Methodology paper to support programme-wide analysis of Lambeth Early Action Partnership using linked population datasets on child outcomes

Gemma Luck and Dakota Langhals, Lambeth Early Action Partnership, August 2024

Overall approach

In the second half of the programme (2021-2025) we have monitored progress and evaluated the effectiveness and impact of LEAP.

Between 2019 and 2021, we worked with services, partners and families to refresh our service, domain and programme Theories of Change (ToC). These are our blueprint for LEAP's evaluation. We also developed a Shared Measurement System (SMS).

The overarching programme-level ToC[i] is divided into eight different but interconnected domains. Here we focus on domain 1: Improving early childhood health and development.

LEAP's SMS enables us to explore how LEAP services are working together to achieve the programme outcomes. The SMS integrates data from across LEAP's services and activities, and enables the LEAP team to monitor performance, compare performance across services, track progress towards outcomes, and identify opportunities for learning and improvement.

Routinely collected child development assessments available via health visiting and education are identified in LEAP's SMS as measures to understand LEAP's impact on child outcomes (ToC domain 1).

The data collected through the SMS is stored on LEAP's Data Integration Platform ('the platform'). The platform was developed to bring together pseudonymised data from across LEAP's different services and enable a programme-level view.

The platform captures individuals' journeys through LEAP's services allowing LEAP to see the combination and sequencing of services accessed by families, and the effect of this engagement on outcomes. Hence, the platform is essential to evaluating the collective impact of the LEAP programme. A full description of the platform can be found in appendix 4 of our first Annual Learning Report[ii].

Data shared with LEAP is pseudonymised, has personal identifiable information removed and is uploaded to the platform. While processed, the platform links individuals across datasets, creating a unique ID. This enables identification of the same individual across each service or dataset.

Our privacy notice outlines how data is processed and the legal basis for sharing. We collect data from partner organisations that deliver the LEAP services. A formal agreement between LEAP and these organisations guide how we share information, making sure that only essential information is shared. This agreement is reviewed regularly. For services delivered by NHS trust partners, we are using legitimate interest, provided by Article 6e and Article 9h of GDPR. Other services will be using consent as a legal basis for processing this information. Consent for us to collect and process data requires a positive opt-in by service users and all non-NHS related LEAP services will ask for this consent.

This data infrastructure has enabled the linkage of routinely collected data about child outcomes via administrative datasets to LEAP engagement data, and quantitative analysis of that supports evaluation of domain 1 at population level was developed by the LEAP team.

For each analytical project, the platform was accessed via Open Database Connectivity (ODBC) in Stata. A query for each was run to create a view of the data necessary for data transformation and analysis. For the current projects, a person ID was used to join multiple tables:

- User table (unique users and their characteristics).
- Engagement table (engagement with LEAP services and activities).
- Outcomes table (stores information about assessments and validated tools).
- Locality table (geographical information such as LSOA, Ward, Borough).

LEAP, as part of A Better Start (a ten-year (2015-2025) programme set-up by The National Lottery Community Fund) aims to support better outcomes in three areas of development, as well as working to bring about systems change. These areas are communication and language (CLD), social, and emotional development (SED) and diet and nutrition. The assessments included in the current projects enable us to focus on CLD and SED as well as in the overall measure of good level of development.

The administrative datasets

ASQ-3

The health visiting service is delivered as part of England's Healthy Child Programme (HCP)[iii]. The HCP provides a framework to support collaborative work and identifies families that need extra support and includes four levels of service delivery. The first, community, is the place-based approach of the health visiting service overall. There are then three levels of support available based on a family's needs: Universal, Targeted and Specialist[iv].

Universal HCP is offered to all families and includes basic health education, immunisations and monitoring of child development. Targeted HCP is for families with risk factors requiring focused support. Specialised HCP is for families needing expert services in specific areas beyond what Universal and Targeted HCP provides. The three needs-based levels are what we refer to as HCP status within this analysis.

In Lambeth, the health visiting service is offered to all Lambeth-resident families with children aged 0-5. Unless a family opts out of the service, information about each assessment or visit offered to families is recorded on Carenotes, the Lambeth health visiting service's administrative system at Guy's and St Thomas' Trust (GSTT). A dataset meeting LEAP's requirements was extracted from Carenotes, pseudonymised and shared with LEAP in September 2023, supported by a data sharing agreement (DSA). The dataset includes data for all ASQ-3 assessments for children at the 2-year health review carried out by health visitors between 2017 - 2023.

