

| Outcome measure | Data to be collected | Point of collection |
|---|--|--|
| PRIMARY: Enrolment of Students at university on Medicine or Healthcare-related course | UCAS entry data from HESA. Aggregated data can be obtained from UCAS strobe service. | Via HESA data: collected via the HEAT tracking service (Spring of the academic year they begin) |
| PRIMARY: Enrolment of Students at university | | Via UCAS Strobe: October of the year they enter HE |
| EXPLORATORY: Number of applications to HE | Aggregated data can be obtained from UCAS strobe service. Individual data relies on asking the students. | Via UCAS Strobe: October of the year they enter HE |
| EXPLORATORY: Number of offers | | From February prior to university entry. |
| EXPLORATORY: Self-reported knowledge of and confidence in the ability to apply to university | Scores on the following survey questions. How confident are you that...? <ul style="list-style-type: none"> • you know how to apply to university • you could make a successful application to university • you could make a successful application to study medicine or healthcare at university [NB: These questions are not validated. There are no established scales.] | Milestone surveys carried out at three times during the programme <ol style="list-style-type: none"> 1. Beginning, 2. Post Personal-Statement event, 3. Post pathway programme |

| | | |
|--|--|---|
| <p>EXPLORATORY: Self-reported knowledge of and confidence in the ability to fund university</p> | <p>Scores on the following survey questions.</p> <p>How much do you know about...?</p> <ul style="list-style-type: none"> • how to fund university <p>How confident are you that...?</p> <ul style="list-style-type: none"> • you can afford to go to university. <p>[NB: These questions are not validated. There are no established scales.]</p> | <p>Milestone surveys carried out at three times during the programme</p> <ol style="list-style-type: none"> 1. Beginning, 2. Post Personal-Statement event, 3. Post pathway programme. |
| <p>EXPLORATORY: Self-reported belonging in HE</p> | <p>Scores on the following survey questions.</p> <p>How much do you agree with the following statements?</p> <ul style="list-style-type: none"> • I would enjoy university • University is for people like me <p>[NB: These questions are not validated. There are no established scales.]</p> | <p>Milestone surveys carried out at three times during the programme</p> <ol style="list-style-type: none"> 1. Beginning, 2. Post Personal-Statement event, 3. Post pathway programme. |

7. Sample selection

Description of study settings

A mixture of live, online, and campus-based activities (COVID permitting).

Participants will be applicants to the Pathway to Healthcare programme. Therefore, the inclusion criteria for this research are simply the eligibility criteria for the programme.

Inclusion criteria (2020/1 pathway entry) [Note criteria are subject to change in subsequent years]

1. Year 12 students:
 - a. who are not part of another Aston University widening participation programme, **and**
 - b. are studying at a non-selective school or college in Birmingham, Solihull or the Black Country, **and**
 - c. have attained at least 5 GCSEs at grade 4 or above *[Note, for students who wish to study medicine this must include Maths, English Language and Double Science or Chemistry and Biology at level 6 or above.]*, **and**
 - d. whose predicted grades at A Level/BTEC/IB would also match the entry requirements of their chosen course at Aston University.

2. **And** meet at least one of the following widening-participation criteria:
- a. Live in a POLAR4, Quintile 1 or 2 area, **or**
 - b. Attend a school or college in a POLAR 4, Quintile 1 or 2 area, **or**
 - c. Come from a home where neither parent has attended a university in the UK or abroad, **or**
 - d. Have a disability or are in receipt of a personal independence payment, **or**
 - e. Are in care or have been in care in the past, **or**
 - f. Are currently in receipt of a means tested bursary (i.e. 16 - 19 bursary), **or**
 - g. Have been in receipt of free school meals at any point over the last three years, **or**
 - h. Are a care leaver or have experience of being looked after by a local authority, **or**
 - i. Come from an underrepresented group (Gypsy, Roma, Traveller communities, refugees, children of military families).

Expected sample size and rationale for this number

Sample size each year is expected to be between 140 and 180 based on historical data. There will be 110 on the programme with the remainder (expected to be between 30-70) in the control group.

Strong links with partner schools and communications via email and social media will ensure that the sample size can be achieved.

8. Randomisation

For each cycle of the programme and from the pool of eligible applicants at the application cut-off date allocation to each arm of the trial will be by pseudo-random number generation subject to the programme being filled to capacity (110) using code developed in R by Eliza Kozman and modified by Robert Summers.

