

# The impact of the Covid-19 pandemic on children's socioemotional well-being and attainment during the Reception Year

## Statistical Analysis Plan

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<b>PROJECT TITLE</b>	The impact of the Covid-19 pandemic on children's socioemotional well-being and attainment during the Reception Year
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<b>STUDY DESIGN</b>	Exploratory
<b>PUPIL AGE RANGE AND KEY STAGE</b>	4-5 years, Reception Year (YR)
<b>NUMBER OF SCHOOLS</b>	95 schools (84 schools participating in full study, 11 schools participating in light touch approach)
<b>NUMBER OF PUPILS</b>	3090 pupils (800 pupils participating in full study; over 2290 anonymous light touch participants)*
<b>MEASURES AND SOURCES</b>	<p>Language, numeracy and socioemotional skills - Early Years Toolbox (Howard &amp; Melhuish, 2017)</p> <p>School adjustments to Covid-19 in Reception classes - bespoke school survey</p> <p>Children's experiences before/during/after lockdown - bespoke parental survey</p> <p>Children's home learning environment quality - Home Learning Environment (HLE) Index (Melhuish, 2010)</p> <p>Early Years Foundation Stage Profile scores (2018/19 (National Pupil Database) &amp; 2020/21 (School Collected)</p>

\*See p. 4 and the study plan for a definition of full study and light touch approach

## SAP version history

VERSION	DATE	REASON FOR REVISION
1.0		N/A

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## Introduction

The aim of this project is to understand the relationship between the Covid-19 pandemic and children's socioemotional development and academic achievement, with a focus on children who started Reception Year (YR) classes in September 2020 (from now on called "school starters").

The project will allow us to explore the impact that measures taken to control the spread of Covid-19 has had on the school readiness of children across England, how children adjust to mainstream schooling, and any implications for educational attainment during what for many children is the first year in a school setting.

This research is designed as an exploratory study that involves primary data collection at three time periods: T1 (autumn 2020), T2 (spring 2021), and T3 (summer 2021). We will collect language, numeracy and socioemotional well-being data using the Early Years Toolbox app. We will also collect EYFSP scores from participating schools. Schools are not required to report EYFSP scores to the Department for Education in 2020/21. However, many schools still carry out assessments of the pupils to help with their transition into Year 1. We will ask schools to share such assessments in a format as similar as possible to how EYFSP scores are usually reported to the DfE. We will use EYFSP scores for children who attended YR prior to the Covid-19 pandemic (the 2018/19 cohort - accessed via the National Pupil Database) to provide some context and assess how our study cohort differs from the pre-pandemic one.

Understanding how pre-reception settings' closures and lockdowns during YR are impacting children's outcomes will help us understand what strategies schools could focus on to mitigate the impact of the pandemic on children. The information gleaned from this project will enable policy makers, practitioners and researchers to a) understand the potential challenges facing school starters; b) understand the risk factors associated with variation in school readiness, socioemotional well-being and educational outcomes, particularly in relation to the pandemic; and c) provide insight into how to identify the most vulnerable children and what type of support would be most beneficial to them. The outcomes will also help us to identify elements that can mitigate the adverse impact of a future crisis.

### *Research questions*

Our primary research question is:

What is the relationship between YR children's experiences of the Covid-19 pandemic and their socioemotional well-being, language and numeracy skills?

Secondary research questions are:

1. What were children's experiences prior to starting formal schooling and during YR?
2. How are children's experiences prior to starting formal schooling and during YR in 2020/21 associated with their socioemotional well-being, language and numeracy skills by the end of YR?
3. To what extent do socioemotional well-being and attainment vary according to school- and individual-level socio-demographic circumstances, with a particular emphasis on disadvantage?
4. How do EYFSP outcomes of the 2020/21 YR cohort in this study compare with average outcomes of the 2018/19 cohort with similar demographics and socioeconomic characteristics?
5. What have been the experiences of schools in supporting the academic skills and socioemotional well-being of YR children during 2020/21, and what influence has this had on their practice?

## Design overview

This is an exploratory study looking at the relationship between the Covid-19 pandemic and children’s socioemotional well-being and attainment on starting school, and the longer-term impact during YR. The study involves both primary data collection and analysis, and secondary data analysis. The study design proposes three data collection time points: T1 (autumn 2020), T2 (after the third national lockdown (March-April 2021), and T3 (summer 2021), with two rounds of recruitment. This will allow for data collected from school and parent/carer surveys (including demographic details and children’s preschool, home, and school experiences) at T1, T2, and T3 to be used to understand and explain outcome data collected at T3 (the end of YR).

