

# Research protocol

## Kent Race Equality Gaps Analysis

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BIT TP number: 2021067

VERSION	DATE	REASON FOR REVISION/NOTES
<i>Any changes to the design to be agreed between the implementation partner(s), evaluator and TASO. Note any agreed changes in the table below.</i>		
1.4	24 Nov 2021	Amendments to outcome measures to explain why percentile rank is being used, and the use of percentage of students receiving a 2:1/1 <sup>st</sup> class to visualise the attainment gap (as requested by TASO and University of Kent).
1.0 [original]	14 Sep 2021	
Pre-registration		This design has been pre-registered on the <a href="#">Open Science Framework</a> .

The QA rating system is based on the Evaluation Security tool presented in the TASO Monitoring and Evaluation Framework.<sup>1</sup>

QA	Comments	Rating (out of 5)
Design	Matched Difference in Differences	4

<sup>1</sup> <https://taso.org.uk/evidence/evaluation/>

Sample size	Expected to be 2,813 observations	4
Outcome measure	Administrative data on attainment	5
Attrition	No attrition due to use of administrative data	5
Validity	Adequate counterfactuals identified using propensity score	4
<b>Overall</b>		

## 1. Summary

### ***Background***

The Centre for Transforming Access and Student Outcomes in Higher Education (henceforth TASO) has funded the University of Kent (henceforth Kent) and commissioned the Behavioural Insights Team (henceforth BIT) to evaluate the impact of their “Diversity Mark” programme (an initiative that seeks to diversify the current Eurocentric, BAME-authors-lacking curriculum) on reducing attainment gaps between Black, Asian and minority ethnic (BAME) students and white students.

### ***Aims***

To evaluate whether and to which extent Kent’s ‘Diversity Mark’ initiative reduced the attainment gaps between BAME and white students.

### ***Intervention***

The “Diversity Mark” initiative is a collaborative response to Kent students’ call for more diverse curricula. The School of Sociology, Social Policy and Social Research (henceforth SSPSSR), students, and library services worked together to audit 19 core undergraduate modules offered in the Medway and Canterbury campuses and explored ways to incorporate BME authors and perspectives into those modules.

### ***Design***

The study is a matched difference-in-differences with repeated cross-sections. We will compare students’ attainment trend among the modules that implemented the Diversity Mark Initiative (treatment modules) with similar comparator modules that didn’t implement the initiative.

### ***Outcome measures***

The primary outcome measure is the module-level average attainment, and it is defined as the percentile rank of the final module mark.

### ***Analyses***

The primary analysis consists of a diff-in-diff regression, comparing module marks before and after the academic year 2017-18 between reformed vs. matched unreformed modules. It will focus on BAME students only. The secondary analysis will repeat the primary analysis for white students. Additional descriptive charts will be made to illustrate the change in attainment gaps of reformed vs. comparator modules before and after the Diversity Mark Initiative.

## 2. Background

This research is part of a TASO-funded project to evaluate the impact of universities' efforts to reform curricula as a means of reducing racial equality gaps in student outcomes.

### 2.1 Funding sources

This research is funded by TASO. TASO has funded a research associate in each of the two partner universities (Kent and Leicester) to evaluate the impact of diversifying curricula and has commissioned BIT to deliver the quantitative evaluation of both universities.

### 2.2 Team, role, and responsibility

Table 1 presents an overview of the project team. TASO instructed BIT to propose the details of a Differences-in-Differences design to answer the research question at hand, using administrative data provided by Kent. BIT has presented the outcomes of a scoping phase on September 22nd to the TASO's team. TASO then instructed BIT to formalise the details of the analysis in a trial protocol. As instructed by TASO, BIT will lead on the development of a technical report as well.

TASO has helped facilitate the collaboration between BIT and Kent in data and knowledge transfer related to this project (e.g., signing data sharing/processing agreement).

Kent's colleagues shared background information of the Diversity Mark Initiative and their preliminary project report with BIT as well as sharing GDPR-compliant individual-level module data. In addition, they will also help BIT address project or data related questions as needed.

Dr Susannah Hume and Chiamaka Nwosu from King's College London shared the original research protocol<sup>2</sup> and preliminary findings related to this project and provided pro bono support where necessary.

**Table 1. Core project team, roles and responsibilities**

Organisation	Name	Role and responsibilities
BIT	Dr Giulia Tagliaferri	Research lead
BIT	Dr Yihan Xu	Research analyst

<sup>2</sup> The original research protocol can be found [here](#).