The ASQ-3 comprises 21 age-specific questionnaires. The 2.5 year developmental review uses the 24, 27 or 30 month questionnaire, depending on the age in months of the child. The assessment is validated to be conducted in person, mailed or completed online. Carers can provisionally complete the ASQ-3 independently as it requires little training, but it is common practice for health visitors to support the completion. Each age-specific questionnaire includes 30 questions about the child's development with response options of 'yes', 'sometimes' and 'not yet'.

The ASQ-3 results in an individual score for five domains (communication, gross motor, fine motor, problem-solving and personal-social) and these are compared to cut-off points. There are three cut-off points: 'need for further assessment with a professional'; 'monitoring zone', where learning activities are provided and the child is monitored; and 'development as expected'. Cut-offs are different for each domain and age-specific questionnaire (detailed in Table 1).

Table 1: Table of cut-off points for scores related to each relevant outcome domain by age-appropriate ASQ-3 questionnaire.

ASQ-3 questionnaire	Communication domain cut-off score	Personal-Social domain cut-off score	Total cut-off score for 'below expected ASQ-3 threshold'
24 month	<25.17	<31.54	<159.72
27 month	<24.02	<25.31	<123.38
30 month	<33.30	<32.01	<147.78

The dataset shared with LEAP includes data during the COVID-19 pandemic 2020-2022. Nationally, and in Lambeth, most assessments were completed over the phone and there was no clear cutoff date for when things 'normalised' again as many ASQ-3 and early-years services continued to run virtually. Lambeth's data shows no drop in the number of ASQ-3 assessments completed during the pandemic, and the outcomes don't seem to be over- or under-estimated. The government still classifies ASQ-3 data during the pandemic as valid.

EYFSP

Information about all EYFSP assessments carried out in Lambeth state-funded primary schools is collected and processed by Lambeth Council via internal administrative systems. A dataset meeting LEAP's requirements for the EYFSP was extracted, pseudonymised and shared with LEAP in February 2024 by Lambeth Council, supported by a DSA. Original data shared covered a time period between 2015/16 – 2022/23, although 2019/20 and 2020/21 were disrupted by the Covid-19 pandemic.

The EYFSP assessment is based on teachers' professional knowledge of what a child knows, understands, and can do on a day-to-day basis. While it is assessed at the end of the reception year, teachers have broad latitude over the implementation of the assessment, which can be made during routine interactions with children and does not need to be planned or documented[v].

The EYFSP determines whether children reach at least expected levels of development in 17 Early Learning Goals (ELG) that are grouped into 7 Areas of Learning (AOL). If a child meets at least expected development, they are assessed as "expected", and "emerging" if they do not.

v Early Years Foundation Stage Profile 2024 handbook (2023). Department for Education.

Children are defined as having reached a Good Level of Development (GLD) at the end of the EYFS if they have achieved the expected level for the ELGs in the specific areas of mathematics and literacy, and the prime areas of learning: communication and language; personal, social and emotional development; and physical development.

Teachers are expected to take a holistic view of children's development based on their own interactions and experiences with them. However, their views can be supplemented by contributions from a range of perspectives including the child, their parents and/or carers, and other relevant adults.

Data transformation and analysis

Analysis of the ASQ dataset included ASQ-3 assessments carried out between January 2019-September 2023.

Analysis of the EYFSP dataset included assessments between academic years 2021/22-2022/23. Earlier years were excluded for the following reasons:

- Disruptions caused by the Covid-19 pandemic, during which time assessments were not mandatory (2020/21) or not collected at all (2019/20).
- The portfolio of LEAP services was fully operational by 2019. However, only a small number of children of reception age in 2019 and their parents had engagement with LEAP, due to the timeline of programme development and the fact that most LEAP services are for younger children.
- Significant changes to the EYFSP came into effect in September 2021, complicating comparison between our analysed years and earlier ones.

Because LEAP offers services that engage both children and parents directly, determining associations between outcomes for children and engagement with LEAP services requires considering both child and parent engagement. Children and parents can be linked on the platform using a unique family ID, which facilitated creation of LEAP engagement flags based on the combined engagement history of a child and their parents.

ASQ engagement flags

Family engagement that occurred less than 12 months before a child's assessment was not counted as 'engaged' when developing the engagement flags. This was done to only consider engagement that could have had an impact on developmental outcomes.

