



Higher
Horizons

Higher Horizons Tracking Report 2026: statistical analysis of progression rates of Higher Horizons participants and non- participants

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Please note: the [HESA Standard Rounding Methodology](#) has been applied to all numbers provided in this report:

1. Counts of people are rounded to the nearest multiple of 5
2. Percentages* are not published if they are fractions of a small group of people (fewer than 22.5)
3. Averages are not published if they are averages of a small group of people (7 or fewer)

Rounding and suppression are applied only to published descriptive counts and percentages. Statistical models were fitted on the underlying individual-level analysis dataset without rounding.

Executive Summary

This report uses statistical techniques to estimate the associations between participation in the Higher Horizons programme and progression to higher education by age 19. Using a sample of 22,790 students recorded in HEAT by Higher Horizons with expected entry years between 2019 and 2022, this statistical analysis demonstrates **strong evidence of a robust positive association between Higher Horizons participation and HE progression by age 19, consistent across several observational methods.**

The analysis uses logistic regression and propensity score matching methods to examine:

1. If participants in the programme progress to higher education by age 19 at higher rates than demographically similar non-participants.
2. If there were any associations between intensity of participation in the programme and progression to higher education by age 19 (for example, if those with a higher number of total contact hours progressed at higher rates than those with a lower number of total contact hours).
3. If there were any associations between participation in specific activity types and progression to higher education by age 19.

Key findings

1. **There is a statistically significant association between participation in the Higher Horizons programme and progression to higher education by age 19 in each cohort year.** After controlling for Expected HE Entry Year, Sex, Ethnic Group, TUNDRA Quintile and IMD Quintile within a logistic regression model, participants had 52% higher odds of progression to higher education by age 19 than non-participants.
2. **Once demographically matched to non-participants, participants had a progression rate 8.7-8.9 percentage points higher than non-participants.** Participants and non-participants were matched by a variety of propensity score methods within their Expected HE Entry Year on Sex, Ethnic Group, TUNDRA Quintile and IMD Quintile. The percentage point increase was found to be consistent across three matching methods: propensity score matching, coarsened exact matching, and inverse probability of treatment weighting.
3. **Those who engaged in a higher number of Higher Horizons activities had higher odds of progression than those who engaged in a minimal amount of outreach after controlling for demographic variables.** Those who took part in ≥ 3 and < 8 contact hours had 57% higher odds of progressing than non-

participants, while those who had taken part in 8 or more contact hours had 73% higher odds of progression than non-participants. When these differences were examined across cohort years, estimated associations for the low dose group (< 3 hours) were not statistically significant across the majority of years, suggesting that a low dose is not significantly different from no dose at all.

4. **Participants who engaged in 3 or more contact hours with the programme had a progression rate 9.4 to 10.3 percentage points higher than those with fewer than 3 contact hours with the programme.** Participants with 3 or more hours of contact with the programme were matched to those who had under 3 hours contact or no contact by a variety of propensity score methods. The two groups were matched within their Expected HE Entry Year on Sex, Ethnic Group, TUNDRA Quintile and IMD Quintile. The percentage point increase was found to be consistent across all three matching methods.
5. **Taking part in Campus Visits, Summer Schools and IAG was positively associated with progression to higher education, while taking part in attainment raising activity was negatively associated with progression to higher education.** It is possible that the negative observed association between attainment raising activities and progression is due to schools targeting these activities to students with lower prior attainment who may be less likely to progress to higher education. Attainment data was not available for use in this study, so while this is a likely explanation it remains hypothetical. There were no statistically significant associations between taking part in subject specific activity or mentoring programmes and progression to higher education found in this dataset.

Limitations of this Study

This study does not include a control for attainment because this data was not available to Higher Horizons. Higher attainment is strongly correlated with an increased likelihood of progression to higher education. Future work in this area could be strengthened if this data was made available.

This study covers years in which education was significantly disrupted by the Covid-19 pandemic. All cohorts included in the dataset except for the first (who were expected to enter HE in 2019) experienced this disruption through school closures and changes to GCSE and A Level examinations during this period. The statistical methods used throughout include Expected HE Entry Year as a covariate to attempt to absorb some of this variation, but it is impossible to totally control for it within this study. While Expected HE Entry Year absorbs average cohort-level differences, it cannot disentangle pandemic assessment effects, outreach delivery mode, university admissions changes, and changes in participant composition.

The statistical analysis also cannot control for unobserved variables such as motivation, parental support, or individual circumstance which influence progression to higher education.

Recommendations for Practice

These recommendations assume that the associations observed in this study are at least partly causal.

1. Practitioners should focus on ensuring participants have a sustained dose of contact with Higher Horizons (defined here as more than 3 hours). Ideally, participants should have 8 or more hours engagement with Higher Horizons during their education.
2. Practitioners should ensure that Campus Visits and IAG remain the core part of the Higher Horizons offer, and that the majority of students are able to engage with these activity types.
3. Track contact hours per participant as a new operational target, including this measure in internal reporting dashboards. This measure should use the contact hour bands used in this report, and aim to see all participants receive at least 3 hours engagement with the programme, and a majority receive over 8 hours engagement with the programme.

Recommendations for further research

This study could be improved by including controls for attainment. This data is not currently available to Higher Horizons, but whether or not it could be accessed to improve the statistical modelling used throughout this study should be investigated.

As additional years of HESA data becomes available, these students should be added to these models to see if these effects persist across cohorts. This is particularly relevant as we move further away from the pandemic and students experienced less disruption of key activities in this period (i.e. later cohorts did not have their assessments disrupted by the pandemic exam arrangements in the same way as the students in this study). HEAT estimates that HESA tracking data for the 2024/2025 academic year should be available in Summer 2026.

