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[National Tutoring Programme]
Leveraging Similarity to Improve Pupil Attendance
Nimble Trials Protocol and Statistical Analysis Plan
Evaluator (institution): The Behavioural Insights Team
Principal investigator(s): Kimberly Bohling

PROJECT TITLE[1]	Leveraging Similarity to Improve Pupil Attendance
DEVELOPER (INSTITUTION)	The Behavioural Insights Team
EVALUATOR (INSTITUTION)	The Behavioural Insights Team
PRINCIPAL INVESTIGATOR(S)	Kim Bohling
PROTOCOL AUTHOR(S)	Yihan Xu, Giulia Tagliaferri, Dave Wilson, Rizwaan Malik, Kathryn Atherton, Lal Chadeesingh, Matthew Holt, Kim Bohling
TRIAL DESIGN	A 2-arm clustered RCT with randomisation at tutor level
PUPIL AGE RANGE AND KEY STAGE	5-16 / KS1-4
NUMBER OF TUTORS	~1.3k
NUMBER OF PUPILS[2]	~29k

[1] Make sure that the project title here matches the title of the document. Please ensure that there is an identification as a randomised trial in the title as per CONSORT requirements.
[2] Replace with other population (e.g., teachers, tutors), if needed

PRIMARY OUTCOME MEASURE AND SOURCE	Average pupil attendance rate in tutoring sessions
SECONDARY OUTCOME MEASURE AND SOURCE	N/A

Protocol version history

VERSION	DATE	REASON FOR REVISION
1.1 [*latest*]		
1.0 [*original*]	11 Feb 2021	N/A

Table of contents

1. Study rationale and background

Research purpose: To test whether a light-touch intervention that leverages similarities between pupils and tutors will increase pupil attendance at tutoring sessions.

There is some evidence to suggest that informing teachers and pupils of their similarities can boost teacher-pupil relationships and subsequently improve academic achievement.

- Teacher-pupil relationships are correlated with academic achievement.[3]
- In the US study that inspired this intervention[4], providing teachers and pupils with information on their similarities improved their perceptions of their relationship with each other.
- The intervention also improved teachers' perceptions of their relationships with pupils (but not pupils' perceptions of their relationships with teachers).
- Pupils who received feedback on their similarity with their teacher seemed to earn higher course grades. However, the confidence interval here did include 0 and the authors are not able to conclusively reject the intervention having no effect.
- Although this result did not replicate when applied to a university context (large group), we believe that the intervention is more likely to work in a small group, tutoring context in schools. In this context, there will be sufficient time for tutors and pupils to explore their similarities (which is harder in larger class sizes).

Impact evaluation: A 2-arm clustered randomised controlled trial, randomised at the **tutor** level, with outcomes measured at the **pupil** level.

- Implementation and Process Evaluation:
  - Compliance and reach data from delivery partners, to understand what the uptake of the intervention is
    - Number of tutor and pupil survey responses
    - Number of tutor surveys with at least one pupil completion
  - Usage metrics from the intervention website to get insights on how the materials were used
    - Average agreement scores for the whole cohort
    - Average time to complete survey (tutor, pupil)
  - Case studies (1 per tutoring provider) based on interviews with partners, tutors, and pupils
    - an interview with a tutoring provider staff member
    - four interviews with two tutors
    - single observations of tutorials conducted by tutor interviewees

2. Intervention and implementation

See **Table 1** for a description of the intervention being evaluated, using the TIDier framework**.**

[3] Cornelius-White, J. (2007). Learner-centered teacher-student relationships are effective: A meta-analysis. Review of Educational Research, 77, 113–143.
[4] Gehlbach, H., Brinkworth, M. E., King, A. M., Hsu, L. M., McIntyre, J., & Rogers, T. (2016). Creating birds of similar feathers: Leveraging similarity to improve teacher–pupil relationships and academic achievement. *Journal of Educational Psychology*, *108*(3), 342–352. doi: 10.1037/edu0000042

Tutors in the control condition will follow their business-as-usual approach to tutoring. Tutors and pupils in BAU will likely still do a brief self-introduction at the start of the lessons. However, it is unlikely that similarities between tutors and pupils will be explored in a systematic manner as in the intervention.

The intervention will be delivered in four stages explained as follows.

1. BIT completes randomisation in batches and sends tutoring providers the list of tutors (anonymised to BIT) to which to send the materials (T) and to which they should not send anything (C). (See Section 3.3 Randomisation for more details).
2. BIT will instruct the tutoring providers to share the intervention materials in the same week and will seek written confirmation that the materials have been sent as agreed. Tutors will then be sent 2 reminders to complete the intervention in the week after receiving the materials - these will be delivered by the tutoring providers.
3. Tutors decide whether to use the intervention materials, i.e. to complete the similarity survey together with pupils. They are not required, but are strongly encouraged, to do so. Completion data will be collected as part of the IPE.
4. Tutors who decide to use the intervention materials (defined as above) are sent reminders of the things they have in common with their pupils (weekly email providing 1 similarity they have with each of their pupils, for 5 weeks).

Table 1. Intervention description

INTERVENTION NAME	Leveraging Similarity to Improve Pupil Attendance
WHY (THEORY/RATIONALE)	Perceived similarity is a key predictor of relationship satisfaction[5]. Previous studies suggest that informing teachers and pupils of their similarities can boost Teacher-Pupil Relationships, and subsequently improve academic achievement[6]. Discussions with two of the authors of these studies - Prof Todd Rogers and Dr Carly Robinson - suggested that this approach may be more effective in a small-group tutoring context where there is sufficient time for tutors and pupils to explore their similarities.
WHO (RECIPIENTS)	Both tutors and pupils will participate in the intervention.
WHAT (MATERIALS)	A web-based survey that provides instant feedback on similarities, accompanied by:

[5] Morry, M. M. (2018). Similarity Principle of Attraction. In *Encyclopedia of Human Relationships*. doi: 10.4135/9781412958479.n493

[6] Gehlbach, H., Brinkworth, M. E., King, A. M., Hsu, L. M., McIntyre, J., & Rogers, T. (2016). Creating birds of similar feathers: Leveraging similarity to improve teacher–pupil relationships and academic achievement. *Journal of Educational Psychology*, *108*(3), 342–352. doi: 10.1037/edu0000042