Within this study there are two samples for our data; the *full study sample* that consists of children actively recruited into this study, with primary data available from both parents and schools, children’s outcomes measured by the EYT scores and EYFSP scores; and the *light touch sample*, that includes anonymous data (EYFSP and demographics) from children who attend recruited schools and school survey data, but no other data. More details on the two samples and their rationale is provided in the [Study Plan](#).

**Table 1. Outcome measures for the ‘full study sample’**

<b>Design</b>		Exploratory Study
<b>Unit of analysis</b> (school, pupils)		Pupils, families, schools
<b>Number of Units to be included in analysis</b>		10-12 Reception Year pupils per school and their families (approximately 800 pupils) across 84 schools participating in full
<b>Variable</b>		Language skills
<b>Outcome</b>	<b>measure (instrument, scale, source)</b>	Expressive vocabulary, 0-55, Early Years Toolbox (Howard & Melhuish, 2017)
<b>Variable</b>		Early Numeracy skills
<b>Outcome</b>	<b>measure (instrument, scale, source)</b>	Early Numeracy, 0-85, Early Years Toolbox (Howard & Melhuish, 2017)
<b>Variable</b>		Socioemotional well-being
<b>Outcome</b>	<b>measure (instrument, scale, source)</b>	Self-regulation and social development, 1-5, Early Years Toolbox (Howard & Melhuish, 2017)
<b>Variable</b>		School adjustments to Covid-19 in Reception classes
<b>Outcome</b>	<b>measure (instrument, scale, source)</b>	Bespoke survey of headteachers, heads of phase or YR teacher
<b>Outcome</b>	<b>Variable</b>	Children’s experiences prior

		to starting school and over the course of the school year
	measure (instrument, scale, source)	Bespoke survey of parents
	Variable	Quality of Home Learning Environment
Outcome	measure (instrument, scale, source)	Home Learning Environment Index, 0-56 (Melhuish, 2010)
	Variable	Early Years Foundation Stage Profile Scores
Outcome	measure (instrument, scale, source)	EYFSP scores, 0-51 Target group: Submitted by schools (2020/21 cohort) Comparator group: NPD (2018/19 cohort)

## Sample size calculations overview

Because of the exploratory nature of this study and the short lead time into recruitment and data collection, the sample size was not determined so as to make sure the analysis achieves a certain power but rather depending on what the team deemed feasible given the timescale and the budget of the project. In addition, to minimise the burden on school during such a difficult time, we decided to randomly select only 10-12 pupils per classroom to be assessed. Nevertheless, we have produced a sample size calculation for what was our target sample, as described below.

Our original target sample size for recruitment for primary data collection was 1,000 children/families across 86 schools and five regions, with an assumed 80% retention rate over the year of the study for a final sample of 800 children. For the 2018/19 NPD data we have requested the full sample for England, which amounts to over 600,000 children. A key aim of the analysis will be to establish if, and what, differences emerge depending on children's characteristics, with a particular focus on FSM children. In 2019, the gap in the average EYFSP point score between FSM pupils and non-FSM pupils was 3.6 points (DfE, 2019b). Under the assumptions of a sample size of 800 children, with an average of 10-12 children per school and an attrition rate of no more than 20% at follow-up, an intra-cluster correlation (ICC) of 0.16, and between 50-60% of the population non-FSM, we estimated that our analysis would have over 80% power to detect a similar difference in average score (assuming a standard deviation of 10.5; equivalent to effect size of 0.34) between the FSM and non-FSM groups. As mentioned above, this is an exploratory study, and as such expectations and possibilities in terms of effect sizes are quite different from usual studies carried out by the Education Endowment Foundation in the form of randomised controlled trials.

Power calculations were carried out using Stata v15.0.

The feasibility of obtaining meaningful results with further disaggregation (e.g. SEND and EAL) will be assessed once the sample is finalised.

## Analysis

### Data collection tools

#### *Schools survey data*

Schools surveys aim to gather information on the following topics:

- General information about the schools, such as: school and YR class size, location, type of school (LA vs MAT);
- The practices schools adopted throughout the year to conform to lockdowns and/or social distancing rules;
- Areas of concern with regard to children's socioemotional development and academic attainment;
- Issues around staff shortages (for example due to the need to self-isolate) and well-being;
- Extra support provided to children and staff to cope with consequences of the pandemic, and where the resources and funding to cover for such support comes from.

The school survey will be distributed at all three points in time and can be answered by headteachers, heads of phase or YR teachers.