Introduction

Higher Horizons is a partnership of universities and colleges working together to deliver widening access activities across Staffordshire, Shropshire and Cheshire. Led by Keele University since 2015, the partnership has delivered this work through successive government-funded programmes: Aimhigher (2004 to 2011), the National Networks for Collaborative Outreach (2015 to 2016), and the National Collaborative Outreach Programme, now called Uni Connect (2017 to present). Since 2017, Higher Horizons has delivered 8,500 activities and engaged with nearly 70,000 individual young people across its region.

Higher Horizons uses the Higher Education Access Tracker (HEAT) to record participant activity and track progression to higher education. All participants are logged in HEAT alongside a record of the activities they have taken part in, and their data is submitted to the Higher Education Statistics Agency (HESA) for matching into the HESA Student record. This report is the first major analysis of participant outcomes since Higher Horizons joined HEAT in summer 2025, following the closure of its previous tracking service, EMWPREP.

The complete tracking dataset contains 44,875 students who were eligible to take part in Higher Horizons activities between 2016 and 2023. The dataset contains both those who participated and those who did not. Students have been tracked into HE entry years up to 2023/2024, providing a longitudinal view of each student's journey from outreach engagement through to HE entry. This analysis focuses on a subset of these data.

This report is accompanied by a technical annex which is [available here](#). The technical annex includes details on how the dataset was constructed, exploratory data analysis tables, and full results of both the logistic regression models and propensity score matching.

Methodology

Research Question

This analysis investigates whether students who participate in Higher Horizons outreach activities progress to higher education at higher rates than students from similar demographic backgrounds who did not participate. Specifically, the analysis addresses three questions:

1. Do participants progress to higher education at a higher rate than non-participants from similar demographic backgrounds?

2. Does dose matter: do participants with a higher amount of outreach engagement progress at higher rates?
3. Does activity type matter: do participants in certain types of outreach activity progress at higher rates?

The methods used cannot confirm that participation caused any observed differences in progression. They can demonstrate statistically significant associations between participation and progression. The analysis also cannot account for unobserved factors such as motivation, personal circumstance, or parental support, nor does it control for prior attainment, as this data is not available to Higher Horizons. Attainment is strongly correlated with progression to HE and its absence is the most significant limitation of this study.

Two statistical methods are used to estimate the effect of participation. Using both, and checking whether they reach consistent conclusions, provides greater confidence that any findings are genuine.

Logistic regression models the probability of HE progression by age 19 as a function of outreach participation, controlling for demographic factors and expected entry year. Multiple models are fitted, including a dose-response model examining whether students with more outreach engagement have progressively higher odds of progression, and an activity types model testing whether participation in specific activity types is associated with higher odds of progression.

Propensity score matching takes a different approach. It first estimates each student's probability of participating in outreach based on their demographic characteristics, then matches each participant to a non-participant with a similar profile from the same cohort year. The difference in progression rates between matched participants and non-participants provides an estimate of the effect of participation. Because matching is performed within cohort years, year-level confounding is removed by design.

Where both methods produce results in the same direction and both are statistically significant ($p < 0.05$), this is taken as evidence that the finding is robust.

Defining the Outcome: Progression by Age 19

The outcome used throughout is whether a student entered higher education by age 19, defined as entering HE in their expected entry year or the year after. This definition ensures comparability across cohort years. Because earlier cohorts have had more years in which to appear in the HESA data, a measure based on progression at any point would favour them. The by-19 measure gives every cohort the same two-year window. It also aligns with the measure used by the Department for Education in its widening participation statistics, allowing results to be benchmarked against national progression rates.

Data Collection

Data was collected by Higher Horizons staff. Before 2020, data was collected individually from participants, with parents or carers providing data for pre-16 students. From 2020, Higher Horizons moved to bulk data collection, receiving data directly from schools for their entire student population. This is why the dataset contains both participants and non-participants and why there are larger cohorts of non-participants in later entry years.

Tracking fields (name, date of birth and postcode) were mandatory; contextual information (sex, ethnicity, free school meal eligibility and disability status) was optional, so some of this data is missing. Postcode has been used to calculate area-based measures of disadvantage, with TUNDRA and IMD quintiles provided by HEAT.

One data quality issue is worth noting. In the final dataset, 85% of non-participants have their last known school or college listed as a post-16 provider, compared to just 33% of participants. However, a third of participants in the dataset have their last known school listed as an 11-16 school, where they could not have remained for post-16 study, while 79% of non-participants do not have an 11-16 school listed on their record even though they must have attended one. This reflects issues with data collection rather than a genuine difference in the schools and colleges these students attended. Because reliable school histories are not available for all students, no school-level variable is included in the analysis. All students in the dataset were drawn from the same group of approximately 100 target state-funded schools and colleges, selected because more than 40% of their pupils come from areas with the lowest rates of HE participation. The schools are therefore broadly comparable in character and context, though the analysis cannot fully account for school-level differences such as institutional culture or provider-level progression support.

Programme Delivery

The Higher Horizons programme was not delivered consistently across the academic years covered by this analysis, due to a combination of external factors such as policy changes and funding cuts, and internal factors including programme redesigns based on evaluation findings and feedback from participants, schools and practitioners.

Information, Advice and Guidance (IAG) sessions were the most-delivered activity type in every year, accounting for around half of all activity. Subject Specific and Attainment Raising activities were the second and third most common, though their order varied year to year. Campus Visits were consistently fourth, with the exception of 2020/2021 when only two visits were delivered due to Covid restrictions. Across the full period, 16.8% of activities were Subject Specific, 15.5% were Attainment Raising, 10.3% were Campus Visits, 6.9% were Mentoring and 1.2% were residential Summer Schools.

During periods of UK lockdown, Higher Horizons activity shifted to online delivery. In 2019/2020, 15% of activity was delivered online, rising to 64% in 2020/2021 before falling back to 21% in 2021/2022 and 2% in 2022/2023.