Blinding to group allocation will not be possible either for the students or researchers due to the unequal sample size and the fact that some students will receive no intervention.

Following best practice (e.g., de Boer et al, 2015) and CONSORT guidelines (Moher et al., 2010) balance of the allocation will not be assessed. Analyses will be used (see below) to account for the effects, if any, of demographic factors (sex, ethnicity, family history of HE and prior attainment).

9. Data collection

Student data will be provided by an online application form. Checks are made on this data at the point of application to ensure dates-of-birth are in the expected range. This data is directly uploaded to HEAT to avoid copy/paste errors.

Student data will be stored on HEAT. HEAT contains an automatic check for student records that are potential duplicates.

Data is stored on encrypted local devices, encrypted cloud services, secure network drives or secure web services with strictly limited access.

To indicate that they accept their place on the programme students will complete a milestone survey (see [annex 4](#)) conducted via HEAT which provides us with baseline attitude/intention data. Students in the control group, and therefore not on the pathway, will also be asked to complete a milestone survey; as completing the survey confers no benefit to these students we will offer an inducement in terms of a prize draw (currently £100 vouchers). This is particularly important for keeping in touch with the control group who, in general, will receive no intervention from us. Where students respond multiple times to the survey only the last complete response will be used. The validity of these surveys is currently untested. Note that for the 2020/1 cohort the first milestone survey was conducted in January 2021, prior to the first post-launch event.

Students will complete a further milestone survey after the UCAS personal statement event during October.

Students will complete a (modified) milestone survey some point after UCAS applications close. The survey has to be modified to adjust questions that are no longer relevant regarding, e.g., students' attitudes to applying to university.

Each event will be followed by a survey that will report how students perceive the aims of the event were met.

Participant retention is encouraged through a contextual offer scheme open to students who complete the pathways programme (i.e., students who have attended all the core events on their pathway). As of 2020, contextual offers at Aston are made by giving students offers two grades lower than the standard offer (by course), e.g. BBB becomes BCC. For medicine, the contextual offer is ABB (with an A in Biology or Chemistry) in contrast to the standard AAA offer.

For milestone surveys 2 and 3 response rates will also be improved by making their completion an entry into a prize draw.

| Data item | Timeframe | Collector |
|---|---------------------------------|------------------|
| Demographic Data <ul style="list-style-type: none"> • Sex • Family history of HE | Application (July-October 2020) | Application form |

| | | |
|---|--|----------------|
| <ul style="list-style-type: none"> • KS4 grades (Maths, English and Science) • Ethnicity • School | | |
| Milestone Survey 1 | Prior to launch event (October 2020) | Robert Summers |
| Milestone Survey 2 | Post UCAS personal statement day (October 2021) | Robert Summers |
| Milestone Survey 3 | Post UCAS applications/Pre A-Level exams (TBC: April 2022) | Robert Summers |
| Participation in additional outreach activity data | Post UCAS applications/Pre A-Level exams (TBC: April 2022) | Robert Summers |
| Attainment data (from students) | Post A-level results (August 2022) | Sarah Fullwood |
| Destination data either from UCAS Strobe service (aggregated), HESA, or from students themselves | October 2022 (Strobe) Spring 2023 (HESA) | Robert Summers |
| Dates for data collection of the second Healthcare pathway cohort are TBC but can assumed to be 12 months later. | | |

10. Procedure

| Timeframe | Action |
|-------------------------|---|
| October 2020 | (2020/1 cohort) Randomisation of eligible Healthcare pathway students to treatment/control group |
| January 2021 | (2020/1 cohort) Milestone survey 1 |
| October 2021 | (2020/1 cohort) Milestone survey 2 |
| October 2021 | (2021/2 cohort) Randomisation of eligible Healthcare pathway students to treatment/control group |
| October 2021 | (2021/2 cohort) Milestone survey 1 |
| February-June 2022 | (2020/1 cohort) Final milestone survey |
| February-June 2022 | (2020/1 cohort) Selection of individuals from milestone survey for focus groups/one-to-one interviews |
| August 2022-Spring 2023 | (2020/1 cohort) Destination data gathering |
| September/October 2022 | (2021/2 cohort) Milestone survey 2 |
| February-June 2023 | (2021/2 cohort) Final milestone survey |

| | |
|-------------------------|---|
| February-June 2023 | (2021/2 cohort) Selection of individuals from milestone survey for focus groups/one-to-one interviews |
| August 2023-Spring 2024 | (2021/2 cohort) Destination data gathering |