School survey data will be analysed using Excel. Quantitative data will consist mainly of descriptive data in terms of number or percentages of schools responding to different items. This data will be used to provide a description of our sample and to explore the themes mentioned below, with surveys at each point in time taking a specific focus on certain topics depending on the pandemic-related circumstances at the time it is distributed.

Schools survey at T1: data will be used to understand what key areas of concern schools have in terms of children's outcomes at the beginning of the academic year; typical practices for transition to YR, and how these differed as a result of the pandemic; whether school staff think this YR cohort needs extra support, how they plan to provide such support and their priorities in terms of the curriculum; and what concerns they have for their staff.

Schools survey at T2: data from T2 survey will be used to understand the impact of, and adjustments to, the third lockdown (January - March 2021), such as the number of children attending school versus receiving home learning; the type of support and activities offered to children and their families, both in school and at home; how schools perceive children's and parents' engagement with such home learning activities; differences in children's attainment based on school attendance during lockdown; and challenges faced during the lockdown and changes made to learning activities over time.

Schools survey at T3: data will be used to shed light on how schools operated during the last term of the academic year, what the key areas of concerns for children moving on to Y1 are, what type of transition activities schools will organise both for YR pupils moving into Y1, and for the incoming YR cohort. It will also look at schools' plans for "catch-up" and use of the pupil premium.

Some questions will be asked at more than one point in time, either in two out of three surveys or in all three surveys. This will allow us to examine answers longitudinally. These questions are: whether schools have concerns about children's development in the different areas of the EYFSP, whether they are prioritising time in school differently as compared to pre-pandemic, how they plan to support children who they feel require additional support, and what types of support they have in place for teachers and school staff.

Qualitative data (free text answers) will also be coded in Excel. A qualitative analysis will be conducted of the answers to all open-ended questions, to explore concepts such as how schools would usually transition children into YR and how that differed during this school year, what schools felt were their main concerns and plans for support for pupils and staff, what learning they took from the first and second lockdowns and whether any new practices would remain in place going forward, as well as what worked or did not work in their communications with parents. We will take a content analysis approach to the free text answers. Some of these free text answers are a follow up to a previous (non free text) question, which will inform the themes that can emerge. For example, the question "How did your school deliver home learning?" was a multiple-choice question that included the option of "other" with a free text answer. In the majority of the cases, the questions with free text answers are self-standing and the data itself will be driving the analysis in a bottom-up generation of themes that will happen after the data analysis has begun. The qualitative analysis of open-ended questions will allow for school staff experiences to speak for themselves and will provide a more in-depth contextualisation of the quantitative data.

#### *Parent survey data*

Parent surveys aim to gather data around the following topics:

- Demographic characteristics and employment status of participants, including whether they are key workers;
- Use of out of home childcare before and during the pandemic to capture changes in patterns of attendance to pre-reception early education settings;
- Parents/carers concerns with regards to their child(ren) starting YR and to specific areas of child development (as mapped to EYFSP areas);
- Experiences of the third lockdown, such as: engagement level with the school, type of activities provided by the school/teachers, and type of support received.

The parent survey will be distributed at all three points in time alongside the school survey.

The survey data will be analysed using Excel. Quantitative data will consist mainly of descriptive data in terms of number or percentages of parents responding to different items. This data will be used to provide a description of our sample and to explore a variety of themes, with each survey taking a specific focus on certain topics depending on the pandemic-related circumstances at the time it is distributed.

Parents survey at T1: data will be used to obtain average demographic characteristics of our sample of parents, along with their employment status and status as key workers; to understand their experience of the first national lockdown, in particular child attendance at EY settings before YR, e.g. type of setting, dosage, pattern of attendance prior to lockdown, attendance during lockdown, forms of support settings offered during lockdown and any change in patterns of attendance post-lockdown; parents concerns with respect to their child(ren)'s development before the start of YR and during the first term; whether their concerns are related to the pandemic or go beyond that.



Parent survey at T2: in addition to collecting data on the HLE, data will be captured on parents/carers and children's experiences of the third lockdown (January - March 2021), e.g. whether children attended school or received home learning; parental availability to provide home learning, the types and frequency of learning activities and support received from the school/teacher; how easy parents felt it was to access these resources; feedback and communication with schools during lockdown; parental and child engagement with learning; and parental perspectives of the strengths and weaknesses of their school's approach during lockdown.

Parent survey at T3: data will be used to capture parents/carers experiences during the last term of the school year, focusing on concerns for their child's development, how they have communicated with the schools, how they feel their child has coped in the final term, any concerns they have about the next academic year, and any absences this term. We will also ask parents to ask children three questions to find out how they feel about being at school.

