

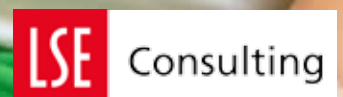


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LOTTERY FUNDED**

Developing an early years Outcomes Framework using area-level routine data

A Better Start Common Outcomes Framework

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A Better Start

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Executive summary

The importance of the early years for positive child development, health and wellbeing are now recognised not just by local and national governments, but also championed by international organisations like the [WHO](#) and [UNICEF](#). Supporting this priority, the Big Lottery Fund's 'A Better Start' (ABS) programme is a 10 year 'test and learn' investment totalling £215m across five local area partnerships within Bradford, Blackpool, Lambeth, Nottingham and Southend-on-Sea.

Improving outcomes in the early years

But how will we know that this unprecedented investment in the early years has made a difference? The old adage of "you can't improve what you cannot measure" is perhaps better phrased as "you won't improve what you do not measure" in this context. Measurement of outcomes is the cornerstone of any effort to evaluate policies and programmes. The Fund therefore commissioned the PSSRU at the London School of Economics to develop a Common Outcomes Framework (COF) for the 'A Better Start' sites, and anyone interested in improving child outcomes by investing in the early years.

Why implement the Framework?

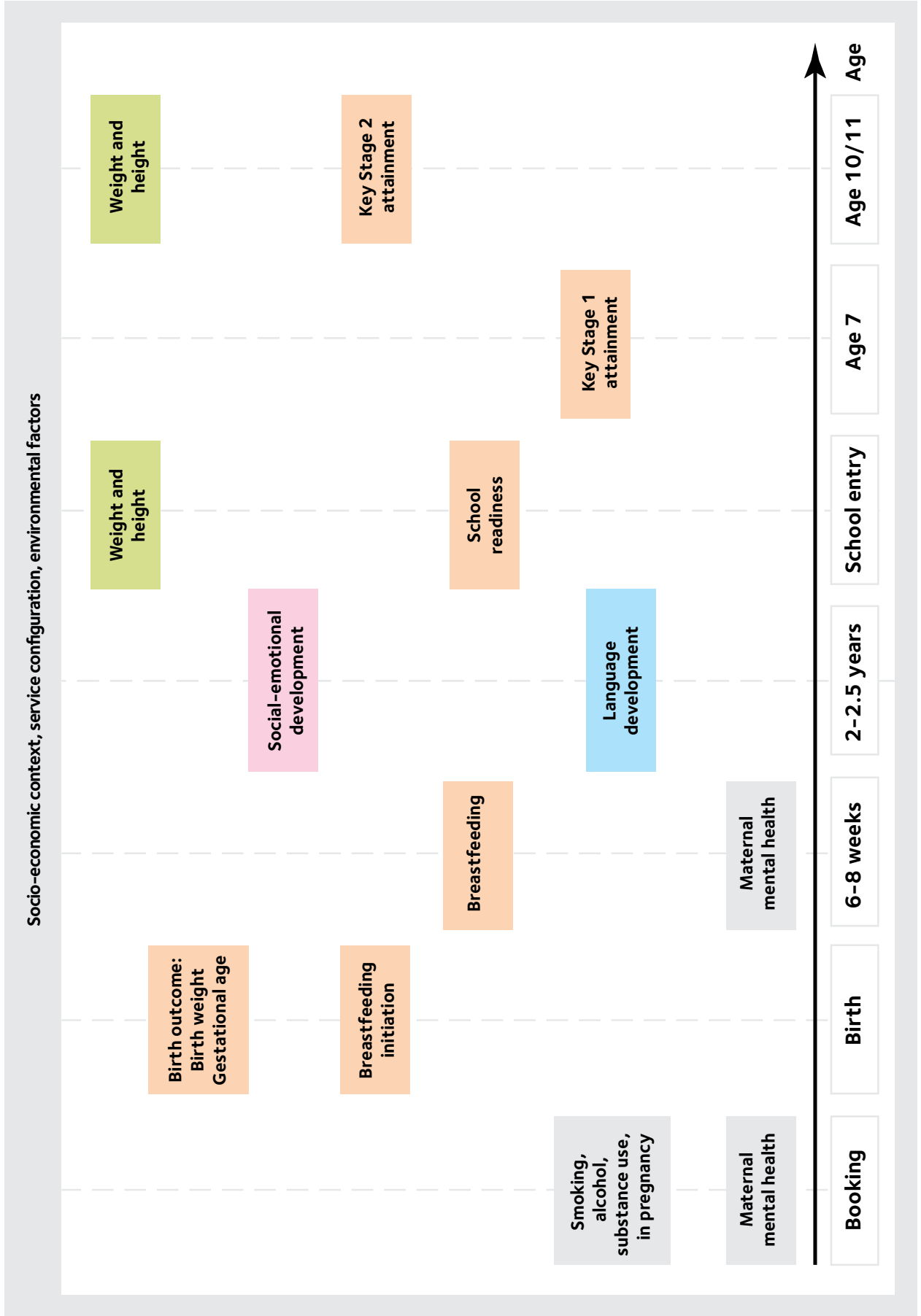
A common measurement framework, if firmly implemented and underpinned by a commitment to rigorous and consistent data collection, supports planning and evaluation locally because it helps to understand **where programmes and policies are making a difference**. At the same time, it can **highlight areas for improvement or prioritisation**. The COF facilitates this by drawing on routine data, both **minimising the burden of data collection** and providing a **convenient source of comparison data**, such as national trends or data on statistical neighbours. An overarching framework, such as the ABS COF, reflects a commitment to improving child outcomes that spans different agencies and stakeholders, and encourages **coordination of work towards a common goal**.

What does the Framework measure?

The COF leverages routinely collected data to collate information on key outcomes and indicators of child development. It is centred around critical milestones in the early years – birth outcome, school readiness and key stage attainment – and covers the three strategic outcomes that are the focus of 'A Better Start':

- **Social and emotional development:** preventing harm before it happens (including abuse and/or safeguarding, neglect, perinatal mental health and domestic violence) as well as promoting good attunement and attachment.
 - **Communication and language development:** developing skills in parents to talk, read and sing to, and particularly praise their babies and toddlers and to ensure local childcare services emphasise language development.
 - **Diet and nutrition:** starting out by encouraging breast-feeding and promoting good nutritional practices.
-

Figure 1: The A Better Start Common Outcomes Framework



How was the Framework developed?

The COF is the result of a consultation process with the five ABS sites and a wide range of experts in the field of child development, underpinned by a review of the evidence base and driven by availability of routinely collected data. The Framework reflects the 'MVP' principles: To give the Framework the best possible chance of being implemented within the ABS areas and beyond, buy-in from those working with and for children and families is essential. Outcomes included in the COF therefore need to strike a chord with those involved, both at the policy level and personnel "on the ground" (M: meaningful). At the same time, the Framework needs to hold up to scrutiny from experts and scientists (V: valid), otherwise it will be difficult to use the data collected to effect broader social changes. Finally, data collection should not impose an unnecessary burden on personnel or services (P: pragmatic).

Conclusions and recommendations

The Framework captures key milestones in child development, and outcomes associated with a positive trajectory. The framework is designed to be implemented with relative ease, and relevant comparison data are readily available from routine data sources. But use of routine data brings with it certain limitations. The language of routinely collected data is often deficit-focussed, subtly shifting the focus from improving wellbeing towards 'reduction of problems'. The nature of routinely collected data means that more complex concepts – for example, attachment and attunement – tend to go unmeasured. A key challenge for those seeking to improve child outcomes will therefore be to continue to develop data collection capacity, not just to be able to expand routine collections, but also to ensure the quality of data already being collected. These efforts need to be supported by a clear incentive structure that puts the wellbeing of children and families at the heart of service provision and programme development because the purpose of the COF is support improvement in outcomes through evaluation and measurement – but measurement is not an end in itself.





Introduction

'A Better Start' (ABS) is the Big Lottery Fund's ten-year strategic programme focussed on developing and testing new approaches to prevention in pregnancy and the first four years of life. The programme aims to improve child outcomes in

- i) Social and emotional development;
- ii) Communication and language development;
- iii) Diet and nutrition.

The ABS initiative reflects strong evidence that the first few years of life build the foundations for future health and wellbeing [1]–[7]. Within the initiative, there is an expectation that systems are changed and organised to provide better quality support to all expectant and new parents and their children living in the ABS target wards. ABS is a "test and learn" investment with a clear commitment to share the lessons learned from the programme to inform others working in the area. Through investing heavily in a small number of local areas, the Big Lottery Fund want to facilitate testing of these interventions at scale, and use the lessons learned from this investment to promote a shift in public policy, public funding and agency culture away from remedial services to greater investment in prevention during pregnancy and the first few years of life.

To complement the [National Evaluation of ABS led by the Warwick Consortium](#), The Fund commissioned the PSSRU at the London School of Economics to support the ABS partnerships in their work on population level outcomes and indicators with the aim of developing a Common Outcomes Framework (COF). This will allow the ABS sites to track their outcomes locally, as well as comparing trends across sites, and to national level data where these are available. The Framework should be useful not only to the five ABS sites, but for all areas who share the Fund's ambition for improving early child development.

The following principles were applied in the selection of outcomes for the Framework:

- **Outcomes are within the remit of 'A Better Start'**: The focus is on the three strategic ABS outcome domains, covering a broad spectrum of developmental outcomes.
- **Outcomes that can be changed by intervention**: There is a focus on child outcomes and their major risk factors within the family that can be addressed by interventions, such as those falling within the remit of 'A Better Start'. This way, we can track whether our efforts in working with children and families are making a difference at the population level.
- **Minimising the burden of data collection**: Where possible, routinely collected and published data are used to populate the Framework. Otherwise, data that are collected but not routinely reported are enhanced for use within the Framework to fill gaps in routine publications.
- **Availability of comparison data**: Aligning the Framework with existing national frameworks, evaluations and routinely collected data means that it is possible to track progress locally against broader trends.
- **Backed by experts**: The Framework draws on scientific research on child development, and has benefitted from the input of experts in the field at every stage.
- **Based on a consensus between the five 'A Better Start' sites**: This ensures the Framework has the backing of those working directly with children and families, and who have first-hand familiarity with the challenges associated with population-wide data collection.
- **The 'MVP' principles**: Reflecting the requirements above, the outcomes and indicators selected for the Framework should be meaningful, valid and pragmatic (MVP). These principles are discussed in more detail in [Appendix 1](#).

The Framework was based on a review of relevant documents to ensure consistency with previous work and – where possible – comparability with national outcomes frameworks and guidelines, as well as indicators and measures used by the national evaluation of 'A Better Start'. Documents included

- The [Public Health Outcomes Framework](#)
- The [NHS Outcomes Framework](#)
- The Welsh Government's [Early Years Outcomes Framework](#)
- '[Measuring What Matters](#)' Guide for Children's Centres
- Data collated by the [National Child and Maternal Health Intelligence Network](#)
- [NICE guidance](#) on relevant topics
- Documentation for large UK cohort studies including ALSPAC, BCS-70 and the Millennium Cohort Study
- Information on the [Warwick national evaluation of 'A Better Start'](#).

The document review was supplemented with a rapid review of the scientific literature on child development, and – at the request of the Big Lottery Fund – a consultation of selected experts.

