Findings from the Early Life Cohort Feasibility Study small-scale field tests

Key findings

- The Early Life Cohort Feasibility Study's academic consultation exercise identified community support for innovative approaches to measuring early markers of brain and behavioural development, the biological embedding of stress and the home environment, including the use of video and audio recordings and machine learning techniques.

- The Early Life Cohort Feasibility Study small-scale field tests (also known as ELC+) therefore aimed to conduct a robust, cost-efficient investigation of the training requirements, practical implementation challenges, data integrity, and acceptability (from a participant perspective), of collecting novel child development, home environment and stress markers when undertaken by agency fieldworkers in home-testing environments.

- The different child development areas were captured using ten research measurements/methods: **actigraphy (activity monitoring), heart rate, hair samples (for assaying cortisol), screen-based neurocognitive assessments (EEG and eye-tracking), anthropometry (head circumference, weight, length and adiposity)** and **in-home language recordings**.

- **Eight agency interviewers** across three waves of data collection were trained and passed accreditation to use the specialist equipment for the interview. They learned procedures for conducting each measure in a specially designed **2.5-day training**, with improvements made to the protocols between the waves.

- **Ninety-three children** between the age of **6-12 months**, recruited from the London and Cambridge area, took part in a 100-minute **home visit**.

- **Twenty qualitative interviews** were completed after home visits to understand parents' experiences of the process and to gather feedback and suggestions for improvement.

- All of the selected tools produce **rich and objective measurements** that have the potential to produce **crucial new insights** about early development, especially when implemented in a large-scale study.

- Feedback from parents was **consistently very positive**. Ninety-six percent of participants who answered the question stated they would participate in a study like this in the future if they were invited.

- The study concluded that a battery of this kind **would be feasible** and would produce high-quality novel data.

- The most feasible models for scaled-up data collection were ones involving **direct integration** with the main study fieldwork (involving the same interviewers returning sometime after the first interview) or '**decoupled fieldwork**', where the novel assessments only begin once mainstage data collection has completed.

About ELC+

The ELC+ field-tested key innovative measurements that go beyond traditional core interview protocols to capture brain and neurocognitive development, physical health (length, weight, head circumference, adiposity), home environment and stress markers.

All of the selected tools produce rich and objective measurements that have the potential to produce crucial new insights about early brain and physical development, the role of the environment in shaping developmental competencies and the mechanisms through which environmental influences 'get under the skin' and affect the psychobiology of early development.

Direct measurements of the kind explored in this study also tend to be richer and have more discovery potential than traditional surveys or questionnaires. New tools for harvesting fresh insights from high-dimensional data of this kind are being continually developed, although their use has so far been mostly restricted to small-scale lab-based studies. The inclusion of such tools offers the possibility of creating a rich 'biobank' for future research and would help to maximise the scientific yield afforded by a new nationally representative birth cohort study.

The ELC+ investigated:

1. Whether agency interviewers can be trained to deliver a multimodal, home based, technology-heavy innovative measurement protocol to acceptable standards.

2. How acceptable such a protocol is to participating families.

3. For each measurement, how consistently it is possible to obtain valid data when collected by agency fieldworkers in the home setting.

4. What lessons can be learnt to optimise a future protocol, in terms of data completeness, quality and acceptability for participants.

5. What models of fieldwork could make it possible to scale up such an innovative measurement protocol for a large-scale study in the future, considering both operational issues and cost.

The ELC+ study was jointly led by the Centre for Longitudinal Studies at UCL and Birkbeck University, with study partners from the University of East London, the University of Cambridge and the University of Edinburgh. Ipsos conducted the fieldwork. This briefing paper outlines key findings from the ELC+ survey.

Taking innovative measures into the home

To assess the feasibility of collecting innovative measures as part of a large-scale representative study, a research kit was assembled with portable versions of all the measurement instruments. All measures were designed to be collected in the home setting in one sitting to test its potential for integration in a large-scale birth cohort.

Participant recruitment and sample

Families who had registered interest in taking part in research via Birkbeck Babylab, the University of Cambridge and the University of East London Babylab volunteer databases or were recruited via online advertising (Facebook) and who had a child aged 6-12 months, were approached to ask for specific consent to be contacted by the fieldwork agency for the ELC+ study.

The age of infants tested across all waves was on average 9.4 months (S.D. 2 months) with 51 female (57% of the sample) and 39 (43%) male. Of the families who completed additional demographic questionnaires, 70% identified as White, 27% identified as more than one ethnicity, and 3% identified as Black or Other. The sample was slightly less ethnically diverse than Greater London (46% minoritised ethnicities vs. 30% in our sample), but more so than the UK as a whole and was generally quite highly educated (82% holding a degree).

Training the interviewers

Interviewers were chosen to be broadly reflective of market research interviewers (for example capturing a mix of interview experience). In addition, interviewers were ideally required to have access to a car, and a willingness to take part in this innovative project.