Students in later expected entry year cohorts also had more opportunity to engage with the programme, as they were younger when it began. A student with an expected entry year of 2023 would have been in Year 7 when the current programme started in 2017, while a student expected to enter HE in 2019 would already have been in Year 11. Students in later cohorts therefore had, on average, higher levels of engagement with Higher Horizons than those in earlier cohorts. Expected HE entry year is included as a variable in the regression models to account for this difference.

Constructing the Analysis Dataset

The raw dataset contains 44,875 unique student records with expected HE entry years spanning 2017 to 2025. Several filtering steps were applied to produce a final dataset suitable for analysis, each of which is described below.

Cohort years. Cohorts with expected entry years before 2019 were removed because they contained very small sample sizes and, crucially, no non-participant records. Without a comparison group, it is not possible to estimate the effect of outreach participation. The 2023 cohort was also excluded because their by-19 tracking window was not yet complete at the time of analysis; determining whether these students entered HE by age 19 would require 2024/25 HESA data, which is not yet available. In total, 16,940 records were removed at this stage, leaving cohorts with expected entry years of 2019 to 2022.

Mature participants. Participants who engaged in outreach after their expected HE entry year were removed (325 students). These individuals had already passed the outcome window before engaging with the programme and represent a different demographic from typical participants, having taken a non-linear route through education.

Mature non-participants. Non-participants whose records were collected after their expected HE entry year were also removed (2,920 students). These individuals were still present at a Higher Horizons target school or college after the point at which they would have been expected to progress to HE. Their inclusion would have introduced bias: this group had a progression rate of just 8.7%, substantially lower than the 30.7% rate among non-participants whose data was collected within the normal timeframe, which would have artificially depressed the non-participant progression rate and overstated the apparent effect of participation.

Pre-expected entry progressors. Thirty records showed students entering HE before their expected entry year. Given the small number involved and the likelihood that these represent data entry errors, they were removed from the dataset.

Missing demographic data. The statistical methods used in this analysis require complete demographic data for every student. Four variables are used as covariates throughout: sex, ethnicity, TUNDRA quintile and IMD quintile. Students with missing data on any of these fields were excluded, resulting in the removal of a further 1,875 records. Missing data rates were low for each individual variable, ranging from 0.13% for IMD quintile to 4.0% for ethnicity.

The final analysis dataset contains 22,790 students.

Final Analysis Dataset

After applying all exclusions, the final analysis dataset comprises 22,790 students: 13,545 participants and 9,245 non-participants, distributed across four expected entry year cohorts (Table 1).

Table 1: Participants and Non-participants per Expected HE Entry Year

Expected HE Entry Year	Non-participant	Participant	Total
2019	705	2,200	2,905
2020	970	2,520	3,490
2021	2,370	3,960	6,330
2022	5,200	4,865	10,060
Total	9,245	13,545	22,790

Participants outnumber non-participants in the 2019 to 2021 cohorts, reflecting the individual data collection model used in those years. In 2022, this reverses, as the shift to bulk data collection from partner schools brought in a larger number of non-participant records. Expected HE entry year is included as a covariate in all statistical models to account for this. For the propensity score matching, the smaller non-participant pools in 2019 and 2020 mean that not every participant in these years will find a matched control; match rates and any resulting reductions in sample size are reported in the results section. The 2021 and 2022 cohorts, which together account for 72% of the sample, will produce higher match rates and more precise estimates.

There are also some demographic differences between the two groups, summarised in **Table 2**.

Table 2: Demographic Characteristics of Participants and Non-participants

Demographic Variable	Participants	Non-participants
Female	53.2%	49.6%
Male	46.8%	50.4%
TUNDRA Q1 and Q2	63.1%	46.3%
IMD Q1 and Q2	57.5%	38.1%
Ethnicity: White	85.4%	90.5%
Ethnicity: Asian	7.8%	4.2%
Ethnicity: Black	1.9%	1.4%
Ethnicity: Mixed	4.1%	3.7%
Free School Meals eligible	18.4%	10.2%
Declared disability	14.3%	23.2%

The most notable differences are in the measures of socioeconomic disadvantage. Participants are more concentrated in the lower TUNDRA and IMD quintiles, and are almost twice as likely as non-participants to be eligible for free school meals. This reflects the targeting of outreach activities towards students who are least likely to progress to HE. The higher rate of declared disability among non-participants is also notable, though it is not straightforward to interpret.

Free school meal eligibility and disability status are not included as covariates in the statistical models due to the volume of missing data in both fields. FSM data is missing for 11.1% of participants and 30.6% of non-participants; disability data is missing for 7.6% of participants and 10.1% of non-participants. Including these variables would have required removing a further 4,325 students with missing FSM data and 1,960 with missing disability data, significantly reducing the size of the dataset. Sensitivity checks were carried out to confirm that excluding these variables was justifiable, and the results of those checks are discussed in the logistic regression section below.