As in the case of the school survey, some questions will be asked at more than one point in time, and will allow us to understand if some important elements in the home have changed during the year. These questions are all related to the Home Learning Environment and parent well-being (see below).

Qualitative data (free text answers) will also be coded in Excel. A qualitative analysis will be conducted on all open-ended questions to explore topics such as what concerns parents had about their child starting school and sending children to school during the pandemic, parents' subjective experience of parenting and homeschooling during the second lockdown, what parents felt schools did particularly well during the lockdown and after and what additional support they would have liked, as well as how children felt about their first school year. As above, we will take a content analysis approach to the free text answers, with the majority of the cases being answers to self-standing questions and the data itself will be driving the analysis in a bottom-up generation of themes that will happen after the data analysis has begun. The qualitative analysis of open-ended questions will allow for parents' experiences to speak for themselves and will enable us to understand more in depth the dynamics beneath the quantitative data.

### **Parent well-being**

Throughout all three surveys, parents' own well-being will also be assessed using a four-item questionnaire (Benson, et al., 2019). Parents will be given the option to skip this question if they do not want to complete it. In line with Benson et al. (2019) we will record item data as it is and only calculate a summary score when we have all four item scores. As per their suggestion (personal communication with the team), we will not proceed to imputing data when missing. After assessing what the response rate is on this set of questions, we will create summary statistics tables or charts to present the results.

### **Home Learning Environment Index**

Parents of participating children will complete the Home Learning Environment Index (Melhuish, 2010) at T1, T2 and T3 (parents recruited after T1 will complete this at T2 and T3 only). Responses to seven of the eight items on this questionnaire are then summed to



generate a score between 0 and 49<sup>1</sup>, where higher scores indicate a more enriched home learning environment. As we will be using the total Index score, incomplete answers, i.e. cases where the respondent has answered only a subset of the seven items will be treated as missing variables.

**Child outcomes data**

Early Years Toolbox data

Key child outcome measures used in this study are measures of socioemotional well-being and attainment. To collect this data we will make use of the Early Years Toolbox (EYT: Howard & Melhuish, 2017). The EYT is a series of eight short on-line game-like assessments suitable for use with children in the Early Years. We will ask participating schools to administer three of the apps measuring numeracy (EYT Early Numeracy), expressive vocabulary (EYT Expressive Vocabulary-2) and socioemotional well-being (Child Self-Regulation and Behaviour Questionnaire - CSBQ) to a sample of pupils in each school.

The use of the EYT for this study was agreed with the EEF project team because of some of its advantages. The tool is easy to use, places minimum burden on schools and teachers to collect the data, and the app will then be available to schools in perpetuity. However, an important drawback is that the EYT is currently normed on an Australian population (Howard & Melhuish, 2017), meaning the norm cannot be used for a direct comparison but only to contextualise our study results to what can be considered age-appropriate scores. Nevertheless, it was deemed useful to use the EYT for a project of this scale in England in terms of helping to create a norm for the UK population. In fact, while the lack of a currently existing UK population norm has disadvantages, we feel we have evidence to suggest that the measure is sufficiently robust to be used in this study. For example, first review of the data collected at T1 shows that the mean and standard deviation for our sample at T1 is aligned with the norm’s mean and standard deviation, even though our sample scores have higher standard deviations.

**Table 2. EYT mean and standard deviation – study sample at T1 and norm comparison**

Tool	Study sample at T1		EYT norm	
	Mean	St. dev.	Mean	St. dev.
CSBQ_Sociability	3.83 (n= 60)	0.92	3.72 (n=711)	0.78
CSBQ_External	1.70 (n= 60)	1	1.86 (n=719)	0.87
CSBQ_Internal	1.77 (n= 60)	0.93	1.60 (n=719)	0.64
CSQB_Prosoc	3.78 (n= 60)	0.96	3.74 (n=719)	0.85
CSBQ_BehavSR	3.73 (n= 60)	1.06	3.77 (n=714)	0.9
CSQB_CogSR	3.49 (n= 60)	1.09	3.64 (n=719)	0.81
CSBQ_EmoSR	4.03 (n= 60)	0.81	3.81 (n=715)	0.79
Number	48.5 (n=50)	18.23	47.07/50.67/47.44 (n=308)*	20.89/18.82/16.03*

<sup>1</sup> In the drafting of our parent survey we excluded one question of the original HLEI, “Does anyone at home ever take \*child’s name\* to the library?” because, given the closure or reduced operation of libraries during the pandemic, answers would have not been valid.