This report briefly summarises the key aspects of child development that underlie the ABS COF and presents the outcomes and indicators selected for inclusion by the ABS sites. The Framework is divided into three levels to accommodate a) a maximum of shared outcomes and indicators or measures as well as b) variation in local priorities and opportunities for additional data collection.

- **Level 1** represents the 'Common Core', the minimum data collection recommended to those wishing to adopt the ABS COF.
- **Level 2** includes additional routine data that are recommended for inclusion if this is appropriate to local circumstances. Level 2 also provides an opportunity to set local priorities beyond Level 1.
- **Level 3** represents the 'test and learn' element of the Framework, highlighting outcome areas where further development work is needed to establish a suitable indicator or measure.

Limitations of the Framework and directions for future development are also discussed in this report. The technical appendices provide further details about how we developed the Framework, an overview of the included indicators and measures, alongside a discussion of their strengths and weaknesses in the context of the COF, and supplementary material on measures included in the COF, or recommended for implementation.

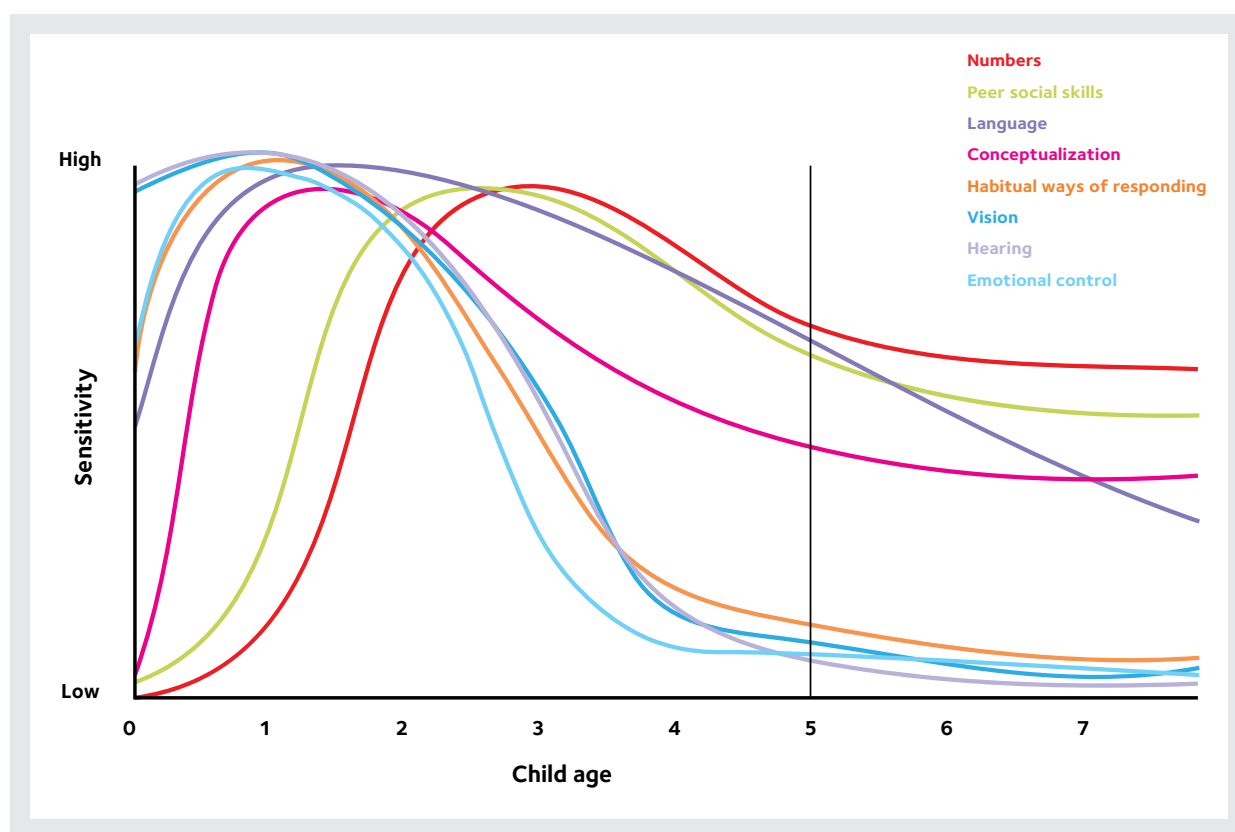


Child development: Giving children a better start

Child development is a complex, multi-faceted process. Many conceptual models seek to explain it, ranging from psychoanalytical and behavioural theories to bio-ecological models [8]. Currently there is a focus on early experiences, including those before birth, that shape brain development. Sensitive periods have been identified where neural connections are formed with respect to various aspects of development [for a summary, see 8].

Figure 2 [based on 9] summarises these sensitive periods, plotting sensitivity against child age. The pre-school period is therefore highlighted as a time where brain development is shaped, calling for early support to prevent later problems.

Figure 2: Sensitive periods in early brain development



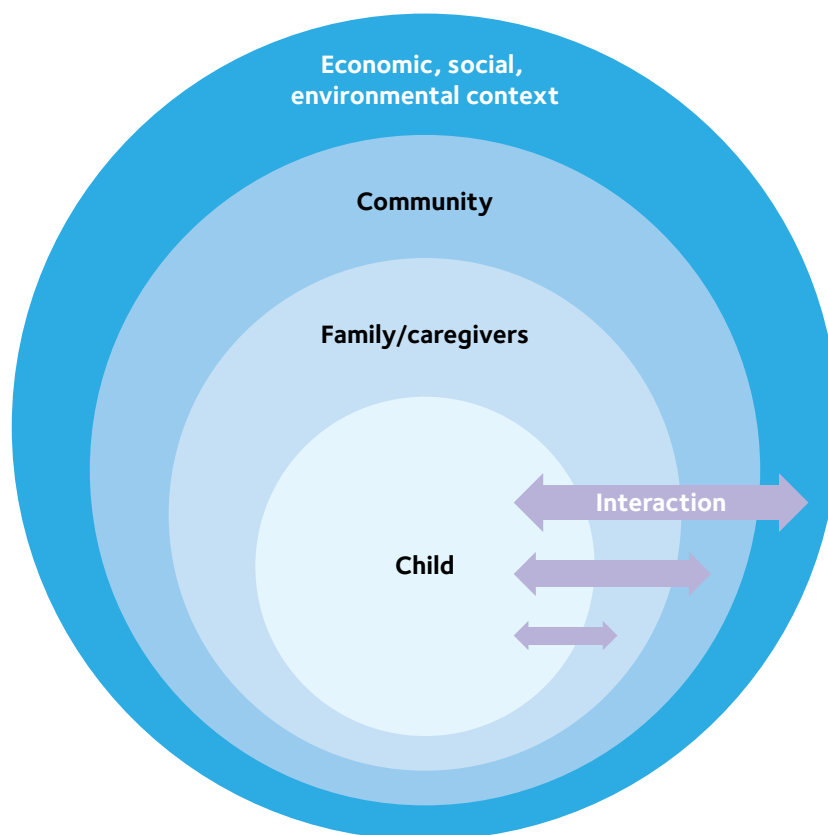
Once the critical period for intervention has been identified, the how of child development becomes important. Two models in particular shape the current scientific and policy debate:

Bronfenbrenner’s *bioecological* model [10] emphasises the multi-layered context of child development, dividing it into various systems based on the immediacy of their influence on the child: the micro system (immediate environment,

such as family or caregivers, school), the meso system (the interactions of different parts of the micro system), the exo system (wider environment, such as the parent's workplace, neighbourhoods), and the macro system (broad cultural and socio-economic system, including laws and policies, or the economy). Additionally, there is a dynamic element to child development (chrono system).

Building on these ideas, Sameroff's *transactional model* [11] focusses on development as a process of complex interaction between the child and its environment. Proximal factors are those that influence the child directly, such as interactions with caregivers, and are more important at younger ages. Distal factors are more indirect, such as family income or the community, and become relatively more important as the child grows up. This model is increasingly influenced by the emergence of epigenetics – the science of how genes can express themselves differently depending on different environments or stimuli [12], and therefore able to incorporate both “nature” and “nurture” in a cohesive model [13].

Figure 3: Simplified bioecological and transactional model



Within 'A Better Start', the focus is on improving child outcomes in the strategic outcome domains nutrition, social and emotional development, and language and communication. ABS interventions focus on the micro system (child) and the meso system (family), with the aim of changing the exo system, where service provision is situated.

In the following section, we discuss key outcomes and associated risk factors within these three strategic outcome domains to inform selection of indicators for the ABS COF. The aim is not an extensive or complete overview of all factors that potentially play a role in child development – this has been ably provided elsewhere (e.g. [12], [14]) – but to pull out key factors that promote and indicate positive child development.

i) Setting the scene: Economic and social context

The developmental models identify the important role parents and families play in promoting child development, but this is set in the wider social and economic context [1, 2] – the exo and macro systems.

Poverty affects a broad range of child outcomes and often persists from one generation to the next [17] [18]. Poorer children face a higher risk of chronic illness [19], poor nutritional status [20], receiving poor parenting [21], self-harm [22], lower cognitive skills [9, 10] and lower educational attainment [25]–[27]. Socio-economic differences in cognitive and social and emotional development as well as health can be measured as early as age three, calling for early intervention and prevention [28]. The longer term costs of children growing up in poverty may be as large as 1% of GDP [29].

The **organisation of public services and institutions** can address and mitigate deprivation. One example is the success of pre-school programmes in improving education outcomes and preventing later criminality by targeting both cognitive and non-cognitive skills [16, 17].

Neighbourhood factors impact child outcomes in complex ways. For example, the design of the physical environment, like the design of buildings and roadways, availability of playgrounds or good “walkability”, can promote increased physical activity [32]–[34]. One study found the neighbourhood and Local Authority where children lived contributed over 20% of the variance in academic achievement, over and above the school and family characteristics [35]. But how people feel about their neighbourhoods also matters, with perceived social climate negatively affecting child outcomes such as behaviour and mental health problems, beyond that indicated by family risk factors [36].