<b>BIT</b>	James Lawrence	Evaluation Supervisor and quality assurance
<b>TASO</b>	Sarah Chappell	Project liaison
<b>TASO</b>	Dr Helen Lawson	Research/project lead
<b>KENT</b>	Professor Kathleen M Quinlan	Partner lead
<b>KENT</b>	Dr Barbara Adewumi	Partner co-investigator
<b>KENT</b>	Dr Ellen Dowie	Partner co-investigator
<b>KENT</b>	Dr Miyoung Ahn	Research associate

### 3. Aims

Some researchers have argued that the race attainment gap could be attributed to the ‘whiteness’ of the curriculum (Mountford-Zimdars et al., 2015; Mcduff, Tatam, Beacock, & Ross, 2018). According to the BME Student Voice Project in 2016, Kent currently has Eurocentric curricula and lacks BME authors. Kent’s own students were aware of the lack of diversity and have voiced their desire toward more diverse curricula (e.g., Kent Union’s “Diversify my Curricula” campaign and the [Decolonise UoK](#) campaign).

However, little empirical research has been done to investigate the causal relationship between diversifying curricula and the race attainment gap. In light of this background, this study aims to offer initial evidence of potential benefits of diversifying curricula by evaluating whether and to which extent Kent’s ‘Diversity Mark’ initiative reduced the attainment gaps between BAME and white students.

#### 3.1 Research questions

**The primary research question:**

How did Kent’s ‘Diversity Mark’ initiative affect the attainment of BAME students?

**The secondary research question:**

How did Kent’s ‘Diversity Mark’ initiative affect the attainment of White students?

**The exploratory research question:**

How did Kent’s ‘Diversity Mark’ initiative affect the attainment gap between White and BAME students.

#### 3.2 Research hypotheses

We hypothesize that undergraduate social science core modules that have diversified their curricula will have smaller post-intervention White/BAME attainment gaps than comparator modules that did not diversify their curricula.

### 3.3 Rationale for choosing comparators

Comparator modules were chosen to establish plausible counterfactuals, for participation in the 'Diversity Mark' initiative was voluntary for module instructors, therefore module reformation could not be (nor could be considered) randomly assigned. See Section 5.1 for details on matching methodology.

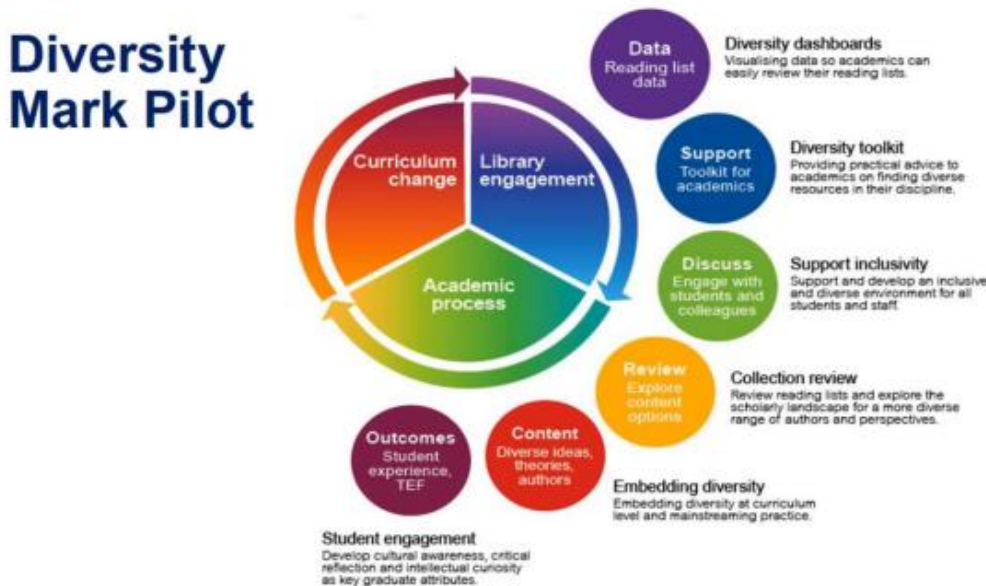
## 4. Intervention

### 4.1 Overview of the Diversity Mark Initiative

The Diversity Mark is a movement that aims to start a conversation on how to address the Eurocentric curricula and prompt curricular change that may help reduce the attainment gaps between White and BAME students (Thomas & Adewumi, 2019).

