Transforming Access and Student Outcomes in Higher Education

Nottingham Trent University

Using institutional data to track post-entry participant outcomes: Nottingham Trent University case study

March 2024

Authors at Nottingham Trent University:

Mike Kerrigan, Head of Research and Insights (Access and Participation)

Laura Hope (Research and Data Coordinator)

Bec Aeddi (Research and Evaluation Coordinator)

Contents

Executive summary

Background

This case study focuses on Nottingham Trent University (NTU) and its use of institutional data infrastructure to track the outcomes of student participation in extra-curricular activities (ECAs). As part of TASO's 'Institutional data use' project, this study aims to contribute to a practical guide for higher education providers on how post-entry interventions can be evaluated using institutional data.

Aims

The study aims to explore how participation in ECAs influences student success, specifically by evaluating differences in academic outcomes between students who participate in ECAs and those who do not. The focus is on identifying whether engagement in these activities is associated with better academic performance.

Intervention

The intervention examined is the participation of undergraduate students in a range of ECAs during the 2022–23 academic year. These activities include programmes like volunteering, mentoring, and involvement in student societies, with data collected on student engagement and outcomes.

Design

The study uses a quasi-experimental design to reduce the impact of selection bias. Specifically, propensity score matching (PSM) and case control matching (CCM) are used to create comparable groups of participants and non-participants, controlling for demographic, academic, and engagement factors.

Outcome measures

The outcome measure of interest is final degree classifications for Level 6 students, and Grade Based Assessment (GBA) marks equivalent to degree classifications for Levels 4 and 5.

Analyses

To assess the impact of ECAs on academic outcomes, matched comparator groups were created using either PSM or CCM.

Results

The analysis indicates that participation in ECAs is positively associated with improved academic outcomes. At level 6, ECA participants were more likely to achieve a 2:1 or first-class degree than non-participants. At levels 4 and 5, ECA participants were more likely than non-participants to achieve a GBA equivalent to a 2:1 or a first. Analysis using PSM revealed larger gaps between participants and non-participants than CCM.

Conclusions

Although the study does not establish a causal relationship due to not being able to eliminate unknown confounding variables, the findings provide strong evidence of a positive association between ECA participation and academic success. This highlights the importance of ECAs as a valuable component of the student experience, contributing to improved academic performance. The methodologies used in this study are replicable and can be adopted by other higher education providers to evaluate the impact of post-entry activities on student outcomes.

1 Introduction

A key strand of NTU's project brief, this case study aims to contribute to TASO's practical guide to how data infrastructure can be used or developed within higher education providers to enable tracking of post-entry higher education activities and participant outcomes. The primary purpose of the case study is to provide practical examples of how institutional data can be used in the real world, using various methodologies to evaluate the impact of post-entry interventions on student success.

Specifically, 2022–23 student enrolment and outcomes data are matched with participant data for a number of pre-defined extra-curricular activities (ECAs) from the same year. The resulting matched dataset is then analysed to track participant outcomes and compare them against non-participants. This ascertains any statistical associations between participation in student success interventions and differential outcomes.

Crucially, NTU's student enrolment and outcomes dataset utilised in this analysis is not dissimilar to the data provided to HESA as per institutional regulatory requirements, so the methods applied in this case study should be replicable. As a retrospective statistical analysis with no randomisation of participation from the offset, we cannot be wholly confident that the controlling mechanisms applied completely eliminate self-selection bias, due to potentially unobservable influential factors. As a result, the case study does not claim any causal (Type 3) relationship between participation in activities and differential student outcomes. Nevertheless, the tracking methodology is transferable to almost any student success initiative and can quite easily be tweaked for experimental studies. The quasi-experimental designs adopted provide strong empirical enquiry (Type 2) evidence in their own right, and these can be tweaked accordingly to develop opportunities for evaluation that will deliver causal evidence.

2 Methodology

2.1 Sample

NTU's individualised student enrolment and outcomes dataset is shared by NTU's Strategic Planning and Change team with an authorised individual within NTU's Centre for Student and Community Engagement team, responsible for the monitoring and evaluation of the University's access and participation plan (APP). This dataset includes students' demographic and educational indicators, as well as learner outcomes (retention, attainment etc.) that they are known to influence.

The students who were of primary interest were full-time undergraduates who were studying Level 4, 5 or 6. All students who fell outside of these parameters were removed from the dataset. In practice, it can be problematic to include international students in some of the statistical modelling because of strong associations with other variables (which can lead to problems of collinearity); for example, all overseas students have a widening participation status of 'unknown' and UCAS entry tariff of 'unknown', which may distort the true effect of these variables. Therefore, to eliminate any of these effects, international students are not included in the analysis shown in this case study.

A summary of the data specifications is shown in Appendix 1 Tables A1a-d. Further details of the process for collecting participant data of various extra-curricular activities and student outcomes are shown in Appendix 2.

After removing international students from the dataset, 32,345 students were available for analysis (Table 2). Tables 2 and 3 demonstrate that the selected activities of interest provide a very strong sample size upon which to undertake statistical analysis of participant outcomes. Across all programme years (Levels 4, 5 and 6), 13,335 students participated in at least one of the selected 12 ECAs (some took part in more than one, hence the higher grand total in Table 3). This compares with 19,010 students who were recorded as not participating in any of these activities, which can be drawn upon to provide various comparator groups.

Table 2: Number of students participating in NTU's selected extra-curricular activities 2022–23

Number of ECAs	Number of students	%
0	19010	59%
1	8735	27%
2	3385	10%
3	940	3%
4	215	1%
5 or more	60	0%
Grand total	**32345**	**100%**

Table 3: Number of students participating in each activity 2022–23

Activity name	Number of students
Black Leadership Programme	170
CERT Mentoring	635
Community Engagement & Volunteering	260
Employability	975
Mansfield Challenge	25
NTSU Academic Reps	670
NTSU Society Committee Members	570
NTSU Society Members	8730
NTU Music	75
NTU Sport - Gym Members	3755
NTU Sport - Club Members	3340
Students in Classrooms	120
Grand total	**19325**

It can be problematic to compare retention outcomes of participants with non-participants. This is because if a student signed up for an activity, this means that they must have been actively enrolled in the institution at the time of sign up. As some interventions may have sign up dates throughout the academic year, this automatically induces bias, because non-participants may already have withdrawn at the time of sign-up. This can be mitigated somewhat with the use of the 1 December enrolment flag (see Table A1a) and only including activities for which sign up was in advance of this date. However, in practice, some students may have completely disengaged from their provider and effectively withdrawn in all aspect bar the formalities. This automatically induces bias, so care needs to be exercised when defining a suitable comparison group. Of course, if a similar methodology were adopted but participation was randomised at source, this effectively eliminates this possible bias.

As the purpose of this case study is to explore potential ways to track the participant outcomes of post-entry higher education activities – and it is effectively a retrospective analysis, with no randomisation of selection – retention and academic progression are not included (recruitment for some of the activities takes place over the whole academic year). Instead, the case study focuses on outcomes (end of year GBA scores and final degree classification) that automatically exclude students who did not successfully progress to their next year of study. This way we can be confident that all students, in both the participant and comparator groups, were sufficiently engaged in their studies to progress to the next level (or complete their degree programme), thus reducing confounding bias. This is further controlled for by including NTU Student Dashboard engagement scores (Table A1c) within the covariates.

2.2 Design

Taking account of the lack of randomisation of selection, a quasi-experimental design is required to reduce self-selection bias, such as intrinsic motivation, which may influence both the propensity to take part in an activity and the outcome of interest. In essence, a quasi-experimental design is an empirical study that estimates the causal impact of the intervention on the target population but without random assignment. There are several types of quasi-experimental designs, some of which are illustrated via TASO's Data infrastructure guide. Due to the lack of historical data with which to establish parallel trends in attainment prior to participating in ECAs it was not possible to use a differences-in-differences approach. A matching design, using propensity score matching (PSM) and case control matching (CCM) was chosen.

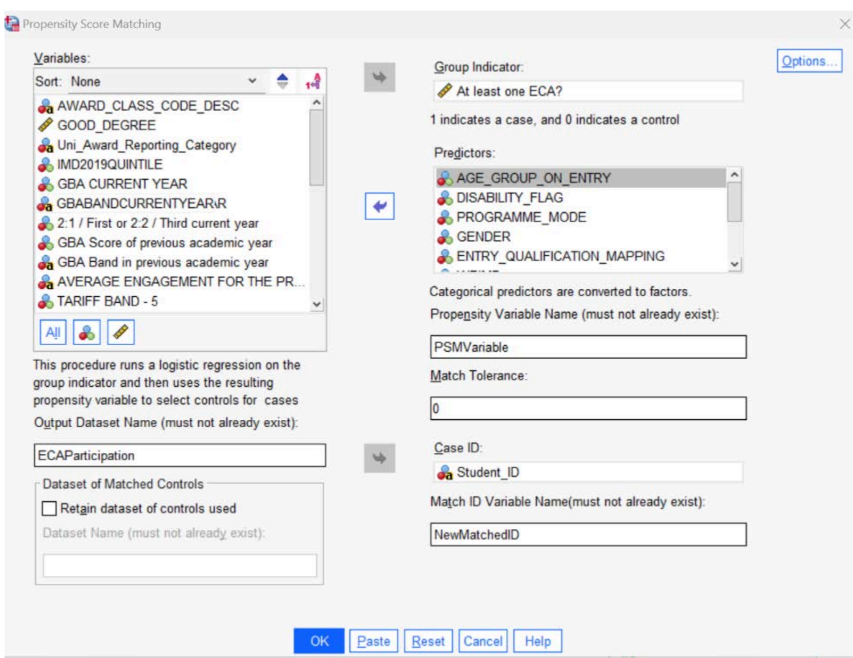
2.3 Propensity score matching

Propensity score matching (PSM), attempts to estimate the probability that, in our case, students with certain characteristics will be assigned to the treatment group (as opposed to the comparator group). A propensity score is an estimated probability that a unit (that is, a student) might be exposed to the programme and is constructed using the unit's (student's) observed characteristics. These scores can be used to reduce selection bias in observational studies by balancing covariates (the characteristics of participants) between treated and comparator groups. As we have a substantial number of covariates in the dataset at our disposal, that influence both participation in the intervention and the outcome of interest, this method is potentially workable.

PSM consists of four phases:

1. Estimating the propensity score for the subjects based on a combination of covariates (statistical software performs this task).
2. Matching individual students who received the treatment with a ‘partner’ student who did not receive the treatment, but has similar propensity scores according to the adopted matching algorithm (statistical software performs this task).
3. Check for balance in propensity scores between subjects assigned to the treatment group and those assigned to the comparator group. Balance can be tested using a two sample t-test to compare the means of all covariates included in the propensity score in order to determine if the means are statistically similar in the treatment and comparison groups. Importantly, if balance is not achieved (that is, the mean propensity scores of the covariates are statistically different), an alternative matching specification should be used until the sample is sufficiently balanced.
4. Estimate the intervention effect and interpret results.

Figure 1: Example of PSM matching process in SPSS



PSM can be undertaken in various statistical software packages and for this case study, we used SPSS (which is often widely available in higher education providers), and, like other software, it essentially uses logistic regression to assign propensity scores to each record. The process is straightforward, provided that the data has been appropriately transformed, with categorical variables recoded as integers.[1] Figure 1 provides an example of how to assign propensity scores to each student. The group indicator needs to be the treatment variable; in our case whether or not the student participated in at least one ECA. The predictors are the factors that are known (or assumed) to influence participation.

Match tolerance should be set at the optimum value between 0 and 1 (which, in practice, may be a process of trial and error). A value closer to zero will provide closer matches (and therefore improve balance) of propensity scores, but will result in a greater number of failed matches, hence the sample size will reduce. The significant covariates from a logistic regression analysis (not described here) were used as a starting point in the attempt to achieve the optimum balance of sample sizes and statistical similarities between the resulting treatment and comparator groups.

In practice, a process of trial and error using descriptive analysis, combined with statistical testing, is necessary to finalise the most appropriate model. Importantly, this must be done before any analysis of outcomes, to avoid any temptation of 'p-value hacking' – the exploitation of data analysis and presenting patterns as statistically significant, when there is actually no underlying effect. Table 4 shows three alternative models that were tested and demonstrates the effect of tolerance applied.

The first model adopted the matching based on all covariates known to have a statistical association (in this case, from the significant covariates identified by a logistic regression analysis carried out in advance) with the likelihood of participating in an ECA, including those with relatively small effect sizes. Zero tolerance was applied, which ensures equality of mean propensity scores for all covariates. In effect, a perfect balance between the assigned treatment and comparator groups based on all of the variables included in the matching process is achieved. However, the combination of zero tolerance and matching attempted on so many covariates resulted in a relatively low 62% of ECA participants receiving a match. Moreover, there were considerable differences between groups. The idiosyncrasies in the dataset resulted in disproportionately lower matches for discrete groups with distinct intersectional characteristics. For example, only 26% of over 25 year-old and 45% of 'Black', 'Asian', 'Mixed' or 'Other' ethnicity participants respectively were successfully matched. In effect, by achieving perfect matches through the combination of zero propensity score tolerance and the inclusion of numerous covariates, some of the very student groups that might be targeted for student success interventions (and who may have the greatest benefit) were disproportionately excluded from the analysis. For these reasons, this model was deemed sub-optimal for our purposes.

The second model included the same covariates but applied a matching tolerance of 0.05. This resulted in an encouraging increase in the sample size to 2,815, representing 89% of all ECA participants. Again, however, idiosyncrasies in the dataset point to potentially disconcerting

[1] The process for readying the data is similar to that utilised for case-control matching. HEAT members can access a resource pack, which provides step-by-step instructions on how to ready the data. This resource pack specifically relates to case-control matching (see next section), but the method for readying the data is effectively the same for PSM.

results of the matching process. For example, 595 (98%) of students who had taken a sandwich course (that is, they had been out on placement in the previous academic year) were successfully matched and therefore allocated to the treatment group. However, only 460 sandwich-course students were allocated to the comparator group, which suggests that the 5% tolerance applied resulted in less than favourable balance in PSM scores between the two assigned groups. To test this further, a t-test for equality of mean PSM scores for each covariate was carried out (Table 5). We can see that the null hypothesis of equal mean PSM scores is rejected for several covariates. The PSM scores tended to be higher in the treatment group than the comparator group. Returning to the sandwich-course placement students, the mean PSM score for the treatment group was 0.53, compared with 0.56 for those SW students assigned to the comparator group. The result of this particular matching process therefore potentially induces the very bias that the PSM is designed to eradicate. As stipulated in the third PSM phase noted above, an alternative matching specification should therefore be identified until the sample is sufficiently balanced.

In practice, large datasets are often complex in nature with numerous potential hidden biases at play. Despite several attempts at tweaking the model, any attempt to apply tolerance to enhance the sample size invariably resulted in a statistical imbalance in mean PSM scores. Model 3, therefore, applied zero tolerance but restricted the use of covariates used in the matching process to those that were found (from the original logistic regression analysis) to have both a statistically significant association with the propensity to participate in an ECA, and a considerable effect size. The result is a perfect match in PSM scores between the assigned treatment and comparator groups (hence eliminating the need to statistically test for equality of mean scores as was required for Model 2), together with a reasonable sample size of 2,530 in each group, representing 80% of all ECA participants. Model 3 was therefore deemed the most optimal result of reasonable sample size and covariate balance between the assigned treatment and comparator groups, hence this model is adopted for subsequent analysis.

Table 4: Variables assigned to treatment and comparator groups via PSM (bold = included in PSM matching)

	Model 1 Zero Tolerance Treatment (n 1,980 62%)	**Model 1 Zero Tolerance Comparator Group (n 1,980)**	**Model 2 Tolerance 0.05 Treatment (n 2,815 89%)**	**Model 2 Tolerance 0.05 Comparator Group (n 2,815)**	**Model 3 Zero Tolerance Treatment (n 2,530 80%)**	**Model 3 Zero Tolerance Comparator Group (n 2,530)**
Age over 25	**10 (26% matched)**	**10**	**40 (100% matched)**	**40**	**25 (63% matched)**	**25**
Age 21-25	**40 (29%)**	**40**	**125 (94%)**	**140**	**100 (74%)**	**100**
Age under 21	**1,935 (64%)**	**1,935**	**2,655 (88%)**	**2,635**	**2,410 (80%)**	**2,410**
V Low engagement	**5 (50%)**	**5**	**10 (100%)**	**10**	**10 (90%)**	**10**
Low engagement	**110 (55%)**	**110**	**200 (99%)**	**200**	**180 (90%)**	**180**
Partial engagement	**975 (78%)**	**975**	**1,225 (97%)**	**1,290**	**1,175 (93%)**	**1,175**
Good engagement	**445 (59%)**	**445**	**665 (87%)**	**670**	**575 (75%)**	**575**
High engagement	**440 (48%)**	**440**	**715 (76%)**	**650**	**590 (63%)**	**590**
Mode FT	**1,690 (66%)**	**1,690**	**2,225 (87%)**	**2,360**	**2,125 (83%)**	**2,125**
Mode SW	**295 (48%)**	**295**	**595 (98%)**	**460**	**405 (67%)**	**405**
BTEC entry	**165 (54%)**	**165**	**295 (98%)**	**315**	245 (81%)	325
‘Black’, ‘Asian’, ‘Mixed’ or ‘Other’ ethnicity	**280 (45%)**	**280**	**595 (95%)**	**615**	**480 (77%)**	**480**
Male	**850 (65%)**	**850**	**1,220 (94%)**	**1,255**	1,045 (80%)	1,170
Widening participation	**370 (55%)**	**370**	**655 (97%)**	**680**	540 (80%)	670
School ARES	**50 (48%)**	**50**	**100 (97%)**	**95**	**80 (76%)**	**80**

Table 5: Mean PSM scores and two sample t-test results for Model 2 (with 0.05 matching tolerance)

Covariate	Comparator n	Treatment n	Comparator mean PSM score	Treatment mean PSM score	p value for equal PSM means
All students	2,815	2,815	0.464	0.474	**0.001**
>25	40	40	0.235	0.252	0.44
21-25	140	125	0.370	0.360	0.48
<21	2,635	2,650	0.472	0.482	**0.001**
V Low e'mnt	10	10	0.089	0.095	0.74
Low e'mnt	200	200	0.324	0.333	0.77
Partial e'mnt	1,290	1,225	0.417	0.421	0.27
Good e'mnt	670	665	0.502	0.508	0.23
High e'mnt	650	715	0.565	0.578	**0.02**
SW mode	460	595	0.534	0.561	**<0.001**
FT mode	2,360	2,225	0.450	0.450	0.89
A-Level	1,910	1,950	0.491	0.502	**0.002**
BTEC	315	295	0.371	0.368	0.73
Asian	235	215	0.407	0.422	0.14
Black	205	195	0.362	0.347	0.19
White	2,180	2,200	0.482	0.493	**0.001**
Female	1,550	1,590	0.483	0.500	**<0.001**
Male	1,255	1,220	0.438	0.438	0.99
Widening participation	680	655	0.396	0.397	0.94
Non-widening participation	2,075	2,095	0.482	0.494	**<0.001**

2.4 Case-control matching

Case-control matching (CCM) methodologies – an alternative matching quasi-experimental design – are regularly used in observational studies to reduce (although not necessarily eliminate) selection bias. CCM performs an approximation of a randomised controlled trial and employs statistical software to match participants with non-participants on factors known to influence the outcomes of interest. As was the case with PSM, the large dataset at our disposal includes numerous such factors and CCM is another potentially practical methodology to employ.