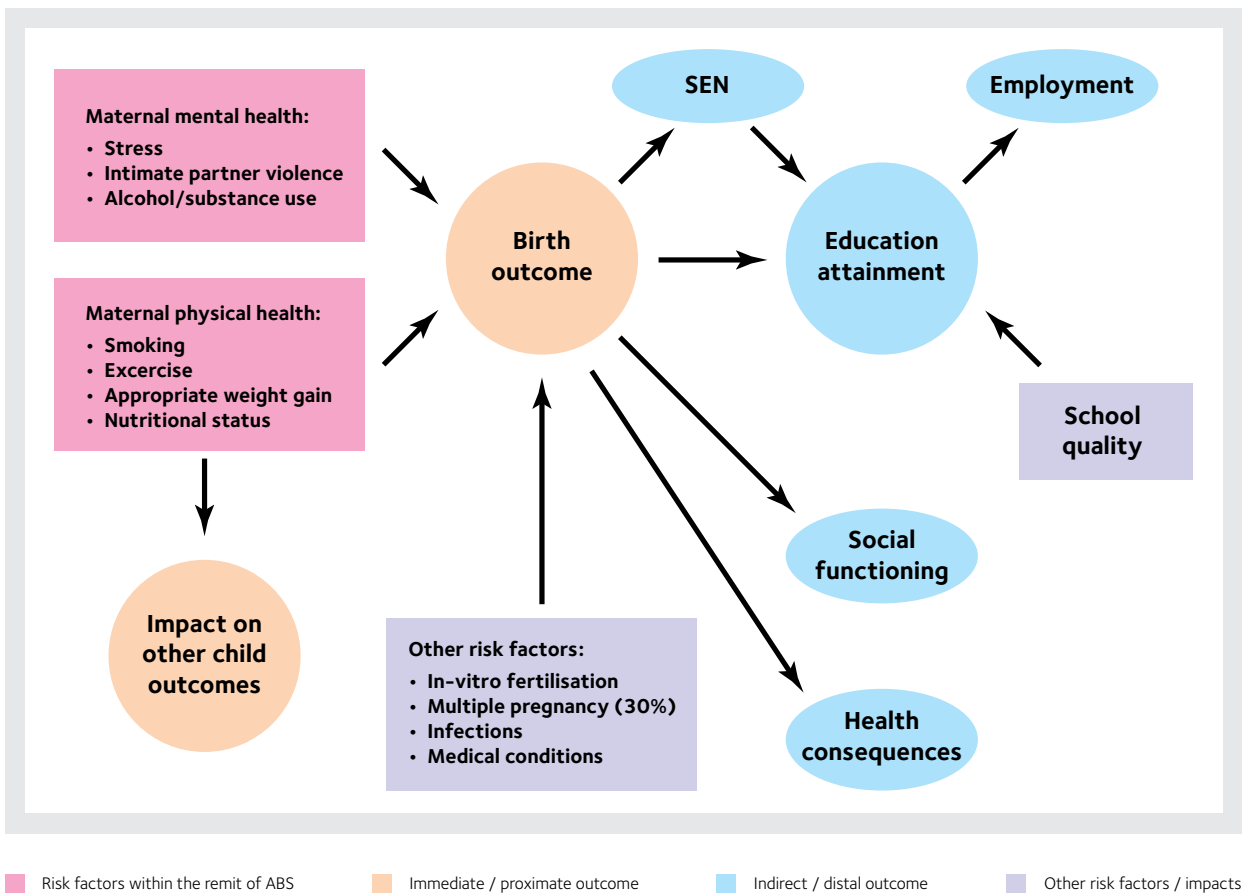
ii) Strong foundations: Family and caregivers

Several cross-cutting factors situated in the meso and micro systems can promote good child development.

Pregnancy and birth

A ‘good birth outcome’ quite literally provides a child with a good start in life. Around 7% of children in England are born prematurely [37] and an increasing trend in the proportion of children born with low birth weight has been noted [38]. They can be indicators of problems during pregnancy that are associated not just with increased healthcare costs, but also later behaviour problems and learning disabilities [39]–[43]. Risk factors include smoking, alcohol and substance abuse in pregnancy, as well as poor nutrition and being over- or underweight before pregnancy [44]. The new and exciting field of epigenetics provides further evidence that maternal mental health and wellbeing are crucial for child development, and that parental mental health may affect birth outcome [15]. A simplified model outlining risk factors for a poor birth outcome and later child outcomes is shown in Figure 4. We distinguish those risk factors that are within the remit of ‘A Better Start’ and those that are important impacts on the outcome but unlikely to be addressed by an intervention provided as part of the initiative.

Figure 4: A simplified model of risk factors and outcomes related to 'birth outcome'



We also show that there are likely to be additional outcomes that are affected by the same risk factors that are relevant in determining birth outcome. This means that the Framework developed here may capture only some of the relevant risk factors, and only some of the outcomes. For the purpose of developing a concise visual representation of the elements that should be reflected in an outcomes framework aiming to capture child development, we consolidate the complex relationships above into a simple building block that will enable us map the suggested indicators for the COF.

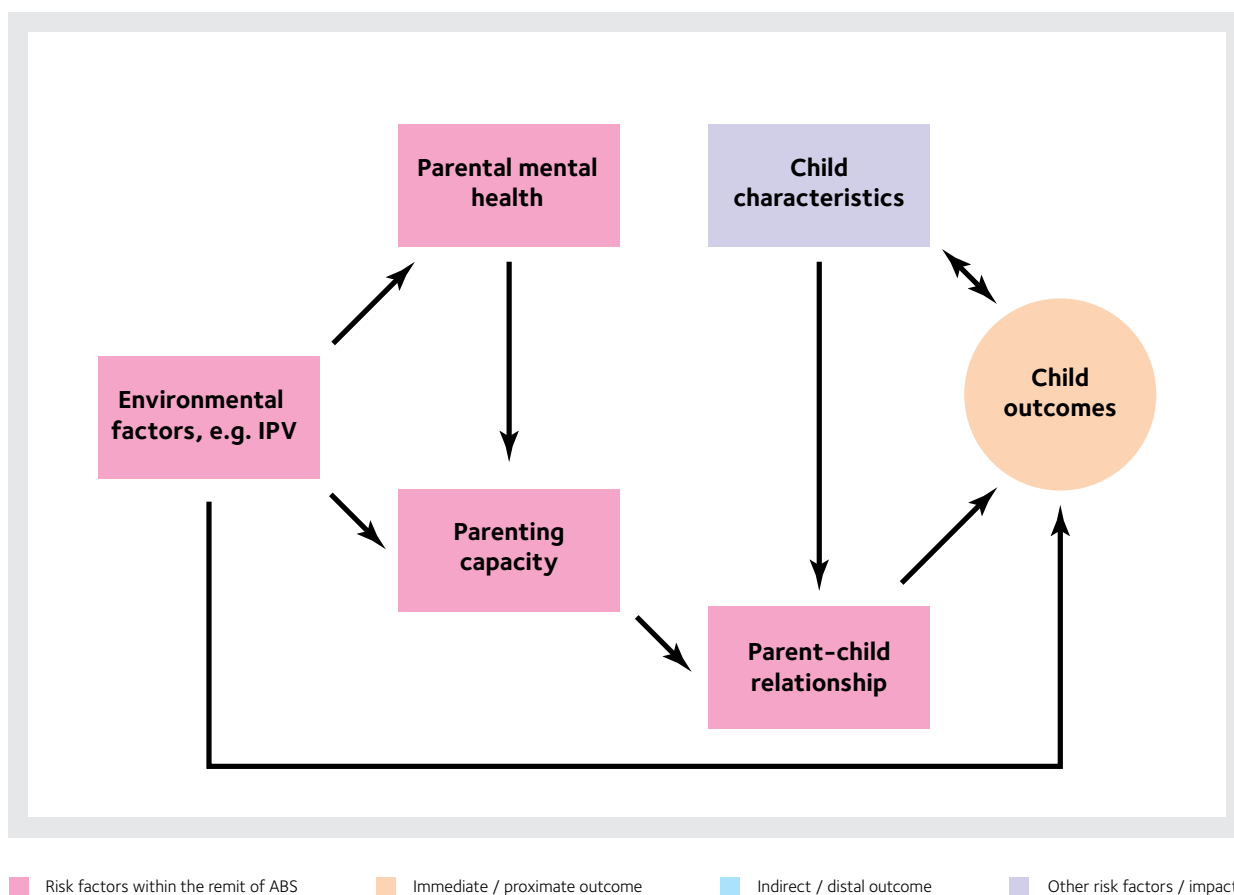
Enhancing family capabilities

As we have seen, the relationship between a child and their parent or carer is fundamental to positive development in the early years. Enhancing parenting capabilities is therefore a key focus in improving child outcomes. Many stressors in the home environment that affect child outcomes – such as exposure to intimate partner violence – are also mediated by parenting skills and behaviours [45]. In addition to targeting environmental factors directly, a focus on parenting is therefore likely to make a positive contribution to child outcomes [46].

Promoting positive *attachment* may prevent later behaviour and emotional problems, as well as preventing child abuse [47]. A perhaps even more subtle concept, *attunement*, refers to interactions between parent and child that are characterised by a sense of understanding and connection. Like attachment, attunement has bi-directional relationships with child maltreatment, and is associated with later behaviour and emotional outcomes [1].

Parental mental health problems can impact on parenting capacity. Depression and anxiety in the perinatal period are common experiences for women, with an estimated prevalence of 10-20% [48].

Figure 5: Parenting and the home environment impact on the parent-child relationship and child outcomes

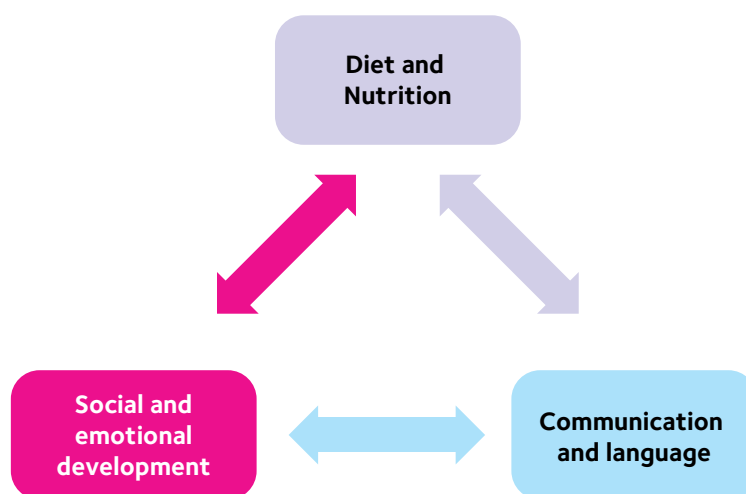


Intimate partner violence (IPV), child maltreatment and other adverse experiences affect children in complex ways, with consequences felt well into adulthood [49]. Exposure to IPV and maltreatment can lead to intergenerational transmission of violence directly by causing behaviour and social-emotional problems, and indirectly through maternal depression and parenting behaviours, again increasing the risk of child behaviour and social-emotional problems [50], [51]. There can be adverse impacts on nutrition and growth, with potential pathways directly through stress, or indirectly via maternal nutritional deficits and low birth weight [52]. It has been shown that there is a cumulative effect, meaning that children exposed to multiple forms of maltreatment, or repeatedly exposed, are at risk of even worse outcomes [49], [53]. On the other hand, strong attachment to a primary caregiver may mitigate the adverse effects of exposure to domestic violence [54].

iii) A Better Start

After discussing some of the cross-cutting factors that affect child development at the meso level, here we turn to outcomes within the three ‘A Better Start’ strategic outcomes – social and emotional development, communication and language development, and diet and nutrition. These domains are interrelated and influence each other. For example, good nutrition in early life is a prerequisite for brain development that can impact on language ability. Developing an appropriate vocabulary and communication skills can help express emotions verbally and is associated with a lower risk of developing behaviour problems [55]. Our purpose here is to highlight those outcomes and risk factors that stand out as being particularly important indicators of child development, with strong links to later outcomes, rather than subscribing to a particular model or school of thought.