Agency interviewers were trained in a 2.5-day training period, which was sufficient to reach a high standard of data collection from the majority of agency interviewers. Six out of 8 interviewers who undertook the training successfully passed the training process and completed the assigned number of research visits.

The interview

After introducing the interview process and taking consent, the interview proceeded as follows: 1) actimetry and 2) heart rate belt were put on, and then 3) head circumference was measured. This was followed by 4) hair sampling, then screen-based tasks, consisting of 5) EEG and 6) eye-tracking. Next the child's 7) length, 8) weight, and 9) adiposity were measured and finally the parent was given instructions for the 10) language recording device.

Interviews lasted an average of one hour and 40 minutes. However, interview length reduced with practice, with the average for interviewers first five interviews running at one hour and 51 minutes, compared to their last five interviews, which ran at one hour and 33 minutes.

Measurement acceptability and data quality

Out of the 107 eligible families, 93 were interviewed, a completion rate of 87%. Refusals were low, suggesting a high level of acceptability and interest among the sample. Only seven of 107 refused; a further three were unavailable during the fieldwork period, and four cancelled their original appointment and couldn't reschedule before the end of the fieldwork period.

Figure 1 gives an indication of the acceptability of each measure by listing the number of consents during the home visit per each measure on the left.

Where valid data were not obtained, it was often because of technical issues, which are described in more depth below, followed by a consideration of ways in which the protocol could be optimised to maximise successful data collection.

Screen-based tasks

- Data quality: Generally high for completed tasks.

- Main challenges: Issues with connecting equipment and troubleshooting scripts.

- Potential improvements: Developing a user-friendly, integrated hardware/software system could streamline the process and improve reliability.

Eye-tracking

- Data quality: Produced valuable neurocognitive insights and robust parallel data for most infants.

- Main challenges: Calibration difficulties and technical issues.

- Potential improvements: Enhanced equipment and interviewer training could improve setup efficiency and data consistency.

EEG

- Data quality: Comparable to laboratory studies, with high-quality data achieved in most cases.

- Main challenges: Setup complexity and interviewer variability.

- Potential improvements: Simplify the setup with plug-and-play systems and provide top-up training for interviewers or more stringent interviewer selection.

Actimetry, heart rate, and physical measurements

- Data quality: High-quality, consistent data; parents found measurements like child length particularly rewarding.

- Potential improvements: Maintain current approaches while continuing to prioritize parent engagement.

Hair sampling

- Data quality: Samples were of good quality, comparable to clinic-based studies.

- Potential improvements: Minimal adjustments needed due to the overall success of this measure. Some children did simply not have enough hair yet at this age.

Home-based audio recordings

- Data quality: Good for returned devices, despite logistical challenges.

- Main challenges: Parents found scheduling and device use difficult; device design issues caused accidental activation or deactivation.

- Potential improvements: Mail recorders before home visits and improve device design to enhance reliability.

Figure 1: A summary of the number of families with valid data and the reasons for missingness after consent was given