Whereas PSM uses probabilities derived from a logistic regression (with dependent variable the participation in the activity of interest) to define the matching eligibility, CCM effectively controls eligibility variable by variable. PSM tolerances are based on the propensity scores derived by combining the variables, while CCM tolerances are based on individual variables, for which the numerical value is meaningful. For example, in our dataset there are 16 GBA scores (from low fail = 1 to exceptional first = 16) and a matching tolerance may be applied. A categorical variable such as ethnicity, however, may be coded numerically but has no inherent numerical value, and therefore would not be appropriate for applying tolerances.

CCM employs statistical software (again, in this case we used SPSS, although alternative software platforms perform similar functions) to match participants with non-participants on factors known to influence the outcomes of interest.[2] While it is, in theory, possible to attempt to match on all available variables, this has the effect of drastically reducing sample sizes, because very few non-participants will share exactly the same combination of characteristics as participants. Therefore, to achieve the optimum balance between sample size and similarities between the treatment group and the comparator group, the most statistically significant variables, and/or those with high effect sizes (in this case from the logistic regression analysis undertaken in advance), are taken into account in the matching process.

Table 6 shows the results of three separate matching models undertaken. In the first model, all variables with strong statistical associations with final degree classification (from the regression analysis) were included. No tolerance was applied and the matching methodology produced 1,810 exact matches, representing a relatively low 57% sample size. Model 2 includes those variables with the highest statistical significance and effect sizes (from the separate logistic regression analysis), again with no tolerance applied. This model resulted in 2,580 exact matches; a 81% sample size. Model 3 used the same covariates but applied a tolerance of +/- 1 for students' previous year GBA attainment scores (1-16).[3] This resulted in a slightly improved sample size of 84%, although the majority of the matches were 'fuzzy' – that is, the matched pairs had different GBA attainment scores based on the tolerance applied.

[2] HEAT members can access a resource pack, which provides step-by-step instructions on how to undertake case-control matching.
[3] See Figure 2 for an example of how to apply these tolerances. Note that GBA is the second variable of four, hence the second integer of four in the 'Match Tolerances' box is set to 1, whilst all the others are set to zero.

As the separate regression analysis had shown that the likelihood of achieving a first class or 2:1 degree classification increases exponentially with incremental prior attainment, the benefits of the additional sample size are outweighed by the potential bias that could ensue. Based on this analysis, Model 2 is the most optimal result of reasonable sample size and effectively a perfect balance for the chosen covariates between treatment and comparator groups (Table 7), hence this model is adopted for subsequent analysis.

Figure 2: Example of CCM matching process in SPSS (model 3)

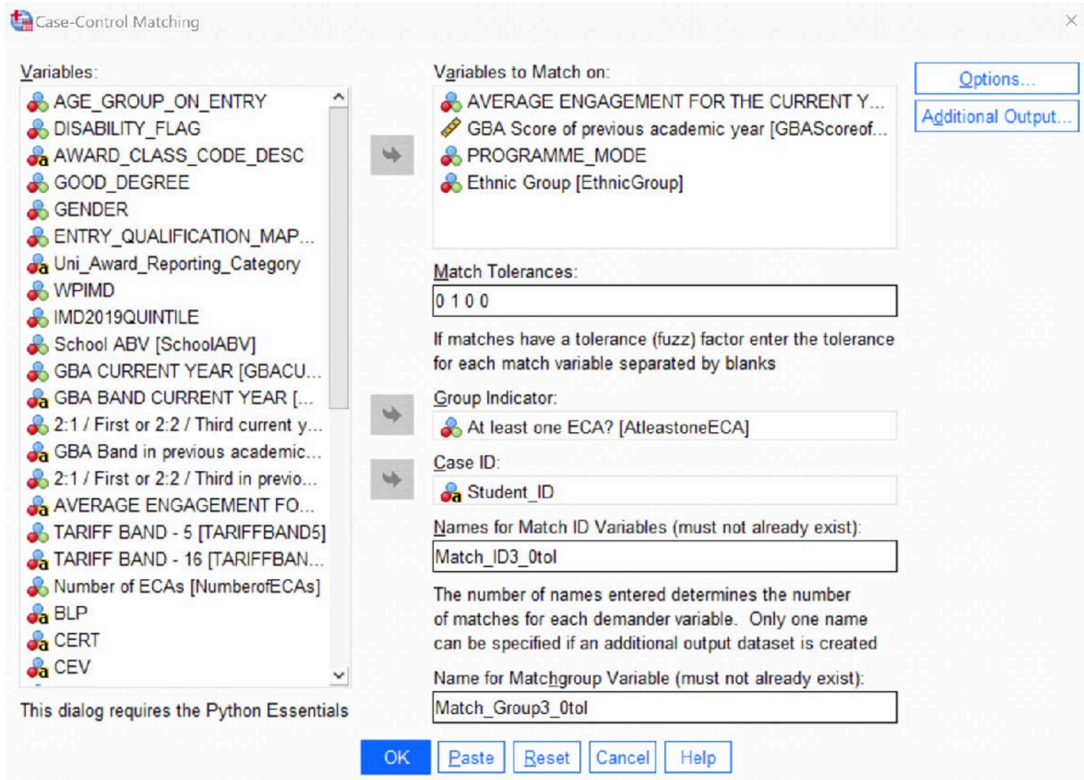


Table 6: Sample sizes derived from CCM based of different covariates and applied tolerances.

	Model 1* Tolerance 0	**Model 2** Tolerance 0**	**Model 3*** Tolerance 1 GBA**
Number of matched treatment and comparator pairs	1,810 (57% matched)	2,580 (81% matched)	2,675 (84%) of which 1,850 are fuzzy matches

* Engagement, GBA attainment, mode, ethnicity, entry route, academic school

** Engagement, GBA attainment, mode, ethnicity

*** Engagement, GBA attainment (with tolerance of +/- 1), mode, ethnicity

The above methodologies that focused on the final degree attainment of ECA participants who were studying Level 6 in 2022–23 were replicated for Level 4 and 5 students. The outcome of interest was students' average attainment scores for the year, based on NTU's GBA processes. The findings from the analysis are presented in the Results section of this case study. To avoid unnecessary duplication, detailed methodologies are not included, as the processes adopted were effectively identical to those explained above.

For the Level 4 data, there were actually more participants (n=3,660) than non-participants (n=2,730), which is not ideal for matching purposes. Therefore, in this case a 100% match success rate would glean 2,730 matches, meaning that in the best possible (very unlikely) scenario, 930 participants would be excluded from the analysis. Several alternative models were scrutinised for optimum combination of balance and sample size. Using PSM (again with zero tolerance applied for the same reasons as discussed for Level 6 outcomes), 1,945 exact matches were achieved, representing a 71% sample size (or 53% if assuming treatment as the denominator). Using CCM, but this time applying a tolerance of +/- 1 for pre-entry qualification tariff band (hence previous GBA attainment not available for Level 4), 2,140 matches were achieved, representing a 78% sample size.

For the Level 5 data, there were more non-participants (n=3,860) than participants (n=3,195). Using PSM with zero tolerance, 2,650 (83%) exact matches were achieved. Using CCM, this time with a tolerance of +/- 1 for prior GBA attainment applied (as this option maintained good balance), 2,690 matches were achieved, a sample size of 84%.

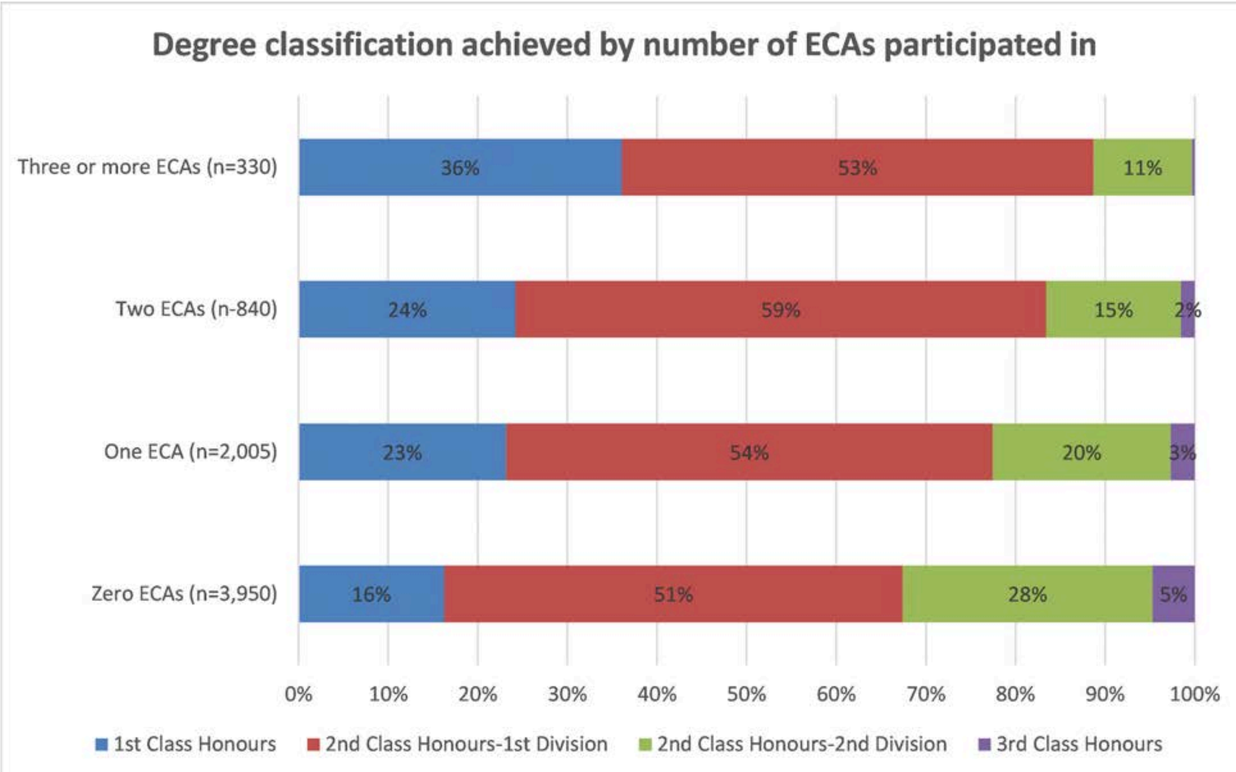
Table 7: Variables assigned to treatment and comparator groups via CCM (bold = included in the CCM matching)

	Model 1 Treatment Group (n 1,810)	Model 1 Comparator Group (n 1,810)	Model 2 Treatment Group (n 2,580)	Model 2 Comparator Group (n 2,580)	Model 3 Treatment Group (n 2,675)	Model 3 Comparator Group (n 2,675)
Low / V Low engagement	**115 (55% matched))**	**115**	**180 (85% matched)**	**180**	**190 (90% matched)**	**190**
Good / High engagement	**800 (47%)**	**800**	**1,220 (72%)**	**1,220**	**1,280 (75%)**	**1,280**
Mode SW	**245 (40%)**	**245**	**415 (68%)**	**415**	**440 (73%)**	**440**
A-Level entry	**1,405 (62%)**	**1,405**	1,835 (81%)	1,720	1,910 (85%)	1,780
BTEC entry	**145 (48%)**	**145**	250 (81%)	300	250 (81%)	310
‘Black’, ‘Asian’, ‘Mixed’ or ‘Other’ ethnicity	**220 (35%)**	**220**	**485 (78%)**	**485**	**550 (88%)**	**550**
White	**1,590 (63%)**	**1,590**	**2,090 (83%)**	**2,090**	**2,110 (84%)**	**2,110**
School ARES	**30 (29%)**	**30**	75 (71%)	90	85 (83%)	90
2021-22 GBA 2:2 / 3rd equiv	**670 (61%)**	**670**	**1,005 (91%)**	**1,005**	**1,020 (93%)**	**1,000**
2021-22 GBA 2:1 / 1st equiv	**1,140 (57%)**	**1,140**	**1,575 (78%)**	**1,575**	**1,660 (83%)**	**1,680**

3 Results

3.1 Level 6 undergraduate students

Figure 3: Degree classification achieved by the number of ECAs participated in



Basic descriptive analysis demonstrates that there is a clear association between participation in ECAs and higher degree classifications. For example, 67% of students who had not participated in our selected ECAs achieved either a 2:1 of first-class degree. This compares with 77%, 83% and 89% of students who had participated in one, two or three or more ECAs respectively. The 2:1/first class (v 2:2 /third class) attainment gap between participating in at least one ECA and participating in none was some 13 percentage points. This is clearly considerable, although not necessarily meaningful, because such descriptive analysis does not take account of any potential self-selection bias.

When controlling for the selection bias using the PSM methodology, we find that the difference in degree outcomes between the treatment group and comparator group is reduced considerably. However, with 78% of the treatment group achieving a 2:1 or first-class degree, compared with 74% of the comparator group, the gap of 4 percentage points remains statistically significant (Chi-squared test for no association, $p<0.001$; odds ratio 1.25 (1.09, 1.42)). As illustrated in Figure 4, this is equivalent to an estimated treatment effect of between 1.8 percentage points (the 95% lower confidence interval equates to 75.8%) and 6.1 percentage points (the 95% upper confidence interval equates to 80.1%). We can therefore reject the null hypothesis of no association between participation in ECAs and students' degree outcomes.

Effectively, when statistically controlling for differing propensities to undertake ECAs based on a combination of influential factors via PSM, we remain confident that there is a discernible impact of taking part on subsequent student attainment.