11. Power calculations

Our assumptions are:

- Significance level: 0.05
- Power: 0.8
- 70% of initial sample remains at end of cycle
- 80% of the treatment group enter higher education based on previous cycles of the programme

| Sample size | Size of treatment group | Size of comparat or group | MDES |
|-------------|-------------------------|---------------------------|---|
| 153 | 110 | 43 | With the assumptions and a sample size of 114 the smallest effect size (Cohen's <i>h</i>) that can be detected is 0.60. Therefore, progression to HE in the control group would need to be less than 52% (versus estimated 80% in control) to detect a statistically significant effect of the programme. |
| 306 | 220 | 86 | If the programme was evaluated over two years with the same level of recruitment and apportioning to standard and flexible groups (total sample = 306) then the smallest effect size (Cohen's <i>h</i>) that can be detected is 0.42. Therefore, progression to HE in the control group would need to be less than 60% (versus the estimate 80% in control) to detect a statistically significant effect of the programme. |

As this is a pilot trial, it is not powered to 0.8 (80%) - the typical threshold for a well powered study. We run 'pilot studies', powered to 0.5 (50%), to determine evidence of promise. Although a significant effect in a pilot study is not sufficient evidence that the intervention works, it may suggest that the intervention 'shows promise' but that further research is required. In general, if we have little existing evidence about the efficacy of an intervention, and we can run a pilot trial powered at the 50% threshold, it may be worth running an underpowered RCT for evidence of promise.

12. Analytical strategy

Specified Analyses (H1-H4)

The primary outcome measures, progression to Medicine/Healthcare related HE course and progression to HE, are binary and will be analysed using mixed-effects binary logistic regression. For mixed effects logistic regression our model will be:

$$\log\left(\frac{P(Y_{ij} = 1)}{P(Y_{ij} = 0)}\right) = \alpha + \beta_0 T_{ij} + \sum_k \beta_k X_{kij} + \mu_j$$

Where:

- Y_{ij} is whether or not the i -th student in school j enrolled at university (in a medicine or healthcare-related course) (1) or did not enrol at university (0).
- $P(Y_{ij} = x)$ is the probability that $Y_{ij} = x$ where $x = 0$ or 1.
- T_{ij} is a treatment indicator, set to 1 for participants in the treatment group and 0 for those in the control group
- X_{kij} is a vector of k demographic covariates (Sex, Family history of HE, Mean KS4 grades ([Annex 5](#)), Ethnicity).
- μ_j represents each school as a random effect in the model thus allowing a different intercept to be fitted for each participant's school.

This can be implemented in R using the function *glmer* from the package *lme4* in the following manner:

For outcomes H3 (number of applications) and H4 (number of offers) we will use mixed effects linear regression where

$$N_{ij} = \alpha + \beta_0 T_{ij} + \sum_k \beta_k X_{kij} + \mu_j$$

Where N_{ij} is the number of applications (H3) or offers (H4) the i -th student in school j received, and the remaining terms are as above.

Exploratory Analyses (H5, H6 and H7)

Exploratory analyses will be used to assess the survey data that informs hypotheses H5 (greater confidence that participants can make a successful application to university), H6 (greater confidence that they can fund university), and H7 (greater belief that university is a place for them). These analyses will be used to inform future work of the optimal methods of analysing this data so it can be properly

specified in future trials. The strength of the analyses is also highly dependent on not only the overall response rate for each survey but how many individuals respond to each survey so individual change can be tracked over time.

We will explore different ways of aggregating the data (combining, for example, those answers that are Agree and Strongly Agree together) and statistical tests. Whether or not the number of milestone surveys is important (i.e., do we just need 2, at the beginning and end of the pathway).

Cost Benefit Analysis

Data will be collected to provide an estimate of the cost of the intervention and these data will be used to conduct cost-benefit analysis. The procedure for this analysis will be developed over the course of the trial. This analysis will help us understand the benefit to participants per unit of expenditure (taking into account monetary but also other costs).