<b>Vocabulary</b>	33.01 (n=73)	8.48	25.69/32.32/32.32(n=1428)*	10.92/9.89/9.31*
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\* Ages 4.0-4.05/4.6-4.11/5.0-5.06

The sample sizes for the Table 2 figures are quite different and in relaying the findings of the study we will be explicit in reporting the caveats to our analysis that derive from the norm being based in Australia.

Originally, it was intended that these measures would be collected by all schools at both T1 and T3. However, due to the January-March 2021 lockdown and subsequent changes to the project design, EYT data will be available at both T1 and T3 for only a very small number of children participating in this study. As a consequence, a longitudinal analysis of children's outcomes based on EYT data will not be possible. Instead, our analysis will focus on the data collected at T3 (approximately 800 children) and child outcomes at T3 will be used as the dependent variable in the regression analysis described below.

#### Early Years Foundation Stage Profile - school collected and NPD data

Schools will not be required to report EYFSP scores to the Department for Education for the academic year 2020/21. Therefore, scores for all English schools will not be available through the NPD. However, we will ask schools participating in the project to provide us with unofficial scores in case they gather such data for internal purposes. Most schools have told us they plan to collect EYFSP data in some form and are willing to share it with the project team. This data will be collated and used to create a broad picture of YR pupil's achievement for this year.

In order to avoid overburdening schools, we will not ask them to report scores in the way they would normally report them to the Department of Education. Instead we will ask them to report whether a child reached the "emerging", "expected" or "exceeding" level in each of the following areas and individual learning goals within each area:

- the prime areas of learning – personal, social and emotional development, physical development, and communication and language
- the specific areas of mathematics and literacy.

These are the areas that are used to assess whether a pupil achieves a good level of development (GLD). Therefore, while not receiving total EYFSP scores, we will still be able to compare our sample with the pre-pandemic cohort (academic year 2018/19) in terms of:

- Whether, and how many, pupils have achieved a good level of development (GLD); and
- Whether, and how many, pupils have achieved at least the "expected" level of development in each of the areas and individual learning goals mentioned above.

This will have implications for how we will carry out our regression analysis as we will not be able to calculate average scores and subscores for our sample, but will be able to answer the question of whether a pupil has achieved at least an expected level of development, how many pupils have achieved it in our sample and what proportion of pupils in our sample have achieved it compared to the pre-pandemic cohort.

EYFSP scores for the cohort of children who attended Reception classes in the academic year 2018/19, i.e. pre-pandemic, will be requested through the NPD data request and will be used to get a sense of the score distribution and how that compares to the score

distribution of our sample. We will be able to look at average scores and distribution of scores of the following:

- Average total EYFSP
- Personal, social and emotional development
- Communication and language
- Physical development
- Literacy
- Mathematics.

However, we will have to group these scores into the three categories of “emerging”, “expected” and “exceeding” to be able to compare the pre-pandemic sample with our study sample.

Before beginning any of the data analysis described in the next section, we will look into the key characteristics of our sample in order to check for representativeness compared to the full English sample from 2018/19. This will allow us to understand if, and how, the two samples differ, particularly in terms of proportion of FSM pupils, and if our sample can be compared to the national dataset or needs to be compared to a subsample with similar characteristics.

## Data analysis

*Primary research question: What is the relationship between YR children’s experiences of the Covid-19 pandemic and their socioemotional well-being, language and numeracy skills?*

Analysis of the data collected through the project will be largely exploratory given the nature of the study. The novelty of the current situation and the lack of evidence on the impact of the Covid-19 pandemic on children, particularly in this age range, make it difficult to develop theoretically sound hypotheses to test with these analyses. Instead, it will be important to take a reflexive approach, using an in depth understanding of the data from the information gathered through the surveys to consider how best to approach the data analytically.

The data on child and family background will help us contextualise data on children’s outcomes in terms of the HLE, family demographics and experiences during lockdown(s). Likewise, the data on school characteristics, and on practices adopted during lockdown and throughout the year will help us contextualise children’s outcomes in terms of e.g. activities and support provided during lockdown, and any changes to practice as a result of the pandemic. Child data from the Early Years Toolbox will be used to assess children’s educational attainment at the end of the school year (YR; 4-5 years of age). As mentioned above, the scores cannot be directly compared to the Early Years Toolbox norms, as the latter are based on an Australian population. However, we will be able to gain insight into whether outcomes align with what are generally considered age-appropriate outcomes from a similar context. In addition, regression analyses exploring the impact of individual-, family- and school-level predictors on children’s outcomes at T3 will be conducted.