Figure 4: Final degree classifications of treatment and comparator groups, using PSM

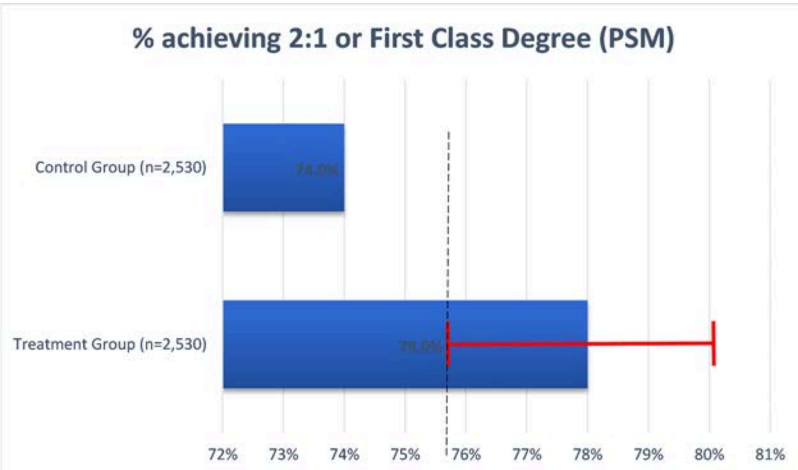
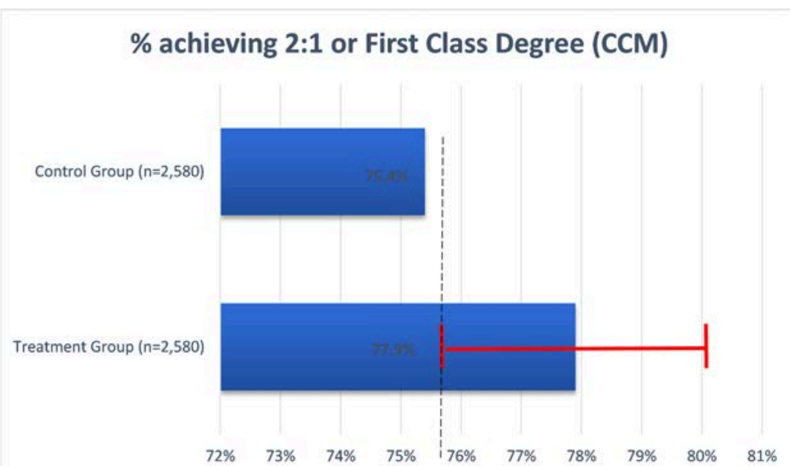


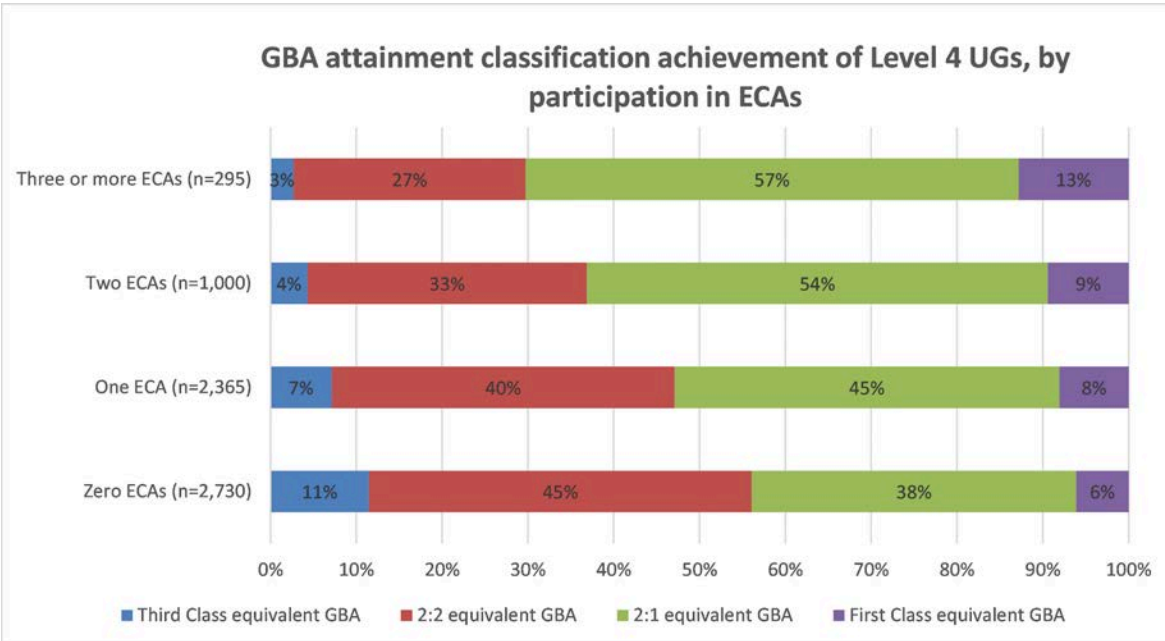
Figure 5: Final degree classifications of treatment and comparator groups, using CCM



Repeating the analysis, but this time using the adopted CCM methodology, we find that 77.9% of the treatment group achieved a 2:1 or first-class degree, compared with 75.4% of the comparator group. The resulting attainment gap between treatment and comparator groups is smaller than it was with the PSM methodology at 2.5% points, but remains statistically significant at the 5% significance level (p=0.03; odds ratio 1.15 with 95% confidence interval (1.01, 1.31)). As illustrated in Figure 5, this is equivalent to an estimated treatment effect of between 0.3 (the 95% lower confidence interval equates to 75.7%) and 4.7 percentage points (the 95% upper confidence interval equates to 80.1%). Further to the results using PSM, this provides further statistical evidence that participation in ECAs has a positive impact on students' undergraduate attainment.

3.2 Level 4 undergraduate students

Figure 6: GBA attainment classification achievement of Level 4 UGs, by participation in ECAs



Basic descriptive analysis (Figure 6) shows that first year undergraduates who participate in ECAs are more likely to achieve higher grades in that first year. Those that take part in multiple activities have an increased likelihood of getting end of year GBA) scores equivalent to first class or 2:1. As we know, however, these aggregated trends mask the likely effects of self-selection.

Figure 7: GBA attainment classification achieved by Level 4 treatment and comparator groups, using PSM

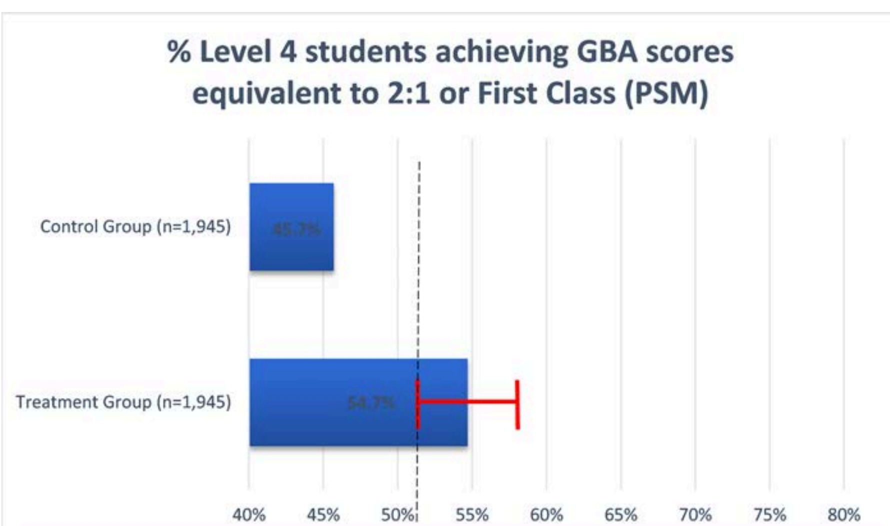
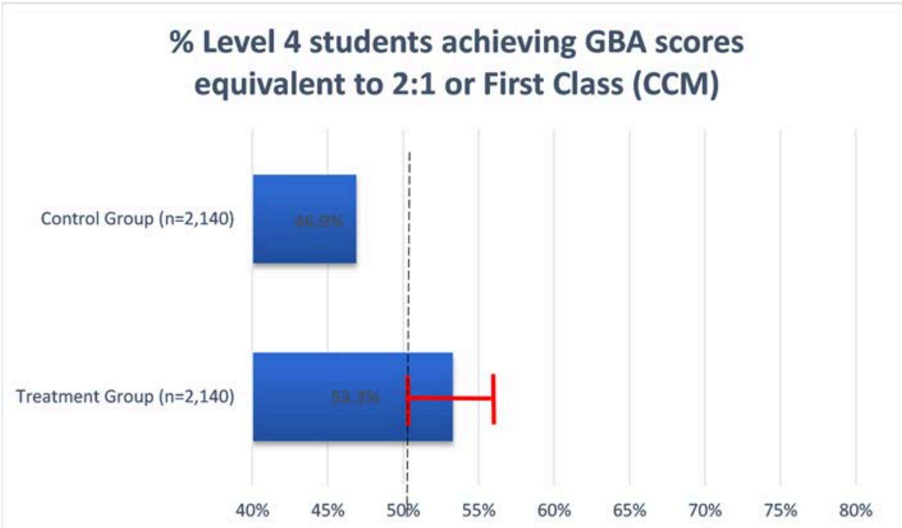


Figure 8: GBA attainment classification achieved by Level 4 treatment and comparator groups, using CCM

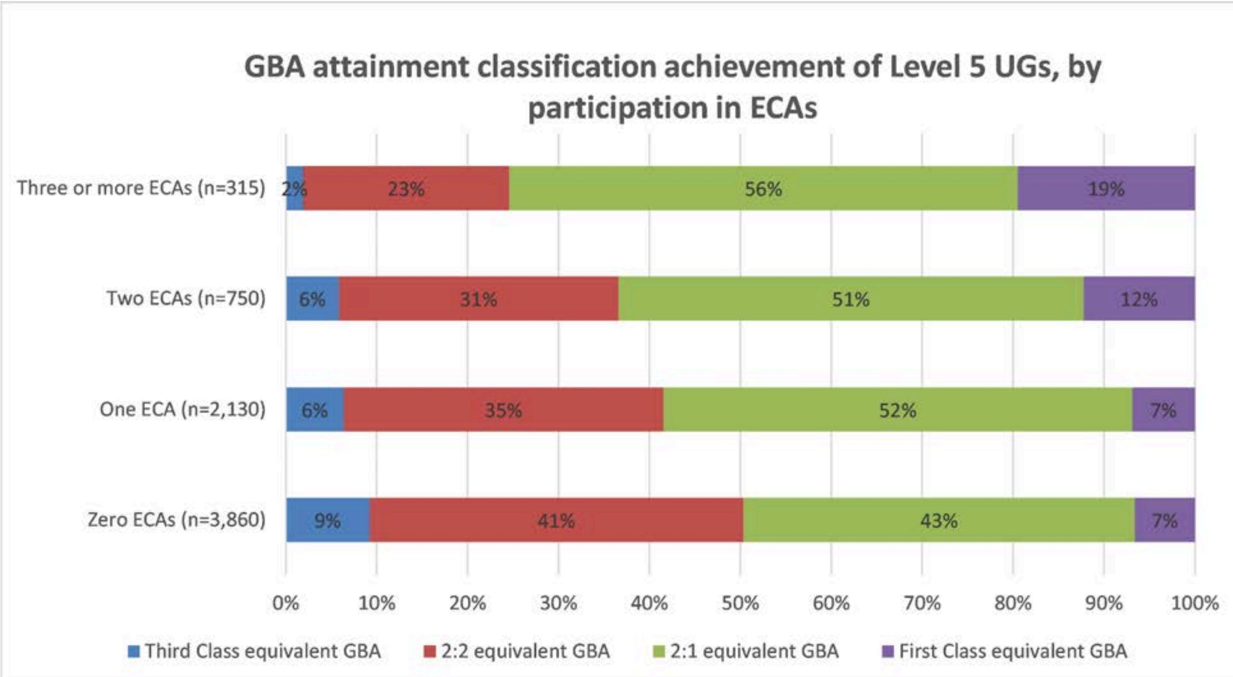


When controlling for the known effects of self-selection using PSM, we find that 54.7% of the treatment group achieved GBA scores, compared with 45.7% of the comparator group (Figure 7). The resulting attainment gap is 9 percentage points ($p<0.001$, odds ratio 1.43 with 95% confidence interval 1.27, 1.62). This is equivalent to an estimated treatment effect of between 6 (the 95% lower confidence interval equates to 51.7%) and 12 percentage points (the 95% upper confidence interval equates to 57.7%). As was the case with final degree classifications, therefore, we have strong statistical evidence that participation in ECAs is associated with improved attainment at Level 4.

When adopting the CCM methodology we find that a slightly lower 53.3% of the treatment group achieved end of year GBAs equivalent to at least a 2:1, compared with a slightly higher 46.9% of the comparator group (Figure 8), resulting in an attainment gap of 6.4 percentage points ($p<0.001$, odds ratio 1.29 with 95% confidence interval 1.14, 1.45). This is equivalent to an estimated treatment effect of between 3.4 (the 95% lower confidence interval equates to 50.3%) and 9.4 percentage points (the 95% lower confidence interval equates to 56.3%). This provides further strong evidence that suggests participation in ECAs when in Level 4 of undergraduate study has a positive impact on student attainment, when statistically controlling for known influential factors.

3.3 Level 5 undergraduate students

Figure 9: GBA attainment classification achievement of Level 5 UGs, by participation in ECAs



As was the case with Level 4 undergraduates, descriptive analysis shows that second year students who participate in ECAs are considerably more likely to achieve higher grades than non-participants (Figure 9). Again, taking part in multiple activities is associated with higher attainment rates.

Figure 10: GBA attainment classification achieved of Level 5 treatment and comparator groups, using PSM

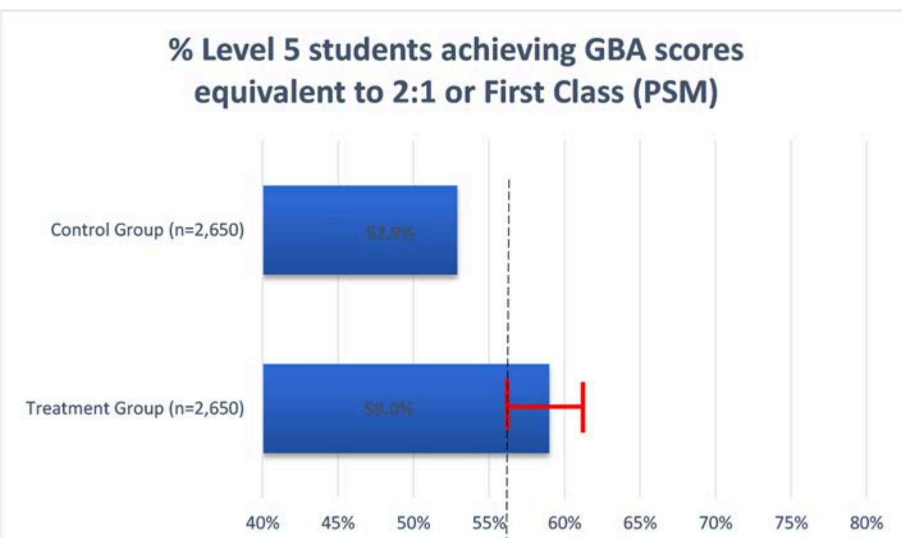
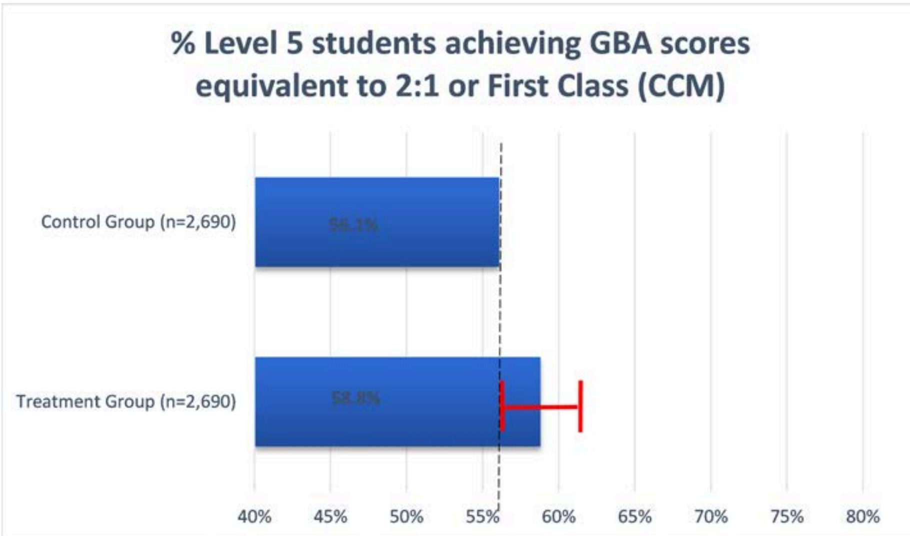


Figure 11: GBA attainment classification achieved of Level 5 treatment and comparator groups, using CCM



Using the more robust PSM methodology than mere aggregated analysis, 59% of the Level 5 treatment group achieved end of year GBA scores equivalent to a 2:1 or first class, compared with 52.9% of the comparator group, a gap of around 6 percentage points (Figure 10). There was, again, very strong statistical evidence ($p<0.001$, odds ratio 1.28 with 95% confidence interval 1.15. 1.43) against the null hypothesis of no association between participation in ECAs and Level 5 attainment. The confidence intervals equate to a lower boundary estimate of 56.3% and a higher boundary estimate of 61.7%, giving an estimated treatment effect of between 3.4 and 8.8 percentage points.

As we had seen for both final degree classifications (Level 6) and Level 4 analysis, the gaps using the CCM methodology for Level 5 attainment were smaller than the PSM analysis. We find that 58.8% of the treatment group achieved GBA scores equivalent to a 2:1 or first class, compared with 56.1% of the comparator group. The gap of 2.7 percentage points remains significant at the 5% significance level (but only just: $p=0.047$, odds ratio 1.12 with 95% confidence interval 1.001, 1,243). As illustrated in Figure 11, this is equivalent to a treatment effect of between just over zero (the 95% lower confidence interval equates to 56.1%) and 5.3 percentage points (the 95% upper confidence interval equates to 61.4%). While these effect sizes were lower than with the PSM methodology and there is lower statistical significance, this provides yet further evidence that participation in ECAs has a positive impact on student attainment.

4 Discussion

This case study has attempted to evaluate the impact of participation in extra-curricular activities (ECAs) on undergraduate student attainment. In the absence of randomisation of students into treatment and control groups at source (which for these types of activities would not be appropriate), two matching approaches were adopted.

Basic aggregated descriptive analysis demonstrated considerable differences in undergraduate student attainment, across all years of study, between participants and non-participants. However, when controlling for factors that may influence both participation in such programmes and the outcomes of interest, these gaps were considerably reduced. Students with an existing pre-disposition to higher rates of attainment have been shown to be more likely to choose to participate in ECAs. Nevertheless, when attempting to control for this selection bias using matching, we find strong evidence that participation in ECAs is associated with improved student attainment, across all levels of undergraduate study.

Ultimately, we cannot be wholly confident that the relationship between participation and successful outcomes is causal, because without randomisation there may be unknown and/or unobservable factors that influence outcomes. We can only control for observable characteristics. The strong evidence of impact holds for both matching methodologies, which increases our confidence in the results, but we cannot realistically claim causality because matching cannot control for unobservable factors. However, that the two matching methods rejected the null hypothesis of no association between participation in ECAs and higher attainment points to a very strong Type 2 evaluation standard (Type 2.5 perhaps), and, in the absence of randomisation, arguably the closest we could get to causality with the data at our disposal.

Interestingly, for the separate analyses undertaken for each of the three levels of undergraduate study, the estimated treatment effect for PSM was higher than that of CCM methodologies. While both methodologies match individual participants with individual non-participants using their observed characteristics to create treatment and comparator groups that share similar (or in some cases identical) characteristics, they do this matching in different ways. PSM matches units (students) based on estimated probabilities that they might be exposed to the programme, while CCM adopts matching based on the likelihood of different characteristics achieving the outcome of interest. Much of these variables that are the basis for matching are the same for both PSM and CCM, but there are some subtle differences that may result in one method giving different treatment effects to another. Alternatively, these differences may be due to random variation (chance) and perhaps it is merely coincidental that PSM had consistently higher treatment effects than CCM. It would be beneficial to test this further with different institutional datasets, activities, and outcomes.