13. Ethical considerations

The study has received a positive decision from Aston University’s Ethics Board. All eligible pathway participants were randomly allocated to each group so no student was disadvantaged relative to any other in their chances of being on the pathway. Students in the control group are not barred from taking part in other outreach events or programmes either at Aston or other universities.

14. Risks

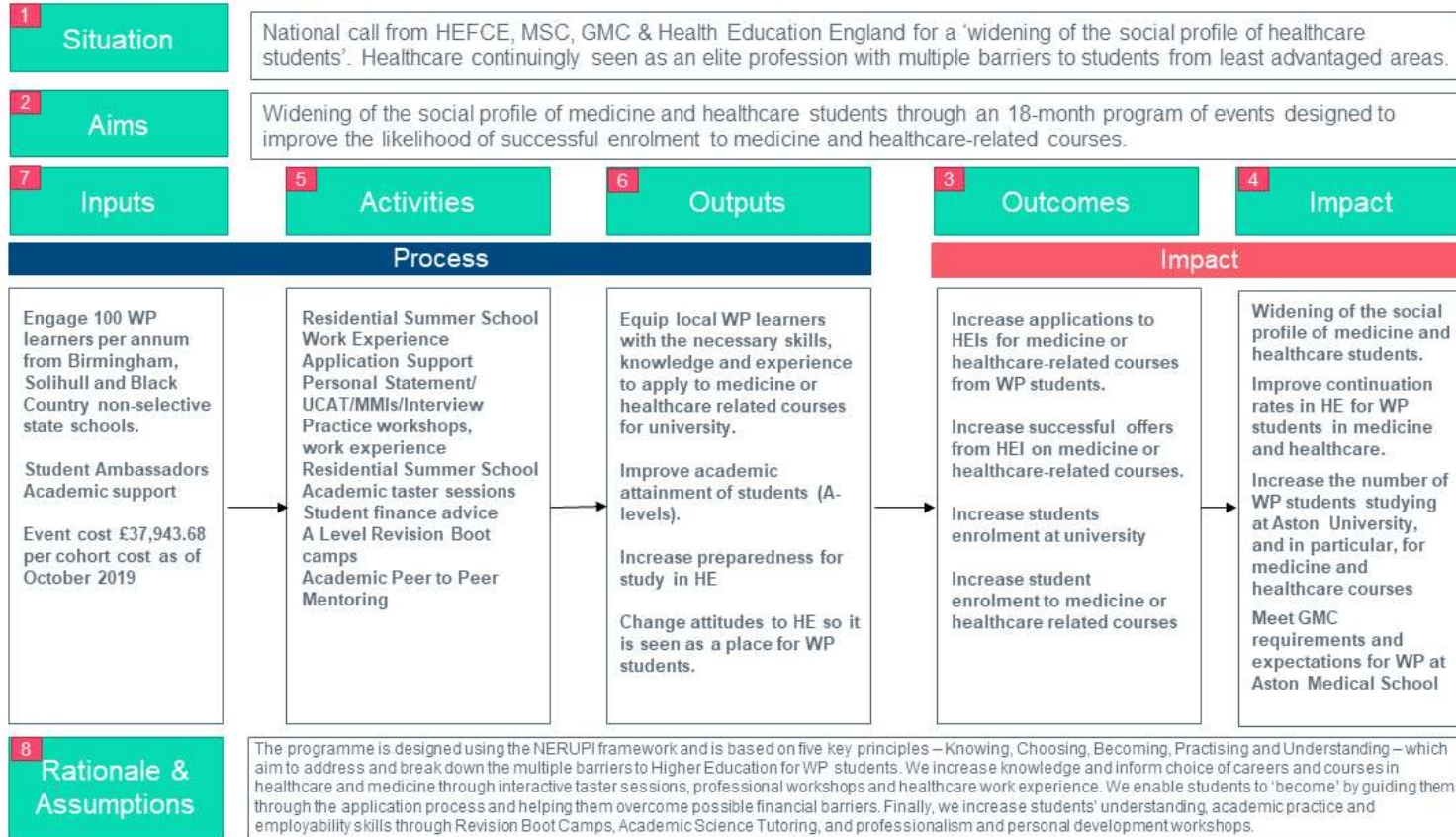
| Part of evaluation | Risk | Mitigation strategy | Risk owner |
|--------------------|--|---|------------------|
| Milestone surveys | Difficulty getting responses from students in the control group | Offer financial inducements to complete survey. | Aston University |
| Control Group | Students from the control group receive outreach interventions not recorded on HEAT. | Towards end of Y13 ask students to list outreach events they've attended. | TASO |