	• An implementation guide for tutors • A short implementation video • An email with a list of similarities sent to tutors immediately after completing the survey • A weekly email to tutors (for 5 subsequent weeks after completing the initial survey) reminding them of similarities they have with each pupil See Appendix A for an illustrative design of intervention materials.
WHAT (PROCEDURES)	The web-based survey asks pupils and tutors about their personal interests, hobbies and preferences. Once completed, both tutors and pupils will receive instant feedback on their similarities, as well as prompts to discuss these. Tutors then receive reminders of their similarities with their pupils for the subsequent 5 weeks, including some suggested conversation prompts.
WHO (PROVIDER)	BIT will provide the intervention materials to tutoring providers, who will share them with tutors.
HOW (DELIVERY MODE)	The link to the website and guidance on the activity will be provided to tutors by the tutoring provider that they work with. Tutors will then provide the link to their pupil.
WHERE (LOCATION)	The intervention will be implemented in tutoring sessions (online or in-person, with online likely to be the dominant model).[7]
WHEN & HOW MUCH (DOSAGE)	The initial similarities survey will be delivered once, towards the beginning of the tutoring sessions. Tutors will be sent five reminders of similarities they share with their pupils over the 5 subsequent weeks after completing the initial survey.
TAILORING (ADAPTATION)	All tutors will receive the same initial survey. Given the nature of the intervention, the similarities feedback provided to tutors and pupils - and the subsequent

[7] This intervention is being implemented during a time period where schooling and tutoring modality depends on national/local Covid-19 restrictions.

	reminders to tutors - will be personalised based on the similarities identified from the survey.

3. Impact evaluation

3.1 Research questions

- RQ1: The primary research question is to investigate whether sending tutors materials to leverage similarities between the tutor and their pupils ***increases pupils' attendance*** at tutoring sessions.
- RQ2: The secondary research question is to investigate whether sending tutors materials to leverage similarities between the tutor and their pupils will ***increase pupils' attendance*** at tutoring sessions among ***pupils who are on pupil premium***.

3.2 Design, participants and outcome measures

Table 2: Trial design and outcomes

Trial design, including number of arms		Two-arm, cluster randomised trial
Participants	**inclusion criteria**	Tutors and pupils at participating tutoring providers
	exclusion criteria	Pupils that have started their first tutoring session before or on Feb 1st, 2021
	target number	29k pupils; 1.3k tutors
Unit of randomisation		Tutor
Stratification variables (if applicable)		Stratify by tutoring provider (a. The Tutor Trust, b. Manning's Tutors, c. Tute, d. Schools Partnership Tutors) for each batch of data
Primary outcome	**variable**	Pupil attendance rate for tutoring sessions, expressed as a proportion of sessions scheduled.
	measure (instrument, scale, source)	The proportion (expressed as a percentage) of tutoring sessions attended by each pupil out of those scheduled by their school.

		This information is provided to NFER[8] by the individual tutoring providers.[9]
	direct measure or proxy?	Direct measure
	time of collection	End of trial (Friday 23rd July)

3.3 Randomisation

- BIT will conduct the randomisation. The tutoring partners will send BIT anonymised IDs of newly hired tutors in batches (every 2 weeks until the end of May).[10] The randomisation code will be QAed by another researcher.
- For each batch, BIT will create new unique IDs for tutors (to avoid mixing up with Tutor IDs provided by NFER) and then send the outcome of the randomisation allocation to the tutoring partners.
- Tutoring partners will be responsible for sending the materials to the tutors.
- For each batch, researchers at BIT will use statistical software R to first stratify tutors at tutoring partner level, and then randomise at tutor level (i.e. all pupils paired with the same tutor will be allocated to the same condition, treatment or control). Each condition will have a roughly equal number of tutors (±1%). Batches will implicitly constitute another layer of strata. In terms of process being used, the researcher will:
  - For each batch from each tutoring partner: load the data into R/Stata
  - Set a new seed and sort seed
  - Generate a random number from a uniform distribution (0-1). In this way, each tutor will be assigned a random number from 0 to 1.
  - Sort the tutors according to this random number from low to high
  - Assign the first N/2 tutors in the list to the treatment group and the remaining N/2 to the control group.
  - Whenever a batch contains an odd number of participants, we will allocate the Nth participant to the arm T/C that has fewest people in it so far (starting from the tutoring providers as ranked in alphabetical order Manning tutors - Schools Partnership Tutors - The Tutor Trust - Tute). If that's a tie, we will generate a second random number from a uniform distribution (0-1) and allocate the participant to T if rand.num<0.5, C otherwise

[8] We are currently finalising our relationship with NFER for accessing this data. The alternative data provider may be the tutoring partners themselves, feeding us the same data they feed to NFER.
[9] BIT will liaise with the tutoring providers involved in this trial to ensure they understand the importance of accurate data collection. In addition, to the best of our understanding, tutoring providers must attend seminars held by NFER in which they are instructed on data collection. We believe that these strategies minimise the risk in accurate data collection (for example, tutoring partners rectifying the number of scheduled sessions if a pupil drops out).
[10] Tutoring Partners will send BIT the anonymised lists of tutors as they hire more tutors, not as tutors take on more students. Basically, once a tutor is enlisted with a provider, they are treated or not treated, and that remains constant across all the classes/groups they'll teach throughout the term.

- Analysts at BIT will archive all randomisation-related data and code files as well as drafting documentation of the whole process. Analysis will be conducted using statistical software (R/Stata) The primary analyst will not be blind to allocation. However, as part of the quality assurance process, another analyst will replicate the analysis while blinded to allocation.[11] Results will also be quality assured by a senior member of the research team.

3.4 Power calculations

We conducted power calculations to estimate the **minimum detectable effect size** given the estimated sample size, desired significance level, and statistical power, see **Table 3b**.

Our calculations indicate that this trial is sufficiently powered to detect the minimum effect size we expect to achieve (5 percentage points) among all eligible pupils as well as among pupils on PP, see **Table 3c**.