The initiative recognises that module reading lists often selectively represent the most dominant, legitimised ideas and theories within a discipline and subject area. As a result, students from the minority backgrounds might have a lower sense of belonging and struggle to engage with the reading materials if the voices and perspectives from minority groups did not find any place in the reading lists.

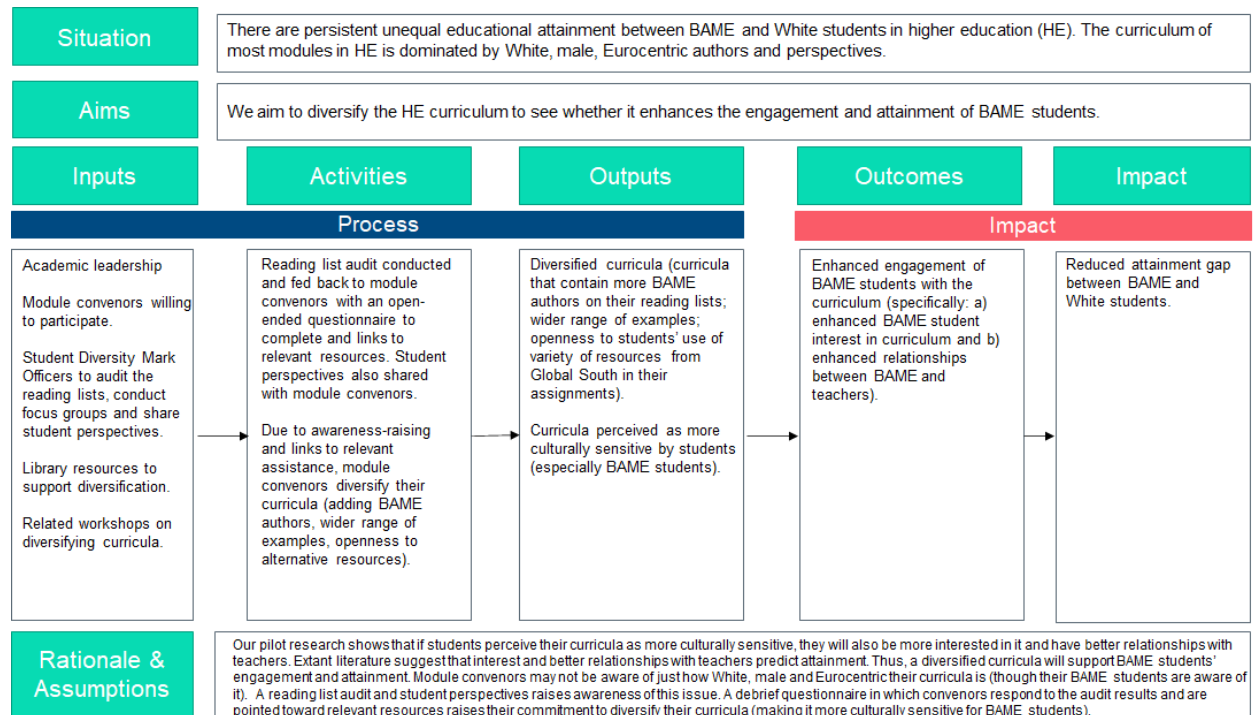
To help module instructors to diversify the reading lists, the library developed a Diversity Toolkit that curates reading materials by authors' backgrounds and perspectives, which can help module instructors find inclusive resources more easily (see the process map below for details).



In addition to the toolkit, academics are offered support in selecting more diverse resources from students' feedback via focus group discussion and seminar discussion, and the library supports in co-curating bibliographies. Those efforts then lead to curriculum change — more diverse content is included which improves the overall student experience and increases students' cultural awareness.

## 4.2 Theory of change

The plausible mechanisms of how the Diversity Mark Initiative reduces the attainment gaps are outlined in the theory of change below.