Methodological idiosyncrasies aside, there remains strong evidence that participation in extra-curricular opportunities has a positive impact on student attainment. And as is the case with many evaluations, the reasons why this may be the case can be explored by triangulating with a theory of change, informed by the literature. The overarching theoretical perspective in our theory of change is that participation in ECAs and other similar opportunities is a key contributor to the student experience. Students' formal and informal interactions with peers, the higher education provider and its staff help them develop 'soft outcomes' – resources like skills, social connections, and a state of engagement (Hoong Wong & Chapman, 2023; Woodall et al, 2014; Zepke & Leach, 2010). Accessing and then developing these resources will contribute to longer term outcomes and impact, as illustrated in the theory of change map in Appendix 3.

ECA interactions can be a crucial aspect of a valuable student experience which, importantly, is personally defined by the student. For value co-creation to occur, engagement, which is effectively the multidimensional behavioural, emotional, and psychological '*outward manifestation of motivation*' (Skinner & Pitzer, 2012) is necessary from all parties involved in the interaction. Students are an active and integral part of co-creating the value that they personally derive from their own experience; without student engagement, value cannot be co-created (Dean et al, 2016). To this end, engagement has been shown to support students' existing academic trajectories, with its absence predicting lower attainment (Collie et al, 2017). This is supported by internal evidence from NTU, which shows that higher academic engagement (according to the NTU Student Dashboard) is highly correlated with completion and attainment (Foster & Siddle, 2019). While engagement with the academic aspects of higher education study is crucial, therefore, extra-curricular opportunities add their own value to the overarching student experience.

Part of this value may come from the resources that ECAs can deliver, which may feed back into the conditions for engagement in the wider student experience. Though once conceptualised as occurring at the expense of the resources needed for curricular participation, more modern frameworks consider ECAs to develop several competencies and capabilities, including self-regulation (Guilmette et al, 2019), goal setting (Larson, 2006), and self-efficacy (Lewis, 2004). Psychological resources such as these may support a sense of belonging (Lewis, 2004), which in turn strengthens students' academic motivation to persist in the student experience (Tinto, 2017). This contextualises findings indicating that participation in ECAs helps students cope with academic stress (Venkatesh Mukesh et al, 2023). Conceptualising ECAs as sites of resource accumulation supports their characterisation as 'agents of resilience' (Lewis, 2004). By engaging with ECAs, students can develop the resources needed for maintaining engagement in value co-creation across other aspects of the student experience.

However, time is a crucial student resource. A recent NTU survey found that during the current cost of living crisis, students are more likely to need to combine study with paid work, which impedes on opportunities to access ECAs. It is perhaps no coincidence, therefore, that our quasi-experimental designs found that some disadvantaged student groups were considerably less likely to participate in ECAs, supporting the notion that the quality of interactions is mediated by demographic characteristics (Hoong Wong & Chapman, 2023; Thomas, 2002), which, over time, can impact on engagement and outcomes (Kasnakoğlu & Mercan, 2020; Snijders et al, 2021). If students cannot participate in the student experience due to higher levels of demands than resources, they cannot participate in ECAs.

As illustrated in the theory of change map (Appendix 3), there are four causal pathways that create the conditions for the change mechanisms which drive ECA participation and subsequent student outcomes and impact. These are:

1. Supporting the conditions for ECA engagement
   Relevant change mechanisms:
    a. Student is better engaged in the student experience

   b. The benefits of ECA participation are greater than the demands such participation places on the student

2. Initial ECA engagement (dependent upon motivation and perceived cost/benefits)
   Relevant change mechanisms:
   a. Student is better engaged in the student experience
   b. The benefits of ECA participation are greater than the demands such participation places on the student

3. Continuous engagement with ECAs
   Relevant change mechanisms:
   a. The benefits of ECA participation are greater than the demands such participation places on the student
   b. Student remains engaged in the ECA and the wider student experience
   c. Student knows how to mobilise developed resources/capitals

4. Development and mobilisation of resources
   Relevant change mechanisms:
   a. Student is engaged in the wider student experience
   b. Student knows how to mobilise developed resources/capitals

As these causal pathways and change mechanisms are negotiated, this creates the requisite conditions for short-, medium- and long-term outcomes. In turn, these outcomes manifest in the overarching impact of ECAs; the long-term development and mobilisation of resources and capitals, which are reflected in enhanced student/graduate outcomes. This includes, as we found in our case study, improved attainment and final degree classifications.

5 Conclusion

Institutional datasets are complex and it can be challenging to evaluate the impact of post-entry higher education interventions. Experimental designs, such as randomised controlled trials, and some quasi-experimental designs (such as difference-in-difference and regression discontinuity design) may be impractical and/or inappropriate methodologies to evaluate activities aimed at enhancing student success. This was found to be the case with our case study. It can therefore be difficult to achieve the gold standard Type 3 evaluation, proving that the intervention directly caused the outcome. Nevertheless, the case study demonstrated that robust evidence of impact can still be gleaned using institutional data, albeit in our case providing robust Type 2 evaluation standards (empirical enquiry), by utilising other quasi-experimental designs.

Both propensity score matching, and case control matching techniques found strong evidence that indicated participation in extra-curricular activities had a positive impact on subsequent student attainment, which was triangulated via an evidenced theory of change. It is recommended that the learnings from this case study are considered and the methodologies appropriately tweaked so evaluation can be built into the design of student success initiatives. This will further develop opportunities to deliver causal evaluation of post-entry interventions.

6 References

Collie, R., 2017. Adaptability, engagement and academic achievement at university. Educational Psychology, 37(5), 632–647. [Online]. Available at: https://doi.org/10.1080/01443410.2016.1231296 [Accessed 08 January 2024].

Dean, A., et al., 2016. Applying Service Logic to Education: The Co-creation Experience and Value Outcomes. Procedia - Social and Behavioral Sciences. 224. 325-331 [Online]. Available at: https://www.sciencedirect.com/science/article/pii/S1877042816304645 [Accessed 04 December 2023].

Foster, E. & Siddle, R., 2019. The effectiveness of learning analytics for identifying at-risk students in higher education. *Assessment & Evaluation in Higher Education,* 45(6), 842-854. [Online]. https://www.tandfonline.com/doi/abs/10.1080/02602938.2019.1682118 [Accessed 05 January 2024].

Guilmette, M., et al, 2019. Past and present participation in extracurricular activities is associated with adaptive self-regulation of goals, academic success, and emotional wellbeing among university students. 73, 8-15. [Online]. Available at: https://doi.org/10.1016/j.lindif.2019.04.006 [Accessed 18 December 2023].

Hoong Wong, W., and Chapman, E., 2023. Student satisfaction and interaction in higher education. Higher Education, 85. 957-978. [Online]. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9159046/pdf/10734_2022_Article_874.pdf [Accessed 07 December 2023].

Kasnakoğlu, B. T. and Mercan, H., Co-creating positive outcomes in higher education: are students ready for co-creation? Journal of Marketing for Higher Education, 31(1). 73-88. [Online]. Available at: https://www.tandfonline.com/doi/full/10.1080/08841241.2020.1825031 [Accessed 04 December 2023].

Lewis, C. P. (2004). The relation between extracurricular activities with academic and social competencies in school age children: A meta-analysis. (PhD dissertation). Texas A&M University, Austin, TX.[Online]. Available at: https://www.proquest.com/docview/305077150?pq-origsite=gscholar&fromopenview=true&sourcetype=Dissertations%20&%20Theses [Accessed 05 January 2024].

Skinner, K., & Pitzer, J., 2012. Developmental Dynamics of Student Engagement, Coping, and Everyday Resilience (Chapter 2). *The Handbook of Research on Student Engagement*. Christenson, S., Wylie, C., & Reschly, A. (eds). 1st ed. New York: Springer US.

Snijders, I., et al., 2021. Relationship quality in higher education and the interplay with student engagement and loyalty. British Journal of Educational Psychology, 92(2), 425-446. [Online]. Available at: https://doi.org/10.1111/bjep.12455 [Accessed 06 December 2023].

Thomas, L., 2002. Student retention in higher education: the role of institutional habitus. Journal of Education Policy, 17(4), 432-442. [Online]. Available at: https://www-tandfonline-com.ntu.idm.oclc.org/doi/epdf/10.1080/02680930210140257?needAccess=true [Accessed 27 February 2024].

Tinto, V., 2017. Reflections on Student Persistence. Student Success, 8(2), 1-8. [Online]. Available at: https://studentsuccessjournal.org/article/view/495/361 [Accessed 04 January 2024].

Venkatesh Mukesh, H., et al., 2023. Are extracurricular activities stress busters to enhance students' well-being and academic performance? Evidence from a natural experiment. Journal of Applied Research in Higher Education, 15(1), 152-158. [Online]. Available at: https://www-emerald-com.ntu.idm.oclc.org/insight/content/doi/10.1108/JARHE-06-2021-0240/full/pdf?title=are-extracurricular-activities-stress-busters-to-enhance-students-well-being-and-academic-performance-evidence-from-a-natural-experiment [Accessed 18 December 2023].

Woodall, T., et al., 2014. Making sense of higher education: students as consumers and the value of the university experience. Studies in Higher Education, 39(1), 48-67. [Online]. Available at: https://www.tandfonline.com/doi/epdf/10.1080/03075079.2011.648373?needAccess=true [Accessed 07 December 2023].

Zepke, N., and Leach, L., 2010, Beyond hard outcomes: 'soft' outcomes and engagement as student success. Teaching in Higher Education, 15(6), 661-673. [Online]. Available at: https://www.tandfonline.com/doi/full/10.1080/13562517.2010.522084 [Accessed 05 December 2023].

7 Appendix 1: Available explanatory variables

In order to get the data readied for analysis, the four separate datasets (Tables A1a to A1d) were amalgamated into one spreadsheet. This was done via a simple Excel 'VLOOKUP' formula,[4] using the unique student identifier as the key matching variable. The amalgamated dataset can now be manipulated as appropriate to produce various descriptive analyses, to inform subsequent inferential statistical testing using users' software of choice. Before undertaking any complex analysis, it is good practice to sense check the data by carrying out basic descriptive analysis, which can be undertaken in Excel via the use of pivot tables, for example.

The amalgamated data may need to be reformatted, depending upon the statistical software package utilised. This case study used a combination of Genstat (23rd edition) software (primarily for logistic regression analysis undertaken in advance) and SPSS (29th edition) software (primarily for propensity score matching, case control matching, chi square testing and independent samples t-testing analysis). The methodologies should be replicable using all major statistical software packages.

[4] There are various alternative options, such as INDEX/MATCH

Table A1a: Key independent (explanatory) variables in the shared dataset

Field name	Field Type	Options
Gender	Factor	Female, Male, Other
Ethnic Group	Factor	Asian, Black, Mixed ethnicity, Other, White
Disability	Factor	Disability, No known disability
Age group on entry	Factor	Under 21, 21-25, Over 25
Widening participation (IMD)*	Factor	Widening participation (quintiles 1-2), Not widening participation (quintiles 3-5)
Entry qualification mapping	Factor	A-Levels only, BTEC only, Mixture of BTEC and A-Level, Other qualifications
UCAS entry tariff	Variate / Factor	0-999, or converted to a factor by tariff bands (for example, AAA or above equivalent; BBB to AAB equivalent)
Entry route	Factor	UCAS Mainscheme, Clearing
1st Dec enrolment flag	Factor	Yes, No.
Academic School	Factor	Nine Academic Schools
Programme Mode	Factor	Full-Time, Sandwich course
Level of undergraduate (UG) study	Factor	Foundation year, Level 4, Level 5, Level 6, On sandwich-course (SW) placement in 2022-23 (exclude from denominator)
GBA Score of Previous year	Variate	0-16; derived from previous year's data (2021-22)
GBA band of previous year	Factor	17 bands; 1 = Low Fail to 16 = Exceptional First
2:1 or First in previous year	Factor	2:1 / First GBA equivalent, 2:2 / Third GBA equivalent

* NTU use IMD as their key widening participation proxy, but others can be used as an alternative.

Table A1b: Potential dependent (response) variables in the shared dataset

Field name	Field Type	Options
PROG_GROUP	Binary variate	Progressing (1), Not progressing (0), Excluded (exclude from denominator)
CONTINUATION_FLAG	Binary variate	Continuer (1), Non-continuer (0), Not in cohort (exclude from denominator)
Failed modules during year	Binary variate	Yes (1), No (0), Excluded (exclude from denominator)
GBA Score current year	Variate	0-16, NULL DATA (exclude from denominator)

GBA band current year	Factor	17 bands; 1 = Low Fail to 16 = Exceptional First, NULL DATA (exclude from denominator)
2:1 or First GBA equivalent current year	Binary variate	2:1 / First GBA equivalent (1), 2:2 / Third GBA equivalent (0), NULL DATA (exclude from denominator)
AWARD CLASS	Factor	First class, 2:1, 2:1, Third class, Other or Award not yet known ((exclude from denominator)
2:1 or First	Binary variate	Yes (1), No (0), Other or Award not yet known ((exclude from denominator)

Table A1c: Additional matched student engagement dataset - Key independent (explanatory) variables in the shared dataset

Field name	Field Type	Options
Average engagement for current year	Factor	Very Low, Low, Partial, Good, High

Table A1d: Additional matched student extra-curricular activity participant dataset - Key independent variables in the shared dataset

Field name	Field Type	Options
Activity name	Factor	CERT MENTORING, COMMUNITY AND ENGAGEMENT VOLUNTEERING, EMPLOYABILITY, MANSFIELD CHALLENGE, NTSU ACADEMIC REPS, NTSU SOCIETY COMMITTEE MEMBERS, NTSU SOCIETY MEMBERS, NTU MUSIC, NTU SPORT – GYM MEMBERS, NTU SPORT – CLUB MEMBERS, STUDENTS IN CLASSROOMS, BLACK LEADERSHIP PROGRAMME*

* This programme is subject to a separate flagship evaluation by the external evaluator.

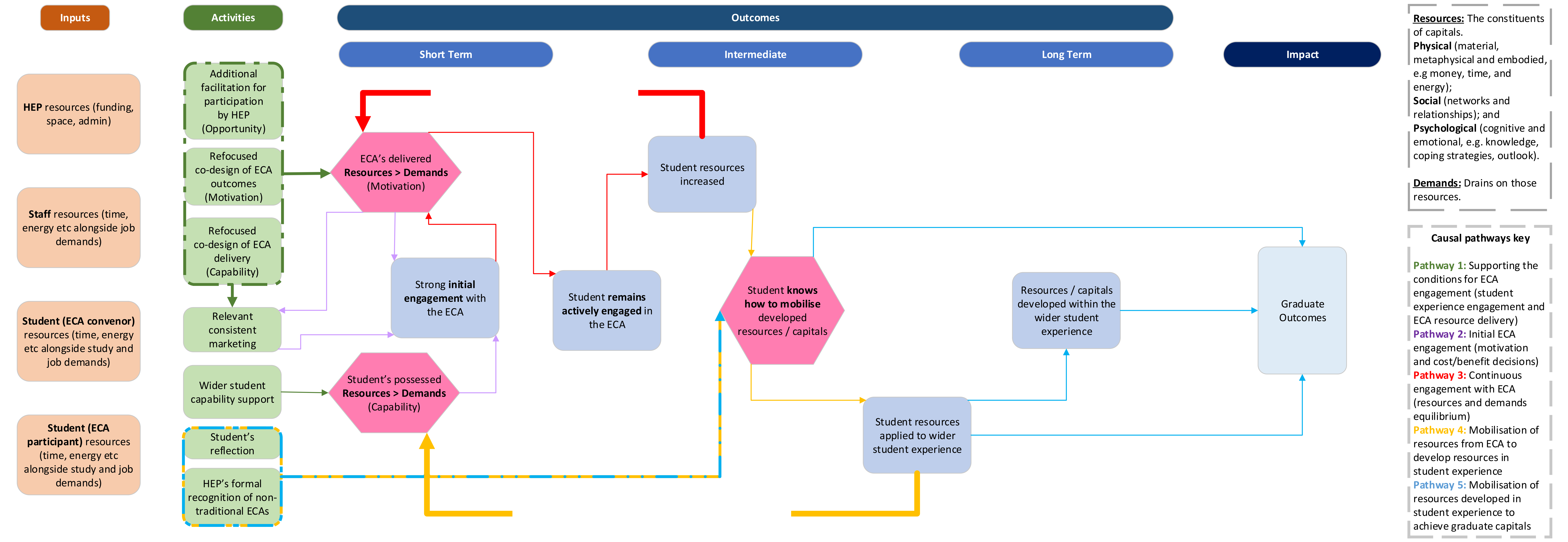
NB all of the above datasets must have a unique student identifier to permit matching.