Figure 6: A Better Start strategic outcomes



Diet and nutrition

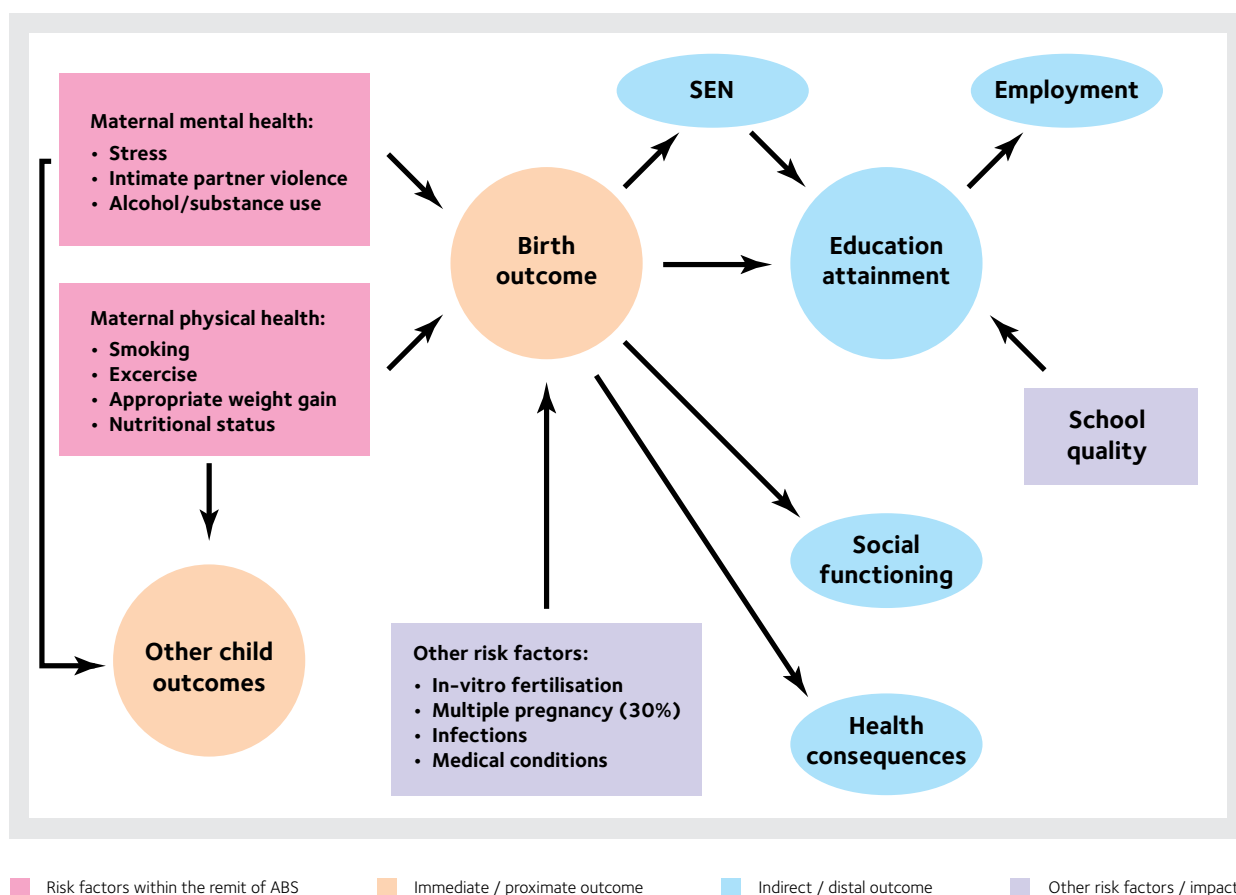
Breastfeeding is recommended during the first 6 months of life to enhance nutrition, promote positive health outcomes for children and their mothers, and to support mother-child bonding [56]. While there are potential positive effects on cognitive development as measured by IQ, the evidence on a hypothesised protective effect on obesity appears mixed [57]–[59]. Despite these potential benefits and strong policy recommendations in favour of breastfeeding [e.g. 60], the latest reported rate of breastfeeding initiation is around 66%, falling to about 47% at 6–8 weeks.

Feeding behaviours and skills in children are considered to be part of motor skills development [45, 46] and motor skills are in turn related to cognitive development [for a potential pathway, see 38]. Timing of *weaning* and introduction to appropriate foods is therefore important for developing not only good eating habits and ensuring nutrition, but also to develop fine motor skills that – among other benefits – will eventually allow the child to feed herself.

Poor *oral health* is an indicator of poor nutritional habits and self-care, and shares risk factors with premature mortality and chronic disease, but is also a cause of disease [64], [65]. Therefore, it is a global health priority, especially for disadvantaged groups [65]. In England, oral health is the most common reason for children aged five to nine to be admitted to hospital, and regional inequalities in the provision of care and in child oral health outcomes have been identified [66]. Intake of sugary foods and drinks as well as poor oral hygiene are considered risk factors for tooth decay [67].

Prevention of *obesity* is a current national policy focus [6] and of concern because interventions to reduce obesity often have only a small effect or are ineffective [e.g. 37]. The components of the most commonly used obesity measure (body mass index or BMI) are height and weight, which are important health indicators in their own right [45, 46]. Early obesity is a risk factor for obesity in adulthood, as over 60% of young people who are obese at age 16 will still be obese at age 30 [71]. This is relevant because a recent analysis of a British cohort showed that if obesity is confined to childhood, it has no adverse social or economic consequences [72]. The same data showed that obesity that resolves in childhood does not carry higher risk of cardio-vascular disease or diabetes in adulthood [73]. Research suggests a bi-directional link between obesity and depression for all age groups [74] with complex biological, psychological and social pathways [75].

Figure 7: Obesity - only part of the picture



In addition to obesity status, the literature indicates that a higher percentage of lean body mass is a predictor of health and longevity independent of total body weight [see for example, 43]. Similarly, *metabolic syndrome* may be a better indicator of poor outcomes than obesity [for an overview of the issue, see 44].

Physical activity has strong (potentially bi-directional) links with obesity [78]. Less than 70% of children achieve recommended activity levels [79] but a study of pooled data from children aged 4-18 showed that higher activity levels (regardless of sedentary time) reduced cardio-metabolic risk [80] and improved lean body mass [81].

Social and emotional development

Social and emotional development in the early years is a catch-all term for a complex process that encompasses several broad categories of skills and competencies [48, p.7]:

- Self-perceptions and self-awareness
- Motivation
- Self-control and self-regulation
- Social skills
- Resilience and coping

The same review links self-control and self-regulation to adult mental health, life satisfaction, education attainment and related economic outcomes, as well as various dimensions of physical health [48]. Several concepts encompassed by 'self-perceptions and self-awareness', such as locus of control ¹ and self-efficacy, were linked to these adult outcomes, while self-esteem was linked to adult mental and physical health. Interestingly, social skills did not predict labour market outcomes, but were linked to better mental health and wellbeing. There was limited evidence on motivation, or on resilience and coping.

Overall, therefore, good social and emotional development is associated with better adult outcomes such as fewer mental health problems, reduced risk of obesity and better chances of employment, as well as better general health and wellbeing. Feedback from the experts consulted as part of the COF development process emphasised the need to measure general *social and emotional development in young children*, alongside early behaviour and mental health problems. Development of inhibitory control skills was identified as an emerging area in predicting good outcomes.

Communication and language development

Development of language and communications skills is a multi-faceted process. Good development in this domain is associated with better education attainment and chance of employment, social relationships, behavioural and emotional development, and reduced criminality [55]. Prevalence estimates for speech and language problems show a somewhat complex picture. One review suggests a median of 5.95% for all children and young people with persistent speech and language delay [83]. The Royal College of Speech & Language Therapists suggest at age 5, about 7% of all children have SLCN, although figures vary between 1% and 15% depending on the breadth of inclusion, age and location of survey [84]. The I CAN TALK evaluation, which focusses on pre-school children, estimates that up to 10% of all children have long-term persistent communication disabilities [85]. In addition, up to 50% of children at nursery or school-entry may have more transient difficulties who, with the right support, are likely to catch up. For example, one analysis of the ALSPAC data found speech errors made at age 5 years – but not at age 2 years – predict speech errors at age 8 [86].

Five key aspects of early communication and language development that are predictive of good outcomes were highlighted by our expert reference group²:

1. **Vocalising:** Vocalising, and specifically babbling, starts in the first year of life. Babbling is a strong predictor of later language production; children who babble early also tend to start to talk early [87].
2. **Development of communicative gestures (non-verbal communication):** Communicative gestures are the precursors to language development; early gesture use is a strong predictor of later language ability. For example, babies who start to use communicative pointing early also develop language earlier [88] and know more words at 18 months of age [87].
3. **Word learning:** Data from the Stanford Wordbank ³ show that the children who learn fastest have already produced their first word by 8 months of age (expressive vocabulary). However, most children will learn to talk between 9 and 14 months of age. There is a huge amount of individual variation and it is not unusual for children to start talking much later (up to 18 months of age). Most children can understand more words than they can say (receptive vocabulary) and some infants begin to show sensitivity to the meaning of common words around six months of age [89]. Data from the Stanford Wordbank suggests that by 18 months, the average American English-learning child can understand 262 words.

1 The extent to which individuals believe they can control events affecting them. The major distinction is between an internal and an external locus of control, with an external locus (belief they are less able to control their own decisions and life) often thought to be associated with adverse outcomes.

2 The information presented in this section was collated by Professors Caroline Rowland, Julian Pine, Anna Theakston, Elena Lieven and Padraic Monaghan of the ESRC LuCiD Centre.

3 <http://wordbank.stanford.edu/>

4. **Development of combinatorial speech:** Children usually start to combine words into phrases at about 24 months of age, though the time of onset depends on the speed of their vocabulary development. Children tend to start combining words when they have between 50 and 100 words in their vocabulary, so slower vocabulary learners will tend to start later. The DfE's Early Years Outcomes guide [90] suggests that children should start combining words into simple sentences between 22 and 36 months of age. However, children should start to understand simple sentences much earlier; between 16 and 26 months of age [90].
5. **Development of more complex sentences:** At some point between 2 and 3 years of age, children will start to produce longer, more complex sentences. At the same time, they will start to include function words (e.g. articles like the/a, pronouns like I, we, you) and word endings (e.g. cars, going) in their sentences. Between 22 and 36 months of age, children start to understand more complex sentences (e.g. Put your toys away and then we'll read a book). At the same time they will start to "Use talk to connect ideas, explain what is happening and anticipate what might happen next, recall and relive past experiences." [90]

iv) A bright future

As is evident from the discussion above, childhood experiences and outcomes are linked to outcomes in adulthood [7], [91]. 'A Better Start' provides support for families and children aged 0–3, with the aim of improving not just immediate outcomes, but to effect long-term, population-wide change. As a result, there is a desire to capture longer-term outcomes. This is consistent with a vision of effecting *change* locally, and employing *systems* change to ensure *sustainability* of change in the long-term. While there are many potential outcome domains – such as mental health or social functioning – that should be considered "important", here we focus on education progress as another composite measure of development that is easy to track using readily available data.

School readiness

School readiness – a deceptively simple term for a complex construct – is usefully summarised as

'what really matters is making sure a child is able to start school ready to learn, able to make friends and play, ready to ask for what they need and say what they think.' [92]

The evidence links school readiness both with early childhood factors that influence the capacity to learn, and education attainment [93]. Ensuring that children are ready for school is therefore an important measure of success for programmes seeking to improve child development outcomes.⁴

Education attainment

Education attainment is a key predictor of later chance of employment and level of income, particularly in the UK where social mobility is comparatively low [94]. Parental education has direct effects on child attainment and is a mediator of outcomes associated with better education success such as parenting practices, highlighting the importance of attainment in preventing the inter-generational [25], [95].