## 4.3 Implementation of the Diversity Mark Initiative

The Diversity Mark Initiative was first piloted at SSPSSR during the Summer of 2018. The process involves three main stages:

- **Auditing.** The 2017-18 reading list of core undergraduate modules offered at SSPSSR at Medway and Canterbury campuses. A total of 19 core modules' reading lists were audited. All Stage 1 modules across all SSPSSR on Campus 1 programmes were examined, which included three degree programmes: Social Sciences, Criminal Justice and Social Work.
- **Feedback.** After the auditing, the module instructors received feedback on how to diversify their reading lists. Module instructors were sent feedback to their reading lists, along with a survey with five open-ended questions:

1. What is your understanding of the function and purpose of the reading list in relation to the rest of teaching?
  2. To what extent do you think there are challenges to the development of a more inclusive curriculum in your subject area? Please outline some of these perceived challenges.
  3. Please outline some of the ways that questions of diversity and demographic difference currently feature in your teaching.
  4. Are there any plans to change?
  5. Do you have any wider thoughts on tackling attainment gaps and diversifying the curriculum?
- **Reform.** Every module instructor (except one) responded to the survey. And following the module audit and survey, five module instructors of audited modules indicated intentions to change their curriculum and plans to incorporate more BAME authors and perspectives into their modules based on the feedback they received from the audit. Those five modules' curricula were audited in the academic year 2017-18 and were reformed in the academic year 2018-19. Another module instructor showed interest and their module was reformed in 2020-21 (see **Table 2** in Section 5.2 for details).

## 5. Design

BIT will use a matched difference-in-differences approach to evaluate the impact of the curricula reform initiative, where comparator modules will be matched to reformed modules on pre-intervention module characteristics. BIT will then compare the pre-intervention and post-intervention trend of students' attainment among the reformed modules with comparator modules that didn't reform their curricula.

### 5.1 Module matching criteria

The comparator modules will be chosen from a pool of unreformed modules based on how similar they were to the reformed modules pre-intervention in the following characteristics:

- Campus
- Whether the module is for stage 1 or not (all reformed modules were stage 1 modules)
- Whether the module is textbook-driven (only non-textbook-driven modules have enough scope for curricula diversification)
- Whether the module has at least one year of pre-intervention data available
- Average number of enrolled students from t-4 to t-1, where t is the first year that the reformed curricula were taught (t = 2018-19 for modules 3,4,5; t = 2020-21 for module 20)



- Average percentage of BAME students from t-4 to t-1, where t is the first year that the reformed curricula were taught
- Average attainment (percentile rank of the final module mark) among BAME students from t-4 to t-1, where t is the first year that the reformed curricula were taught

The reformed status and key module characteristics are presented in **Table 2**.

**Table 2. Key characteristics for reformed and candidate comparator modules**

moduleID	Campus	Stage	Reformed	Availability of 3 years of pre-intervention data	Textbook driven	Included in matching
Module 01	Campus 1	1	Yes (in 18/19)	No	No	No
Module 02	Campus 1	1	Yes (in 18/19)	No	No	No
Module 03	Campus 1	1	Yes (in 18/19)	Yes	No	Yes
Module 04	Campus 2	1	Yes (in 18/19)	Yes	No	Yes
Module 05	Campus 2	1	Yes (in 18/19)	Yes	No	Yes
Module 06	Campus 1	1	No	Yes	No	Yes
Module 07	Campus 1	1	No	No	Yes	No
Module 08	Campus 1	1	No	No	Yes	No
Module 09	Campus 1	1	No	No	No	No
Module 10	Campus 1	1	No	Yes	No	Yes
Module 11	Campus 1	1	No	Yes	No	Yes
Module 12	Campus 1	3	No	No	NA	No
Module 13	Campus 1	1	No	Yes	No	Yes
Module 14	Campus 1	2	No	No	NA	No
Module 15	Campus 1	2	No	No	NA	No
Module 16	Canterbury	1	No	Yes	Yes	Yes
Module 17	Campus 2	1	No	Yes	No	Yes
Module 18	Campus 2	1	No	Yes	No	Yes
Module 19	Campus 2	1	No	Yes	No	Yes
Module 20	Campus 2	1	Yes (in 2020/21)	Yes	No	Yes
Module 21	Campus 2	1	No	Yes	No	Yes
Module 22	Campus 2	1	No	Yes	No	Yes
Module 23	Campus 2	1	No	Yes	No	Yes

## 5.2 Module inclusion and exclusion criteria

A few modules will be excluded from further analysis for the following reasons:

- **Module 12, 14, and 15** will be excluded as they are not stage 1 modules.

- **Module 1, 2, 7, 8, 9** will be excluded due to poor availability of pre-intervention data availability (having no or only 1 year of pre-intervention data).
- **Module 16** will be excluded as it's textbook-driven, in which case the scope for diversifying curricula is severely constrained.