15. References

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16. Annex 1: Theory of Change



17. Annex 2: Programme of events

2020/1 Cohort –

Note: delivered online during 2020/1 due to COVID, plan to deliver events live and in person during 2021/2.

| Date | Event | Details |
|---------------------------------|-------------------------------|---|
| October 2020 | Launch | Inform parents and students about the Pathway to Healthcare programme and the commitment needed from students. |
| January 2021 | Medicine Taster Day | Introduction to studying and “Working in Medicine talk”. What’s it like to study Medicine? (Talk from Clinical Teaching Fellows) Taster Medicine Lecture with video clinical skills videos Meet our current Medical Students |
| January – May 2021 (8 sessions) | Academic Tutoring | Academic Support (tutoring, revision sessions) for Biology or Chemistry led by current undergraduate healthcare students [Optional] |
| March 2021 | NHS & Allied Professions Day | So you think you know healthcare & the NHS? (25-minute talk) Studying Healthcare at university? Meet the students (20-minute interactive presentation) Bringing Bedside manner to life (15-minute presentation) |
| April 2021 (2 days) | A-level revision boot camp | Academic Support (tutoring, revision sessions) led by current A-level Biology and Chemistry teachers. [Cancelled, due to COVID]. |
| April 2021 | UCAS application day | UCAS application process talk Personal statement workshop Developing your brand workshop Your university choice workshop |
| May 2021 | Work Experience Prep Day | Overview of Work Experience in a healthcare sector (includes online provision and thinking outside of the box – linking back to UCAS Application) Work Experience Expectations (45-minute workshop) Reflection and your Personal Statement (45-minute workshop) |
| July 2021 | Summer School Parents Evening | Student Session – Your summer school group Parent Session – The University Process |
| August 2021 (3 days) | Summer School Residential | No Limits challenge Outbreak – A healthcare Experience (interactive group clinical skills sessions and healthcare challenges) Healthcare Research Project + Presentation (Group work, 1 day) Preparing to deliver a university presentation (1-hour talk) Student finance seminar (30 minutes) UCAT and BMAT seminar Preparing to Study Healthcare at University (30-minute seminar) Social activities Working Lunch (1 hour) |

| | | |
|----------------------------------|--|---|
| August 2021 | Work Experience | Experience in a healthcare-related workplace [Note: Limited numbers and application process applies – cancelled in 2021 due to COVID] |
| October 2021 | University Interviews and MMI prep day | An overview of university interviews and MMIs – the soft skills universities are looking for (30 minutes talk) You're hired! Preparing for university interviews (45-minute talk) Preparing for MMI's – Interactive practice (breakout) |
| February – May 2022 (8 sessions) | Academic Tutoring | (see above) |
| February 2022 (2 days) | A-level revision boot camp | (see above) |

18. Annex 3: Definition of medicine and healthcare-related courses

For the purposes of this RCT the definition of a medicine or healthcare-related course are subjects in the Common Aggregation Hierarchy (HESA, 2021) whose HECoS classification falls into CAH01 (medicine and dentistry), CAH02 (subjects allied to medicine) and CAH04 (psychology). Subjects within CAH02-06-06 (complementary and alternative medicine) are excluded from the definition. The subjects that fall under the definition of medicine and healthcare-related courses that are taught at Aston are: medicine, pharmacy, optometry, psychology, audiology and biomedical sciences.

19. Annex 4: Milestone survey questions

Milestone survey questions have a 5-point Likert scale response with a “Don’t know” option.