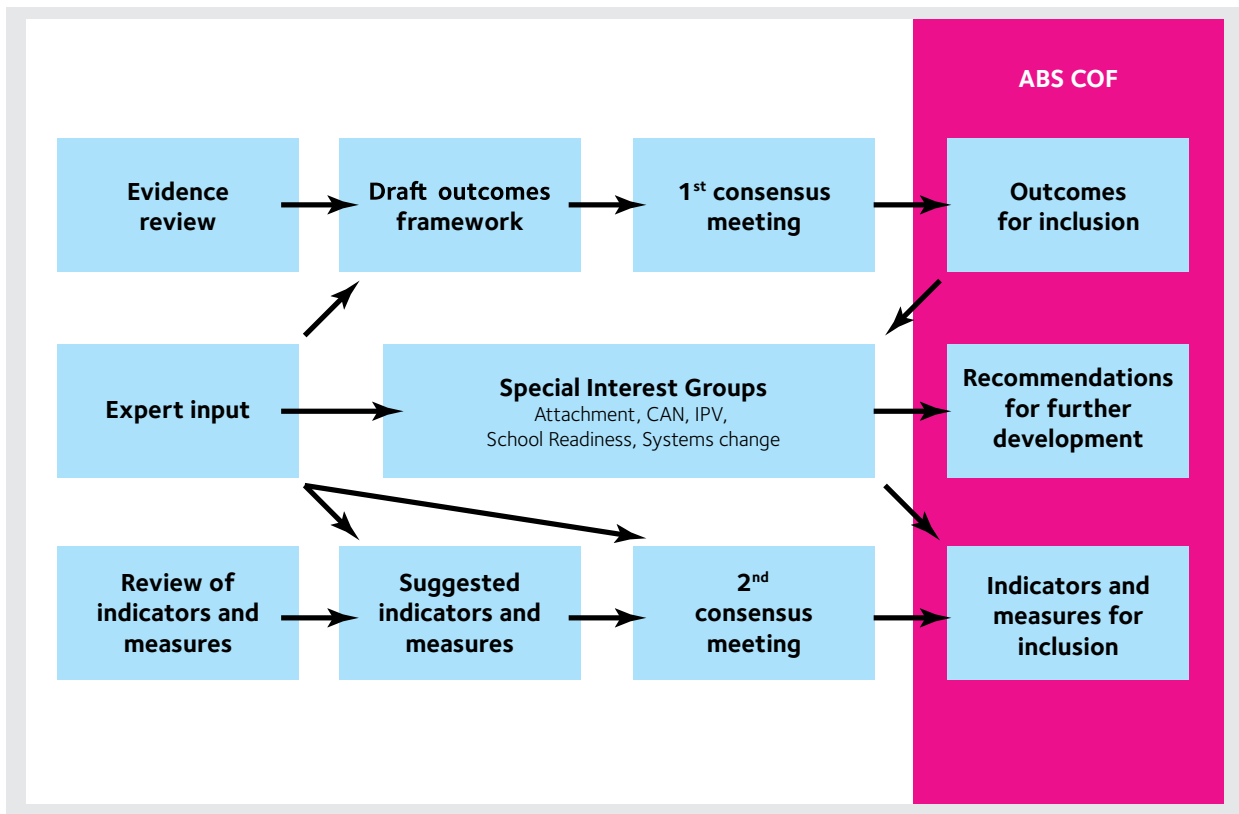
4 Note that the UNICEF Framework [88] usefully conceptualises school readiness on three levels: The child is ready for school, the school is ready for the child, and the family is ready for school.

The 'A Better Start' Common Outcomes Framework

Figure 8 shows the consensus process that led to the selection of outcomes and indicators for the ABS COF. The PSSRU at LSE provided pre-meeting papers based on evidence reviews and the available indicators and measures. These were discussed at two consensus meetings with the ABS sites, hosted and facilitated by the PSSRU. These meetings resulted in a) a selection of outcomes for inclusion in the COF and b) a selection of indicators and measures to track these outcomes.

Where no suitable indicators and measures could be identified, Special Interest Groups (SIGs) were set up to explore these outcomes further. SIGs were led by the ABS sites, who recruited their own experts and facilitated meetings and conference calls to discuss attachment; child abuse and neglect; inter-personal violence; school readiness; and systems change. The SIGs either recommended an existing measure or indicator, or outlined the gaps and challenges, alongside recommendations for further action. These recommendations have been integrated into the COF. Throughout, experts on the various aspects of child development provided feedback, and participated in our meetings and discussions.

Figure 8: Developing the ABS COF



The outcomes, indicators and measures included in the COF are presented at three levels of recommended and optional indicators. This flexibility reflects the consensus around key measures, while at the same time allowing those sites wishing to collect more data to do so within a single Framework.

- **Level 1: Common core.** The minimum recommended level of data to be monitored by those adopting the 'A Better Start' Common Outcomes Framework.
- **Level 2: Additional routine indicators.** This level extends the minimum Framework by including additional routinely collected and reported data. These indicators may reflect a specific area of interest or local priority. There may be quality or conceptual issues associated with these data that mean monitoring may not be appropriate or desirable for all local areas adopting the COF.
- **Level 3: Areas of special interest where additional data collection is recommended.** This level covers special interest topics where no routinely collected and published population data currently exist, or where existing data are thought to have significant validity or interpretation problems. Examples are attachment, inter-personal violence and parenting practices.

Level 1: Common Core

Level 1 of the ABS COF reflects a commitment from the five sites to adopt a common outcomes and measurement framework. The outcomes are plotted against their measurement points in Figure 10.

At the heart of the Framework are two cross-cutting key milestones in child development (orange): Birth outcome and school readiness. These reflect general development across several domains. Birth outcome is monitored both in terms of gestational age and birth weight. School readiness is measured as reaching the 'expected' level on the [Early Years Foundation Stage Profile \(EYFSP\)](#)⁵.

Note: Making better use of your data

While data on smoking, alcohol and substance use are already collected at booking, there is currently no associated routine indicator available. The same applies to measures of maternal mental health, which are taken by health visitors as part of routine visits. Development work will be needed locally to ensure access and consistent reporting. There is likely to be variability in the way these data are collected and recorded. A goal of the ABS COF initiative going forward will be to encourage consistent collection and reporting of these data.

In the perinatal period, several maternal risk factors are included (Figure 12, shown in grey): Smoking, alcohol use and substance use in pregnancy, as well as maternal mental health. (See Figure 9 for considerations regarding pregnancy data.)

Moving forward in time, breastfeeding is an important indicator that again cuts across several domains (nutrition, social and emotional development), and will be measured at two time points: Initiation following birth and at 6–8 weeks.

⁵ The government recently announced that the EYFSP would remain statutory in 2016, following an earlier decision to abolish baseline assessments. Given the current uncertainty around a statutory measure of school readiness, there is a possibility that this indicator will need to change in line with prevailing policy.

As a key outcome related to nutrition (green), weight and height are recorded at School Reception and Year 6 as part of the National Child Measurement Programme.

Social and emotional development (red) will be assessed as part of the 2-year old check, or Integrated Review, between 2 and 2.5 years. At the same time, language development (blue) will be assessed.⁶

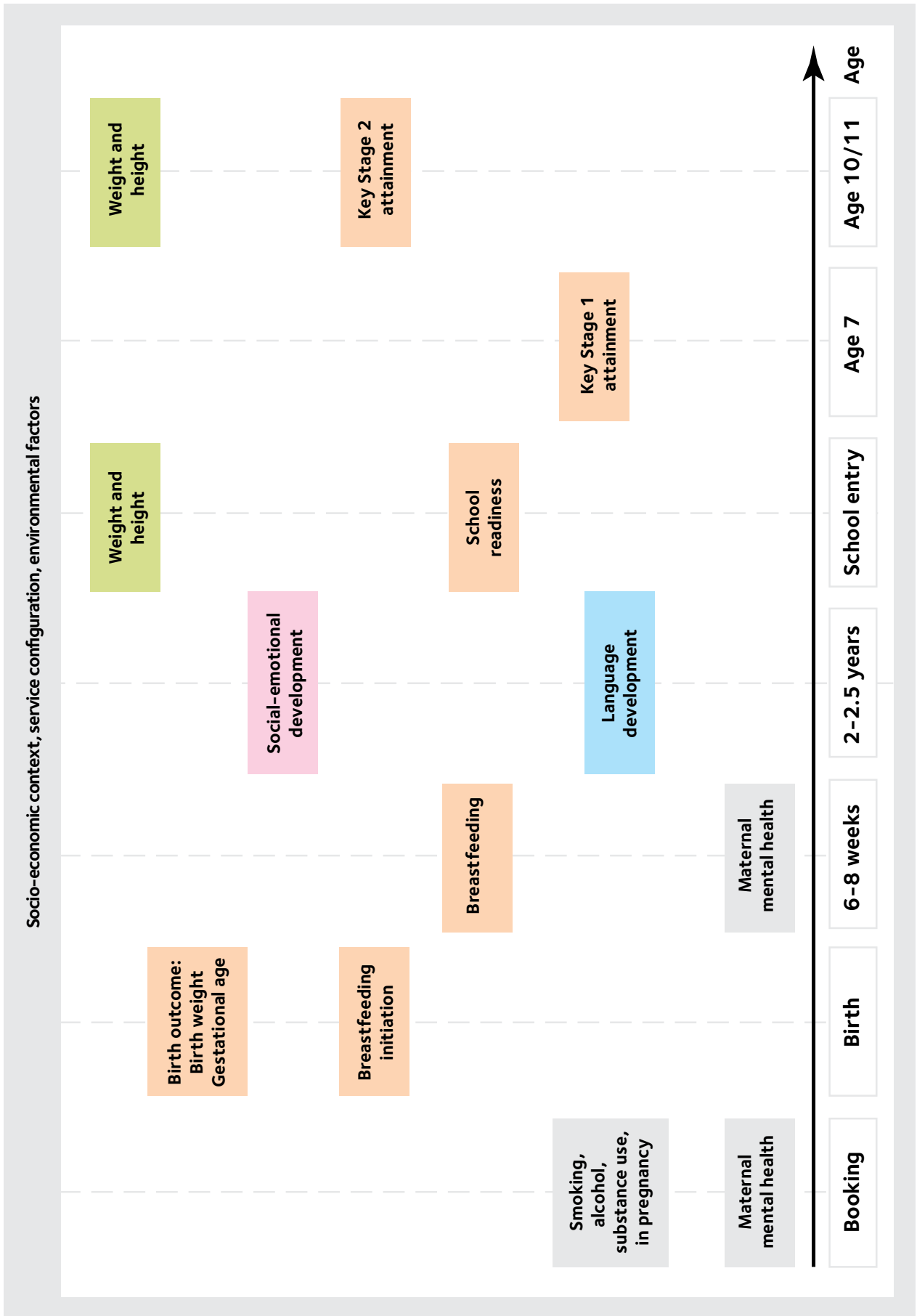
Attainment at Key Stages 1 and 2 are included to monitor the long-term progress of children benefitting from interventions. Again this is regarded as a cross-cutting outcome.