After excluding the above modules, a total of 14 modules remained: 4 of them were reformed and 10 of them were candidate comparators (summarised in the final column of **Table 2**). Some student records were also excluded (see **Section 7.2** sample inclusion and exclusion criteria).

### 5.3 Module-matching procedure and results

The matching was done using the R package MatchIt<sup>3</sup>. Each Module was matched based on the following characteristics:

- Campus
- Average number of enrolled students from t-4 to t-1
- Average percentage of BAME students from t-4 to t-1
- Average module attainment (percentile rank of the final module mark) among BAME students from t-4 to t-1

The modules were assigned a propensity score, indicating the fitted likelihood that the module was reformed given its characteristics. Matching was done on a 1:1 basis, without replacement, as this is a conservative matching method which is also intuitive to interpret. The matching was done separately for module 3, 4, 5 (reformed in 2018-19) and module 20 (reformed in 2020-21). **Table 3** presents the propensity scores of the reformed modules pairing with four comparator modules that had the closest propensity scores.

**Table 3. Propensity scores of reformed vs. comparator modules**

Reformed module	Propensity score	Comparator module	Propensity score
Module 3	0.3474	Module 18	0.4138
Module 4	0.6668	Module 13	0.6203

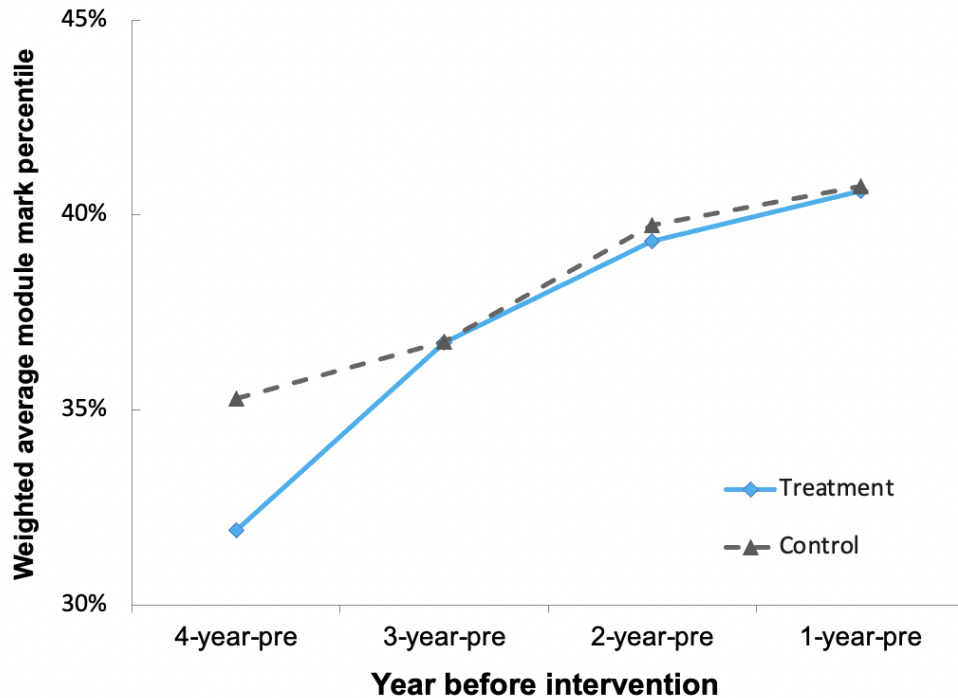
<sup>3</sup> Ho, D. E., Imai, K., King, G., & Stuart, E. A. (2007). Matching as nonparametric preprocessing for reducing model dependence in parametric causal inference. *Political Analysis*, 15(3), 199–236. doi: 10.1093/pan/mpi013

Module 5	0.3911	Module 21	0.4107
Module 20	4.64e-11	Module 17 <sup>4</sup>	1.00e+00

### 5.4 Visual inspection of the parallel trend assumption

We calculated BAME students’ module-level weighted average attainment of the reformed and comparator modules up to 4 years prior to intervention. We then plotted the parallel trends in Figure 2. It appears that the trends were parallel up to 3 years prior to intervention. In the next section, we will specify how we test the parallel trend assumption formally.

**Figure 2. Trends in weighted average<sup>5</sup> module mark before the intervention**



### 5.5 Formal testing of the parallel trend assumption

We used a similar regression specification as the main regression (see **Section 11**) to

<sup>4</sup> The propensity score is 0 for module 20 and 1 for module 17 because there was only one module that was treated in 2020-21, therefore the logistic regression fit perfectly. Despite the sharp disparity, the other variables match reasonably well so we consider module 17 as an adequate match for module 20.