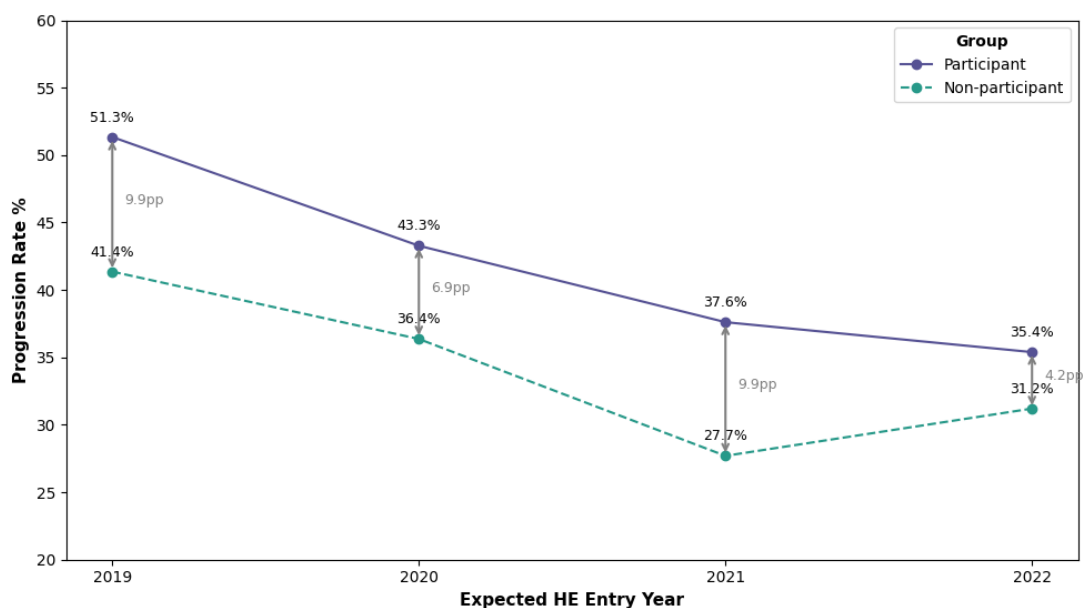
Exploratory Data Analysis

This section describes the key features of the dataset before any statistical adjustment is applied, providing important context for interpreting the results that follow.

Unadjusted Progression Rates

Looking at raw progression rates across the four cohort years, participants consistently progressed to HE at higher rates than non-participants in every year (Figure 1). However, both groups show a declining trend over time, and the gap between them narrows

Figure 1: Raw Progression Rates by Participation



Participant progression rates fell from 51.3% in 2019 to 35.4% in 2022, while non-participant rates fell from 42.5% to 26.9% over the same period. Before drawing any conclusions from this pattern, it is important to consider what else changed across these cohort years, particularly the demographic composition of the two groups and the nature of the programme itself.

One additional observation from the raw data is worth noting. Among students who did eventually enter HE, participants were substantially more likely than non-participants to enter on time, that is, in their expected entry year rather than the year after. Across cohorts, 77% to 81% of participants who progressed did so on time, compared with 46% to 70% of non-participants. The gap was particularly large in the 2021 cohort (78% vs 46%), whose Year 12 and Year 13 were disrupted by the pandemic. This may suggest that participation in outreach is associated with a smoother and more timely transition into HE, though it may also reflect how schools and teachers select students for outreach activities.

Demographic Composition

The demographic profile of the participant group changed substantially over the four cohort years in ways that help explain the declining progression rates. The proportion of participants from TUNDRA quintile 1 (areas with the lowest rates of HE participation)

rose from 28.3% in 2019 to 43.6% in 2022, while the proportion from quintile 5 fell from 9.7% to 4.7%. A similar pattern is visible in the IMD quintile distribution: the proportion of participants from the two most deprived quintiles grew from 27.9% in 2019 to 39.6% in 2022. By contrast, the non-participant group remained broadly stable in its TUNDRA and IMD composition across all four years.

This shift matters because students from the lowest TUNDRA and IMD quintiles have lower rates of HE progression nationally. A participant cohort that is increasingly concentrated in these groups would therefore be expected to have a lower average progression rate even if the programme's effect on each individual student remained unchanged. The declining raw progression rates for participants are therefore at least partly explained by the programme reaching a more disadvantaged group of students over time, rather than by any reduction in programme effectiveness. Similarly, the narrowing of the raw gap between participants and non-participants reflects the fact that the two groups were diverging demographically across this period. When the analysis is restricted to TUNDRA Q1 and Q2 students only, the progression gap between participants and non-participants becomes more consistent across cohort years, which supports this interpretation. The sex and ethnicity composition of both groups remained broadly comparable across years, suggesting the demographic shift was driven primarily by increasing socioeconomic disadvantage.

Disruption Due to the Covid-19 Pandemic

Three of the four cohorts included in this analysis had their pre-university education disrupted by the Covid-19 pandemic. The 2020 and 2021 cohorts did not sit level 3 examinations, while the 2022 cohort did not sit GCSE exams. As noted in the programme delivery section, Higher Horizons activity also moved largely online during this period.

Assessment arrangements were also changed in 2020 and 2021. The 2020 cohort received Centre Assessed Grades after Ofqual's moderation algorithm was withdrawn over concerns it was biased against students from lower socio-economic backgrounds, and the 2021 cohort received Teacher Assessed Grades. In both years, concerns were raised about grade inflation, with more students than usual receiving their expected grades and securing university places. It is therefore possible that progression rates for the 2020 and 2021 cohorts in this analysis are higher than they would have been under normal assessment conditions. The 2022 cohort did sit examinations, though with some modifications in recognition of the disruption to their learning leading up to their exams.

The statistical models used in this analysis include expected entry year as a variable, which absorbs some of these cohort-level differences. However, this is not a complete control for the different ways in which the pandemic affected each cohort, and this

remains a limitation of the analysis. The findings for the 2020 and 2021 cohorts in particular should be read with this context in mind.