The COF assesses outcomes for children and families within the three ABS strategic outcome domains at several time points, and includes two important composite measures of child development (birth outcome, school readiness) to provide a comprehensive yet concise overview of child development. The key measurement points (perinatal period, 2-2.5 years, reception) ensure that there is information on early development that is likely to be directly affected by preventative initiatives, as well as longer-term outcomes that will show whether potential benefits early on translate into longer-term changes.

Detail of the suggested indicators corresponding to COF outcomes for levels 1 and 2, and an assessment of the selected indicators in terms of their suitability for the underlying MVP approach can be found in [Appendix 2](#). Measures used to collect data mentioned in the description of COF outcomes can be found in [Appendix 3](#).

⁶ Please note that an indicator of child development, to be collected at the 2-2.5 year visit, is being developed by Public Health England, and is expected to be available in the PHOF from 2017. For more information, see https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/518351/asq-3-march-2016.pdf (retrieved July 29, 2016).

Figure 9: ABS COF – Common Core of outcomes and measurement points



Level 2: Additional indicators

In addition to the Common Core outcomes and measures, several others were identified where monitoring was thought to be desirable. However, there may be issues with the routinely available data either in terms of what is measured (and the associated potential to set 'perverse incentives' by including it), or in terms of data quality (coverage, frequency). Other reasons for including items at Level 2 rather than Level 1 might be because indicators reflect priorities or particular challenges in one locale but are of less concern elsewhere.

Here we discuss two key 'additional indicators': child abuse and neglect (CAN) and oral health. COF users are encouraged to monitor these indicators, supplementing them with additional data that reflect priorities.

Child abuse and neglect (CAN)

CAN is a significant public health problem [96]. An increasing number of children are subject to child protection plans or placed in care [97] pointing towards an increasing prevalence of CAN. At the same time, many children who experience CAN occasionally or never reach the threshold for assessment by child protection services will not be captured in these routinely collected statistics [96]. Rather than using a single indicator, a set of indicators capturing known cases of CAN or proxies for CAN (hospital admissions) provides a more comprehensive picture of CAN, and is more likely to capture the impact of prevention programmes over time [98]. The SIG led by A Better Start Blackpool recommended consideration of three indicators relating to child abuse and neglect.



Note: Use caution when interpreting CAN indicators

Note that there are concerns around using these indicators to set “targets”. The goal of initiatives supporting child development is not to reduce, for example, the number of children going into care, but to reduce the need to take children into care and to act in the best interest of the child. Changes in service provision or different models of working may result in an increase in the detection of CAN. Interpreting movement in these indicators therefore needs to take into account any local initiatives that may affect detection, as well as service thresholds for intervention.

- 1) Children in need due to abuse and neglect
- 2) Children in care (looked after children) due to abuse and neglect
- 3) Hospital admissions caused by unintentional and deliberate injuries in children (aged 0–4 years)

While individually, these indicators may be less meaningful, the combination captures children at risk, children who have are known to have been exposed to CAN, those requiring service intervention, and a proxy measure for undetected cases.

Oral health

Oral health has been identified as a key national and global priority [65], [66]. In England, the Oral Health Survey of three-year olds is conducted every four years but data collection is resource intensive as it is based on a clinical assessment by a health professional. From 2008 to 2014, the Oral Health Survey data were also collected for five-year olds attending maintained schools. There are a number of challenges to using these data as an indicator: Not least is that the data are not collected annually and that this is a population sub-sample rather than a full population survey. Moreover, the low incidence of problems in some areas has led to concerns about the indicator’s sensitivity to local initiatives that do not cover the whole local authority (the sampling unit for the survey). It is therefore recommended to use the Public Health Outcomes Framework Indicator 4.02 only where this deemed to be appropriate to local circumstances.

A Better Start partnerships may consider fieldwork boosts for future waves of the Oral Health Survey to provide more representative data for the ABS target wards. Additional measures, including the number of dental general anaesthetics for children, the number of children who have caries and the severity of cases of caries could also be explored by the A Better Start partnerships

Level 3: Recommendations for the Framework's further development

In the course of the consensus process, outcomes were identified that were considered to be of particular interest, but no satisfactory measure or indicator was readily available. The 'Special Interest Groups' (SIGs), based in the ABS sites, explored these topics in more detail. In addition, expert opinion was sought on communication and language development. The consensus process also revealed that an additional home visit – beyond statutory requirements – with families at 4-6 months after birth could be leveraged to collect additional data.

The major findings and recommendations from the SIG investigations and related work are summarised below.

Attachment

The Attachment SIG, led by the LEAP partnership (Lambeth) met and discussed available measures of attachment with a view to their suitability for use in universal services. Key issues identified were the intensity of training required, the time needed to conduct the assessment, and whether the measure could be easily used in routine practice.

The 'gold standard' measure of attachment, the Ainsworth Strange Situation [99], is reliable and has been used extensively in research studies. However, as it requires a laboratory set-up and extensive training, it was deemed impractical as a population-wide assessment. Observational measures were deemed to be more promising, although they also require training to ensure consistent coding of the observation. Options to investigate further include the Attachment Q-Set or AQS [100] and the Toddler Attachment Sort [101] – a shorter version of the AQS.

Additional options included using a screening tool at population level to identify those who could benefit from further assessment. To our knowledge, there is currently no tool available that has been designed for use by professionals such as health visitors, where minimal training is required. In addition to learning from local pilots and the CYP-IAPT⁷ work, it was suggested that the development of a new screening tool should be explored. This tool would provide a pragmatic assessment of risk and would be tailored to fit with the practice of health visitors and other professionals working with families. This is being discussed further by the ABS sites.

Intimate partner violence (IPV)

The IPV SIG was led by Blackpool Better Start. IPV against women is an important public health issue based on the prevalence of associated morbidity for both women and children (if the woman is pregnant or a primary caregiver). There is strong evidence of an association between physical IPV during pregnancy and adverse perinatal outcomes. However, there is currently no suitable data source to assess the prevalence of IPV.

The aim of monitoring of IPV trends over time at the local authority level is to provide evidence for programme planning and evaluation concerned with reducing IPV prevalence. The development of an IPV monitoring system is proposed that both meets the needs of service planners, and ensures the safety of respondents. As for CAN, a combination of indicators is suggested:

- Prevalence data on the types, pattern, and severity of IPV, key risk factors for IPV events, and the morbidity due to IPV.
- Regarding morbidity due to IPV, Hospital Episode Statistics (HES) can provide data on IPV events that require hospital treatment. Hospital admissions for violence is an existing indicator based on HES data contained within the Public Health Outcomes Framework.

7 <https://www.england.nhs.uk/mentalhealth/cyp/>

A periodic IPV population-based survey of women of childbearing age in a local authority area could offer the detail required to monitor the impact of prevention programmes and inform planning and implementation of these programmes. Another option is a periodic population-based survey using probability sampling on the prevalence of mental (ill-) health, risk factors (such as IPV, drug and alcohol misuse, social support), associated morbidity, and use of health services. This may be more efficient in terms of cost and logistics, and more useful to commissioners and program managers than a survey that focuses solely on IPV.

Instruments for accurately measuring prevalence of IPV need to be considered rather than instruments used for IPV screening in healthcare settings. Careful consideration should be given to type of instrument that is used to capture IPV exposure. IPV events may be infrequent or minor, and more comprehensive instruments should be preferred.

Communication and language development

As discussed above, communication and language development is a complex and subtle process. This is not adequately captured by currently available routine indicators and thus we drew on the expertise of the ESRC LUCiD Centre. Their expert opinion identified the most important aspects of language and communication development to track at the population level that would demonstrate the impact of preventative programmes in the early years. A summary can be found on p17-18 and the full recommendation, including suggested measures for the five different aspects of language and communication development, can be found in [Appendix 4](#). It is recommended that local areas interested to improve their monitoring of language and communication development implement these recommendations, in the absence of a national strategy.

Additional data collection at non-statutory visit

Discussion about the timing of data collection and leveraging statutory visits to families post-birth revealed that there is a gap between the 6-8 week visit and the 2-2.5 year review; not all areas provide a home visit at 3-4 months, and some areas (but not all) provide a visit at 6 months instead.

Where possible, it is suggested that the additional non-statutory home visit at 3-4 or 6 months is used to collect data on

- Maternal mental health
- Breastfeeding status
- Child height and weight (for comparison with the relevant growth reference data)
- Attachment (conditional on a suitable measure being available)

This information is valuable both in terms of tracking outcomes, and in terms of monitoring the wellbeing of children and families in the critical first year of life.

Reflections

The ABS COF is a culmination of several years of effort by the ABS sites, the Big Lottery Fund, and the academic teams supporting the evaluation of the 'A Better Start' initiative. The aim was to determine what is most important to measure, and how to measure it. The Framework reflects the knowledge and experience of local area personnel, data and service managers about their local collection processes and systems.

From the outset, it was agreed that any shared framework needed to be **meaningful, valid, and pragmatic**. The focus of the Framework is therefore very much on leveraging existing indicators and routinely collected data. While this aligns well with the requirement of pragmatism, sometimes this is to the detriment of finding a more meaningful or scientifically validated measure.

Deficit-focussed language of routinely collected data

It was noted during the COF consensus process that the language of available indicators is often deficit-focussed, whereas it would be preferable to capture information about people and outcomes in terms of their capacity or skills. A re-phrasing of the indicators (for example, 'children with a good level of development' instead of 'children with a poor level of development') can be a first step. However, in the long term, a move of routinely collected indicators towards outcomes that measure capabilities instead of deficits may encourage interventions that are not aimed at reducing problems but instead on proactively improving wellbeing.

Gaps in the set of currently available indicators

While a plethora of indicators are routinely published, we found that the focus is on data that are readily available or easily, rather than necessarily the data that are most meaningful. This is perhaps not surprising as the subtler aspects of child development may be difficult to measure, and require high levels of training and expertise in the administration of instruments and interpretation of data.

In the context of 'A Better Start', a few gaps are particularly notable.

- Aside from the ASQ:SE, few data on child mental health in the early years are routinely collected. As became apparent when the ABS sites shared their experience and local practice, even the ASQ:SE is not always routinely administered to all children, but used as a second stage tool following a screen using the ASQ-3. The SDQ, a well-validated measure that is backed by extensive experience both in research and practice, is used with children going into care but not the general population. Improving availability of data on child mental health would provide invaluable information on a key aspect of child development that is often neglected, and one that can have long-lasting and severe consequences into adulthood if problems are not detected and addressed early.
- Available indicators of language development may not capture the complexities of the developmental process. At the same time, research often focusses on small, clearly defined concepts, so that it is difficult to link broad measures with later outcomes. While alternative tools exist, there are issues around recommending commercial products for use with an outcomes framework that aspires to have a wide reach, especially when there is a lack of scientific evidence supporting their psychometric properties.
- Similarly, outcomes and indicators around diet and nutrition tend to focus on obesity, even though in terms of development and outcomes, this may not be the most relevant indicator. For example, research now indicates that overweight status may be associated with better outcomes than obesity or indeed "normal" weight [102]overweight,

and obesity may help to inform decision making in the clinical setting. Objective To perform a systematic review of reported hazard ratios (HRs – but the NCMP reports the proportion of children considered ‘overweight’ and ‘obese’ combined. There is also a lot of debate in the scientific community about what constitutes a ‘good diet’ and consequently, reliable and easily accessible indicators are lacking. Similarly, while it is recognised that activity levels are important determinants of health, these are not easy to measure – especially at the population level.