- Given the light touch of the intervention, the evidence base for the similarity intervention, and the baseline attendance rate of pupils in the prior term (provided by the tutoring partners), we assessed that a 5 percentage point difference in pupil attendance rate would constitute a substantive effect size, and the tutoring providers confirmed this would be a meaningful improvement.
- In January 2021, tutoring partners provided their latest estimates for the number of tutors and pupils they plan to reach this academic year. Specifically, we asked tutoring partners for an estimate of the number of pupils that they expected to have their first tutoring session on or after the 1st February 2021. The figures, outlined in the table below, provide us with our estimated sample size.

Table 3a: Estimates of Tutor-Pupil Ratio

Tutoring Partner Name	Number of tutors	Number of pupils	Tutor-pupil ratio
The Tutor Trust	250	1,900	1:10
Manning's Tutors	300	4,250	1:18
Schools Partnership Tutors	720	20,000	1:28
Tute	50	2,441	1:49
TOTAL	1,320	28,591	1:23

[11] Our proposed solution is that the main researcher will
1- clean the data, compile the final dataset, run the analysis
2- save a v2 of the dataset in which they have replaced Treatment=0/1 with a non-revealing flag like Group=A/B
3- pass these data to a second researcher who will analyse the data independently following the same trial protocol, while being blinded to the original allocation.

- The ICC range (0.2~0.7) was not estimated by a model, but from observations from trials[12] in similar contexts. Based on the literature, 0.2 is the value we deem more likely. Nevertheless, we provide power calculations for a wide range of values, to show that the trial is likely to be powered also in more extreme circumstances.
- The cluster size ranges from 10 to 49 pupils per tutor, the weighted average[13] is about 23.
- In the power calculations, we adopt a conservative approach by not accounting for the explanatory power that covariates may have.

Power calculations for secondary analysis - We were informed by EEF that 47% of our sample is expected to belong to the premium pupil (PP) group. The percentage of PP pupils for each tutoring partner is presented in Appendix C.

Table 3b: Preliminary data and assumptions for MDES Calculation

		OVERALL	PP subgroup
Assumed baseline (control group)[14]		73% (SD = 28%)	
Substantive effect sizes		5 percentage point difference (Cohen's h = 0.1)	
Cluster details	**Intracluster correlations (ICCs) [level: tutor]**	0.2~0.7	
	Average cluster size	Average is around 23 (10~49 depending on partner)	
Alpha		0.05	
Power		0.8	
% of pupils in the PP group		%	

[12] In EEF's Smart Space trial protocol and another government project, the inter-cluster correlation was both assumed to be 0.15 (the unit of randomisation is school). A report that summarises EEF's recent trials also shows that ICC in the education context (with attainment as the outcome) ranges from 0.07 to 0.16. We think the ICC might be higher as the unit of randomisation in this trial is tutor, so we assumed the starting point of ICC to be 0.2, and we think the 0.7 is high enough to simulate the extreme situation.

[13] Weighted average across provided by provider size, as given by tutoring providers. We acknowledge that cluster size is not fixed within tutoring providers, but tutoring providers had not been able to provide more accurate data.

[14] Derived from tutoring attendance data from prior term from tutoring providers

Number of all tutors	**Intervention**	660	660
	Control	660	660
	Total	1,320	1,320
Number of all pupils	**Intervention**	14,295	12,150
	Control	14,295	12,150
	Total	28,590	24,300
Software used for calculations		RStudio1.2 & R 3.6.0 Selective R packages: data.table,dplyr, plyr, psych, xlsx, gmodels, foreign, TREX(developed by BIT)	

Table 3c: MDES estimates

		OVERALL	**PP subgroup (47%)**
Intracluster correlations (ICCs)	**ICC = 0.2**	2.1%	3.1%
	ICC = 0.3	2.5%	3.7%
	ICC = 0.5	3.1%	4.6%
	ICC = 0.7	3.7%	5.3%

4. Impact analysis[15]

Table 4: Impact analysis summary

Research question	Sample	Dependent Variable	Independent variable	Control variable[16]	Analytical method	Interpretation
RQ1	all pupils with suitable tutoring start date	Tutoring attendance (percentage)	treatment assignment, where treatment is clustered at the tutor-level and stratified by tutoring partnership and batch	Pupils[17]: whether PP; whether SEND; year group; main subject of tutoring Tutors: gender; experience; Stratification vars: tutoring partner*batch ;	OLS linear regression	The intervention affects attendance rate by X percentage points.
RQ2	As above, but restricted to pupils on PP			same as for RQ1		

[15] Please see the Statistical Analysis Guidance.

[16] The list of control variables is still being finalised in conversations with NFER

[17] NFER will obtain a set of pupil characteristics from the NPD and a set from tutoring partners. Given the timeline of the project, we are unable to access the set of variables (including pupils' gender) that NFER obtains from the NPD. Because this is an RCT, this only marginally affects power (in that gender may have explained part of the variation of the outcome) but it does not affect the internal validity of our treatment effect estimates.

4.1 Analytical approaches

- Analysis will be Intention to Treat (ITT), meaning outcomes will be analysed on the basis of the groups that tutors and pupils were randomly allocated to regardless of implementation.
- The covariates used in the analysis model include the stratifiers and a few variables that could influence the outcomes substantially, as listed in Table 4. This will increase the precision of our estimates. In particular, controlling for the batch (as part of the interaction batch * tutoring provider) will help controlling for differences in the outcome variable that we might expect to be introduced by different start dates throughout the year. The interaction batch*tutoring provider is effectively our strata. It will take the form of strata fixed effects (so a set of dummy 0/1 each representing
    - tutoring provider The Tutor Trust, batch 1
    - tutoring provider Manning's Tutors, batch 1
    - tutoring provider Tute, batch 1
    - tutoring provider Schools Partnership Tutors, batch 1
    - tutoring provider The Tutor Trust, batch 2
    - tutoring provider Manning's Tutors, batch 2
    - tutoring provider Tute, batch 2
    - tutoring provider Schools Partnership Tutors, batch 2
    - etc...
- Analysis will use the raw form of the outcome data (i.e. percentage, not transformed or scaled, ranging from 0 to 100). We will create the outcome variable using the following variables/formula:

    attendance rate for pupil i = 100* (# face-to-face sessions attended by pupil i + # online sessions attended by pupil i) / (# face-to-face sessions purchased by the school for pupil i + # online sessions purchased by the school for pupil i)

- A good outcome will be that the attendance rate of pupils in the treatment group is more than 5 percentage points higher than those in the control group.
- This is a multi-site trial. But since its primary aim is to test the efficacy (rather than effectiveness) of the intervention, at this stage we do not seek to generalise the findings beyond the sample we've recruited, thus we'll use a fixed-effect model. (See section on Multi-site trials in the EEF Statistical Analysis Guidance for detailed rationale.)