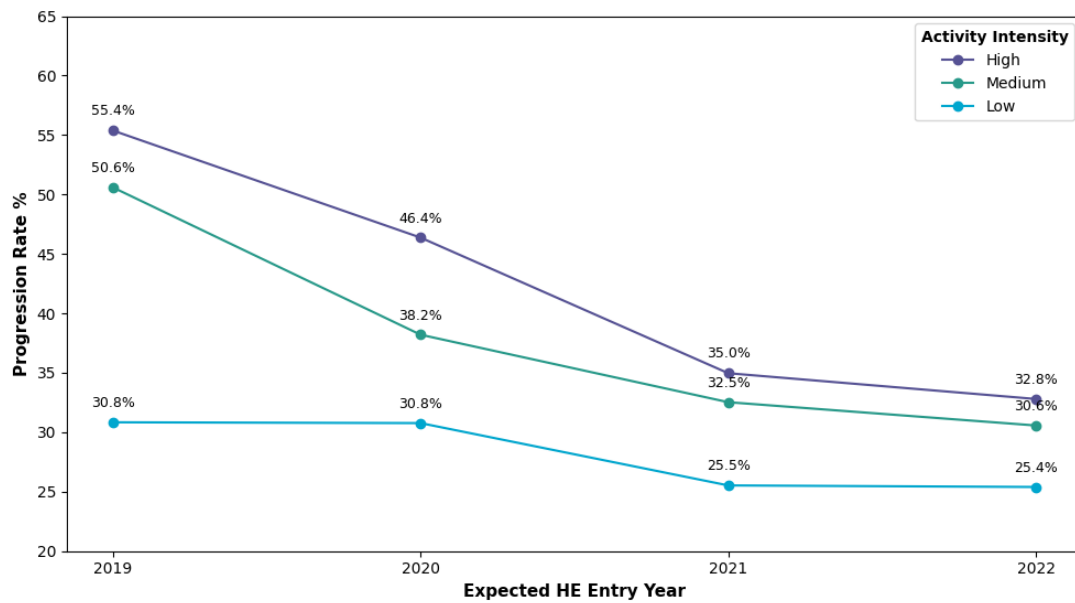
Activity Intensity Across Cohorts

As well as becoming more socio-economically disadvantaged over time, participants in later cohorts also engaged with the programme more intensively. In 2019, the average participant took part in 1.8 activities; by 2022 this had risen to 4.1. Mean contact hours followed a similar trend, rising from 6.7 hours in 2019 to 13.3 hours in 2022. This increase reflects the fact that students in later cohorts were younger when the current programme began and therefore had more years in which to accumulate engagement. It also reflects a period of relative programme stability and funding. Contact hours for more recent cohorts not included in this analysis (2024 to 2026) have returned to lower levels following funding cuts from 2021 onwards.

To account for this variation in engagement intensity, participants were grouped into three contact hours bands for use throughout the analysis: Low (fewer than 3 hours), Medium (at least 3 and fewer than 8 hours), and High (8 or more hours). The composition of these bands shifted noticeably across cohort years. In 2019, around one in five participants (21.1%) fell in the High band; by 2022, this had risen to nearly half (48.5%). The proportion in the Low band fell from 31.5% to 19.2% over the same period.

Raw progression rates by contact hours band show a broadly positive relationship between engagement and progression, though this gradient is not always consistent across cohort years when the full dataset is used. When the analysis is restricted to TUNDRA Q1 and Q2 students, a cleaner and more consistent dose-response pattern emerges: higher contact hours are associated with higher progression rates within each year and within comparable demographic groups (**Figure 2**).

Figure 2: Progression Rate by Contact Hours Band (TUNDRA Q1 and Q2 Students Only)



The progression gap between the High and Low bands is particularly pronounced for this group of students. This finding supports using contact hours bands as the primary dosage variable in the statistical models.

Activity Types Across Cohorts

The mix of activity types delivered to participants also changed substantially over the four cohort years. IAG remained the most common activity type throughout, with the proportion of participants receiving at least one IAG session rising from 53% in 2019 to 77% in 2022. Subject Specific activity grew sixfold in terms of mean sessions per participant (from 0.10 to 0.60), and its reach increased from 8% to 29% of participants. Attainment Raising activity also grew strongly and reached around 28% of participants by 2022, up from 11% in 2019. Campus Visit reach was relatively stable across all four years at around 40% to 44%. Mentoring remained low in reach throughout, though it grew from a very small base. Summer Schools fluctuated year on year, reflecting their dependence on specific funding streams; they were not delivered after 2019 due to a combination of Covid restrictions and subsequent funding cuts.

Participants in later cohorts also engaged with a broader range of activity types. In 2019, 84% of participants attended only one type of activity; by 2022 this had fallen to 48%, with around one in four participants attending three or more types and one in ten attending four or more. This diversification of engagement reflects both the longer period over which later cohorts could engage with the programme and the expansion of the programme's activity offer during this time.

Implications for Interpreting the Results

Taken together, these patterns mean that "participation" in 2019 and "participation" in 2022 were quite different in practice. The 2019 participant group was less disadvantaged, engaged with fewer activities and fewer activity types, and was more likely to have experienced campus visits and IAG as their primary form of contact with the programme. The 2022 participant group was more disadvantaged, had accumulated substantially more contact hours, and engaged with a broader range of activity types, including more Subject Specific and Attainment Raising activity.

This context is important when interpreting the year-on-year variation in the adjusted participation effects presented later in the report. Some of that variation should be expected, given that what participation actually looked like differed considerably across cohorts. The pooled odds ratios average over these very different patterns of delivery, and the regression coefficients should be read alongside this descriptive picture of how the programme itself changed over the analysis period.

Statistical Analysis: Logistic Regression

Logistic regression is a statistical technique used when the outcome being analysed is binary. In this case, the outcome is whether a student progressed to HE by age 19 or not. The outputs of the model can be expressed as odds ratios, which describe how much higher or lower the odds of an outcome are for one group compared to another. An odds ratio of 1 indicates no difference between groups; an odds ratio of 1.5 indicates that one group has 50% higher odds of the outcome than the other. Logistic regression does not establish causality; it demonstrates associations between variables and an outcome.

Four models were fitted in sequence, each building on the last. The models were assessed using standard diagnostic tests at each stage to confirm that the results were reliable and that the model specification was appropriate.

Model 1: Baseline

The first model estimates the association between outreach participation and progression by age 19, controlling only for cohort year. It does not adjust for demographic characteristics and is not intended as a final estimate; its purpose is to establish a baseline for comparison with the more detailed models that follow.

After controlling for cohort year, students who participated in at least one Higher Horizons outreach activity had **35% higher odds** of progressing to HE by age 19 than non-participants (OR 1.35, 95% CI 1.27–1.43, $p < 0.001$). The year coefficients confirm the cohort-level decline in progression rates described in the exploratory analysis: students in the 2021 and 2022 cohorts had around 44% lower odds of progression than the 2019 baseline, reflecting the demographic and programmatic changes discussed

earlier. This confirmed that including expected entry year as a covariate in all subsequent models was the right approach.