- Some measures appear to be used because they are convenient rather than as an active choice based on validity. One example is the ASQ-3 which is used as part of the Healthy Child Programme, but no UK validation studies could be located for this instrument.
- A lot of indicators capture only the most severe problems; the ‘tip of the iceberg’. Examples are SEN statistics or social services indicators on children in care. When the goal is to shift outcomes for whole populations rather than high-risk groups, it is possible that those shifts will not be captured using these high-threshold indicators.

Ensuring data quality

A key message from this work is that data quality must be a priority. This has implications for workforce development and data systems. Those implementing the COF should be committed to ongoing efforts to improve data quality. In addition to workforce development and quality assurance procedures, it may be possible in some instances to use commissioning power or to design care pathways in such a way that there are incentives to collect good quality data.

Setting appropriate incentives

Once the decision is made to focus on improving outcomes as measured by a certain indicator, there may be concerns around incentives. A straightforward effect may be that breastfeeding rates are over-stated due to pressures to improve an indicator that is high on the policy agenda. Problems may be under-reported, with potential effects on detection and referrals. It is therefore key to situate the indicators in the context of a policy of ‘doing what is right for the family’, and placing the wellbeing of children and their parents at the heart of policy and practice.

For example, instead of focussing solely on breastfeeding rates, a better focus may be to look at ‘breastfeeding take-up in families where this is the appropriate choice’. Similarly, when attempting to reduce the number of children taken into care, this needs to be conceptualised in the context of the child’s best interest. The aim then is not to reduce the number of children taken into care, but rather to reduce the number of children where this is the most appropriate action with regard to child wellbeing and safety.

While these are not issues that can be easily resolved and probably require on-going efforts to frame and interpret the monitoring data appropriately, options should be explored to implement ‘systems change’ indicators such as client satisfaction ratings (perhaps linked to services or initiatives designed to increase breastfeeding uptake), and monitor the outcome indicator and systems change indicator side by side.

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Appendix 1: A Framework fit for practice - MVP

The Common Outcomes Framework (COF) is a measurement framework that can be used to monitor change at the *population level*. Front line personnel responsible for delivering services for children and families are under enormous pressure already. To give the Framework the best possible chance of being implemented within the ABS areas and beyond, buy-in from those working with and for children and families is essential. Data collection should not impose an unnecessary burden on personnel or services. At the same time, the Framework needs to hold up to scrutiny from experts and scientists, otherwise it will be difficult to use the data collected to effect broader social changes. Therefore, outcomes and indicators included in the ABS COF were selected because they are *meaningful, valid and pragmatic* (MVP). These guiding principles are discussed in more detail below.

Meaningful

An important starting point to develop the COF was to revisit the starting point for ABS: *Your vision for the future*. The sites described how things would change in their area as a result of ABS, what would improve, and what skills, capabilities and support children and families would have in 8-10 years' time.

By sharing this vision for the future at the first Consensus Meeting, we identified the common themes and items that were important to all five sites. In turn, this determined the outcomes included in the COF, emphasising the links with early child development, the commonalities, and where to allow space for different emphases that reflected local needs and ambitions.

To decide whether an indicator or measure is 'meaningful', we looked at

- how the outcome is conceptualised in the measure and how this maps to the outcome to be measured
- what questions are asked by the instrument and whether these are in fact the questions we wanted to answer
- whether it was the whole instrument or a subscale that was relevant, and
- whether there were any contextual factors to consider when interpreting the results of the measurement.⁸

Valid

To have an impact within and beyond ABS, the Framework needs to be convincing to scientists, policy makers, commissioners and service providers: a scientific approach to measurement is key. Choosing measures that have been scientifically validated and indicators supported by a high level of data quality ensured that the Framework actually measures the outcomes ABS is meant to improve, and that the magnitude of change can be established.

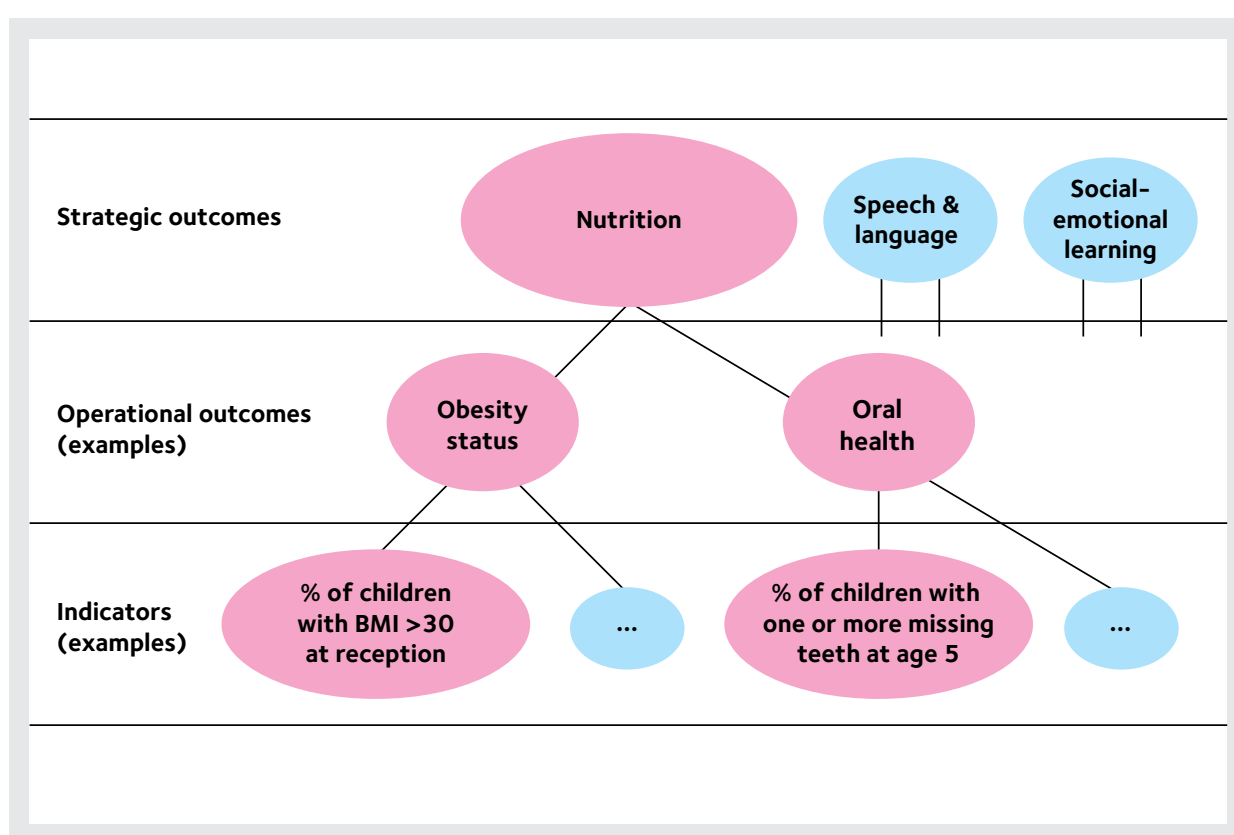
The Framework reflects the strategic outcomes ABS seeks to improve, i.e. social and emotional development, communication and language development, and diet and nutrition. For each of these strategic outcomes, a set of

⁸ Note that both the assessment of 'meaningful' and 'valid' are based on the concept of statistical validity, but to allow for a discursive approach, the consideration of psychometric properties and other 'quantitative' issues has been separated from this initial, 'qualitative' assessment.

'operational outcomes' was developed as part of the COF consultation process. Operational outcomes are items within each strategic outcome that can be changed by ABS interventions. Using the strategic outcome 'diet and nutrition' as an example (see Figure 12), these items may include child obesity rates and breastfeeding rates. In this Framework, outcomes are therefore a measure of change, and this change can be quantified.

'Indicators' are routinely collected pieces of data, such as breastfeeding rates collected for ChiMat, while 'measures' are standardised schedules or assessments, collected from individuals.⁹ Figure 12 shows the three levels of strategic outcomes, operational outcomes and indicators for the example of the strategic outcome 'diet and nutrition'. Potentially, several indicators can be used for one operational outcome, and several operational outcomes may fall under the same strategic outcome.

Figure 10: Levels of outcomes and indicators



To assess whether an indicator or measure should be considered 'valid' in the context of the COF, the following questions were asked:

- Who is the respondent and does that seem sensible given the perspective we are interested in for the outcome in question?
- Is there an established cut-off point or magnitude of movement in the indicator that clearly shows there has been an improvement?¹⁰

⁹ Note that measures can feed into indicators.

¹⁰ This may not be appropriate or necessary for all measures and indicators.

- Is there published information on the reliability and validity of the measure (psychometric properties), and research on what the distribution of scores looks like in a reference population (normative data)? This is usually a good indication that a measure will be considered 'valid'.

For novel measures, this information may not (yet) be available. If there is information on how the new measure compares to existing ones, and especially why it might be preferred, this is included in the assessment.

Pragmatic

Measuring outcomes in a meaningful way relies upon consistent data collection. The Framework can help by acknowledging that data is more likely to be collected if the process is easy. Support from commissioners and service providers will be greater if data collection is cost-effective. This means that within the ABS COF, priority was given to indicators and measures that draw on routinely collected data, and those that are considered particularly powerful in supporting efforts to improve outcomes for children. The goal is to minimise the burden of data collection, and to maximise the availability of meaningful indicators.

To assess this aspect, we looked at the length of the measure, whether it is considered easy to use during a routine contact, and whether there is already some experience with using the instrument in practice. An additional consideration is whether there is a charge for use of the instrument.



Appendix 2: Technical summaries of indicators and measures

Here we provide an overview of Level 1 (light blue) and Level 2 (purple) COF indicators, including their definition, associated indicators and measures.

	Level 1 COF indicators
	Level 2 COF indicators

We also include the MVP rating. The MVP assessment process used a simple 'traffic light' indicator to summarise how well each indicator or measure fits the MVP framework.

	Significant problems or discrepancy compared to the MVP goals
	A reasonable match to the MVP goals, but some concerns
	A good match to the MVP framework.

Maternal mental health

COF outcome	Perinatal maternal mental health – depression and anxiety
Indicators / measures	<p>Several local implementations of NICE guidance CG192 were identified in our work with the ABS sites:</p> <ul style="list-style-type: none"> a) Routine use of GAD-7 and PHQ-9 b) Whooley questions (screening), followed by <ul style="list-style-type: none"> • GAD-2 and PHQ-9 • GAD-7 and PHQ-9 • EPDS <p>Suggested indicators are</p> <ul style="list-style-type: none"> a) Proportion scoring above the cut-off, by measure b) Proportion screened into further assessment on Whooley, followed by proportion scoring above the cut-off. <p>A review of the diagnostic accuracy of the Whooley questions did not find sufficient evidence to recommend its use as a case finding instrument [103]. The EPDS is the most commonly used instrument to assess post-natal depression [104] and shows promise for use with fathers as well as mothers [105]. While there is evidence that the EPDS anxiety sub-scale can usefully identify anxiety and distinguish it from depression [106], sensitivity for detecting generalised anxiety disorder is greater for the GAD-7 [107]. There is a high level of agreement between the EPDS and the PHQ-9 [108]–[110], with the PHQ-9 capturing somatic symptoms of depression.</p>
Time points collected	Booking, 6–8 weeks
Routine data source	Collected as part of routine contacts, but not routinely published. Booking data are part of the maternity dataset.
Meaningful?	Perinatal maternal mental health is of great concern, and a current policy priority [48].
Valid?	Use of the Whooley questions may lead to under-identification.
Pragmatic?	Data are routinely collected, but development work may be necessary to ensure data access.
Caveats	Note that at booking, the Whooley questions are recommended as per NICE guidance CG62. Both a combination of GAD-7 and PHQ-9 or the EPDS can be recommended, but the local approach should be noted in any comparison with other data.