4.2 Primary analysis

We evaluate the effect of the intervention on attendance using the following OLS model:

$$Y_i = \alpha + \beta_T Treatment_i + \beta_C Covariates_i + \eta \cdot Stratifier_i + \epsilon_i;\ \epsilon_i \sim N(0, \sigma^2)$$

- Y_i is the outcome of interest (attendance rate [percentage]) for each pupil$i$.
- $Treatment_i$is a dummy variable indicating which group participants were assigned to (0 = Control group, 1 = Treatment 1 group).
- $Stratifier_i$ is a fixed-effects variable that refers to the tutoring partner interacted by the randomisation batch number.

- $Covariates_i$ is a set of all covariates t as described in table 4
- $\varepsilon_i$is the individual error term, clustered at the tutor level

4.3 Secondary analysis — subgroup analysis[18]

Secondary outcome analysis will follow the same model specification used for the primary outcome except that we'll only include pupils eligible for Pupil Premium.

5. Implementation and process evaluation[19]

5.1 Research questions

1. What proportion of tutors in the treatment group used the intervention materials and had at least one of their pupils use the materials? (Compliance)
2. How many tutors and pupils completed the survey? (Reach)
3. How did tutors and tutoring providers staff experience the intervention? (Quality)
4. How was the intervention implemented? (Fidelity)
5. What were the barriers and facilitators to implementation and delivery? How much similarity did tutors and pupils share on average? (Mechanisms)

5.2 Research methods

In **Table 5** below, we present details on the research and data collection methods to address the implementation and process evaluation (IPE) research question, including how many participants or data sources each method will draw on.

Table 5: IPE methods overview

Research methods	Data collection methods	Participants/ data sources (type, number)	Data analysis methods	Research questions addressed
Quantitative	Survey/Webapp data: -Number of tutors who completed the survey and had at least one pupil complete the survey. -Number of tutors who completed the survey.	Delivery partners	Quantitative methods (descriptive analysis)	1. Compliance 2. Reach 4. Fidelity 5. Mechanisms

[18] Unfortunately, a CACE analysis is unfeasible given that we will not be able to match up compliance data with outcome data due to outcome data being anonymised. This stems from the fact that BIT will collect the email addresses of tutors who complete the intervention, but will be unable to match those email addresses to the anonymised IDs present in the outcome dataset received from NFER. This will prevent us from running a 2SLS analysis to recover the causal effect on compliers (CACE).

[19] Please follow the principles detailed in the Implementation and Process Evaluation Guidance (2019).

	-Number of pupils who completed the survey. -Average agreement scores -Time spent on the survey by tutors / pupils.			
Qualitative	Semi-structured interviews	4x tutoring providers staff	Thematic analysis	3. Quality 4. Fidelity 5. Mechanisms
Qualitative	Longitudinal semi-structured interviews	8 x tutors at two time points (16 interviews)	Thematic analysis	3. Quality 4. Fidelity 5. Mechanisms
Qualitative	Tutorial observations	8 x recorded tutorials	Thematic analysis	3. Quality 4. Fidelity 5. Mechanisms

Compliance definition:

- Tutoring partners share intervention materials with all tutors assigned to the treatment condition and do not share those materials with any tutor assigned to the control condition.
- Tutors decide to use the intervention materials, i.e. they complete and submit the similarity survey and have at least one pupil complete and submit the similarity survey.

Fidelity definition:

Tutors follow the instructions when completing the similarity survey with pupils. They spend adequate time (minimum 2 minutes per person, maximum 10 minutes per person) completing the survey and ask pupils to complete the survey.

The tutor uses the survey results in sessions with their pupils as the starting point for conversations. These might go in any number of directions depending on the specific individuals and their tutoring relationship.

Quantitative Methods:

Descriptive statistics such as mean and standard deviation will be presented for compliance, reach, fidelity and mechanisms. We will collect compliance, reach, fidelity and mechanisms data from delivery partners via the survey platform.

Qualitative Methods:

We will use a case study approach to collecting qualitative data. Case studies, which in this evaluation will involve the triangulation of multiple perspectives from multiple sources, will help provide a more detailed understanding of the processes of implementation and the processes of change. We will collect data from participants from four cases, with each case consisting of two tutors and a member of staff from each of the four providers. Each case will include:

- an interview with a tutoring providers staff member
- four interviews with two tutors
- single observations of tutorials conducted by tutor interviewees

Ideally, we would be able to interview pupils in order to obtain a clearer understanding of the mechanisms driving impact. However, given the nimble focus of this trial, and the time required to involve pupils in qualitative research (e.g., participant recruitment, obtaining parental consent, and arranging a time that is not disruptive to pupil learning), we have decided to pursue light-touch qualitative research to complement the trial.

Provider Interviews: We will conduct a semi-structured interview with a member of staff from each provider. The interviews will be conducted using video conferencing software by one of the qualitative researchers on the project team and will last around 30 minutes. We will liaise with each provider to identify the staff member closest to intervention delivery per organisation and interviews will focus on the intervention setup, aims of the intervention and barriers and facilitators to successful delivery. Topic guides will be developed using the research questions and in collaboration with the intervention team.

Tutor Interviews: We will conduct interviews with two tutors per case at two different time points. The first interview will take place after tutors and pupils have received feedback from the initial survey and will last 30 minutes. This interview will focus on the initial setup, the implementation of the survey and results, as well as perceptions of the effectiveness of the survey on relationship development. The second interview with each tutor will take place after tutors receive reminder emails, focusing on perceptions of the reminders, changes to delivery and perceived efficacy, again lasting 30 minutes.

Two tutors will be purposefully selected per provider, and we seek diversity across 1) their years of experience and 2) their number of pupils. Tutors will be recruited using tutoring providers as gatekeepers.