EYFSP engagement flags

Family engagement that occurred less than 12 months before a child's assessment was not counted as 'engaged' when developing the engagement flags. This was done to ensure that any family engagement was for the assessed child, as opposed to a younger sibling, for example. While the exact length of a "buffer" period is somewhat arbitrary, the analytical results are robust to choices of shorter buffer periods.

A list of 'relevant' services

In the primary analysis for both ASQ and EYFSP assessments, the engagement flag identifies children with their own or their parent or carer's engagement with a defined list of 'relevant' LEAP services. A service's inclusion in the relevant list reflects an expectation that the service would have contributed to the child development assessment domains included in analysis. The list was determined in consultation with LEAP's public health team and early years specialists. The full list of services deemed relevant is listed below.

Relevant services for primary analysis:

Baby Steps

Breastfeeding Peer Support

Caseload Midwifery

Circle of Security Parenting

Doorstep Library

Empowering Parents, Empowering Communities (EPEC)

Family Nutrition (HENRY)

Family Partnership Caseload (FPC)

Healthy Living Platform (HLP)

Housing and Early Years Workforce Development Coordinator

Making it REAL

Natural Thinkers

Oral Health – Supervised Tooth Brushing

PAIRS One-to-One

PAIRS Together Time

Parent Champions Volunteers

Sharing REAL with Parents

Speech and Language Therapy – Chattertime (SaLT Chattertime)

Speech and Language Therapy – Evelina Award (SaLT Evelina)

Supporting Babies' Next Steps

Additional engagement flags

In addition to the list of relevant services, LEAP services can be grouped into several different categories. For example, some services sit within the Communication and Language Development (CLD) strand, while others sit within the Social and Emotional Development (SED) strand, reflecting the core objective of those services.

Similarly, services can be targeted towards families with specific or acute need with specific eligibility criteria, while others have a more universal offering, and others still fall somewhere in between (we refer to these as pseudo-universal).

Engagement flags were created for each of those 5 categories to allow us to better understand how different kinds of LEAP engagement may be associated with different outcomes. Lastly, a flag was created to identify engagement with any LEAP service, regardless of inclusion within any of the other categories. For all of the engagement flags, children are flagged as engaging if they or their parents had any engagement with the services referred to by the flag category outside of the buffer period. All other children were flagged as not engaged.

Outcome variables

ASQ

Scores reported against each outcome domain were converted to binary categorical variables to represent whether each child was reaching expected levels of development, or not. A binary overall development variable was created that represented whether children had reached at least expected levels of development across all 5 domains. Binary categorical variables for communication, personal and social development and overall development were the outcome variables for the ASQ project.

EYFSP

Data provided by Lambeth Council includes binary outcome variables for reaching expected development in all ELGs of the Communication and Language AOL and Personal, Social, and Emotional Development AOL, as well as a binary outcome variable showing whether a child has reached a Good Level of Development (GLD) overall. Additionally, the data include a variable that totals the number of ELGs in the prime and specific AOLs where expected development was reached.

Covariates

A number of variables were included as covariates. These included:

Sex

Child's sex was treated as a binary variable (Male or Female).

Ethnicity

Child's ethnicity is grouped into six categories: White, Asian, Black, Mixed, Other and Undefined. The Undefined group includes data entries that have been marked as 'Unknown' and is not included in analytical models for either project.

IDACI

Income Deprivation Affecting Children Index (IDACI) is a measure that reflects geographical poverty. It is a marker used in the UK to measure the proportion of children under 16-years of age that live in low-income households in a local area. It is supplementary to the Indices of Multiple Deprivation (IMD) and forms part of the English indices of deprivation 2019 – an official statistical release from Ministry of Housing, Communities & Local Government (2018 to 2021)[vi].

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vi English indices of deprivation – income deprivation affecting children index (2019). Ministry of Housing, Communities & Local Government (2018 to 2021).

IDACI uses lower super output areas (LSOAs)—groupings of postcodes into geographical areas, which link to IDACI scores based on benefit status. IDACI scores were re-scaled to give relative deprivation quintiles within Lambeth, rather than national quintiles.

HCP status – ASQ only

The HCP-status can either be Universal, Targeted or Specialist. It is treated as an ordered categorical variable. Universal HCP involves the least intense level of intervention, and Specialist HCP the most intense.

English as an additional language (EAL status – EYFSP only

EAL status is a binary flag variable that identifies whether the child's primary language is English.

Year of assessment – EYFSP only

Year of assessment is the calendar year in which the assessment took place.