Model 2: Adding Demographic Controls

Model 1 could not rule out the possibility that some of the apparent participation effect reflected pre-existing differences between participants and non-participants rather than the effect of outreach itself. Model 2 addresses this by adding four demographic variables to the model: sex, ethnicity, TUNDRA quintile and IMD quintile.

After controlling for cohort year, sex, ethnicity, TUNDRA quintile and IMD quintile, the participation odds ratio increased from 1.35 in Model 1 to **1.52**, meaning participants had **52% higher odds** of progressing to HE by age 19 than non-participants (95% CI 1.43–1.61, $p < 0.001$). The fact that the odds ratio increases rather than decreases when demographic controls are added reflects the profile of the programme: participants are disproportionately drawn from the most disadvantaged groups, which have lower baseline rates of progression. Once the model accounts for this, the participation advantage grows. In other words, participants are progressing at higher rates than would be expected given their demographic profile.

The demographic coefficients behaved as expected. Male students had 44% lower odds of progression than female students while students from Asian, Black and Mixed ethnic backgrounds had higher odds of progression than White students, all of which is consistent with national trends. Each step up the TUNDRA and IMD scales was associated with around 12% and 16% higher odds of progression respectively.

Sensitivity checks confirmed that neither free school meals eligibility nor disability status needed to be added as covariates. While disability is a meaningful predictor of progression, adding it to the model made no material difference to the participation odds ratio (1.52 in both cases). FSM eligibility could not be included without dropping a substantial number of students with missing data, and testing showed that these missing students were not a random subset of the dataset; their removal inflated the apparent participation effect rather than producing a more accurate estimate. The Model 2 specification was therefore retained.

Model 3: Dose-Response

Model 3 replaces the binary participation indicator with a four-category measure of engagement intensity based on total contact hours: No contact (non-participants), Low (under 3 hours), Medium (3 to under 8 hours), and High (8 or more hours). This tests whether the association between outreach and progression strengthens as students receive more contact with the programme.

The results show a clear and statistically significant dose-response gradient. After controlling for cohort year and demographics, students in the Low band had **17% higher**

odds of progression than non-participants (OR 1.17, $p < 0.001$); those in the Medium band had **57% higher odds** (OR 1.57, $p < 0.001$); and those in the High band had **73% higher odds** (OR 1.74, $p < 0.001$). The pattern suggests diminishing returns at higher levels of engagement: the largest single increase in odds ratios is the step from Low to Medium, with a smaller additional gain from Medium to High.

Sensitivity checks confirmed that this gradient was not a product of where the band cut-points were placed. When contact hours were treated as a continuous variable, the dose-response relationship held in the same direction and with similar magnitude. Year-stratified models confirmed that the gradient held within each cohort year after demographic adjustment, and was not driven by between-cohort compositional change. The one qualification is that the Low band's association with progression was not statistically significant in three of the four cohort years individually, suggesting that a minimum threshold of engagement may be needed before a reliable association with progression emerges.

Model 4: Activity Types

Model 4 replaces the single participation indicator with separate flags for each of the seven broad activity types delivered by the programme: Campus Visits, Summer Schools, IAG, Attainment Raising, Subject Specific, Mentoring, and Other. This tests whether particular types of activity are more strongly associated with progression than others. Students were flagged if they had taken part in any of the seven activity types, which means the coefficients are not measuring the association with progression for each activity type in isolation but rather holding cohort year, demographics, and attendance at other activity types constant.

The results show meaningful differences between activity types. Campus Visits had the strongest association with progression (OR 1.59, $p < 0.001$), followed by Summer Schools (OR 1.35, $p < 0.001$) and IAG (OR 1.26, $p < 0.001$). Mentoring was also positively associated with progression (OR 1.26, $p = 0.032$), though based on a smaller group. Subject Specific activity was not statistically significant (OR 1.07, $p = 0.168$). Attainment Raising showed a statistically significant negative association (OR 0.85, $p < 0.001$).

The positive associations for Campus Visits and Summer Schools are consistent with these being the most immersive and HE-focused activity types in the programme. IAG's positive association is notable given that it is by far the most widely delivered activity type, reaching 41% of the sample, but also considered one of the least intensive forms of engagement. The negative coefficient for Attainment Raising most likely reflects teacher selection practices rather than a genuine negative effect: these activities are typically targeted at students with lower prior attainment, who are also less likely to progress to HE. Because prior attainment is not available in this dataset, the model

cannot fully account for this selection effect, and the Attainment Raising result should be interpreted with that caveat in mind.

A sensitivity check replacing binary activity flags with contact hours confirmed that the pattern of results held across all alternative specifications. The Model 4 findings were therefore not an artefact of how engagement was measured.

Taken together, the four models present a coherent and consistent picture: participation in Higher Horizons outreach is positively associated with progression to HE by age 19; the association strengthens with greater engagement; and it is strongest for the most immersive forms of contact with higher education. The propensity score analysis that follows provides a methodologically distinct estimate of the same question, and its consistency with these regression findings forms the basis of the overall conclusions of the report.

Statistical Analysis: Propensity Score Methods

Propensity score methods offer a complementary approach to logistic regression. Rather than controlling for demographic differences within a statistical model, they first estimate each student's probability of participating in outreach based on their demographic characteristics (their propensity score) and then use that score to construct a fairer comparison between participants and non-participants. Where both approaches produce consistent results, this substantially strengthens the evidence that the findings are genuine rather than an artefact of the method used.

The propensity score for each student was estimated using a logistic regression predicting participation from the same four demographic variables used in Model 2: sex, ethnicity, TUNDRA quintile and IMD quintile. This was fitted separately within each cohort year, so that every comparison between a participant and non-participant is made within the same year.