<sup>5</sup> Since modules vary greatly in number of enrolled BAME students, we weighted the module attainment by BAME students count.

test whether the pre-intervention trends between treatment and comparator modules were parallel.<sup>6</sup> The regression outputs (using data up to 2019-20) showed that although the trend in the 4th pre-intervention year appeared non-parallel in the plot, it was not statistically significant compared to the trend during the first pre-intervention year. As a result, we think the reformed modules and the matched modules had an adequately parallel trend before the intervention.

## 6. Outcome measures

### 6.1 Definition of the outcome measure

This study only has one outcome measure, and it's listed in the table below.

**Table 4. Outcome measures**

Outcome measure	Data collected	Point of collection
Primary outcome: Final module mark in percentile ranking	Raw final module grades for all students of the modules listed in Table 2 from academic year 2014-15 to 2020-21. Data will be anonymised before sharing.	The data is routinely collected by Kent and will be provided (sent in two batches, in Aug and Oct 2021) by Kent once the BIT-TASO data processing agreement and the KENT-TASO data sharing agreement are signed between.

We will use percentile rank of module mark as our primary outcome measure for the following reasons:

- Percentile rank is less susceptible to trend, e.g., grade inflation
- Percentile rank is also less susceptible to course instructors' grading style (some instructors' 70 might be equivalent to others' 60) as the highest value (whether it's 70 or 90) will always be standardised to 100 and the lowest value will be standardised to zero, making between-module difference more objective and comparable
- Percentile is more intuitive to interpret, e.g., if BAME students' average percentile rank is 50%, it indicates zero White-BAME gap.
- Lower risk of de-identification of module instructors (See Section 12.2 for details)

On the other hand, using raw marks as the outcome measure does have some benefits as the OfS uses this metric to calculate awarding (% of students achieving first/second class honour) gaps. We acknowledge that our primary approach differs from the OfS approach, however, we think overall the benefits outweigh the risks. Furthermore, in order for the output to be better comparable to other reports in this area, we will visualise the degree awarding gap using both

<sup>6</sup> In the formal testing we interact each pre-intervention year with the treatment dummy to identify whether treated and control modules have different trends in each year pre-intervention. In the main analysis we interact with a more general 'post' dummy with the treatment dummy to increase power.

percentile rank and percentage of students receiving either an upper second class or a first class in the modules (see Section 11).

## 6.2 Interpretation of the outcome measure

Although the theoretical range of both the raw module mark and the percentile rank of module mark is from 0 to 100, in practice, the range of the latter is likely to be much wider than the former, because instructors seldom give marks higher than 80 or lower than 40. Descriptive analysis (using data up to 2019-20) shows that the mean raw mark was 59.6 for White students and 55.4 for BAME students, whereas the mean percentile rank was 53.3 for White students and 38.9 for BAME students. Thus the attainment gap might seem wider if we use percentile rank, however this metric will be useful in establishing students' standing in relation to others.

As stated above, we will visualise the attainment gap for White and BAME students using both percentile rank and the percentage of students who achieved an upper second class or first class so that this is comparable.

## 7. Sample selection

### 7.1 Study settings

The Diversity Mark Initiative was piloted among cohorts enrolled in Kent's SSPSSR degree courses that took place in two campuses. While the named degree courses are similar and follow the same assessment patterns and overall School and University policies, the two campus cohorts are separate. At one campus, 147 undergraduates were enrolled in SSPSSR degree courses in 2017-18; and on the other 337 were enrolled.

### 7.2 Inclusion and exclusion criteria

The sample comprises BAME and White students' final module marks of Stage 1 core social science modules in the following academic years: 2014-15, 2015-16, 2016-17, 2017-18, 2018-19, 2019-20, and 2020-21.

#### 7.2.1 For modules

All modules (see **Table 2**) were worth 15 credits and taught over 12 weeks by an SSPSSR staff member in one of the degree programmes in SSPSSR. In addition, as specified in **Section 5.1 and 5.2**, all included modules must be:

- Stage 1 core modules
- Having at least three years of pre-intervention administrative data
- Fitting a typical reading list pattern (i.e. not textbook-driven), following a standard assessment pattern which typically consisted of essay assignments, short research projects, presentations and an end of module exam.