8 Appendix 2: Process for collecting participant data of various extra-curricular activities and student outcomes

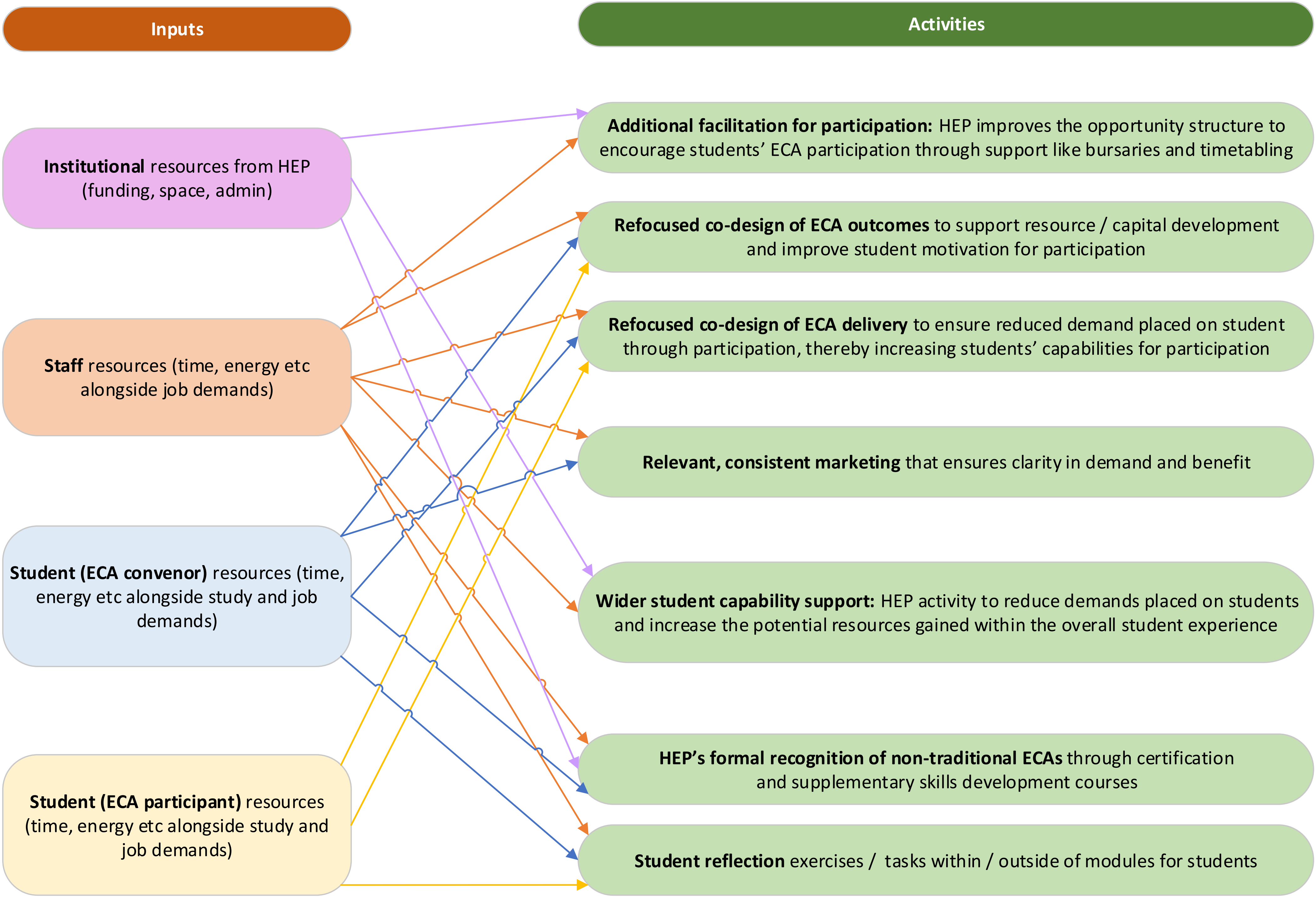
- Project leads of various extra-curricular activities (ECAs) collect data on the participants who take part in their programmes
- The type of data they collect varies but the only essential field required for tracking is the unique student ID
- If the recruitment window is open over a long period, including the whole academic year, as there has been no randomisation built in (and for most programmes this would not be appropriate) it is problematic to compare retention outcomes for these participants against non-participants. This is because the non-participating cohort will, by definition, include in the denominator students who had already withdrawn *before* some students signed up and/or participated in the ECA. Therefore, date of sign up and/or when they first participated is a useful data field to be included, if this is possible.
- For some programmes, the recruitment window is exclusively at the start of the academic year and, as there is a field that checks if students are enrolled as at 1 December in the year of enrolment, this permits retention comparison between participants and non-participants (that is, restrict both denominators to those students who were still enrolled as of 1 December).
- The above is notwithstanding the known unknown influential factors (for example, intrinsic motivation) that may be associated with both dependent (for example, retention) and independent (for example, participation in the ECA). It is challenging to control for these in any retrospective analysis.
- An enrolment file, complete with student ID, key student outcomes and a multitude of covariates is compiled by Strategic Planning & Change (SPC) on a given student outcomes snapshot date towards the end of September each year. This date is chosen as the optimum between timeliness and accuracy and is timed after all exam and referral boards have taken place. Inevitably, a small number of student outcomes are yet to be finalised. Assuming this remains a small proportion, it is relatively safe to proceed, although students with such 'unknown' outcomes should be removed from the denominator.
- The agreed snapshot date for 2022-23 student outcomes was **Tuesday 19 September 2023**. The data were downloaded from the date warehouse on this date and are fixed from that timepoint.
- As a matter of course, SPC produce several data dashboards to show overarching trends for key student outcomes. These include:
  - Academic progression rates
  - Student withdrawal rates (although not finalised until after end of December due to HESA methodology, which NTU replicates)
  - Module failure rates
  - Grade Based Assessment (GBA scores
  - Degree classifications

- The same underlying enrolment dataset that is used to compile the above data dashboards is provided to the research team. This comprises over 100 fields of data relating to individual students. Importantly, the unique student ID is included.
- To check accuracy, pivot tables are created to balance the raw dataset with the aggregated data dashboards. Once these balance, the data can be filtered as appropriate (for example, to restrict to full-time, UK domiciled undergraduates).
- Many data fields in the standard enrolment dataset are not required. These are deleted.
- Other fields that are required but not in the standard enrolment dataset, yet available from elsewhere, are added using simple lookup techniques via the unique student ID.
- Once the ECA participant and cleaned standard enrolment datasets are finalised, the two can be matched. There are two ways in which this can be done.
- The first method is to match key fields from the standard enrolment dataset to the much smaller participant dataset. This permits a very quick analysis of overarching trends – for example, targeting, engagement, retention, module failure, final degree award – and these can be compared against aggregate trends for the whole (equivalent) student population.
- The above first method is fine for simple comparisons, but is insufficient for more in depth statistical analysis, such as regression. The second method permits this complex analysis and is effectively the reverse of the first method. This time the ECAs are matched with the overarching full standard enrolment dataset. This can then be converted into a format suitable for statistical software, hence more advanced analysis such as logistic regression can be undertaken

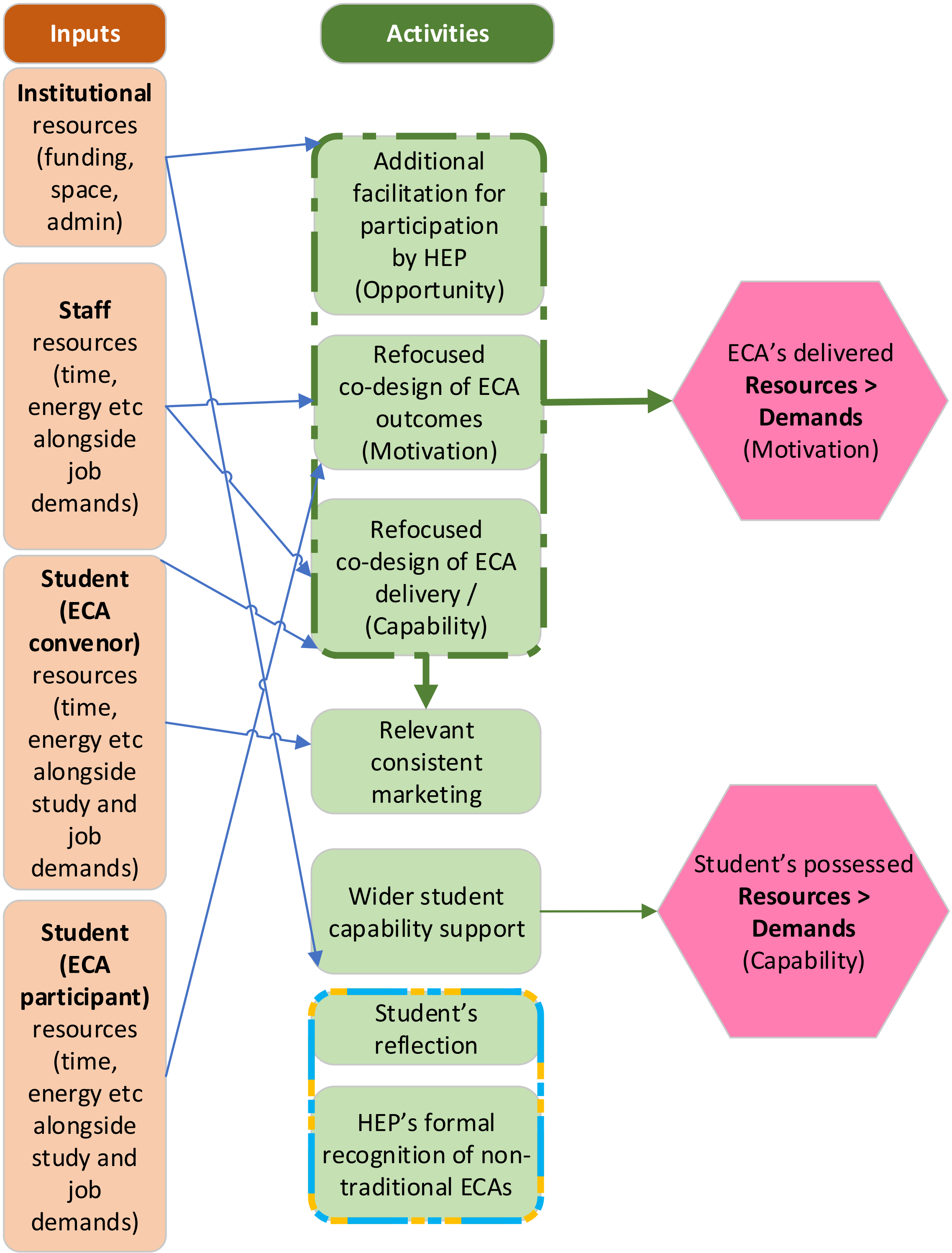
9 Appendix 3: Extra-curricular activity theory of change map



Inputs
Activities
Outcomes
Short Term
Intermediate
Long Term
Impact
HEP resources (funding, space, admin)
Staff resources (time, energy etc alongside job demands)
Student (ECA convenor) resources (time, energy etc alongside study and job demands)
Student (ECA participant) resources (time, energy etc alongside study and job demands)
Additional facilitation for participation by HEP (Opportunity)
Refocused co-design of ECA outcomes (Motivation)
Refocused co-design of ECA delivery (Capability)
Relevant consistent marketing
Wider student capability support
Student's reflection
HEP's formal recognition of non-traditional ECAs
ECA's delivered Resources > Demands (Motivation)
Student's possessed Resources > Demands (Capability)
Strong initial engagement with the ECA
Student remains actively engaged in the ECA
Student resources increased
Student knows how to mobilise developed resources / capitals
Student resources applied to wider student experience
Resources / capitals developed within the wider student experience
Graduate Outcomes
Resources: The constituents of capitals.
Physical (material, metaphysical and embodied, e.g money, time, and energy);
Social (networks and relationships); and
Psychological (cognitive and emotional, e.g. knowledge, coping strategies, outlook).
Demands: Drains on those resources.
Causal pathways key
Pathway 1: Supporting the conditions for ECA engagement (student experience engagement and ECA resource delivery)
Pathway 2: Initial ECA engagement (motivation and cost/benefit decisions)
Pathway 3: Continuous engagement with ECA (resources and demands equilibrium)
Pathway 4: Mobilisation of resources from ECA to develop resources in student experience
Pathway 5: Mobilisation of resources developed in student experience to achieve graduate capitals


Inputs
Activities
Institutional resources from HEP (funding, space, admin)
Staff resources (time, energy etc alongside job demands)
Student (ECA convenor) resources (time, energy etc alongside study and job demands)
Student (ECA participant) resources (time, energy etc alongside study and job demands)
Additional facilitation for participation: HEP improves the opportunity structure to encourage students' ECA participation through support like bursaries and timetabling
Refocused co-design of ECA outcomes to support resource / capital development and improve student motivation for participation
Refocused co-design of ECA delivery to ensure reduced demand placed on student through participation, thereby increasing students' capabilities for participation
Relevant, consistent marketing that ensures clarity in demand and benefit
Wider student capability support: HEP activity to reduce demands placed on students and increase the potential resources gained within the overall student experience
HEP's formal recognition of non-traditional ECAs through certification and supplementary skills development courses
Student reflection exercises / tasks within / outside of modules for students

Pathway 1: Supporting the conditions for ECA engagement (student experience engagement and ECA resource delivery)

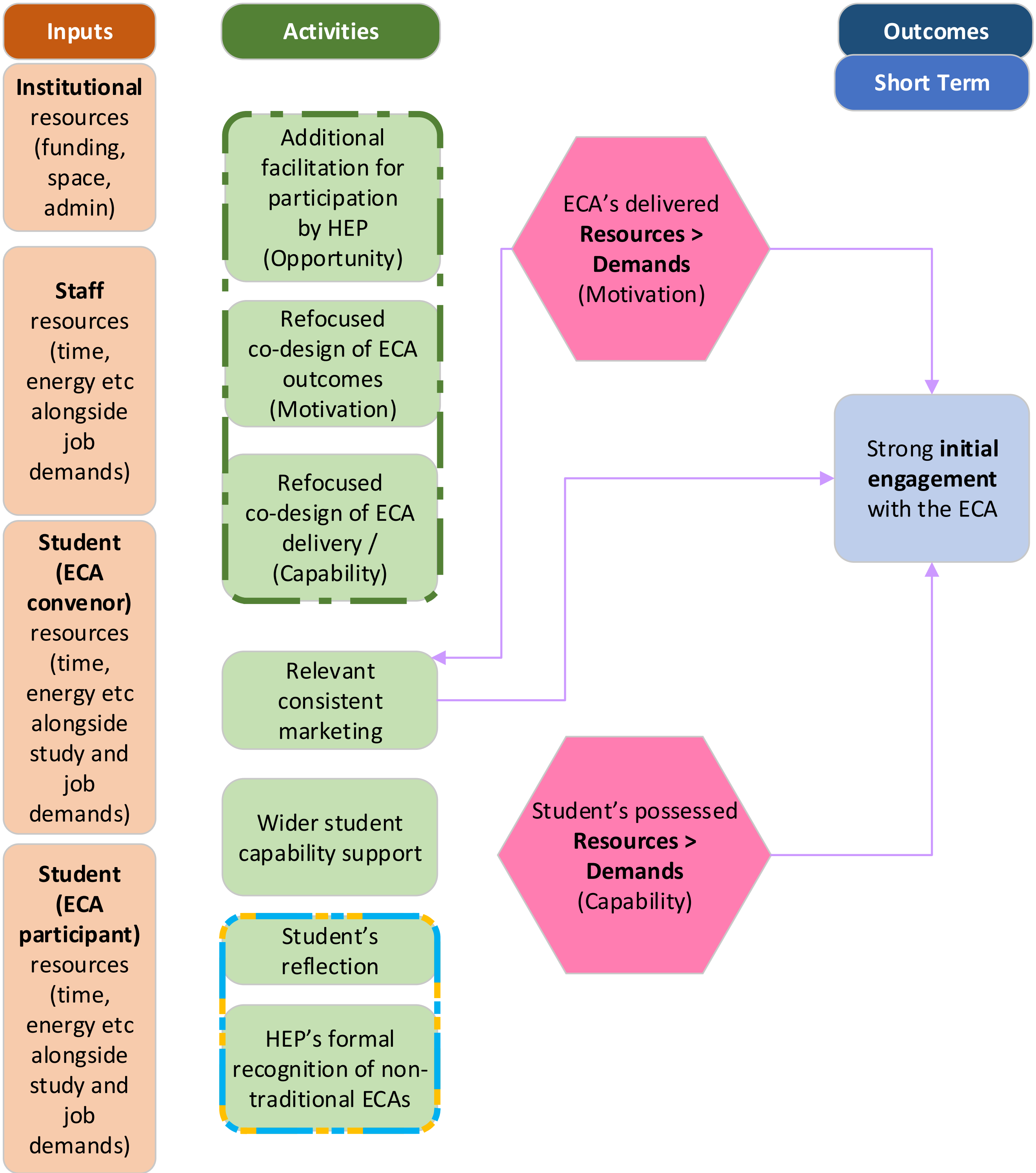


Resources: The constituents of capitals. **Physical** (material, metaphysical and embodied, e.g money, time, and energy); **Social** (networks and relationships); and **Psychological** (cognitive and emotional, e.g. knowledge, coping strategies, outlook).
Demands: Drains on those resources.