We will run a similar analysis using EYFSP data as a measure of children’s outcomes. EYFSP data will also allow us to understand how many and what proportions of Reception pupils are achieving at an “emerging”, “expected” or “exceeding” level, and whether these proportions are different from the pre-pandemic (2018/19) YR class.

Our overarching research question is:

What is the relationship between YR children’s experiences of the Covid-19 pandemic and their socioemotional well-being, language and numeracy skills?

Below we provide more detailed plans for the analysis in line with the secondary research questions. In doing so we will be referring to some of the key variables described in Table 3.

**Table 3. Description of key variables**

<b>Predictors</b>	<b>Source</b>	<b>Type of variable</b>
<i>Child level</i>		
Age	Parent survey/EYFSP spreadsheet/EYT data	Continuous
FSM	EYFSP spreadsheet	Binary
EAL	EYFSP spreadsheet	Binary
SEND	EYFSP spreadsheet	Binary
Gender	EYFSP spreadsheet	Binary
<i>Family level</i>		
Parent/carer education level	Parent survey	Categorical
Key worker status	Parent survey	Binary
Siblings	Parent survey	Binary and categorical
Parental well-being	Parent survey	Ordinal
Home learning environment	Parent survey	Continuous
<i>School level</i>		
School size	School survey	Ordinal
School type	School survey	Categorical
Geography (region)	School survey	Categorical
% FSM / PP	School survey	Continuous
% EAL	School survey	Continuous
% SEND	School survey	Continuous
<i>Lockdown experiences</i>		
Homeschooling vs school attendance	Parent survey	Binary
Parental support for home learning	Parent survey	Categorical
Home learning conditions	Parent survey	Categorical
Parent availability	Parent survey	Categorical

Table 3 provides the list of variables that will be used in the regression analysis as possible explanatory variables grouped by child-, family- and school-level. Secondary research question #1 will afford us the possibility of understanding the final dataset available for the analyses and assessing which variables have good response rates.

***Secondary research question #1: What were children's experiences prior to starting formal schooling and during YR?***

The data we will use to answer this question is data collected through the bespoke parent and school surveys.

Key questions from the parent survey to answer this research question are those related to:

- Demographic characteristics and employment status of participants, including whether they are key workers;
- Use of out of home childcare before and during the pandemic to capture changes in patterns of attendance to pre-reception early education settings;
- Experiences of the third lockdown, such as: engagement level with the school, type of activities provided by the school/teacher, and type of support received.

Key questions from the school surveys that will be used to answer this research question are those related to:

- Areas of concern with regard to children's socioemotional development and academic attainment;
- Issues around staff shortages (for example due to the need to self-isolate) and well-being;
- Extra support provided to children and staff to cope with consequences of the pandemic, and where the resources and funding to cover for such support come from.

We will create descriptive statistics to gain a picture of children's experiences of the first lockdown, for example in terms of whether they attended nursery because they are children of key workers or are considered vulnerable children, of how children settled into YR, and how the academic year progressed in light of further lockdown and restrictions. We will also create crosstabs to explore how these results vary depending on a variety of factors, such as:

- School location, school and YR class size, type of school;
- Parent socio-economic background, employment status, status as key worker;
- The practices schools adopted throughout the year to conform to lockdowns and/or social distancing rules, as well as to adapt to online learning.

After assessing response rates to questions on HLE and on parent's well-being, we will calculate the total score for the HLE Index - which in our study will range between 0 and 49 - and the total score on parents' well-being.

In the parent survey at T3 we will ask parents to ask children three questions to find out how they feel about being at school. These answers will also help contextualize the findings to this research question.

As mentioned above, in answering this question we will also be able to assess which variables are most important and suitable for the regression analyses discussed below.

***Secondary research question #2: How are children's experiences prior to starting formal schooling and during YR in 2020/21 associated with their socioemotional well-being, language and numeracy skills by the end of YR?***

The data we will use to answer this question is data collected through all the data collection tools of this study.

For the children who are part of the full participation sample we will consider the moderators of children's socioemotional, language, and numeracy skills. In particular, we will use the EYT scores to investigate the impact on average scores for vocabulary, numeracy and socioemotional well-being of children/families' experiences of the pandemic, such as: nursery attendance during and after the first lockdown; home-schooling versus school attendance during subsequent closures; teacher continuity; parental support for home learning; parent/carer availability for home learning and other childcare activities during lockdowns; technology availability.

Average scores for the EYT assessments on vocabulary, numeracy and socioemotional skills development will be used to test the null hypothesis:

- $H_0$ : EYT scores for YR pupils in 2020/21 were not affected by experiences of the pandemic.