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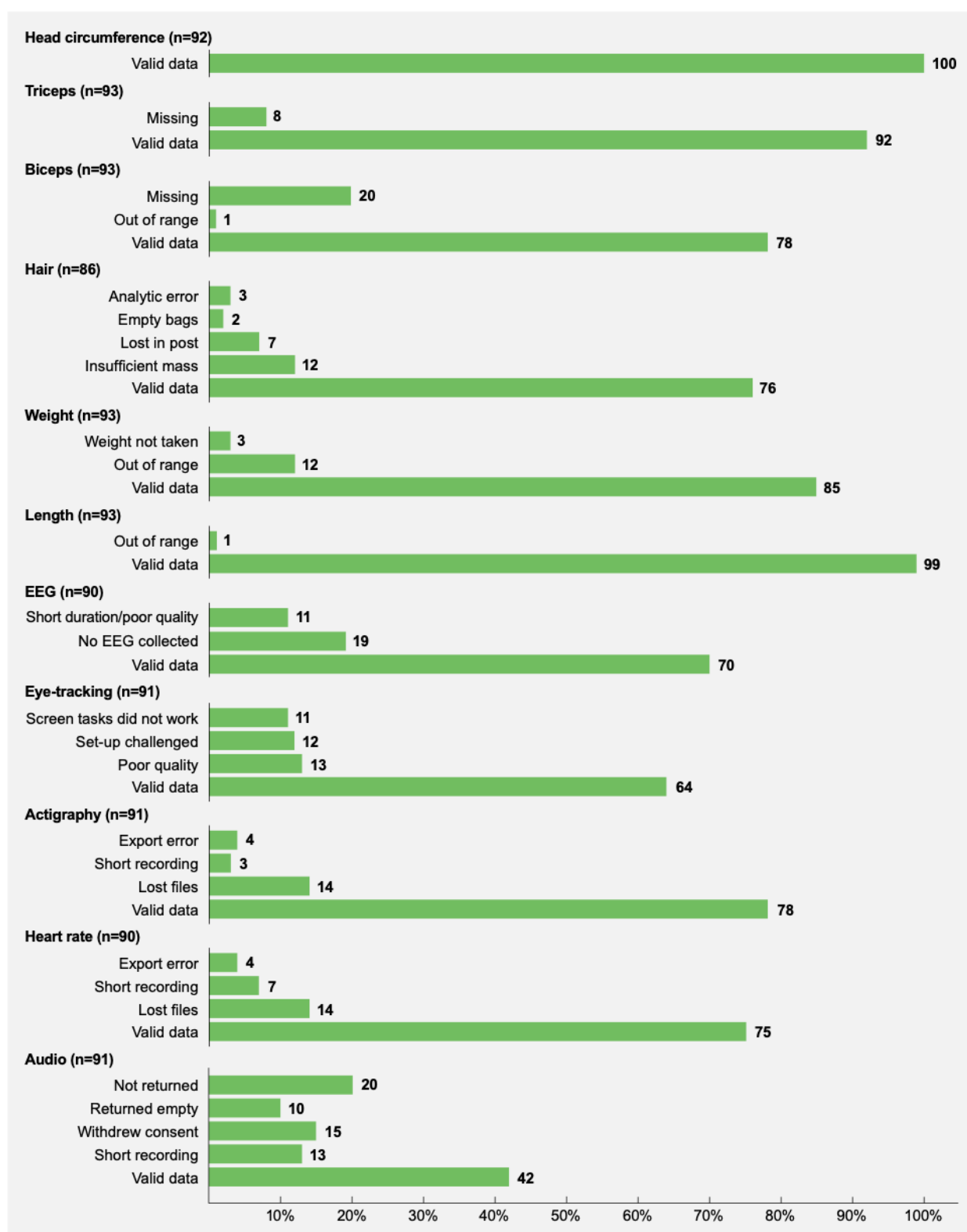
Considerations for scale-up

The principal aim of the ELC+ study was to conduct assessments of the feasibility and acceptability of a series of scientific tools designed to deliver new scientific insights within the framework of a future Early Life Cohort Study, which could not be achieved using more traditional survey methodologies.

In the broadest sense, the project produced good initial evidence that a battery of assessments of this kind, when delivered in the home by agency interviewers, is highly acceptable to families and can produce adequate and sometimes excellent rates of analysable data, judged by straightforward metrics of data completeness and quality and parental feedback.

Parents consistently enjoyed the direct assessments involving the child and expressed a great deal of interest in these in-depth measurements. While parents were generally very positive about the measures, we should stress that consent rates are likely to be lower in a main stage study, given the shift to a random probability recruitment approach and a more diverse sample. Nonetheless, results from this study point to a high baseline of acceptability.

There are four core factors to think about when considering the scalability of an enhanced measurement survey of the kind investigated in ELC+:

1. **The cost of equipment**, and therefore how many interviewers can deliver fieldwork at any one time for a given budget.
2. **Capability of an agency fieldforce**, and how a large enough pool can be trained to pass accreditation.
3. **Quality and validity of data** – a smaller field team will generally provide better data quality (due to higher scope for selection and greater opportunities for practice).
4. **Integration with** (and potential impact on) **the mainstage** design, sample and fieldwork protocols.

Our initial conclusion was that there were two models for scaled-up data collection that seemed most robust.

The first was one in which selected interviewers visit a subset of their consenting families for a follow-up visit to take the enhanced measurements (perhaps a month or so later). This model benefits from continuity for the families and is relatively cost effective. However, it has the disadvantage of taking some capacity away from the main cohort data collection.

The second most robust model involved 'decoupling' of the mainstage and enhanced add-on fieldwork by only beginning the add-on work once mainstage data collection has completed. This would limit any impacts on fieldwork capacity for the main survey and could provide continuity (by assigning the same interviewer where possible).

The main drawback of this approach is the lag between the initial visit and the add-on measurements, meaning that the children would be considerably older. This could be mitigated by subsampling the final months of fieldwork in the main survey because there would then be a larger pool of available fieldworkers and shorter gaps between the initial wave 1 visit and the novel measures visit.

Participant feedback

Families' experience of participating in the study was a central part of the study's focus, with all families being invited to complete a feedback questionnaire and a sub-group being invited to take part in a qualitative interview. Ninety-six percent of participants who answered the question stated they would participate in a study like this in the future if they were invited.

Next steps

Discussions about whether and how some or all of the evaluated instruments could be included in the mainstage Early Life Cohort Study, if it goes ahead, are ongoing.

Acknowledgements

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