Causal pathways key

Pathway 1: Supporting the conditions for ECA engagement (student experience engagement and ECA resource delivery)
Pathway 2: Initial ECA engagement (motivation and cost/ benefit decisions)
Pathway 3: Continuous engagement with ECA (resources and demands equilibrium)
Pathway 4: Mobilisation of resources from ECA to develop resources in student experience
Pathway 5: Mobilisation of resources developed in student experience to achieve graduate capitals

Pathway 2:
Initial ECA engagement (motivation and cost/benefit decisions)

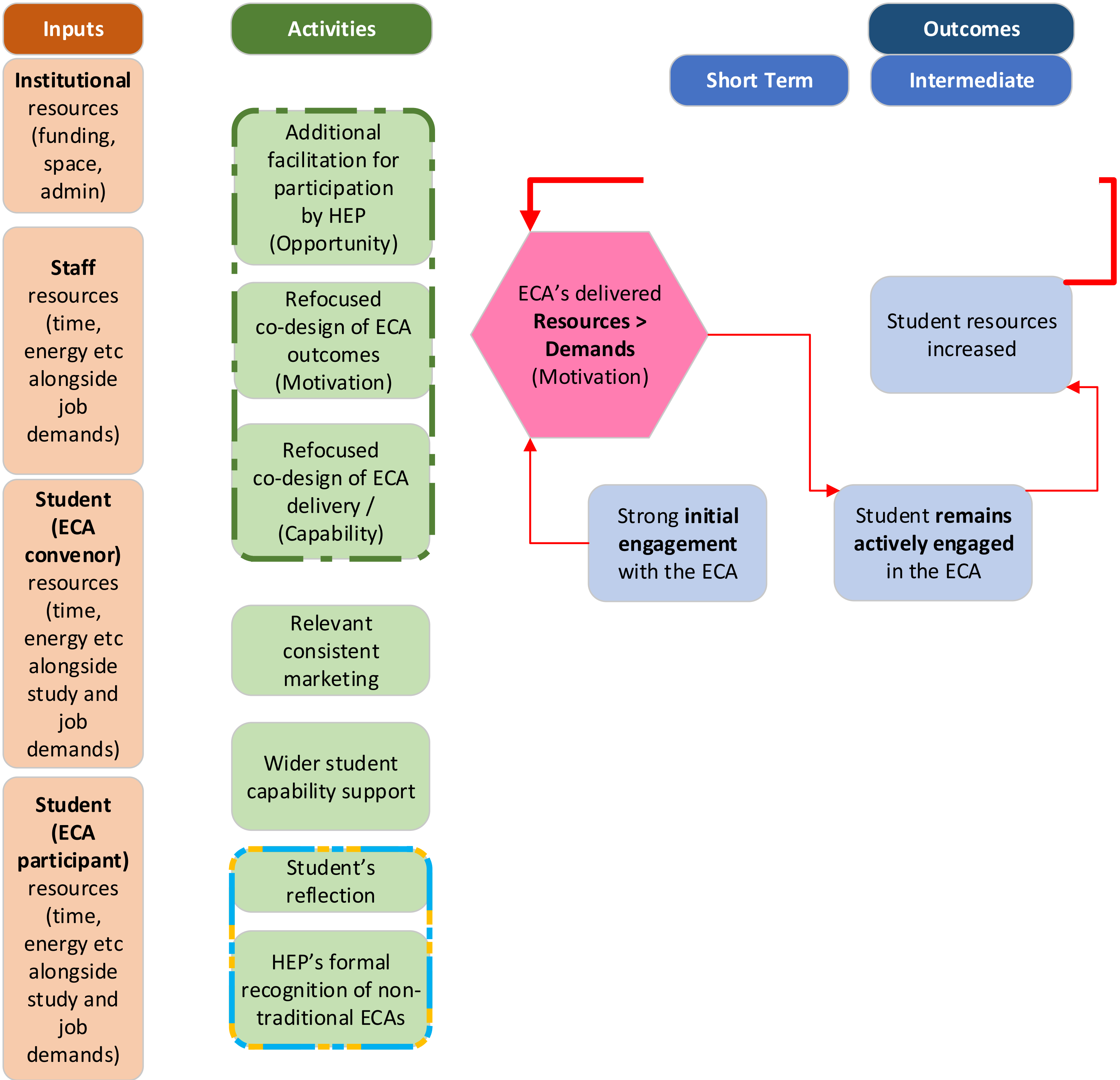


Resources: The constituents of capitals. **Physical** (material, metaphysical and embodied, e.g money, time, and energy); **Social** (networks and relationships); and **Psychological** (cognitive and emotional, e.g. knowledge, coping strategies, outlook).
Demands: Drains on those resources.

Causal pathways key

Pathway 1: Supporting the conditions for ECA engagement (student experience engagement and ECA resource delivery)
Pathway 2: Initial ECA engagement (motivation and cost/ benefit decisions)
Pathway 3: Continuous engagement with ECA (resources and demands equilibrium)
Pathway 4: Mobilisation of resources from ECA to develop resources in student experience
Pathway 5: Mobilisation of resources developed in student experience to achieve graduate capitals

Pathway 3: Continuous engagement with ECA to develop resources in ECA

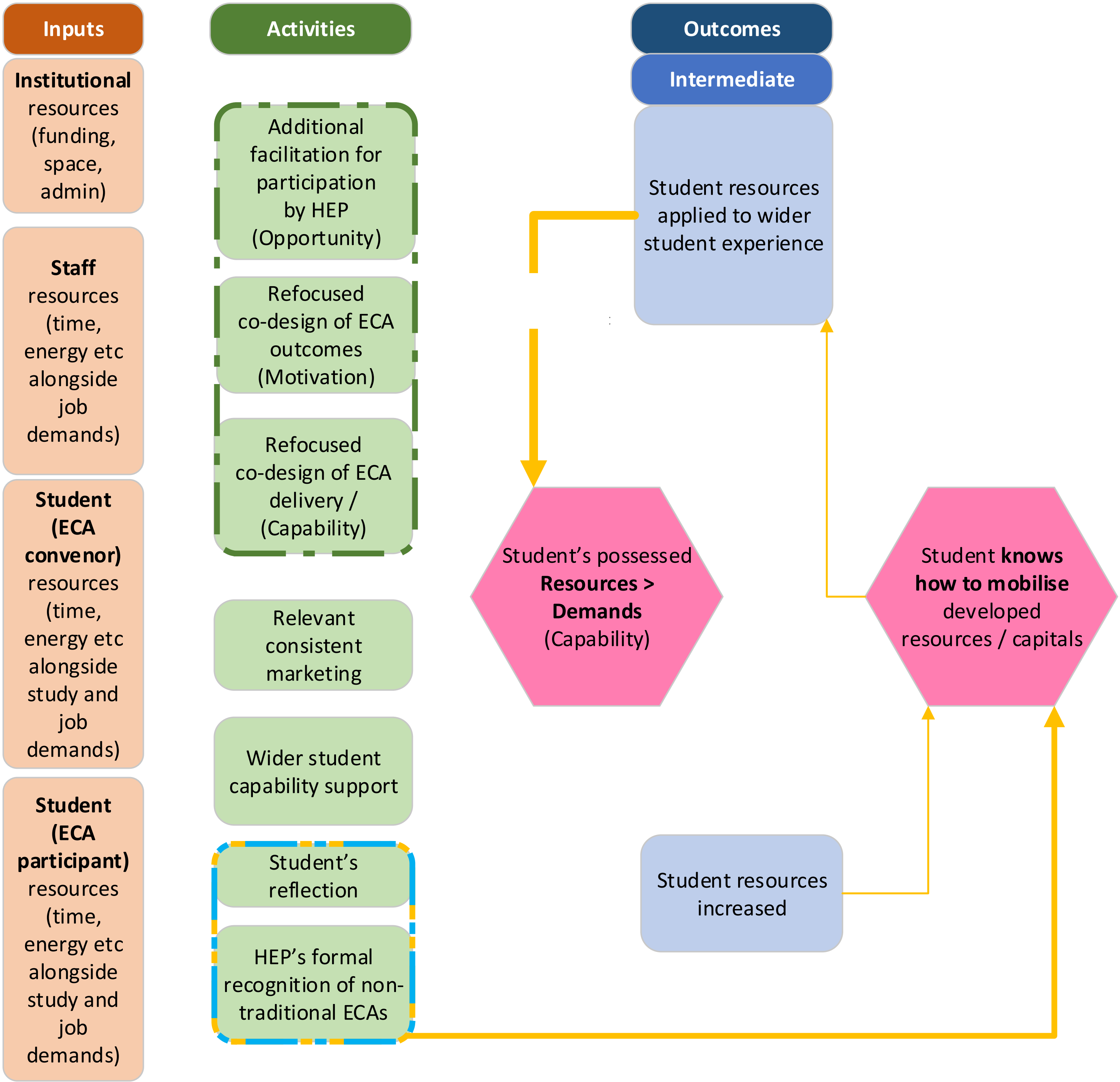


Resources: The constituents of capitals. **Physical** (material, metaphysical and embodied, e.g money, time, and energy); **Social** (networks and relationships); and **Psychological** (cognitive and emotional, e.g. knowledge, coping strategies, outlook).
Demands: Drains on those resources.

Causal pathways key

Pathway 1: Supporting the conditions for ECA engagement (student experience engagement and ECA resource delivery)
Pathway 2: Initial ECA engagement (motivation and cost/ benefit decisions)
Pathway 3: Continuous engagement with ECA (resources and demands equilibrium)
Pathway 4: Mobilisation of resources from ECA to develop resources in student experience
Pathway 5: Mobilisation of resources developed in student experience to achieve graduate capitals

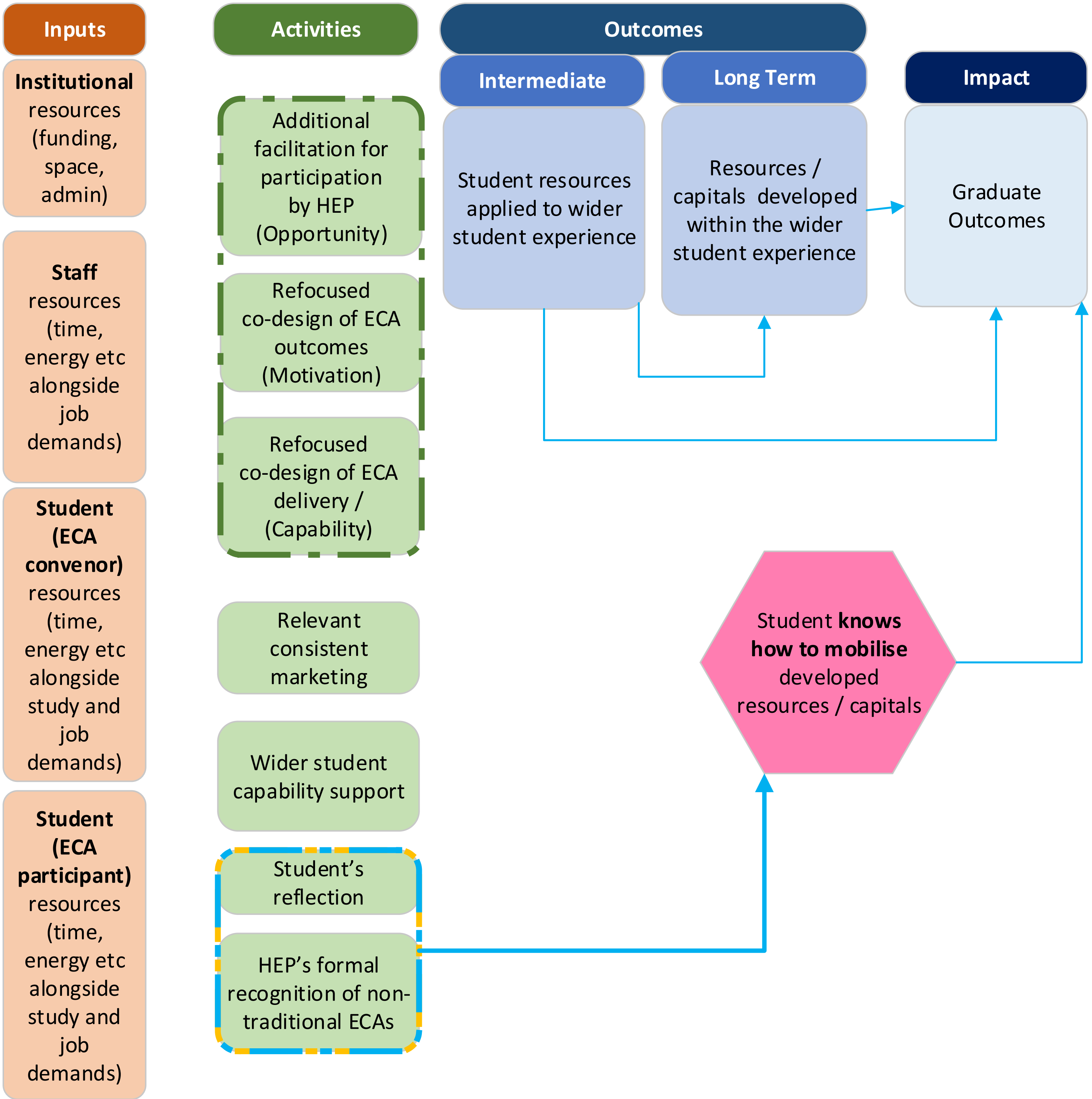
Pathway 4: Mobilisation of resources from ECA to develop resources in student experience



Resources: The constituents of capitals. **Physical** (material, metaphysical and embodied, e.g money, time, and energy); **Social** (networks and relationships); and **Psychological** (cognitive and emotional, e.g. knowledge, coping strategies, outlook).
Demands: Drains on those resources.

Causal pathways key

Pathway 1: Supporting the conditions for ECA engagement (student experience engagement and ECA resource delivery)
Pathway 2: Initial ECA engagement (motivation and cost/ benefit decisions)
Pathway 3: Continuous engagement with ECA (resources and demands equilibrium)
Pathway 4: Mobilisation of resources from ECA to develop resources in student experience
Pathway 5: Mobilisation of resources developed in student experience to achieve graduate capitals



Pathway 5: Mobilisation of resources developed in student experience to achieve graduate capitals

Resources: The constituents of capitals. **Physical** (material, metaphysical and embodied, e.g money, time, and energy); **Social** (networks and relationships); and **Psychological** (cognitive and emotional, e.g. knowledge, coping strategies, outlook).
Demands: Drains on those resources.

Causal pathways key

Pathway 1: Supporting the conditions for ECA engagement (student experience engagement and ECA resource delivery)
Pathway 2: Initial ECA engagement (motivation and cost/benefit decisions)
Pathway 3: Continuous engagement with ECA (resources and demands equilibrium)
Pathway 4: Mobilisation of resources from ECA to develop resources in student experience
Pathway 5: Mobilisation of resources developed in student experience to achieve graduate capitals

Theory of change for extra-curricular activities at Nottingham Trent University

Author: Bec Aeddi

March 2024

Introduction

Engagement in extracurricular activities (ECAs) has been demonstrated to enhance outcomes associated with curricular activity, particularly for students who may be at greater risk of lower outcome measures (Kerrigan & Manktelow, 2021; Stuart et al, 2011). However, data indicates that engagement in many of these ECAs is unequal; students most likely to benefit are statistically less likely to participate (Kerrigan et al, 2018; McGowan et al., 2016, Stuart et al, 2011). As such, it is necessary to consider how higher education providers (HEPs) can increase student participation in ECAs, and the benefits associated with it.

This theory of change (ToC) considers a series of interconnected pathways aimed at improving ECA take-up throughout the student body, as well as supporting students to benefit from this participation throughout the rest of their student experience and beyond university. This holistic approach is aimed at improving the conditions necessary for students to have the resources to engage with ECAs, to continue to engage with them, to get resources out of them, and to use those resources in the student experience.

Overarching rationale and assumptions

This ToC posits that engagement in the student experience and ECAs requires and supports a balance between resources and demands. Students, staff, and HEIs expend physical (material and embodied), social, or psychological (cognitive or emotional) resources when engaging in the student experience, mobilising them against present or future challenges or demands (Dodge et al., 2012; Hendry & Kloep, 2002; Hobfall, 2001). Resource definition depends on personal and contextual factors (ibid).

Interactions among peers, staff, and the HEP develop 'soft outcomes' like skills, social connections, and engagement (Hoong Wong & Chapman, 2023; Woodall et al., 2014). These resources can collectively be understood as 'graduate capitals' foundational to long-term outcomes (Tomlinson, 2017). These outcomes, represented by degree classification, progression into employment or further study, and 'graduate' employment (Mountford-Zimdars et al., 2015), involve mobilising capitals beyond university (ibid; Benati & Fischer, 2020).

These interactions co-create the 'value' of the student experience (Dean et al., 2016). HE can be considered an 'experiential service' with staff and HEPs as providers and students as consumers (Smørvik & Vespestad, 2020). Interactions between staff and/or students occur both within and outside of the curriculum (Hoong Wong & Chapman, 2023), meaning ECAs can be conceptualised as sites of value-co creation. 'Value' determined by needed or possessed capital (Lombardo & Cabiddu, 2017), and resource mobilisation is influenced by social, environmental, and individual psychological factors (Benati & Fischer, 2021; Tomlinson, 2017), making value personal (Dean et al., 2016).

Engagement – the multidimensional 'outward manifestation of motivation' (Skinner & Pitzer, 2012:22) – from all parties is necessary for value co-creation (Dean et al., 2016). Students are an active and integral part of co-creating the value that they personally derive from their student experience; without engagement, value cannot be co-created (ibid). Supporting this, engagement has been shown to support academic trajectories, with absence predicting lower attainment (Collie et al., 2017). Likewise, NTU data shows engagement correlates with completion and attainment (Kerrigan & Manktelow, 2021). Engagement and outcomes are impacted by value co-creation interactions over time (Kasnakoğlu & Mercan, 2020; Snijders et al., 2021), mediated by demographic characteristics (Hoong Wong & Chapman, 2023; Thomas, 2002). Thus, while engagement mediates value co-creation, it is also influenced by these interactions.

Theoretical frameworks

As well as a mindset, engagement is a behaviour (Skinner & Pitzer, 2012). The COM-B model of behaviour change highlights how as well as possessing the necessary capabilities for engagement, students need to be sufficiently motivated and have the opportunity to participate in the student experience (Wilson et al, 2018). Conceptualising engagement with both the student experience and ECAs as behaviours, and applying the COM-B model as a framework, helps to separate the various factors that influence these behaviours.

This perspective is further supported by two related theoretical perspectives. Within the first, value co-creation interactions are affected by the resources and challenges possessed by the individuals (and institutions) involved in the co-creation interaction (Finsterwalder & Kuppelweiser, 2020). Equilibrium between resources and challenges is defined as a state of wellbeing (Dodge et al, 2012). Interactions produce more value when those who are interacting are in this state of wellbeing (Finsterwalder & Kuppelweiser, 2020). The resources and challenges possessed by students, staff, and the HEP can therefore shape the value of the student experience and related outcomes. From this perspective, wellbeing can influence the conditions in which a valuable student experience is created.