This hypothesis will be tested using the following multi-level regression model:

$$Y_{ij} = \beta_0 + \beta_1 W_{ij} + \beta_2 Z_{ij} + \beta_3 Q_{ij} + \varepsilon_{ij} + u_{0j}$$

Where

- $Y$  is either the vocabulary, or numeracy or socioemotional well-being score for child  $i$  in school  $j$  - these are discrete variables with the following ranges: literacy score 0-55; numeracy score 0-85, socioemotional development score 1-5;
- $W_{ij}$  is a vector containing variables related to experiences of the pandemic as described in Table 3;
- $Z_{ij}$  is a vector of selected variables related to family-level characteristics for child  $i$  that have the potential of having an impact on children's outcomes, namely: a) whether the child has siblings, b) parent/carer's education level;
- $Q_{ij}$  is a vector of selected variables related to school-level characteristics for child  $i$  that have the potential of having an impact on children's outcomes, namely: a) school size, b) school type, and c) geography.

A similar analysis will be carried out using EYFSP data collected directly from participating schools, testing the following null hypothesis:

- $H_0$ : the proportion of YR pupils achieving "emerging", "expected" or "exceeding" level in 2020/21 were not affected by the experiences of the pandemic.

In this case, we will run an ordinal logistic regression analysis for the proportion of pupils achieving "emerging", "expected" or "exceeding" level:

- Across all the areas we have available
- In the personal, social and emotional development area
- In the communication, language and literacy area
- In the mathematical development area
- In the physical development area.

In building our regression model we will adopt two rules to decide which variables to include as explanatory variables:



1. Variables that are already proven in the literature to be related to children's outcomes and which had informed the questions included in the surveys
2. Interaction terms of variables that have large main effects.

There could potentially be variables that have low variability, which should still be conditioned on. For example in RY child age has "low variability" (i.e. all children are a relatively similar age), but we know from previous research that age is still a strong predictor of some outcomes. Therefore, unless a variable has no variability at all, we will aim to keep in in the analysis.

In all regressions we will allow the effects of any explanatory variables of interest to vary by FSM status (i.e. by fitting interaction(s) between the variable of interest and FSM status).

All regression analysis will be carried out in Stata v15.0

***Secondary research question #3: To what extent do socioemotional well-being and attainment vary according to school- and individual-level socio-demographic circumstances, with a particular emphasis on disadvantage?***

The data we will use to answer this question is data collected through all the data collection tools of this study.

For the children who are part of the full participation sample we will consider the mediators and moderators of children's socioemotional, language, and numeracy skills. In particular, we will use the EYT scores in the following ways:

1. To calculate the percentage of the children in our sample who fall within their expected age band's score and descriptively compare such percentages across subgroups of children (e.g. FSM v non-FSM pupils) to calculate the disadvantage gap.
2. To investigate the impact on average scores for vocabulary, numeracy and socioemotional well-being of child-level characteristics (depending on the final sample size of each subgroup), such as: gender (female/male); socio-economic background (FSM/non-FSM); mother tongue (EAL/non-EAL); special education needs (SEND/non-SEND); and nursery/YR attendance patterns.
3. To investigate the impact on average scores for vocabulary, numeracy and socioemotional well-being of family-level characteristics, such as: parental education level; parental occupation (pre/during lockdown); key worker status; presence/number of siblings; parental well-being; quality of the home learning environment (HLEI).
4. To investigate the impact on average scores for vocabulary, numeracy and socioemotional well-being of school-level characteristics, such as: type of school; size of school; number of reception classes/size of YR cohort; location (region and rural/urban); preponderance of FSM/Pupil Premium students in the school; preponderance of EAL students in the school; preponderance of SEND students in the school.

Average scores for the EYT assessments on vocabulary, numeracy and socioemotional skills development will be used to test the null hypothesis:

- Ho: EYT scores for YR pupils in 2020/21 were not affected by 1) child-level characteristics; 2) family-level characteristics; and 3) school-level characteristics.

This hypothesis will be tested using the following regression:

$$Y_{ij} = \beta_0 + \beta_1 X_{ij} + \beta_2 Z_{ij} + \beta_3 Q_{ij} + \varepsilon_{ij} + u_{0j}$$

Where

- $Y_{ij}$  = average score for vocabulary/numeracy/socioemotional well-being
- $X_{ij}$  = individual-level characteristics for child  $i$
- $Z_{ij}$  = family-level characteristics for child  $i$
- $Q_{ij}$  = school-level characteristics for child  $i$

for child  $i$  in school  $j$ .

We will run the regression testing the significance of a variety of explanatory variables.