A structural feature of the dataset created a practical challenge. In the 2019 and 2020 cohorts, the number of non-participants available as potential controls was substantially smaller than the number of participants: 705 controls against 2,200 participants in 2019, and 970 against 2,520 in 2020. This imbalance means that in standard one-to-one matching, many participants cannot be matched to a demographically similar non-participant and must be dropped. To understand and address this problem, three matching methods were applied in sequence, each handling the imbalance differently.

Propensity Score Matching (PSM)

The first method matched each participant to the non-participant with the nearest propensity score from the same cohort year, provided the distance between their scores

fell within a standard threshold. Each non-participant could only be used as a match once.

This produced 7,720 matched pairs from 13,545 participants, an overall match rate of 57%. Match rates were particularly low in the early cohorts where the control pool was smallest: 32% in 2019 and 38% in 2020, rising to 78% in 2022. The 43% drop rate is high. An analysis of who was dropped showed that the unmatched participants were systematically more disadvantaged than those retained, being more concentrated in TUNDRA Q1 and IMD Q1 and more likely to be from ethnic minority backgrounds. The ATT estimated from PSM therefore applies primarily to the matched subset rather than all participants.

Among the matched pairs, participants progressed at 40.3% compared to 31.4% for matched non-participants, giving a difference in progression rates of **+8.9 percentage points** (95% CI: +7.4pp to +10.4pp, $p < 0.001$). The effect was positive and statistically significant in every cohort year.

Two complementary sensitivity analyses assessed how large an unobserved confounder would need to be to explain away this result entirely. A Rosenbaum bounds analysis, which concerns the treatment-assignment side of the problem, found that an unobserved factor would need to make a student 1.45 times more likely to participate, holding all observed demographics constant, before the ATT would lose statistical significance. This represents a moderate level of robustness.

An E-value was also calculated (1.89), which means that an unmeasured confounder would need to be associated with *both* participation in outreach *and* progression to higher education by a risk ratio of at least 1.89 on *each* of those two associations over and above the measured demographic covariates in order to fully explain away the estimated association. A confounder that was strongly related to one but only weakly to the other could not account for the result.

Prior attainment is the most plausible omitted variable in this context, however the e-value findings would require attainment to be associated with both progression to higher education and participation in higher horizons activities by at least 1.89 to change the results. While prior attainment is a strong predictor of HE progression, it is not how students are targeted for participation in Higher Horizons activities so there is no strong reason to expect higher-attaining students to be substantially more likely to participate. If that is the case, prior attainment would struggle to meet the 1.89 threshold on the participation side, and the result would be more robust to this particular confounder than the headline figure alone suggests.

Taken together, both analyses point in the same direction: a confounder of moderate strength could overturn the finding. This is consistent with the report's central position that these results should be interpreted as associations rather than confirmed causal

effects. Both the Rosenbaum bounds and the E-value quantify the strength of a *single* unmeasured confounder. Neither excludes the possibility that several weaker confounders acting jointly could collectively exceed the stated thresholds.

Coarsened Exact Matching (CEM)

Rather than matching on a single summary score, CEM matches participants directly to non-participants who share exactly the same demographic profile across all variables: cohort year, sex, ethnicity, TUNDRA quintile and IMD quintile. The key advantage of this method for this dataset is that it uses variable match ratios. Where PSM drops a participant if no suitable one-to-one match exists, CEM retains all students within a demographic stratum and applies weights to the non-participants to make the comparison balanced. This makes much better use of the limited control pool in the early cohorts.

CEM matched 13,125 of 13,545 participants, a match rate of 96.9%. Only 415 participants (3.1%) were dropped, compared to 43% under PSM, and the match rate exceeded 94% in every cohort year including 2019 and 2020. The small number of unmatched students were those in rare demographic combinations for which no non-participant with that exact profile existed in that year.

The CEM ATT was **+8.8 percentage points** (95% CI: +7.3pp to +10.3pp, $p < 0.001$), within 0.1 percentage points of the PSM result despite using an entirely different matching approach and retaining a much larger proportion of participants. The effect was positive and statistically significant in every cohort year.

Inverse Probability of Treatment Weighting (IPTW)

IPTW addresses the drop problem entirely by including every student in the analysis. Rather than finding a matched non-participant for each participant, it reweights the non-participant group using the propensity score so that their weighted demographic distribution mirrors that of the participant group. No student is excluded.

The weight diagnostics were reassuring: the large majority of control weights were modest, and the analysis was not dominated by a small number of extreme cases. The ATT was stable across three variants of the weighting approach (raw, trimmed and stabilised weights).

The IPTW ATT was **+8.7 percentage points** (95% CI: +7.2pp to +10.1pp, $p < 0.001$). The effect was positive and statistically significant in every cohort year.

Summary: Participation Analysis

The three methods produce estimates within a range of 0.2 percentage points of each other (+8.7pp to +8.9pp), with overlapping confidence intervals that all exclude zero. This convergence is notable because the methods differ in almost every respect: how they achieve demographic balance, how they handle the control pool imbalance, and which students they include or exclude. Despite these differences, they arrive at essentially the same answer. This consistency provides strong evidence that the estimated association between participation and progression is genuine and not a product of any single analytical approach.

Dose-Response Propensity Score Analysis

The logistic regression analysis found that the association between participation and progression was dose-responsive, with higher contact hours associated with higher odds of progression. This section tests whether the same pattern holds using propensity score methods.

Because the year-stratified regression found that Low-band participants (those receiving fewer than 3 hours of contact) were largely indistinguishable from non-participants in three of four cohort years, these two groups were combined into a single control group for this analysis. The treatment group comprises students who received at least 3 hours of contact with the programme (Medium and High-band participants). The analysis therefore tests whether substantive engagement with Higher Horizons is associated with higher progression than minimal or no engagement.