Within the second perspective, challenges are referred to as ‘demands’, and while a balance between resources and demands is desirable, it is not characterised as wellbeing. Nonetheless, validated models have established that adequate resources empower students (Salmela-Aro et al, 2022) and staff (Schaufeli & Taris, 2014) to manage demands placed on them within the student or employee experience, fostering engagement, while a lack thereof increases burnout risk which can lead to attrition (Tummers & Bakker, 2021; Robins et al, 2015; Moneta, 2011). Importantly, while resources and demands are personal, they are also largely determined by what the institution requires and provides to support engagement (Salmela-Aro et al, 2022; Bakker & Demerouti, 2017). If considered alongside understandings of wellbeing, HEPs can be understood as powerful influencers on staff and student wellbeing, and therefore engagement and the student experience.

Assumptions

Altogether, the five pathways that make up this ToC are based on the following assumptions:

1. Interactions within HEPs between staff and students, as well as between students and other students, are where student outcomes are created. These outcomes are eventually partially expressed in measures such as attainment, completion, and labour market position, but are reflections of the resources that students possess outside of, develop during, and mobilise within and beyond the student experience.
2. Students and staff require adequate resources (capabilities, opportunities, and motivation) to engage with the university experience. Excessive demands without sufficient resources may impair engagement and outcomes.
3. When staff and students have what they need to engage in the university experience, they can co-create value from those interactions. Value emerges from these interactions in the form of skills, connections, and other resources that shape graduate outcomes.
4. HEPs can influence the wellbeing and engagement of the staff and students involved in co-creating the student experience, and thus the student experience itself. HEPs cannot control for all of the variables that might affect students and staff but have some control over the conditions they provide for work and study.
5. Participation in ECAs can support the development of additional resources for students to draw upon during their studies and beyond graduation.
6. Increasing participation in ECAs requires a holistic approach aimed at improving access to extracurricular opportunities, supporting capabilities and motivation for continued participation, helping students get value from that participation, and enabling them to mobilise that value to advance their academic and post-graduation outcomes.
7. Successful implementation of initiatives aimed at the above goals relies on engagement from all involved parties, including HEPs, staff, and students. Facilitating engagement in ECAs and the student experience generally requires holistic consideration of the demands faced and resources possessed by all co-creators.

Causal Pathways

Pathway 1: Supporting the conditions for ECA engagement

Aim of this pathway: To ensure that the conditions for initial and ongoing engagement with an ECA.

For the student to initially and continuously engage with an ECA, the conditions for two integral change mechanisms must be met:

1. Students (and staff) must be capable of engaging in co-creating the student experience.

2. The student must know that the benefits of ECA participation are more than the demands it places on the student.

Change mechanism 1:

Student's possessed resources are more than the demands they face (they have the capability to engage in the student experience).

Rationale

Students face a variety of academic, social, developmental, and financial demands during and after university which require resources to manage (Dean et al, 2016; Lesener et al, 2020). Resources may already exist or need to be accumulated (Lesener et al, 2020). As resources are the constituents of capital (Redmond, 2020), and capital is unequally possessed by individuals (Bourdieu, 1986), the resources that students have to engage in various aspects of the student experience are not consistent throughout the student body. While HEPs cannot control personal resource bases, they can ensure that the structure of the institution maximises resource delivery and reduces demand as much as possible, thereby increasing students' capabilities for engagement.

Activities

Activities to increase potential resources / capabilities include the various student success initiatives already carried out through institutions, such as financial support, pastoral care, employability guidance and high-quality teaching. HEPs should continue to ensure that their offer is holistic and accessible to all students. Activities to reduce demand include giving attention to understanding demands through research and data insights, and ensuring that timetabling and course demands are conducive to engagement. Similarly, activity should be undertaken by the HEP to ensure that staff are supported through employee assistance programmes and attention given to workload to ensure that they have the capacity to engage in co-creating the student experience.

Change mechanism 2:

The benefits of ECA participation are more than the demands it places on the student (the student is motivated to participate).

Rationale

The motivation and subsequent decision to engage in a voluntary activity is determined by appraisal of the anticipated resources the circumstance will demand and deliver (Blascovich, 2013). In line with the COM-B model, this can also be considered an appraisal of capabilities relative to motivations. Designing an ECA so that it will deliver valuable resources (motivation) without placing an undue burden on students (capabilities) is therefore necessary for ensuring a favourable outcome of a student's ECA participation appraisal. On the one hand, this involves planning the ECA's logistics to ensure that participation will not demand too much from students; ECA participation can be detrimental to the resources needed for students' participation in other aspects of the student experience (Seow & Pan, 2014). On the other hand, engaging in the ECA should be worth the resource expenditure; any level of engagement in an ECA is a cost to a student (Sjogren et al, 2023).

Activities

Co-designing ECAs to reduce participation demands (capability) and improve resource value (motivation).

While value-co creation can be used as it is in this ToC to frame the student experience (Dean et al, 2016), it is also a strategy based partially on the concept of co-production (Dollinger et al, 2018). The first stage of this strategy in HE involves students and staff combining resources such as knowledge and experience to co-produce elements of the student experience (ibid). In the context of ECAs, this would mean that students – both those who might be involved in facilitating an ECA through taking on a position of responsibility within it, and those who might participate without taking on such responsibilities – would help to co-design ECAs. Students could act as consultants, co-researchers, co-designers or representatives to support staff with the ECA production process (Bovill et al, 2015). This could help ensure the ECA's relevance and value to students (Dollinger et al, 2018), and the act of partnership with staff could also provide meaningful benefits for students (Beckingham, 2020). Equity should be a key consideration in the co-production process, to ensure that resource-demand appraisals are positive for all students. Where ECAs already exist, they could be evaluated by students in relation to their capability-motivation/resource-demand appraisals.

Activity to support ECA participation opportunities, e.g. bursaries and timetabling

HEPs must ensure that their 'structure of opportunity' (Kiyama & Luca, 2014) supports ECA participation, as their practices, policies, structures, and spaces shape students' opportunities to engage (ibid; Reger, 2018; Brower & Upcharch, 2022). The choice, maximum, and minimum capacity of ECAs offered also constrains student choice (McNeal, 1999, Stearns & Glennie, 2010, Buckley & Lee, 2021). These opportunities intersect with personal resources and demands – capabilities – originating both from within and outside of the student experience (Bathmaker et al, 2013; Kiyama & Luca, 2014; Dickinson et al, 2021;). Students may prioritise academic demands (Dickinson et al, 2021), or employment, caring, and cultural responsibilities (Stevenson & Clegg, 2012) over ECA participation. ECA participation also often requires the expenditure of financial resources (Bathmaker et al, 2016) or the possession of embodied physical resources that disabled students may lack (Chipchase et al, 2023). Due to their origin from outside of the HE context, many barriers may be insurmountable for HEPs to mitigate.

Nonetheless, HEPs should improve the opportunity structure by engaging with students from various intersectional backgrounds, focusing on Widening Participation (WP), to understand and holistically account for differential barriers. This could involve addressing curricular timetabling, physical spaces, delivery mode, levels of necessary engagement, or ECA support bursaries. Given the complex, intersectional barriers faced by WP students, barrier reduction must target multiple barriers simultaneously.

Pathway 2: Initial engagement with the ECA

Aim of this pathway: To leverage the now-established conditions as change mechanisms, facilitating the student's initial engagement with the ECA (short-term outcome).

Rationale: If students have the capabilities to engage with ECA opportunities (change mechanism 1) and are motivated to do so (change mechanism 2), they need to be aware of these opportunities.

Activities: consistent and relevant marketing

Students are made aware of ECAs often through university communications and events like Welcome. Advertising is crucial in raising awareness of the existence and characteristics of phenomena (Barroso & Llobet, 2012), so the way that ECAs are marketed is key to ensuring that students are aware of them and thus able to engage initially. Hordósy and Clark (2018) classify students' extracurricular activity (ECA) participation decisions based on their timing: continuing pre-university ECAs, trying new opportunities, or joining later in their studies. To cater to these different decision types, ECA marketing should be consistent throughout the student experience, using various touchpoints such as Welcome Week, digital communications, and word of mouth.

Further, students' motivation to participate in extracurricular activities (ECAs) can be intrinsic, extrinsic, social, or pro-social, depending on the ECA type and the student's goals

(Chapman et al., 2023). Extrinsic motivation is linked to the perceived value ECAs may convey to employers (Dickinson et al., 2021; Chapman et al., 2023). Intrinsic and social motivations are associated with sports and societies, while pro-social motivations relate to ECAs supporting others' development and often accompany other forms of motivation (Chapman et al., 2023). Ensuring that the breadth of student motivations for ECA participation are catered for within marketing may increase the likelihood that students will participate in an ECA.

Pathway 3: Continuous engagement with the ECA to develop resources

Aim of this pathway: To maintain engagement with the ECA in the context of competing demands from within and beyond the student experience (short term-intermediate outcome). This will support the delivery of resources by the ECA (change mechanism 1) and pathways 4 and 5.

Student remains actively engaged in the ECA (short term-intermediate outcome).

Rationale

Engagement with ECAs is an ongoing process in which consistency of involvement appears to be related to level of benefit. Work from Canada indicates that ECA engagement can improve HE students' mood (Guilmette et al, 2019) and highschoolers' retention rates (Thouin et al, 2020), but only if participation is sustained. However, research relating to US middle schoolers indicates that expected and experienced psychological, physical and temporal costs and the expected benefits associated with ECA participation influence ongoing participation levels (ibid). Value represents "both sacrifice and benefit" (Woodall et al, 2014:62), and perceptions of value are an essential component of sustained engagement (Al Issa et al, 2022).

Activities

Ensuring through co-production that the resource value of ECA participation is worth the demands it places on students' time will support sustained engagement, as well as the initial engagement discussed above. However, appraisal and reappraisal are a dynamic process; initial appraisals relating to the costs and benefits of engaging in a circumstance can be updated based on incongruent experiences (Garland, 2009). Students' experiences of the balance between resources and demands in both the student experience and in ECA participation should be revisited consistently throughout the student lifecycle to support congruence between the initial decision-making appraisal and the realities of ongoing ECA participation. Engagement with students through student voice modalities would help to ensure that understandings of resource and demands balances are as dynamic as the changing context within which students work and study.

Intermediate outcome: Resources are developed within the ECA

ECAs are uniquely placed to deliver resources in all three resource domains: psychological, social, and physical. Research has shown that ECAs can support the development of several competencies and capabilities, including self-regulation (Guilmette et al, 2019), goal setting (Larson, 2006), and self-efficacy (Lewis, 2004). Psychological resources such as these may support a sense of belonging (ibid), which in turn strengthens students' academic motivation to persist in the student experience (Tinto, 2017). Stuart et al (2011) found that both university-linked and community-based ECAs supported the formation of friendships and networks, contributing to social capital. These networks persisted after university, with alumni mobilising contacts to aid career progression. As Mishra (2020) shows, social resources contribute to student success, particularly for WP students. Finally, physical resources related to health and physical wellbeing may be developed through certain ECAs, such as sports. Participation in sports may be associated with attainment (Muñoz-Bullón et al, 2017).

The importance of active engagement

Ultimately, however, once the conditions are in place to support students in engaging with the ECA, the development of resources within this interaction depends on how the student chooses to engage with it. Engagement is influenced by multiple factors, but individual autonomy cannot be ignored. No matter how fertile the conditions are for value co-creation, students may be differentially engaged; while some students may participate fully – remaining cognitively, behaviourally, emotionally, and 'agentically' (enthusiastically and interactively) engaged, – others may not be engaged in all of these ways (Reeve, 2012). This ToC rests on the assumption that students want to engage actively and fully with an ECA that they choose to participate in, and indeed with the student experience. If this assumption does not hold, then resources are unlikely to be developed within the ECA.

Pathways 4 and 5: Mobilisation of resources from ECA to develop resources in student experience, with further mobilisation beyond the HE context

Aim of these pathways: To support the mobilisation of resources from the ECA to facilitate ongoing engagement with the student experience and the development of graduate capitals.

Rationale: Mobilising resources developed in ECAs to develop resources within and beyond the student experience

The resources that ECAs can deliver may feed back into the conditions for engagement in the wider student experience. Recent research indicates that participation in ECAs helps students cope with stress without directly influencing academic attainment (Venkatesh Mukesh et al, 2023), which supports their characterisation as 'agents of resilience' (Lewis, 2004). By engaging with ECAs, students can develop the resources needed for maintaining engagement in value co-creation interactions across the overall student experience. Because these interactions are sites of resource development, the resources developed through sustained ECA participation (intermediate outcome) can contribute to the development of broader graduate capitals (long term outcome).

Change mechanism 4: Student knows how to mobilise developed resources / capitals

The importance of resource identification for mobilisation appears surprisingly under-researched. However, in value co-creation logic, "all products and services are value-free until the consumer imposes value upon them...the true value of the exchange is the application of the resource by the consumer" (Dollinger et al, 2018:216). Reflection opportunities within and beyond the curriculum could help students to identify the resources gained from ECA participation, as well as how they have been used or might be in the future (Redmond, 2020; Thompson et al, 2013). More broadly, Merino et al (2019) found that workshops focusing on resource identification, generation methods and future mobilisation positively impacted longer term student outcomes. Reflection opportunities may therefore enhance the value of both the student experience, ECA participation, and outcomes via the identification of resources and mobilisation strategies.

Activity: Recognition of non-traditional ECAs

To further support the identification of resources gained, HEPs could broaden the definition and validation of ECAs to account for experiences beyond university and support the identification and mobilisation of the resources generated within these. The value of the demands that students face outside of formal university ECA offerings, such as employment and caring responsibilities, may be underestimated or overlooked by HEPs and staff (Clegg et al, 2010) as well as by students themselves and future employers (Stevenson & Clegg, 2012). While these conflicting responsibilities may reduce participation in university offerings, particularly for WP students (Redmond, 2020), they may also act as sites of resource accumulation (Stevenson & Clegg, 2012). As such, HEPs could explore opportunities to acknowledge and validate the resources developed in these activities beyond those which are offered by the university (ibid). Through certificates and reflection opportunities, HEPs could formally recognise students' part-time work, volunteering, and caregiving duties, helping students to build on these resources and mobilise them more broadly, including professionally.

Conclusions and recommendations

Students gain tangible and intangible resources by participating in ECAs. However, participating can incur a short-term physical resource cost, both in terms of time, energy, and occasionally money. These limited resources are invested at the expense of the resources they may need to mobilise to meet the demands of other aspects of the student experience, including those within and beyond the context of the HEP. Increasing participation in ECAs requires that the demands faced and resources possessed or needed by students be holistically accounted for, both in terms of ECA design and in attention to the wider student experience.

As such, the following recommendations for increasing ECA participation and maximising ECAs' potential as sites of co-creating a valuable student experience and improving outcomes are:

1. Provide a range of ECA opportunities that speak to the breadth of participation motivations, and ensure that students are easily able to evidence their participation
2. Take steps to co-design ECAs around the capabilities of students, with a focus on flexibility and accessibility, particularly for disabled students
3. Explicitly communicate the tangible and intangible gains ECA involvement can provide, focusing on the various forms of capital
4. Support students in managing their external commitments to enable participation, ensuring that this support is designed with holistic consideration of students' conflicting demands and motivations
5. Ensure openness regarding the resource requirements for beginning and continuing engagement
6. Provide reflective opportunities both within and outside of the curriculum both to allow students to utilise the resources they have gained through ECA participation, and to support their continuing motivation for ECA participation
7. Consider mechanisms through which to validate and supplement students' activity beyond the HEP's formal offerings, and provide opportunities for students to reflect on the resources developed through this activity and how it might relate to other aspects of their present and future lives

8. Ensure that attempts to reduce barriers to participation are interconnected and comprehensive.

Bibliography

Al Issa, H., et al., 2022. The impact of perceived value on engagement: the role of teacher behavior. International Journal of Educational Management, 36(7), 1176-1192. [Online]. Available at: https://doi.org/10.1108/IJEM-03-2022-0102 [Accessed 15 January 2024].

Barroso, A., and Llobet, G., 2012. Advertising and Consumer Awareness of New, Differentiated Products. American Marketing Association, 49(6), 773-792. [Online]. Available at: https://journals.sagepub.com/doi/pdf/10.1509/jmr.11.0045 [Accessed 11 March 2024].

Bathmaker, A. M., Ingram, N., & Waller, R. (2013). Higher education, social class and the mobilisation of capitals: recognising and playing the game. British Journal of Sociology of Education, 34(5–6), 723–743. [Online]. Available at: https://doi.org/10.1080/01425692.2013.816041 [accessed 11 March 2024].

Bathmaker, A., et al., 2016. Higher Education, Social Class and Social Mobility : The Degree Generation. Chapter 5: Fitting In and Getting On, 73-98. London: Palgrave Macmillan.

Beckingham, S., 2020. Co-creating learning experiences with students as partners. The Journal of Social Media for Learning, 1(1). 70-77. [Online]. Available at: https://openjournals.ljmu.ac.uk/JSML/article/view/394/331 [Accessed 11 March 2024].

Benati, K., & Fischer, J., 2021. Beyond human capital: student preparation for graduate life. Education & Training, 63(1), 151-163. [Online]. Available at: https://www-emerald-com.ntu.idm.oclc.org/insight/content/doi/10.1108/ET-10-2019-0244/full/pdf [Accessed 08 January 2024].

Blascovich, J. (2013). Challenge and Threat. In A. J. Elliot (Ed.), Handbook of Approach and Avoidance Motivation (pp. 431-446). Psychology Press.