| | Preamble | Statement | Response |
|----|--------------------------------|---|--|
| 1 | How much do you know about...? | the benefits of university | Almost nothing/A little/Something/Quite a bit/A great amount |
| 2 | How much do you know about...? | the range of courses available at university | Almost nothing/A little/Something/Quite a bit/A great amount |
| 3 | How much do you know about...? | the range of medicine and healthcare-related courses available at university | Almost nothing/A little/Something/Quite a bit/A great amount |
| 4 | How much do you know about...? | the different routes into university | Almost nothing/A little/Something/Quite a bit/A great amount |
| 5 | How much do you know about...? | how to fund university | Almost nothing/A little/Something/Quite a bit/A great amount |
| 6 | How confident are you that...? | you can afford to go to university | Not confident/Not that confident/ Neutral/Quite confident/Extremely confident |
| 7 | How confident are you that...? | you know how to apply to university? | Not confident/Not that confident/ Neutral/Quite confident/Extremely confident |
| 8 | How aware are you about...? | which university courses interest me | Not aware/Slightly aware/Somewhat aware/ Moderately aware/Extremely aware |
| 9 | How aware are you about...? | which university courses I can do with my current subject choices | Not aware/Slightly aware/Somewhat aware/ Moderately aware/Extremely aware |
| 10 | How aware are you about...? | where I could find out more about university | Not aware/Slightly aware/Somewhat aware/ Moderately aware/Extremely aware |
| 11 | How likely are you to...? | apply to university | Extremely unlikely /Unlikely/Neutral/Likely/Extremely likely |
| 12 | How likely are you to...? | apply to a medicine or healthcare-related course at university | Extremely unlikely /Unlikely/Neutral/Likely/Extremely likely |
| 13 | How confident are you that...? | you could make a successful application to university | Not confident/Not that confident/ Neutral/Quite confident/Extremely confident |
| 14 | How confident are you that...? | you could make a successful application to study medicine or healthcare at university? | Not confident/Not that confident/ Neutral/Quite confident/Extremely confident |
| 15 | How confident are you that...? | you could succeed on a medicine or healthcare course at university | Not confident/Not that confident/ Neutral/Quite confident/Extremely confident |
| 16 | How confident are you that...? | you can achieve the grades needed to apply to and study Medicine and Healthcare at university (AAA-BBB) | Not confident/Not that confident/ Neutral/Quite confident/Extremely confident |

| | | | |
|----|---|---|---|
| 17 | How much do you agree with the following statement? | I would enjoy university | Strongly disagree/Disagree/Neutral/Agree/Strongly agree |
| 18 | How much do you agree with the following statement? | university is for people like me | Strongly disagree/Disagree/Neutral/Agree/Strongly agree |
| 19 | How much do you agree with the following statement? | I have a clear understanding of what to expect from life whilst at university | Strongly disagree/Disagree/Neutral/Agree/Strongly agree |
| 20 | How much do you agree with the following statement? | I have a clear understanding of what to expect of my social life whilst at university | Strongly disagree/Disagree/Neutral/Agree/Strongly agree |
| 21 | How much do you agree with the following statement? | I have a clear understanding of what to expect whilst studying at university | Strongly disagree/Disagree/Neutral/Agree/Strongly agree |
| 22 | How much do you agree with the following statement? | I have a clear understanding of the available resources to support my academic work at university | Strongly disagree/Disagree/Neutral/Agree/Strongly agree |
| 23 | How much do you agree with the following statement? | People like me have the skills and experiences to actively participate in classes at university | Strongly disagree/Disagree/Neutral/Agree/Strongly agree |
| 24 | How much do you agree with the following statement? | People like me can initiate contact with teaching staff at university | Strongly disagree/Disagree/Neutral/Agree/Strongly agree |

Questions 19-24 are part of a sense of belonging scale developed by K+ and TASO and adapted for use at Aston University. These questions were added after the first milestone survey was sent out to the 2020/1 cohort.

20. Annex 5: Calculation of mean KS4 grade

Students' mean grade will be computed from the mean GCSE grade (1-9). The grades from other level 2 qualifications (e.g., BTEC, OCR, iGCSE, GCE/O-level) will be converted to GCSE grades using the following table (adapted from Cambridge, BTEC and Pearson):

| New GCSE Grade | Old GCSE grade iGCSE grade GCE O-level | Other level 2 qualification (e.g., BTEC, OCR) |
|----------------|--|---|
| 9 | A* | Distinction* |
| 8 | | |
| 7 | A | Distinction |
| 6 | B | Merit |
| 5 | | |
| 4 | C | Pass |

Other level 2 grades that cover 2 of the numeric GCSE grades are taken as the average of the two (e.g., GCSE A* or Distinction* is counted as 8.5).