## 7.2.2 For students

To minimise potential bias, within the included modules, we excluded those whose:

- Ethnicity is unknown
- BAME and White students whose fee payment status is other than the UK (this is consistent with the approach of the OfS. Furthermore, UK fee payers will likely have gone through the UK education system, so this exclusion reduces spurious factors).

## 7.3 Expected sample size

After applying the inclusion and exclusion criteria, we are left with the following approximate sample sizes (See **Table 5**). Note that the sample size for 2020-21 (highlighted in grey) was estimated using 2019-20's data as it is expected to be available in October 2021.

On average, 38% of all module mark records belonged to BAME students and 62% to White students. And about 19% (1397 out of 7249) of the records took place post-intervention.

**Table 5.1 Expected total sample size (including both BAME and white students)**

Academic year	Module 3,4,5		Module 20		Comparator Modules	Overall	
	un-reformed	reformed	un-reformed	reformed	un-reformed	un-reformed	reformed
2014-15	296	0	129	0	264	689	0
2015-16	343	0	165	0	442	950	0
2016-17	356	0	173	0	531	1060	0
2017-18	432	0	222	0	652	1306	0
2018-19	0	388	197	0	533	730	388
2019-20	0	400	209	0	564	773	400
2020-21	0	400	0	209	564	564	609
<b>Total</b>	<b>1427</b>	<b>1188</b>	<b>1095</b>	<b>209</b>	<b>3550</b>	<b>6072</b>	<b>1397</b>

**Table 5.2 Expected total sample size for BAME students**

Academic year	Module 3,4,5		Module 20		Comparator Modules	Overall	
	un-reformed	reformed	un-reformed	reformed	un-reformed	un-reformed	reformed
2014-15	127	0	51	0	114	292	0
2015-16	145	0	69	0	161	375	0
2016-17	118	0	52	0	169	339	0
2017-18	155	0	76	0	238	469	0
2018-19	0	175	88	0	251	339	175
2019-20	0	143	68	0	201	269	143
2020-21	0	143	0	68	201	201	211
<b>Total</b>	<b>545</b>	<b>461</b>	<b>404</b>	<b>68</b>	<b>1335</b>	<b>2284</b>	<b>529</b>

## 8. Data collection

Data will be collected in two batches. The data from academic year 2014-15 to 2019-20 has already been collected and is part of the University of Kent's institutional dataset. The data from the academic year 2020-21 will be collected over the summer of 2021 and provided to BIT in October 2021.

For the purpose of this study, BIT's researchers will receive pseudonymised data only. Main data items to be collected are listed in **Table 6**. The data will be transferred via encrypted method and also stored encrypted on BIT servers and access will be restricted to researchers directly involved in this project. All researchers' laptops have anti-virus applications installed and encrypted hard-drives to protect data stored locally. The code for cleaning and analysis will be quality assured at BIT. Further details of data management procedures are specified in the data sharing agreement.

**Table 6. Data collection**

Data item	Timeframe	Collector	Data collection status
Module reformed status, Module attainment, student covariates, Module characteristics	Academic year 2014-15 to 2019-20	Kent	Shared with BIT in Aug 2021
Module reformed status, Module attainment, student covariates, Module characteristics	Academic year 2020-21	Kent	Expected to be shared by 26 Nov 2021

## 9. Procedure

The high-level project plan is presented in **Table 7**.

**Table 7. Project plan for deliverables**

Timeframe	Action	Owner
June 2021	Kick off meetings to clarify roles & responsibilities	BIT, TASO, Kent
July ~ Aug 2021	Pre-Analysis (part 1) - Agree on DSAs (June 2021) - Define scoping of research design and options	BIT, TASO, Kent
Sep 2021	Break point and presentation of scoping ahead of full protocol development	BIT

Sep – Oct 2021	Pre-Analysis (part 2) - Draft trial protocol - Agree on draft trial protocol	BIT, TASO
End of Nov - Dec 2021	D-in-D Analysis	BIT
Dec 2021	Draft analysis report and orally present the analysis results	BIT

## 10. Power calculations

As the setup and analytical strategy of this trial is not a typical D-in-D setup (beyond the simpler 2 groups x 2 periods diff-in-diff design), it usually requires running extensive simulations to estimate the MDES. A close approximation is possible as individual level data before 2020-2021 are already available, starting from the SD of treatment effects from the intended regression. We used the following information to estimate MDES:

- Significance level: 0.05
- Power: 0.8
- Expected sample size (see **Table 5.2** and **Table 8**)
- Standard error of the coefficient for treatment effects using the data set up to 2019-20: 2.32
- Standard deviation of module mark (in percentile ranking): 27.20
- Constant used to estimate MDES:  $qnorm(0.975) + qnorm(0.8) = 2.80$

As a result, we calculated the MDES (in percentile ranking) as  $2.80 \times 2.32 = 6.50$ . In other words, **we're powered to detect a difference of 6.50 percentile rank of final module marks before vs. after intervention among BAME students**. If expressed in the unit of Cohen's D, the MDES is  $6.50/27.20 = 0.24$ , i.e. we're powered to detect a small to medium difference. It's worth noting that this is likely to be an under-estimation of the MDES as we haven't included the 2020-21 data when estimating the standard error.

## 11. Analytical strategy

The primary analysis will focus on BAME students only, including data from academic year 2014-15 to 2020-21. The analysis will be a difference-in-difference regression with multiple pre-intervention and post-intervention data points, and the intervention took place in different years. The OLS regression model is specified as follows:

$$Y_{imt} = \beta_0 + \delta \text{ PostInvervention}_t \times \text{EverTreated}_m + \beta_1 \text{Time}_t + \beta_2 \text{EverTreated}_{mt} + \beta_3 \text{MatchedPair}_m + \beta_4 \text{Gender}_i + \beta_5 \text{Campus}_m + \epsilon_{imt}$$



Where:

- $Y_i$  denotes the final module mark (in percentile rank) of individual  $i$  of module  $m$  in academic year  $t$
- $\beta_0$  is the constant
- $\delta$  is the causal effect of interest, representing the difference in attainment trend for reformed modules in the post-treatment period(s).  $PostIntervention_{mt} = 1$  if by academic year  $t$ , the intervention had taken place for the reformed module  $m$  and its matched module;  $PostIntervention_{mt} = 0$  if the intervention had not.  $EverTreated_m = 1$  if module  $m$  was ever reformed;  $EverTreated_m = 0$  if module  $m$  was never reformed.
- $Time_t$  is a set of dummies that take value from 2014-15 to 2020-21.
- $MatchedPair_m$  is a set of dummies that denotes one of four pairs of modules matched by propensity scores based on module characteristics.
- $Gender_i$  denotes the gender of participant  $i$  gender (0 = female; 1 = male )
- $Campus_m$  indicate whether module  $m$  was taught (0 = campus 1; 1 = campus 2)
- $\epsilon_{imt}$  is an individual-level error term.

We use heteroskedasticity robust standard errors for all parameters.

The second analysis will focus on White students and use the same model specification as that of the primary analysis.

A descriptive exploratory analysis will deduct the attainment gap between White and BAME students from the primary and secondary analysis, and the race attainment gap results (in module mark percentile rank and award achieved) will be visualised using line charts.

## 12. Ethical considerations

### 12.1 Data protection

This study has high standards of data protection. TASO and BIT have cooperated closely with Kent's data protection officer to ensure that this study complies with all the data protection protocols. It only uses pseudonymised individual-level and module-level data. No identifiable information will be elicited from students and module instructors. Because data is fully anonymised and shared using encrypted methods, there is little risk to the students and module instructors involved in this study.

### 12.2 Risk of de-anonymisation

It is possible that colleagues within the participating school might be able to infer the treated modules by reading the number of enrolled students or the attainment gaps. This may cause some self-consciousness for module instructors if the modules they taught deteriorated over the years compared to other modules. To mitigate this risk, we have standardised module marks by converting the raw mark into percentile rank so that it's less straightforward to make inferences about. We have also aggregated the results at "treatment" vs. "comparator" level, further lowering the risk of individual modules being identified.

### 12.3 Consent

Consent is addressed through the university's standard data protection agreement with students, rather than separate consent for this study. The data will be retained for 12 months after the delivery of the final report. The agreed date for the deletion of all evaluation and research data shall be March 31st, 2023.

## 13. Risks

**Table 8. Potential risks and mitigation strategies**

Risk	Mitigation strategy	Risk owner
Lower student engagement with reading materials in the academic year 2019-20 and 2020-21 due to the remote teaching mode during the pandemic	BIT will include fixed effect for academic year to control for potential effects	Kent
Data delay due to DSA/DPA signing	BIT and Kent team will hold regular team meetings to engage relevant stakeholders	Kent
Fail to identify matched modules	BIT will use available data to explore multiple matching strategies and proceed with the most promising one	BIT

## 14. References

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