Tutorial Observations: We will conduct a lesson observation of one recorded session per participant tutor from the interviews, selected by the tutor and satisfying consent procedures for pupils. Data from interviews with tutoring provider staff and initial tutor interviews will be used to develop observation guides. The observations will provide the behavioural evidence of fidelity as well as mechanisms as reported by tutors in the interviews.

5.3 Qualitative Analysis

Interviews will be transcribed and along with observation notes, will be analysed in NVIVO. We will conduct a thematic analysis using Braun & Clarke's[20] six-step approach, which involves coding the transcripts and identifying emerging themes. Themes will undergo a further round of classifying and will be sorted into high-level themes and sub-themes.

We will use the predetermined topics of the interview and observation guides to interrogate the data, maintaining a balance between deduction (using existing knowledge and the research questions to guide the analysis) and induction (allowing concepts and ways of interpreting experience to emerge from the data). We will mitigate researcher bias by using the interrater reliability checker on NVIVO, ensuring multiple researchers are coding the transcripts in the same way. Furthermore, verbatim participant quotations and case examples will be used to provide evidence and exemplify the theme(s) discussed in the paragraph before the quotation. Quotations will be selected by the qualitative researchers who conduct the data analysis, by considering multiple factors including how well they exemplify the theme(s) discussed.

6. Risks

Table 6: Risk register

Risk	Likelihood of occurring	Magnitude of impact	Strategy to mitigate risk	Responsible party	Timeframe (if applicable)
Intervention may backfire for pupils with few similarities with their tutors	Low	Low	Intervention materials are designed to include a sufficient number of questions so that the likelihood of no similarities being identified is very low. In the original study (n = ~300), all the teacher-pupil pairs had 5 things in common apart from one pair who had 4 things in common. We will also provide guidance in an implementation guide for tutors on what they should do if no	Intervention development team	Trial period

[20] Virginia Braun & Victoria Clarke (2006) Using thematic analysis in psychology, Qualitative Research in Psychology, 3:2, 77-101, DOI: 10.1191/1478088706qp063oa

			similarities are identified with a pupil.		
Randomisation failure[21]	Low	High	Ensure that tutoring partners are fully briefed on how to allocate tutors to different conditions and carry out interim balance checks (if possible) to double check. Randomisation results will be shared in two separate and clearly labeled spreadsheets (control/treatment). A member of the implementation team will have a video call with each tutoring provider to support the correct implementation of the randomisation. BIT will ensure that no identifiable information is seen here by the BIT team. Any (potential) observed small imbalance (less than 10%) between treatment and control will be accounted for	Research and implementation team	One interim check

[21] Please assess imbalance between intervention and control groups at baseline using : (i) cross-tabulation of background characteristics (including any relevant characteristics for interventions targeted at specific participant groups) for all units as they were randomised. This cross-tabulation is likely to include both school# and pupil-level characteristics. Include a justification for the characteristics chosen; (ii) for continuous variables, report means and standard deviations. For categorical variables, report counts and percentages in each category. Any differences should be discussed in the report. Please report differences in pupil-level pre-tests as effect sizes.

			in the analysis by including the set of regressors available in the data.		
Case study recruitment for IPE	Medium	Low	If we are unable to observe the recorded tutorial of an interviewee, we will observe the tutorial of a similar tutor. Similarly, if there is attrition between longitudinal interviews, we will interview other tutors at the second time point.	Evaluation team	Trial period
Fidelity to intervention plan	Medium	Medium	Fully brief tutoring partners and tutors on how interventions should be delivered and send them reminders.	Implementation team	Periodical reminder
Missing data	Low	Low	Missingness of outcome: we will assess if this happens as a function of the treatment by regressing a dummy outcome_missing on treatment variable. If there isn't a statistically significant relationship between outcome missingness and treatment assignment, we will exclude from the analysis observations with missing outcomes. If treatment significantly affects missingness, we will use a weighting	Research team	End of trial

			strategy as coarsened exact matching to address missingness not-at-random Missingness of covariates: we will assess if any covariate is missing for more than 5% of the obs. If so, we will drop the covariate from the analysis. For variables with missingness <5% of cases, we will replace the missing value with an extra category flagging the missingness (eg. for tutors' gender is missing, we will control two dummy variables, one that takes value 1 if 'female' and 0 otherwise, one taking value 1 if 'missing gender', 0 otherwise).		
Inaccurate outcome data	Medium	High	Attendance data is provided to NFER by the individual tutoring providers. BIT will liaise with the tutoring providers involved in this trial to ensure they understand the importance of accurate data collection. In addition, to the best of our understanding, tutoring providers must attend seminars held by NFER in which they are instructed on data	Implementation team	Before the trial

			collection. We believe that these strategies minimise the risk of inaccurate data collection (for example, tutoring partners rectifying the number of scheduled sessions if a pupil drops out).		
Risk of spillover if a tutor is employed by multiple tutoring providers	Low	Low	If possible, NFER will include a flag in their data for tutors who appear more than once in their dataset (employed by more tutoring partners). From initial reviews of the NTP data, NFER have identified a small minority of tutors that are working for more than one tutoring partner (1.4%). This number will likely be even smaller within our study, as this number is across all providers, and we are only working with a select few.	NFER & Evaluation Team	Analysis period
Risk of bias in developer-led trials	Low	Low	The risk is minimised by having a second independent analyst analysing the trial under blind allocation of treatment groups. Registration of the trial, and the completion of this document and transparency about	Intervention development team	Beginning of trial

			the project all act to minimise risk of bias.		
Risk of small strata sizes	Low	Medium	Small strata are known to be problematic for causal inference[22]. Our internal guidance to causal estimation uses as rule of thumb that stratified randomisation should not be used if (i) the average strata size < (the number of arms * 10) (ii) there are 10+ strata containing ≤ (the number of arms * 2). For this trial, we would want the average size of the strata to not be less than 20 participants, and we would want to not have 10 or more strata containing 4 or fewer participants. Given the patterns of inflow of tutors, we do not expect this to pose significant problems. If anything, we expect batches of smaller sizes to flow into the trial towards the end of the trial. We will actively monitor batch sizes as the data come in, and were we to reach a situation in	Evaluation team	During the trial