21. Annex 6: Pilot study objectives

The following table has been used to consider what we want to get out of a pilot study.⁴

| Main Reason | Examples |
|---|---|
| Process: This assesses the feasibility of the processes that are key to the success of the main study | <ul style="list-style-type: none"> ● Assess opt out rates (Currently zero) ● Recruitment rates – high enough for RCT? ● Difficulties taking into account requirements of WP team and using eligibility criteria? <ul style="list-style-type: none"> ○ Criteria can be widened if required. ● Attendance rates at events <ul style="list-style-type: none"> ○ Generally higher for online events which tend to be shorter and require travel. ○ Participants must attend >80% of events in year 1 to progress to year 2 of the programme. ● Demographics of those who apply <ul style="list-style-type: none"> ○ Representative of those schools overall? ○ Dependent on pathway (STEM/Medicine/Law/Business)? ● Length of time to fill out all the study forms <ul style="list-style-type: none"> ○ There are issues with the sheer volume of evaluations related to each event. |

⁴ Table taken from Thabane, L., Ma, J., Chu, R., Cheng, J., Ismaila, A., Rios, L. P., ... & Goldsmith, C. H. (2010). A tutorial on pilot studies: the what, why and how. *BMC medical research methodology*, 10(1), 1.

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|---|--|
| | <ul style="list-style-type: none"> ○ Will students suffer from survey-fatigue? – though for milestone surveys this might be mitigated by inducements (e.g., £100 prizes). ● Understanding of study questionnaires or data collection tools: Do subjects provide no answer, multiple answers, qualified answers, or unanticipated answers to study questions? |
| <p>Resources: This deals with assessing time and resource problems that can occur during the main study</p> | <ul style="list-style-type: none"> ● Is the equipment readily available when and where it is needed? <ul style="list-style-type: none"> ○ Particular issue for online delivery as ~10% participants have poor technology access. ○ Support offered, e.g. internet dongle, tablet. ● Survey tools <ul style="list-style-type: none"> ○ Vevox <ul style="list-style-type: none"> ▪ Great for ensuring good response rates during an event. ▪ Doesn't integrate with HEAT. ▪ Can Vevox responses be uploaded to HEAT and attached to individuals? ▪ Recording identifiable information whilst respecting privacy is difficult. ○ HEAT survey tool <ul style="list-style-type: none"> ▪ Buggy and not as user-friendly as Vevox. ▪ Directly integrated with HEAT. ▪ Great for milestone surveys where identifiable information and responses from the control group are required. |
| <p>Management: This covers potential human and data management problems</p> | <ul style="list-style-type: none"> ● Are there any problems entering data into the computer? <ul style="list-style-type: none"> ○ Recording of 1-to-1 sessions with HEAT is cumbersome particularly if we want to be able to report on it. ○ How to code intensity of event ○ Engagement of student ○ Intended outcomes ● Can data coming from different sources be matched? <ul style="list-style-type: none"> ○ Some data matching for non-HEAT sources is possible where participants are asked to report first three letters of first name and last 2 letters of postcode. ● Do data show too much or too little variability? <ul style="list-style-type: none"> ○ Issues around survey responses where a high percentage of responses are already "Strongly Agree" |

| | |
|--|---|
| | <p>to an attitude that we're hoping to influence. We'll struggle to be able to measure a positive change here.</p> |
| <p>Scientific: This deals with the assessment of treatment safety, dose, response, effect and variance of the effect</p> | <ul style="list-style-type: none"> ● Survival analysis <ul style="list-style-type: none"> ○ At what point do students drop out of the pathway? ○ Do those students still go to university? ● Number of offers and applications <ul style="list-style-type: none"> ○ UCAS data though they are unwilling/unable to share this. ○ May need to gather via a survey around "pathway graduation time". ● Investigate the fidelity of intervention delivery <ul style="list-style-type: none"> ○ Was the intervention delivered as intended? ○ Break down the intervention into parts and code each event in terms of the outputs they are supposed to achieve vs the outputs reported by the students. <ul style="list-style-type: none"> ▪ For each output was that part of the intervention delivered ▪ Did the delivered parts have the specified output? ● Improvements in student attainment <ul style="list-style-type: none"> ○ Current situation regarding COVID means improvements (or otherwise) in A-level results may be difficult to disentangle from issues around time in school and curriculum covered across schools. ● If all events are virtual then certain aspects of the programme intended to for example, raise aspirations, may not have the desired effect if they're being delivered to someone's bedroom! |