This redefinition produced a larger control pool of 12,530 students compared to 9,245 in the participation analysis. The same three methods were applied.

PSM produced a match rate of 84.8% (8,695 matched pairs), a substantial improvement on the 57% match rate in the participation analysis, reflecting the larger control pool. The ATT was **+9.4 percentage points** (95% CI: +8.1pp to +10.8pp, $p < 0.001$), positive and statistically significant in every cohort year. A secondary analysis found that High-band students showed a larger effect (+10.4pp) than Medium-band students (+8.3pp), consistent with the dose-response gradient from the regression models.

CEM matched 10,105 of 10,255 treated students (98.5%), dropping only 150 (1.5%). The ATT was **+10.2 percentage points** (95% CI: +8.8pp to +11.5pp, $p < 0.001$), positive and statistically significant in every cohort year.

IPTW included all 22,790 students with no drops, and weight diagnostics were well-behaved with no extreme values. The ATT was **+10.3 percentage points** (95% CI: +9.0pp to +11.6pp, $p < 0.001$), positive and statistically significant in every cohort year.

Summary: Dose-Response Analysis

The three methods produce estimates within a range of 0.9 percentage points (+9.4pp to +10.3pp), with all confidence intervals excluding zero. The dose-response ATTs are consistently higher than the corresponding participation ATTs (+8.7pp to +8.9pp), indicating that substantive engagement is associated with a larger difference in progression rates than any participation at all. This is consistent with the regression finding that the largest gains are associated with moving students from minimal or no engagement into meaningful contact with the programme.

The overall weight of evidence from both the regression and propensity score analyses supports the same conclusion: the association between Higher Horizons outreach and progression to HE by age 19 is positive, statistically significant, consistent across methods, and dose-responsive.

Conclusions and Recommendations

The statistical analysis presented in this report demonstrates a clear and consistent positive association between participation in Higher Horizons activities and progression to higher education by age 19.

This represents the first large-scale analysis of this impact dataset. The findings confirm that not only is participating in Higher Horizons outreach associated with a higher rate of progression, but also that this association strengthens with more intensive engagement, as measured by contact hours. The findings support the programme's sustained and progressive approach. Students with at least 3 hours of engagement, and especially those with 8 or more hours, show consistently higher progression rates than comparable students with minimal or no engagement. However, because the analysis is observational, this should be interpreted as evidence of a robust association rather than proof that additional contact hours cause higher progression.

The strength of this evidence rests not on any single model or method, but on the convergence of results across analytical approaches that make different assumptions, handle the data differently, and have different strengths and weaknesses. Logistic regression estimates a participation odds ratio of 1.52 after controlling for demographic differences, and confirms that this association is dose-responsive, with progressively higher odds for students receiving more contact hours. Propensity score matching, coarsened exact matching, and inverse probability of treatment weighting converge on an Average Treatment Effect on the Treated of between 8.7 and 8.9 percentage points for participation, and between 9.4 and 10.3 percentage points for substantive engagement of 3 or more hours despite these methods constructing the counterfactual comparison in fundamentally different ways. These methods differ in which students they include and exclude, how they achieve demographic balance, and whether they

rely on parametric modelling assumptions, yet the estimates they produce fall within a range of 0.2 percentage points for the participation analysis and 0.9 percentage points for the dose-response analysis. What makes the overall finding compelling is that every method tested points in the same direction including year-stratified models that confirm the result holds in each individual cohort year, with overlapping confidence intervals and consistent statistical significance. This triangulation across methods provides substantially stronger evidence than any individual analysis could.

The activity-type analysis adds a further dimension to these findings. Campus Visits, the most immersive form of outreach the programme delivers, show the strongest positive association with progression (OR 1.59), followed by Summer Schools and IAG. The dose-response gradient and the activity-type findings together suggest that it is not simply the fact of participation that matters, but the nature and intensity of engagement: more contact hours and more immersive experiences are associated with larger differences in progression rates.

The absence of prior attainment remains the single biggest limitation of the analysis and should be prioritised in future data linkage or evaluation work. While HEAT does provide some Key Stage 4 and Key Stage 5 attainment data to members, Higher Horizons have not yet been able to access this data due to joining HEAT after the current cycle of this work had been completed. This data is also not provided historically, so Higher Horizons has missed the chance to access this data for students in this study via this method. Higher Horizons could investigate whether it would be possible to access this data directly from the Department for Education, though applications to access the National Pupil Database and conduct analysis within the ONS Safe Research Service are notoriously difficult and can take considerable amounts of time.

The practical recommendations that follow assume that the observed associations are at least partly attributable to the programme itself, an assumption that is supported by the consistency of findings across methods and the presence of a dose-response gradient, but which cannot be confirmed without controlling for prior attainment and other unobserved variables.

Programme design should focus on ensuring that participants have the opportunity to engage in at least three contact hours, and ideally ensure a majority of participants have access to over 8 contact hours. Practitioners should work with target schools to plan a sustained programme of activity for their learners which ensures participants have had a 'high' dose of engagement by the end of Year 11. Campus Visits and IAG sessions should remain at the core of what Higher Horizons delivers because of their positive associations with progression. Despite the negative association between Attainment Raising activities and progression, these activities should not be scaled down: evaluation data suggests these activities are having a positive impact on short-term outcomes. Some consideration should be given to the volume of Subject Specific

activities delivered, despite no statistically significant association with progression. Evaluation data for these activities should be reviewed to identify which activities have positive effects on short-term outcomes.

HEAT has indicated that HESA data for the 2024/25 academic year will be available in Summer 2026. This data will mean that Higher Horizons has by-19 progression outcomes for the 15,020 participants and non-participants with an Expected HE Entry Year of 2023. After completing the same data cleaning steps used in this study, this would add a further 13,830 students (8,295 participants and 5,535 non-participants) from the 2023 cohort to the dataset. Once this data becomes available, this analysis should be repeated with these additional students in the dataset.