[22] Kang M, Ragan BG, Park JH. Issues in outcomes research: an overview of randomization techniques for clinical trials. J Athl Train. 2008;43(2):215-221. doi:10.4085/1062-6050-43.2.215

			which by proceeding with a randomisation the average batch size would fall below 20 or would lead to 10 strata with 4 participants or fewer, we would exclude further batches from the trial to avoid these risks to the internal validity of the trial.		
Some tutors will have already started tutoring with students who will become part of the intervention	Medium	Low	Ideally, we would have computed the rate of attendance after the intervention begins. Unfortunately, because of data limitations, it is not possible for us to observe the exact date a session takes place and attendance (yes/no) to each session individually. We will only be able to observe - the date of the first scheduled session and the date of the last scheduled session, as bought by schools for a given pupil - the attendance rate of a pupil across those scheduled classes (0-100) In order to minimise this problem, we timed the launch of the intervention such that there will only be a 2 weeks interval	Intervention development team	Before the trial

			between tutors recruitment and launching. We are launching before spring break, and the overwhelming majority of pupils will start their tutoring sessions after the spring break - for this reason, we expect a small minority of students to be affected by this.		

7. Timeline

Table 7: Timeline

Dates	Activity	Staff responsible/ leading
W/C 8th Feb	Finalising intervention materials	BIT (Project Team)
W/C 15th Feb	Randomisation allocation	BIT (Research Team)
W/C 15th Feb	Launch trial	BIT / Tutoring Partners
W/C 22nd Feb	Tutor reminders to use the intervention	BIT / Tutoring Partners
Feb - March	Tutor reminders about their similarities with pupils (as part of the intervention)	BIT
Feb - July	Monitoring trial IPE interviews and observations	BIT / Tutoring Partners
End of July	NFER receives data from tutoring partners	Tutoring Partners

Beginning of August (w/c 16th)	NFER sends BIT data, BIT starts analysing the data	NFER
w/c Sept 6th	BIT sends results to EEF	BIT

8. Ethics and registration

All BIT trials need to have been through BIT's internal research ethics process. This trial was assessed as being Low Risk.

On all dimensions barring two, the trial is determined to have minimal ethical risks. This is a light-touch intervention that is being delivered within an existing tutoring context, with minimal personal data being collected on tutors and no personal data being collected on pupils. Importantly, all of the tutors that will be overseeing the intervention will have been subject to screening and undergone appropriate safeguarding training delivered by their Tuition Partner.

The first dimension in which the risk is identified as not Low is linked to the age and setting for the participants. Due to recent school closures, the majority of tutoring will be taking place online in children's homes (rather than in their school as previously planned). The Tuition Partners in this trial have undergone a rigorous process - overseen by the National Tutoring Programme - to ensure they are able to deliver tuition online to pupils in their homes safely. This includes confirmation of parental consent and clear communication with parents and schools about safeguarding processes.

The second dimension in which the risk is identified as not Low relates to the nature of the data being collected. The survey has been designed so as to prevent sharing any sensitive data. That is, all questions are multiple choice and are on non-controversial topics (e.g., favourite hobbies).

Personal, individual-level tutor data will be collected for (a) all tutors that complete the online intervention, and (b) for tutors that agree to participate in the IPE. On (a), tutors will be informed that this personal, individual-level data will be collected in a Privacy Notice at the start of the activity. On (b), tutors will provide their explicit consent to participate in the IPE. There is an ethical concern around confidentiality, particularly because of the power dynamic between tutors and tutor providers, their employers. All personal, individual-level data collected will be treated with the strictest confidence by BIT, unless safeguarding or whistleblowing concerns are raised during the interview and require disclosure in line with any applicable laws and procedures on data protection and safeguarding that BIT must comply with. Reporting outputs will contain anonymised quotes and case examples which will not be able to be traced back to specific individuals. BIT has implemented appropriate measures to ensure secure storage and handling of Personal Data, including obtaining a Cyber Essentials Plus certification and developing a comprehensive Data Handling Protocol. We are registered with the UK ICO under the terms of the Data Protection Act 2018. We are confident that our processes will ensure that the tutor's employer will not be able to link our findings to a particular tutor.

The following table highlights in orange where the current trial falls in terms of risk for different dimensions:

Dimension	Low risk	Medium risk	High risk
Research methods	Standard research methods commonly applied within the substantive area of the research.	Standard research methods that may not have been applied within a particular substance area and that may prove controversial or be sensitive.	Non-standard research methods that may be highly controversial or sensitive.
Participants	Non-vulnerable adults (i.e. 18 years+ in England & Wales or as stated in applicable national legislation).	Children without vulnerable characteristics in a regular setting (school/youth club).	Individuals from vulnerable groups (e.g. refugees) or are children outside regular settings or do not have legal capacity within the meaning of the Mental Capacity Act 2005 or relevant national legislation. (NB: any research with the latter group requires approval via an additional legally mandated process.)
Subject matter	Research relates to a politically and socially uncontroversial area, such as recycling.	Research relates to an issue of some contention but is relatively light-touch	Research relates to a highly-contentious, potentially currently debated or partisan issue
Nature of data	Aggregate anonymous data or data on non-contentious topics (e.g. recycling behaviour) or routinely collected admin data.	Individual-level data not routinely collected.	Individual-level, highly sensitive or special category data routinely or not routinely collected. Also, criminal offence data

Legal exposure	The legal framework in which we are operating is clear. If the project is in a foreign country: we have worked in this country and a similar context before and know the legal requirements.	The legal situation with respect to any aspect (data collection, participant group, intervention) is unclear.	The legal situation with respect to any aspect (data collection, participant group, intervention) is controversial or problematic.
Unknown unknowns	BIT has run a similar project in this domain before	BIT has some experience in the domain, but certain aspects of the project are new to BIT.	BIT has no prior experience in this policy domain.

This trial does not alert participants to the fact that they are taking part in a trial. All participating tutors agreed to an initial Privacy Notice covering the NTP that referenced their possible involvement in Reach & Engagement RCTs.

Before launching the trial, BIT will register it at the Open Science Framework (osf.io). We will ensure the trial registry is updated with outcomes at the end of the project.