Bourdieu, P., 1986. The Forms of Capital. In: Richardson, J., Handbook of Theory and Research for the Sociology of Education (1986), Westport, CT: Greenwood, pp. 241–58. [Online]. Available at: https://www.socialcapitalgateway.org/sites/socialcapitalgateway.org/files/data/paper/2016/10/18/rbasicsbourdieu1986-theformsofcapital.pdf [accessed 11 March 2024].

Bovill, C., et al, (2015). Addressing potential challenges in co-creating learning and teaching: overcoming resistance, navigating institutional norms and ensuring inclusivity in student–staff partnerships. Higher Education, 71(2), 195-208. [Online]. Available at: https://link.springer.com/article/10.1007/s10734-015-9896-4 [accessed 11 March 2024].

Brower, M., and Upchurch, J., 2022. Opportunity Structures for Student Activism, Diversity, and Institutional Change. Politics of Education Association. 37(3), 1886-1916. [Online]. Available at: https://journals.sagepub.com/doi/pdf/10.1177/08959048221127991 [Accessed 11 March 2024].

Buckley, P., and Lee, P., 2021. The impact of extra-curricular activity on the student experience. Active Learning in Higher Education, 22(1), 37-48. [Online]. Available at: https://journals.sagepub.com/doi/pdf/10.1177/1469787418808988 [Accessed 04 January 2024].

Chapman, G., et al, 2023. Higher education student motivations for extracurricular activities: evidence from UK universities. Journal of Education and Work, 36(2), 138-152. [Online]. Available at:

https://www-tandfonline-com.ntu.idm.oclc.org/doi/full/10.1080/13639080.2023.2167955 [Accessed 04 January 2024].

Chipchase, S., et al., 2023. Experience of university life by disabled undergraduate students: the need to consider extra-curricular opportunities. Disability & Society. [Online]. Available at: https://www.tandfonline.com/doi/pdf/10.1080/09687599.2023.2233687 [Accessed 11 March 2024].

Clegg, S., et al, 2010. Staff conceptions of curricular and extracurricular activities in higher education. Higher Education, 59(5), 615-626. [Online]. Available at: https://www.jstor.org/stable/40602423?seq=8 [Accessed 12 January 2024].

Collie, R., 2017. Adaptability, engagement and academic achievement at university. Educational Psychology, 37(5), 632–647. [Online]. Available at: https://doi.org/10.1080/01443410.2016.1231296 [Accessed 08 January 2024].

Dean, A., et al., 2016. Applying Service Logic to Education: The Co-creation Experience and Value Outcomes. Procedia - Social and Behavioral Sciences. 224. 325-331 [Online]. Available at: https://www.sciencedirect.com/science/article/pii/S1877042816304645 [Accessed 04 December 2023].

Dickinson, J., et al, 2021. 'It's just another thing to think about': encouraging students' engagement in extracurricular activities. Journal of Further and Higher Education, 45(6). [Online]. Available at: https://doi-org.ntu.idm.oclc.org/10.1080/0309877X.2020.1813263 [Accessed 05 January 2024].

Dodge, R., 2012. The challenge of defining wellbeing. *The international journal of wellbeing*. 2(3), 222-235. [Online]. Available at: https://www.internationaljournalofwellbeing.org/index.php/ijow/article/view/89/238 [Accessed 04 December 2023].

Dollinger, M., et al, 2018. Co-creation in higher education: towards a conceptual model. Journal of Marketing for Higher Education, 28(2), 210-231. [Online]. Available at: https://www.tandfonline.com/doi/full/10.1080/08841241.2018.1466756?src=recsys [Accessed 04 December 2023].

Finsterwalder, J., and Kuppelwieser, V., et al, 2020. Equilibrating resources and challenges during crises: a framework for service ecosystem well-being. Journal of Service Management, 31(6). 1107-1129. [Online]. Available at : https://www-emerald-com.ntu.idm.oclc.org/insight/content/doi/10.1108/JOSM-06-2020-0201/full/html [Accessed 04 December 2023].

Garland, E., et al, 2009. The Role of Mindfulness in Positive Reappraisal. EXPLORE, 5(1), 37-44. [Online]. Available at: https://www.sciencedirect.com/science/article/abs/pii/S1550830708003212 [Accessed 08 January 2024].

Guilmette, M., et al, 2019. Past and present participation in extracurricular activities is associated with adaptive self-regulation of goals, academic success, and emotional wellbeing among university students. 73, 8-15. [Online]. Available at: https://doi.org/10.1016/j.lindif.2019.04.006 [Accessed 18 December 2023].

Hendry, L., and Kloep, M., 2002. Lifespan development: Resources, challenges and risks. London: Thomson Learning.

Hobfall, S., 2001. The Influence of Culture, Community, and the Nested-Self in the Stress Process: Advancing Conservation of Resources Theory. Applied Psychology: An International Review, 50(3), 337-421. [Online]. Available at: https://iaap-journals.onlinelibrary.wiley.com/doi/epdf/10.1111/1464-0597.00062 [Accessed 11 March 2024].

Hoong Wong, W., and Chapman, E., 2023. Student satisfaction and interaction in higher education. Higher Education, 85. 957-978. [Online]. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9159046/pdf/10734_2022_Article_874.pdf [Accessed 07 December 2023].

Hordósy, R., and Clark, T., 2018. Beyond the compulsory: a critical exploration of the experiences of extracurricular activity and employability in a northern red brick university. Research in Post-Compulsory Education. 23(3), 414-435. [Online]. Available at: https://www.tandfonline.com/doi/epdf/10.1080/13596748.2018.1490094?needAccess=true [Accessed 11 March 2024].

Kasnakoğlu, B. T. and Mercan, H., Co-creating positive outcomes in higher education: are students ready for co-creation? Journal of Marketing for Higher Education, 31(1). 73-88. [Online]. Available at: https://www.tandfonline.com/doi/full/10.1080/08841241.2020.1825031 [Accessed 04 December 2023].

Kerrigan, M., and Manktelow, A., 2021. Extra-curricular activities in higher education: enhancing the student experience. Widening Participation and Lifelong Learning, 23(1), 123-147. [Online]. Available at: https://www.ingentaconnect.com/content/openu/jwpll/2021/00000023/00000001/art00007# [Accessed 06 January 2024].

Kerrigan, M., et al, 2018. Sandwich placements: negating the socioeconomic effect on graduate prospects, Journal of Widening Participation and Lifelong Learning, 20(4), 81-103.[Online]. Available at: https://www.ingentaconnect.com/content/openu/jwpll/2018/00000020/00000004/art00005 [Accessed 06 January 2024].

Kiyama, J., and Luca, S., 2014. Structured Opportunities: Exploring the Social and Academic Benefits for Peer Mentors in Retention Programmes. Journal of College Student Retention, 15(4), 489-514. [Online]. Available at: https://journals.sagepub.com/doi/10.2190/CS.15.4.b [Accessed 03 January 2024].

Larson, R. W., Hansen, D. M., & Moneta, G. (2006). Differing profiles of development experiences across types of organized youth activities. Developmental Psychology, 42(5), 849–863. [Online]. Available at: https://www.proquest.com/docview/614459743?accountid=14693&sourcetype=Scholarly%20Journals [Accessed 05 January 2024].

Lesener, T., et al. 2020. The Study Demands-Resources Framework: An Empirical Introduction. International Journal of Environmental Research and Public Health, 17(14). 1-13. [Online]. Available at: https://www.mdpi.com/1660-4601/17/14/5183 [Accessed 02 October 2023].

Lewis, C., 2004. The relation between extracurricular activities with academic and social competencies in school age children: A meta-analysis. (PhD dissertation). Texas A&M University, Austin, TX.[Online]. Available at:

https://www.proquest.com/docview/305077150?pq-origsite=gscholar&fromopenview=true&sourcetype=Dissertations%20&%20Theses [Accessed 05 January 2024].

Lombardo, S., & Cabiddu, F., 2017. What's in it for me? Capital, value and co-creation practices. Industrial Marketing Management, 61, 155-169. [Online]. Available at: https://www.sciencedirect.com/science/article/pii/S0019850116301134 [Accessed 11 March 2024].

McGowan, I., et al, 2016. Does all work and no play make a dull graduate? Perceptions of extra-curricular activities and Employability, Journal of Perspectives in Applied Academic Practice, 1(1), 13–18. [Online]. Available at: https://jpaap.ac.uk/JPAAP/article/view/183/html [Accessed 06 January 2024].

McNeal, R., 1999. Participation in High School Extracurricular Activities: Investigating School Effects. Social Science Quarterly, 80(2), 291-309. [Online]. Available at: https://www.jstor.org/stable/42863901 [Accessed 04 January 2024].

Merino, M., et al, 2019. Is There Any Relationship between Unemployment in Young Graduates and Psychological Resources? An Empirical Research from the Conservation of Resources Theory. Journal of Work and Organizational Psychology, 35(1), 1-8. [Online]. Available at: https://www.redalyc.org/journal/2313/231360290001/231360290001.pdf [Accessed 20 December 2023].

Mishra, S., 2020. Social networks, social capital, social support and academic success in higher education: A systematic review with a special focus on 'underrepresented' students. Educational Research Review, 29. 100307. [Online]. Available at: https://www.sciencedirect.com/science/article/pii/S1747938X1830304X [accessed 11 March 2024].

Moneta, G., 2011. Need for achievement, burnout, and intention to leave: Testing an occupational model in educational settings. Personality & Individual Differences, 50(2). 274-278. [Online]. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0191886910004861 [Accessed 02 October 2023].

Mountford-Zimdars, A., et al, 2015. Causes of differences in student outcomes. *Higher Education Funding Council for England.* [Online]. Available at: https://dera.ioe.ac.uk/id/eprint/23653/1/HEFCE2015_diffout.pdf [Accessed 04 December 2023].

Muñoz-Bullón, F., et al, 2017. The influence of sports participation on academic performance among students in higher education. Sport Management Review, 20(4), 365-378. [Online]. Available at: https://www.sciencedirect.com/science/article/abs/pii/S144135231630064X [Accessed 11 March 2024].

Redmond, U., 2020. "Creating capital": The impact of sustained engagement with extracurricular activities on access students' experience of University (PhD Thesis). Dublin City University. [Online]. Available at: https://doras.dcu.ie/24094/1/UnaRedmond_ApprovedThesisJanuary3rd2020.pdf [Accessed 20 December 2023].

Reeve, J., 2012. A self-determination theory perspective on student engagement. In: Christenson, S., Reschly, A., Wylie, C., (Eds.), Handbook of research on student engagement (pp. 149–172). London: Springer.

Reger, J. (2018) Academic opportunity structures and the creation of campus activism. Social Movement Studies, 17(5), 558–573. [Online]. Available at: https://doi.org/10.1080/14742837.2018.1495073 [Accessed 11 March 2024].

Robins, T., et al, 2015. Burnout and Engagement in Health Profession Students: The Relationships Between Study Demands, Study Resources and Personal Resources. The Australasian Journal of Organisational Psychology, 8(1), 1-13. [Online]. Available at: https://www.cambridge.org/core/journals/australasian-journal-of-organisational-psychology/article/burnout-and-engagement-in-health-profession-students-the-relationships-between-study-demands-study-resources-and-personal-resources/5881F618CAC81BD027EFBBDAA192B9F0 [Accessed 02 October 2023].

Salmela-Aro, K., et al., 2022. Study Demands-Resources Model of Student Engagement and Burnout. Pp. 77-93. In: Handbook of Research on Student Engagement. Reschley, A., & Christenson, S (Eds). 2nd Edition. London: Springer.

Schaufeli, W. B., & Taris, T. W. (2014). A critical review of the job demands-resources model: Implications for improving work and health. In: G. F. Bauer & O. Hämmig (Eds.), *Bridging occupational, organisational and public health: A transdisciplinary approach*. 43–68. Springer Science + Business Media. https://doi.org/10.1007/978-94-007-5640-3_4

Seow, P., & Pan, G., 2014. A Literature Review of the Impact of Extracurricular Activities Participation on Students' Academic Performance. Journal of Education for Business, 89(7). [Online]. Available at: https://doi.org/10.1080/08832323.2014.912195 [Accessed 02 October 2023].

Sjogren, A., et al, 2023. Profiles of afterschool motivations: A situated expectancy-value approach. Contemporary Educational Psychology, 74. [Online]. Available at: https://doi.org/10.1016/j.cedpsych.2023.102197. [Accessed 08 January 2024].

Skinner, K., & Pitzer, J., 2012. Developmental Dynamics of Student Engagement, Coping, and Everyday Resilience (Chapter 2). *The Handbook of Research on Student Engagement*. Christenson, S., Wylie, C., & Reschly, A. (eds). 1st ed. New York: Springer US.

Smørvik, K., & Vespestad, M., 2020. Bridging marketing and higher education: resource integration, co-creation and student learning. Journal of Marketing for Higher Education, 30 (2), 256-270. [Online]. Available at: https://www-tandfonline-com.ntu.idm.oclc.org/doi/epdf/10.1080/08841241.2020.1728465?needAccess=true [Accessed 08 December 2023].

Snijders, I., et al., 2021. Relationship quality in higher education and the interplay with student engagement and loyalty. British Journal of Educational Psychology, 92(2), 425-446. [Online]. Available at: https://doi.org/10.1111/bjep.12455 [Accessed 06 December 2023].

Stearns, E., and Glennie, E., 2010. Opportunities to participate: Extracurricular activities' distribution across and academic correlates in high schools. Social Science Research, 39(2), 296-309. [Online]. Available at: https://doi.org/10.1016/j.ssresearch.2009.08.001 [Accessed 04 January 2024].

Stevenson, J., and Clegg, S., 2012. Who cares? Gender dynamics in the valuing of extra-curricular activities in higher education. Gender and Education, 1(24), 41-55. [Online]. Available at: https://www-tandfonline-com.ntu.idm.oclc.org/doi/full/10.1080/09540253.2011.565039?casa_token=gf4-RQFr_W4AAAAA%3AxYdcozsz-dTPSXsdzHBjD65lci7BSM9joQ-mJeDF2935u7fGJaHu-SeHtjx6Lszyr6YwEpEZHaBw [Accessed 18 December 2023].

Stuart, M., et al, 2011. The impact of engagement with extracurricular activities on the student experience and graduate outcomes for widening participation populations. Active Learning in Higher Education, 12(3), 203-215. [Online]. Available at: https://journals.sagepub.com/doi/pdf/10.1177/1469787411415081 [Accessed 11 March 2024].

Thomas, L., 2002. Student retention in higher education: the role of institutional habitus. Journal of Education Policy, 17(4), 423-442. [Online]. Available at: https://www-tandfonline-com.ntu.idm.oclc.org/doi/abs/10.1080/02680930210140257 [Accessed 11 March 2024].

Thompson, L., et al, 2013. 'It's just like an extra string to your bow': Exploring higher education students' perceptions and experiences of extracurricular activity and employability. Active Learning in Higher Education. 14(2), 135-147. [Online]. Available at: https://journals.sagepub.com/doi/pdf/10.1177/1469787413481129 [Accessed 15 January 2024].

Thouin, E., et al, 2020. School-based extracurricular activity involvement and high school dropout among at-risk students: Consistency matters. Applied Developmental Science, 26(2), 303-316. [Online]. Available at: https://www-tandfonline-com.ntu.idm.oclc.org/doi/full/10.1080/10888691.2020.1796665?casa_token=la-ybIIlK0IAAAAA%3ACdjFvnVI0Gy05fjpVDIM7j9XW57WcUrrvsVHnMN7oPAKpYctQLjM7I5c-FONQcC4in9sqwK7mwEP [Accessed 18 December 2023].

Tinto, V., 2017. Reflections on Student Persistence. Student Success, 8(2), 1-8. [Online]. Available at: https://studentsuccessjournal.org/article/view/495/361 [Accessed 04 January 2024].

Tomlinson, M., 2017. Forms of graduate capital and their relationship to graduate employability. Education and Training, 59 (4), 338-352. [Online]. Available at: http://dx.doi.org/10.1108/ET-05-2016-0090 [Accessed 08 January 2024].

Tummers, L., & Bakker, A., 2021. Leadership and Job Demands-Resources Theory: A systematic review. Frontier in Psychology (12), 1-13. [Online]. Available at: https://www.researchgate.net/publication/354947519_Leadership_and_Job_Demands-Resources_Theory_A_Systematic_Review [Accessed 08 January 2024].

Venkatesh Mukesh, H., et al., 2023. Are extracurricular activities stress busters to enhance students' well-being and academic performance? Evidence from a natural experiment. Journal of Applied Research in Higher Education, 15(1), 152-158. [Online]. Available at: https://www-emerald-com.ntu.idm.oclc.org/insight/content/doi/10.1108/JARHE-06-2021-0240/full/pdf?title=are-extracurricular-activities-stress-busters-to-enhance-students-well-being-and-academic-performance-evidence-from-a-natural-experiment [Accessed 18 December 2023].

Wilson, C., et al, 2018. A new framework for the design and evaluation of a learning institution's student engagement activities. Studies in Higher Education, 44(11), 1931-1944. [Online]. Available at: https://doi.org/10.1080/03075079.2018.1469123 [Accessed 20 November 2023].

Woodall, T., et al., 2014. Making sense of higher education: students as consumers and the value of the university experience. Studies in Higher Education, 39(1), 48-67. [Online]. Available at:

https://www.tandfonline.com/doi/epdf/10.1080/03075079.2011.648373?needAccess=true [Accessed 07 December 2023].

Woodall, T., et al., 2014. Making sense of higher education: students as consumers and the value of the university experience. Studies in Higher Education, 39(1), 48-67. [Online]. Available at:
https://www.tandfonline.com/doi/epdf/10.1080/03075079.2011.648373?needAccess=true [Accessed 07 December 2023].