- $Y$  are discrete variables with the following ranges: literacy score 0-55; numeracy score 0-85, socioemotional development score 1-5.
- $X$ ,  $Z$  and  $Q$  are vectors containing variables as described in Table 3.

A similar analysis will be carried out using EYFSP data collected directly from participating schools. We will first calculate the percentage of the children in our sample who achieved an “emerging”, “expected” or “exceeding” level as a whole and in the different EYFSP areas. We will then calculate the disadvantage gap as the gap between the proportion of disadvantaged pupils and other (non-disadvantaged) pupils achieving the expected level of development by the end of Reception year. Finally, we will calculate how this gap has changed between the pre-pandemic cohort and our 2020/21 sample.

In addition we will test the following null hypothesis:

- $H_0$ : EYFSP scores for YR pupils in 2020/21 were not affected by 1) child-level characteristics; 2) family-level characteristics; and 3) school-level characteristics.

As above, we will run an ordinal logistic regression analysis for the proportion of pupils achieving “emerging”, “expected” or “exceeding” level:

- Across all the areas we have available
- In the personal, social and emotional development area
- In the communication, language and literacy area
- In the mathematical development area
- In the physical development area.

Similarly, in all regressions we will allow the effects of any explanatory variables of interest to vary by FSM status (i.e. by fitting interaction(s) between the variable of interest and FSM status).

All regression analysis will be carried out in Stata v15.0

*Secondary research question #4: How do EYFSP outcomes of the 2020/21 YR cohort in this study compare with average outcomes of the 2018/19 cohort with similar demographics and socioeconomic characteristics?*

The data we will use to answer this question is data collected through the NPD data we requested access to (for 2018/19 scores) and the EYFSP spreadsheet we asked all participating schools to fill out (for 2020/21 EYFSP scores). The latter will be collated and used to create a broad picture of YR pupil's achievement for this year. EYFSP scores for the academic year 2018/19 will first be used to get a sense of the score distribution and how that compares to the score distribution of our light touch approach sample. As mentioned above, we will not be able to look at scores per se and will instead investigate the proportion of pupils achieving "emerging", "expected" or "exceeding" level:

- Across all the areas we have available
- In the personal, social and emotional development area
- In the communication, language and literacy area
- In the mathematical development area
- In the physical development area.

The EYFSP data will first be used to test the following null hypothesis:

- Ho1: The proportion of pupils achieving emerging", "expected" or "exceeding" level in our sample are the same as the proportion of pupils achieving such level in the 2018/19 cohort.

One of the inclusion criteria for the study was that schools were not early adopters of the new EYFSP framework. Therefore, any data we will obtain from participating schools will be comparable to previous years' data. We aim to first calculate the difference between the pre-pandemic cohort and the 2020/21 cohort for these proportions, and to test whether they are statistically significant.

Finally, analysis carried out to answer secondary research question #1 will allow us to understand if our sample is comparable to the national sample from previous cohort data. Representativeness checks will be carried out both at pupil and at school level. This will inform further analysis to compare results at school level and/or with subgroups with similar characteristics, for example in terms of FSM prevalence and gender. Other comparisons we will consider are those based on EAL status and SEND status. If our sample is not comparable we will consider weighting our analysis. However, we will first need to assess if we have enough observations with EAL and/or SEND status to make such comparison meaningful.

*Secondary research question #5: What have been the experiences of schools in supporting the academic skills and socioemotional well-being of YR children during 2020/21, and what influence has this had on their practice?*

The data we will use to answer this question is data collected through the bespoke school survey. Across all three school surveys, we will ask questions aimed at capturing how schools have reacted and responded at different stages of the pandemic.

We will create descriptive statistics to summarise schools experiences and cross tabs to investigate whether these experiences were different depending on location, size and type of school, as well as depending on their pupil intake, such as whether the school has a percentage of FSM pupils that is above or below the national average.

This data will be used to explore a variety of themes, such as what their typical practices for transition into YR are, and how these differed as a result of the pandemic; whether school staff think this YR cohort needs extra support, how they planned to provide such support, and their priorities in terms of the curriculum.

While the surveys at each point in time have a different focus, related to the specific time of the academic year at which they will be administered, some questions will be the same across all three points in time. For example, as we will be asking what the key areas of concern in terms of children's outcomes are, we will also look into if, and how, school practices have changed to address these concerns. Likewise, we will look into what practices schools are adopting to welcome the incoming YR cohort and whether these differ from what was done with the cohort that started in September 2020. Finally, we will look into how practices have changed in terms of home learning and support to families during lockdown, which could provide some "lessons learned" to adopt next year in the eventuality of more classroom/school closures or disruptions.