9. Data protection[23]

- Include a data protection statement relevant to the project (i.e., not a link to the organisation's generic data protection policy). This may use information from the Memorandum of Understanding, information sheets and privacy notice

All personal data collected as part of the study will be treated with the strictest confidence by BIT and processed only in accordance with the requirements of the GDPR and the Data Protection Act 2018. BIT will not use any personal data in any report arising from this project. BIT is collecting and processing personal data solely for the purposes of proper delivery, management and evaluation of the project.

- We are seeking to minimise the collection of personal data.
- We will be performing the randomisation of tutors using BIT-ID numbers rather than names, and sharing the randomisation results (including randomisation batch number) with tutoring providers; tutoring providers will be sharing the intervention with the intervention tutors, so that we will not need contact details for this purpose.

[23] Please see the Data Protection Statement for EEF Evaluations.

- We will ensure that no personal data is visible to BIT team members during the video calls we have with tutoring providers to support the correct implementation of the randomisation.
- We will need to collect personal data from the tutors who complete the intervention, and a privacy notice will be hosted on the intervention website through which this personal data is collected. We will collect the following information associated with these individual tutors:
    - Tutor email addresses (so that we can administer the subsequent intervention reminders, and so that we can recruit and schedule TP staff case study interviews)
    - Tutor names (so that the intervention reminders and interview recruitment correspondence can be personalised)
    - Intervention question answers (which will be used in the intervention reminders)
    - Intervention delivery metadata (including date of completion)

  These data will allow us to administer the intervention reminders and schedule and conduct interviews with tutors (as indicated above), as well as help us answer RQ1 of the IPE, and help us identify when the intervention was administered.
  We will also collect personal data (name and email address) from those tutoring staff who are to take part in IPE interviews.
- We will tell tutors to ensure that pupils enter codenames, rather than real names, when they complete the intervention. Therefore, we will have access to pupil answers to the intervention's multiple choice questions (which will be used in the reminders for the intervention tutors), and metadata about intervention delivery (including the date of completion, which will help us identify when the intervention was administered), but this will not be personal data as BIT will not be able to link it to individuals.
- We will be collecting data for the impact analysis from NFER against pupil IDs and tutor IDs rather than names. Ahead of this data transfer, tutoring providers will share with NFER each tutor's BIT-ID, their BIT trial randomisation assignment and their randomisation batch number, linked to tutor names and other data, as part of a scheduled NTP data transfer. NFER will integrate these data into their relational database and share with BIT the data we need for our impact analysis, against newly-generated tutor and pupil ID numbers rather than names. Both the pupil and tutor tables will contain the tutor's ID number, BIT trial randomisation assignment and randomisation batch number.
  We have performed a risk assessment analysis and concluded that we do not consider these data to be personal. Nevertheless, we will include a sentence in our privacy notice for intervention tutors (hosted on our intervention website) detailing the data we are collecting from NFER, letting them know it will be in anonymised form and that we will not be linking it with the personal data we are collecting from them.

Please see Appendix B for more information

- Specify your legal basis for processing personal data, with reference to the General Data Protection Regulation (GDPR) Article 6 and/ or Data Protection Act 2018.

LEGITIMATE INTERESTS: Our lawful basis for processing personal data is legitimate interests (as per Article 6 (1) (f) of the GDPR) and we have considered that participants' interests and fundamental rights do not override those legitimate interests.

Please see Appendix B for more information.

- Specify your legal basis for processing any special data with reference to GDPR Article 9 and/ or Data Protection Act 2018.

We are not collecting any personal special category data.

10. Personnel

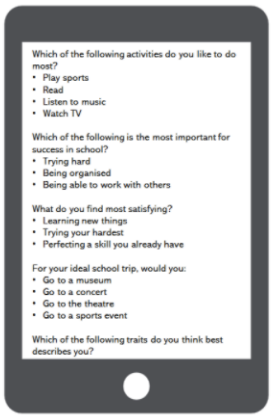
Project team member	Project role
Kimberly Bohling	Principal Investigator
Dr Giulia Tagliaferri	Quantitative Lead (RCT design and analysis)
Dr Matthew Holt	Qualitative Lead (IPE design and analysis)
Lal Chadeesingh	Project Manager and Intervention Design Lead
Nancy Wilkinson	Quality Assurance and Senior Project Advisor
Dr Raj Chande	Quality Assurance and Senior Project Advisor
Dr Kathryn Atherton	Policy Advisor (Education) and Data Management Lead
Dave Wilson	Policy Advisor (Education)
Rizwaan Malik	Policy Advisor (Education)
Dr Yihan Xu	Research and Analysis Advisor
Dr Jo Milward	Research and Analysis Advisor
Dr Paul Calcraft	Technical Lead (Intervention Website)
Miranda Jackman	Product Manager (Intervention Website)

Eleanor Collerton	Project Advisor and Data Support
Dr Todd Rogers (Harvard Kennedy School)	Academic Advisor
Dr Carly Robinson (Brown University)	Academic Advisor
Dr Hunter Gehlbach (Johns Hopkins University)	Academic Advisor

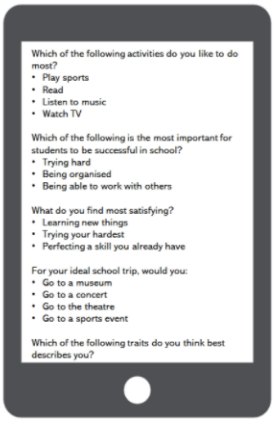
Appendix A — Illustrative design of intervention materials

Stage 1

- Tutors are provided with the details for a website that hosts the intervention
- In an early tutoring session, tutors and pupils visit the website and complete a short online survey (5 minutes) on a laptop, tablet or smartphone



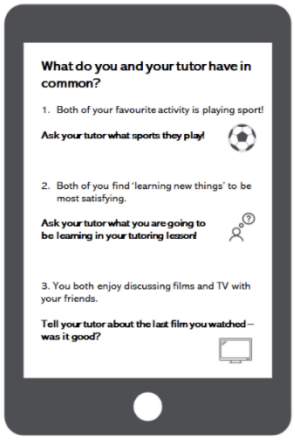
Example pupil survey



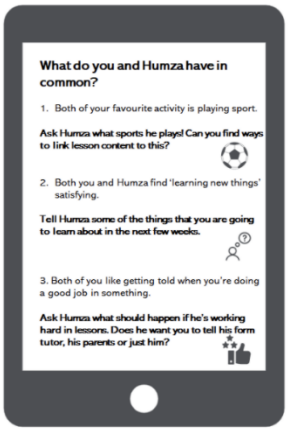
Example tutor survey

Stage 2

- After completing the survey, tutors and pupils receive instant feedback on their similarities.
- We will also provide guidance to tutors on what they could do with the similarities feedback and how long to spend on this activity.