Eligibility for free school meals/pupil premium – EYFSP only

The free school meals/pupil premium flag is a binary variable identifying whether a child is eligible for free school meals and the pupil premium[vii].

Descriptive analysis

Analysis was conducted in Stata.

Univariate and bivariate descriptive statistics were generated to give a better understanding of each variable and relationships in the data. Univariate logistic regressions of outcomes against the engagement flags were used to provide a first approximation of the association between our variables of interest.

During analysis of EYFSP assessments, we also visualised the distribution of the number of ELGs a child achieved against the engagement flags to get a better sense of how the overall distributions compare for engaged and non-engaged children, in addition to the binary outcome measures.

Multivariate logistic regression

Analysis was conducted in Stata.

Each of the engagement flags were used separately as explanatory variables in multivariate logistic regression models predicting the likelihood of a child reaching at least expected levels of development for each binary outcome. The relevant covariates for each dataset listed above were included in adjusted models. The models were restricted to include only observations for which all covariates in the model were not missing.

vii Pupil premium: overview (2024). Department for Education.

The same multivariate logistic regression models were run, now using a categorical variable identifying whether a child or their family engaged with 0, 1, or 2 or more services within each engagement flag category. Results from these regressions have been reported wherever there is evidence that multiple service use has different associations with outcomes compared to single service use.

Finally, robustness checks were run to see whether results were sensitive to various criteria that relied on an element of judgment. These included: changing the engagement data cutoff threshold from 12 months to 3 months and 0 months (EYFSP only); modifying the list of included LEAP services; including some earlier years in the analysis (EYFSP only); and including different combinations of covariates.

Limitations

This work comes with limitations that must be considered.

The process of linking children comes with a margin of error. It is possible that not all children who have a parent who engaged with LEAP were linked to that parent. Therefore, some children might have been incorrectly classified as non-engaged.

The approach to linking service users to individuals in administrative datasets differed for EYFSP. This was due to a lack of identifiers common to LEAP's typical approach. This resulted in a lower rate of children linked between our engagement data and the EYFSP dataset. Therefore, some children might have been incorrectly classified as non-engaged.

Data linkage limitations are underpinned by the lack of a nationally recognised single unique identifier for children. LEAP developed an approach to consistently identify individuals as part of the development of the platform, to enable data linkage. However, as we have identified in the limitations of this project, this presents some challenges.

We were unable to account for a family's depth of engagement with LEAP beyond a measure of multiple-service use. Consequently, the engagement flags may capture families that were only transiently engaged with services, including those who wouldn't be expected to have been greatly impacted in less programmatic analyses.

Causal inference is limited by the cross-sectional nature of this work. We were unable to measure the changes to a child's outcome before and after engagement with LEAP compared to a randomised control group. Rather, we can speak of associations between service engagement and developmental outcomes.

The limitations of our approach are clearest when considering what engagement says about a family. On one hand, we may expect that engaged families would have better outcomes than very similar families that do not engage. On the other hand, engagement may, in some instances, reflect acute levels of need. This could potentially lower baseline expectations for developmental outcomes relative to families that do not engage.

Alternative statistical approaches that better identify baseline levels of need, and that more precisely identify the programme's contribution to outcomes over time, would paint a more complete picture. However, data quality and collection are key barriers to implementing

such approaches. Outcomes are only collected at one point in time. We have only been able to access child-level data for Lambeth. It makes more sophisticated designs, such as differences in differences, or those that employ synthetic controls, not possible.

We do not have a satisfactory way to account for possible distortions caused by the Covid-19 pandemic.

There are possible ceiling effects to consider with the ASQ analysis, with consistently very high percentages of children reaching expected development at population level.

(i) LEAP Theory of Change (https://theory-of-change.leaplambeth.org.uk/)

(ii) LEAP Annual Learning Report 2021/2022 – The Story of LEAP (https://story-of-leap.leaplambeth.org.uk/)

(iii) Healthy child programme. Resources to help keep children healthy and well from preconception to adulthood (2023). Office for Health Improvement and Disparities.

(iv) Healthy Child Programme Schedule of Interventions Guide (2023). Institute of Health Visiting.

(v) Early Years Foundation Stage Profile 2024 handbook (2023). Department for Education.

(vi) English indices of deprivation – income deprivation affecting children index (2019). Ministry of Housing, Communities & Local Government (2018 to 2021).

(vii) Pupil premium: overview (2024). Department for Education.