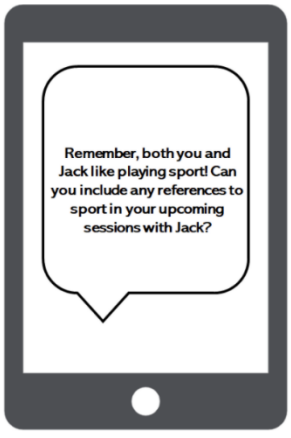
Example similarity report for pupils



Example similarity report for tutors

Stage 3

- Tutors are sent periodic reminders of similarities they share with pupils.
- The reminder will prompt the tutor to consider whether they can tailor lesson content to the pupil's interests.



Example reminder for tutors

Appendix B — Additional data protection information

1. Legal bases for data processing

LEGITIMATE INTERESTS: Our lawful basis for processing personal data is legitimate interests (as per Article 6 (1) (f) of the GDPR) and we have considered that participants' interests and fundamental rights do not override those legitimate interests.

It is necessary in BIT's 'legitimate interests' to process the personal data identified above in order to deliver a meaningful RCT that has been commissioned by EEF (commercial interests). The research project fulfils BIT's core business aims including undertaking research, evaluation and information activities in sectors that will deliver social impact. This project has broader societal benefits; it tests the effectiveness of interventions designed to increase pupils' engagement with the National Tutoring Programme - an initiative designed to help address the adverse consequences of COVID-19-related school closures for children's education, especially disadvantaged children.

2. Our approach to GDPR compliance

BIT is minimising the collection of personal data wherever possible in this project. We are collecting data for the impact evaluation against pupil and tutor IDs rather than names. We have performed a risk assessment analysis and concluded that we do not consider these data to be personal.

We will tell tutors to ensure pupils use codenames, rather than real names, on the intervention website. We will, however, need to collect personal data from the tutors who complete the intervention (for the purposes of: administering the intervention reminders; recruiting and scheduling TP staff case study interviews; helping us answer RQ1 of the IPE; and allowing us to see when the intervention was administered, as described above). A privacy notice will be hosted on the intervention website through which this personal data is collected, which explains what personal data we are collecting and why, our legal basis for doing so, who will have access to the data, our data security arrangements and our plans for data retention. We have appointed a Data Protection Officer (DPO) who is responsible for overseeing questions in relation to this privacy notice. The privacy notice contains the DPO's contact details, and informs the reader of their legal rights, including the right to make a complaint at any time to the Information Commissioner's Office (ICO), the UK supervisory authority for data protection issues (www.ico.org.uk). The privacy policy asks these tutors to make sure the details they provide are accurate and up to date, and to let us know about any changes as soon as possible.

As stated above, all personal data collected as part of the study will be treated with the strictest confidence by BIT and processed only in accordance with the requirements of the GDPR and the Data Protection Act 2018. BIT will not use any personal data in any report arising from this project. BIT is collecting and processing personal data solely for the purposes of proper delivery, management and evaluation of the project.

2.1. Data security

We take reasonable steps to protect personal information and follow procedures designed to minimise unauthorised access, alteration, loss or disclosure of personal information.

Taking into account the state of the art, the costs of implementation and the nature, scope, context and purposes of processing as well as the risk of varying likelihood and severity for

the rights and freedoms of natural persons, we implement appropriate technical and organisational measures to ensure a level of security appropriate to the risk of processing.

We ensure that those who have permanent or regular access to personal data, or that are involved in the processing of personal data, are trained and informed of their rights and responsibilities when processing personal data. We provide such access on a need-to-know basis, and have measures in place which are designed to remove that access once it is no longer required.

Physical personal devices used by BIT are encrypted to protect personal data.

We have put in place procedures to deal with any suspected personal data breach and will notify participants and any applicable regulator of a breach where we are legally required to do so.

2.2. All parties with access to the data

The personal data that BIT collects will be accessed by a limited number of researchers and advisors in BIT's team working on this project.

BIT may disclose information to third parties in connection with the purposes of processing personal data set out in the privacy notices. These third parties may include:

- other companies in BIT's group [that are based within the United Kingdom];
- regulators, law enforcement bodies and the courts, in order to comply with applicable laws and regulations, assist with regulatory enquiries, and cooperate with court mandated processes, including the conduct of litigation;
- suppliers, research assistants and sub-contractors who may process information on behalf of BIT. These third parties are known as data processors and when we use them we have contractual terms and policies and procedures in place to ensure that personal data is protected. This does not always mean that they will have access to information that will directly identify individuals as we will share anonymised or pseudonymised data only wherever possible. We remain responsible for personal information as the controller; and
- any third party to whom we are proposing to sell or transfer some or all of our business or assets.

We may also disclose personal information if required by law, or to protect or defend ourselves or others against illegal or harmful activities, or as part of a reorganisation or restructuring of our organisations.

2.3. Data retention

We will not retain any personal data longer than it is needed to deliver, manage and evaluate the project. The anticipated date of deletion of personal data is October 2021.

3. Data processing roles

For the personal data we collect (about intervention tutors via the intervention website): Behavioural Insights Ltd (the legal name of Behavioural Insights Team (BIT)) is the controller and is responsible for the personal data.

As noted in the section above, we may share personal data with a limited number of trusted data processors solely for the purposes of supporting the delivery, management and evaluation of the project. This will be detailed in the privacy notice on our intervention website.

It will not be necessary to archive any personal data from this project.

Appendix C – Pupil premium status

Table C1: Pupil premium status per tutoring provider

Tutoring Partner Name	% Pupil Premium Pupils reached so far as of 29/01/21 (EEF Monitoring Data)
The Tutor Trust	60%
Manning's Tutors	58%
Schools Partnership Tutors	54%
Tute	43%