Health behaviours in pregnancy

COF outcome	Smoking in pregnancy
Indicators / measures	<p>Part of the maternity dataset (MAT 101 Booking Appointment Details).</p> <ul style="list-style-type: none"> • Smoking status <ul style="list-style-type: none"> o Current smoker o Ex-smoker o Non-smoker – history unknown o Never smoked • Cigarettes per day
Time points collected	Booking
Routine data source	While these data are collected at booking, they are not part of a routine publication. Development work may be needed locally to ensure consistent collection and data access.
Meaningful?	Meaningful indicators of health behaviours in pregnancy and highly predictive of child outcomes, in particular birth outcome.
Valid?	Given that data are not routinely published, coverage / missing data cannot be assessed at this time.
Pragmatic?	Data are routinely collected, but development work may be necessary to ensure data access.
Caveats	Given that there may be (perceived) stigma associated with smoking in pregnancy, workforce development initiatives should include training in administering the question to ensure good response rates and collection of accurate data.

COF outcome	Alcohol use in pregnancy
Indicators / measures	Part of the maternity dataset (MAT 101 Booking Appointment Details). Weekly alcohol units.
Time points collected	Booking
Routine data source	While these data are collected at booking, they are not part of a routine publication.
Meaningful?	Meaningful indicators of health behaviours in pregnancy and highly predictive of child outcomes, in particular birth outcome.
Valid?	Given that data are not routinely published, coverage / missing data cannot be assessed at this time.
Pragmatic?	Data are routinely collected, but development work may be necessary to ensure data access.
Caveats	Given that there may be (perceived) stigma associated with alcohol use in pregnancy, workforce development initiatives should include training in administering the question to ensure good response rates and collection of accurate data. The recall period is not specified.

COF outcome	Substance abuse in pregnancy
Indicators / measures	Part of the maternity dataset (MAT 101 Booking Appointment Details). Substance use status.
Time points collected	Booking
Routine data source	While these data are collected at booking, they are not part of a routine publication. Development work may be needed locally to ensure consistent collection and data access.
Meaningful?	Meaningful indicators of health behaviours in pregnancy and highly predictive of child outcomes, in particular birth outcome.
Valid?	Given that data are not routinely published, coverage / missing data cannot be assessed at this time.
Pragmatic?	Data are routinely collected, but development work may be necessary to ensure data access.
Caveats	Given that there may be (perceived) stigma associated with substance use in pregnancy, workforce development initiatives should include training in administering the question to ensure good response rates and collection of accurate data. Note that this item only covers unauthorised substances, such as cocaine, crack, heroin, marijuana, morphine and solvents, but excludes tobacco, alcohol and prescription medications.

COF outcome	Birth outcome – low birth weight of term babies
Indicators / measures	Numerator: Number of live births at term (>=37 weeks gestation) with low birth weight (<2500g). Denominator: Number of live births at term.
Time points collected	Delivery
Routine data source	PHOF indicator 2.1; ONS national data
Meaningful?	A good indicator of a healthy pregnancy and predictive of later outcomes.
Valid?	This is a straightforward indicator that is likely to be reliably recorded.
Pragmatic?	Data are routinely collected and published.
Caveats	There may be a delay in obtaining ONS data, so local sourcing of data is encouraged.

COF outcome	Birth outcome: Gestational age
Indicators / measures	Numerator: Number of live births at term at <37 weeks gestation. Denominator: Number of live births.
Time points collected	Delivery
Routine data source	This is not published as a routine indicator, but data are available through ONS: Birth Characteristics
Meaningful?	A good indicator of a healthy pregnancy and predictive of later outcomes.

Valid?	This is a straightforward indicator that is likely to be reliably recorded.
Pragmatic?	Data are routinely collected and published.
Caveats	There may be a delay in obtaining ONS data, so local sourcing of data is encouraged.

COF outcome	Breastfeeding initiation
Indicators / measures	Proportion of women initiating breastfeeding. Numerator: Number of women who initiate breastfeeding in the first 48 hours after delivery. Denominator: Number of total maternities.
Time points collected	Delivery
Routine data source	PHOF indicator 2.2; UNIFY2 (moving to MCSSUD)
Meaningful?	A meaningful indicator of breastfeeding
Valid?	Coverage of this indicator and data quality appear to be good.
Pragmatic?	Data are routinely collected and published.
Caveats	

COF outcome	Breastfeeding at 6–8 weeks
Indicators / measures	Numerator: Number of infants totally breastfeeding at 6–8 weeks and / or number of infants partially breastfeeding at 6–8 weeks. Denominator: Number of infants due a 6–8 week check.
Time points collected	6–8 weeks
Routine data source	PHOF indicator 2.2i; UNIFY2 (moving to MCSSUD)
Meaningful?	A meaningful indicator of breastfeeding
Valid?	Some doubts around validity due to variability in local coverage of 6–8 week check-ups. During the move to the maternity dataset, PHE statistics are considered experimental. The indicator is likely to be biased due to the denominator (number of infants due a check rather than receiving the check, which is the condition for determining breastfeeding status).
Pragmatic?	Data are routinely collected and published.
Caveats	Coverage of 6–8 check-ups and any inequalities need to be considered alongside this indicator. Note that this is reported quarterly, and rates for the four quarters need to be aggregated appropriately to obtain the annual rate.

COF outcome	School readiness
Indicators / measures	Proportion of all eligible children achieving a 'good level of development', defined as achieving at least the expected level within the areas of communication and language development; physical development; personal, social and emotional development; literacy; and mathematics, measured using the early years foundation stage profile (EYFSP)
Time points collected	End of EYFS, normally the final term of the academic year when the child reaches the age of five.
Routine data source	Data are submitted by schools and early years providers to their local authority, and then loaded onto the DfE system COLLECT.
Meaningful?	The EYFSP is considered a useful and comprehensive measure of child development by early years providers.
Valid?	Coverage appears to be comprehensive, with 100% of expected schools and early years settings submitting the latest return (2015 cohort), but the technical document on the indicator does not supply details on the data validation rules in place.
Pragmatic?	Data are routinely collected.
Caveats	Children who are not in receipt of a government funded early education place at the end of the EYFS are not included in the results. Coverage and potential inequalities in coverage should therefore be reported alongside the indicator. Data are comparable from 2013 onwards due to a change in the profile. While the EYFSP is set to remain statutory in 2016, this requirement may change in the future. Note that this is a teacher assessment, and the incentive structure should be monitored closely to ensure data quality.

COF outcome	Key Stage 1 attainment
Indicators / measures	Numerator: Percentage of pupils achieving level 2 or above in reading; writing; mathematics. Denominator: Pupils at the end of key stage 1
Time points collected	End of key stage 1
Routine data source	Data are submitted by schools to their local authority, and then loaded onto the DfE system COLLECT.
Meaningful?	Reading, writing and mathematics (basic skills) are highly predictive of later education attainment and employability [111]–[114].
Valid?	Independent schools and non-maintained special schools can report key stage 1 results if they wish. Coverage is therefore limited.
Pragmatic?	Data are routinely collected.
Caveats	Note that key stage 1 is a teacher assessment, and the incentive structure should be monitored closely to ensure data quality.

COF outcome	Key Stage 2 attainment
Indicators / measures	Numerator: Percentage of pupils achieving the expected standard (scaled score of 100 or above) in reading; Grammar, punctuation and spelling; mathematics. Denominator: Pupils at the end of key stage 2
Time points collected	End of key stage 2
Routine data source	Data are submitted by schools to their local authority, and then loaded onto the DfE system COLLECT. This is combined with other data in the national pupil database (NPD).
Meaningful?	Reading, writing and mathematics (basic skills) are highly predictive of later education attainment and employability [111]–[114].
Valid?	Independent schools, non-maintained special schools and pupil referral units can report key stage 2 results if they wish. Coverage is therefore limited.
Pragmatic?	Data are routinely collected.
Caveats	A new key stage 2 assessment was implemented for 2016, removing the possibility of comparison with previous cohorts. Note that unlike key stage 1, this is a test instead of a teacher assessment.

Diet and nutrition

COF outcome	Weight and height
Indicators / measures	Numerator: Number of children at Reception and Year 6 with valid height and weight recorded who are classified as overweight or obese (\geq 85th centile of UK90 growth reference). Denominator: Total number of children at reception with valid height and weight recorded.
Time points collected	Reception, Year 6
Routine data source	PHOF indicator 2.6i; NCMP
Meaningful?	Obesity is an indicator for only one aspect of nutritional status.
Valid?	Coverage is limited to children in maintained schools.
Pragmatic?	Data are routinely collected and published.
Caveats	Note that 'overweight' status is not thought to be associated with the same health risks as 'obese' status. Where possible, the two should be reported separately.

COF outcome	Oral health
Indicators / measures	Percentage of 5 year olds who are free from obvious dental decay (PHOF indicator 4.02). Numerator: total number of 5 year olds examined who are free from obvious dental decay in an area. Denominator: Total number of examined five year old children in area.
Time points collected	Age 5 to align with PHOF (data collection currently every 4 years); age 3 also available.
Routine data source	Oral Health Survey of 3 / 5 Year Old Children, Public Health England
Meaningful?	While this is a good indicator of oral health, it is suggested to also look at the average number of teeth “decayed, missing or filled” (d3mft) per child, which provides a measure of severity of dental problems.
Valid?	This is based on a population sample. Local authorities are not included in reporting if they did not take part in the survey, or if the number of children examined is less than 30. The infrequent collection makes this a less useful indicator. However, it is possible that data collection will be expanded in the future. Coverage is limited to children in state-funded primary schools.
Pragmatic?	Data are routinely collected and published.
Caveats	Note that this is based on a population sample, and population weighting is applied (see http://www.nwph.net/dentalhealth/). It is suggested to also look at the average number of teeth “decayed, missing or filled” (d3mft) per child, which provides a measure of severity of dental problems.

Communication and language development

COF outcome	Overall language development
Indicators / measures	Proportion of children in monitoring zone and proportion below cut-off on “Communication” domain of ASQ-3
Time point	2-2.5 years
Routine data source	Not currently part of routine publication, but a child development indicator is expected to be included in the PHOF from 2017. The data are being collected, but local development work may be necessary to access.
Meaningful?	Unclear whether this appropriately captures the most important aspects of language development
Valid?	No validation study of the ASQ-3 or ASQ-SE for England / UK could be located. Coverage may vary locally. Coverage of 2-2.5 year old visits should be reported alongside this indicator.
Pragmatic?	Data are collected but not currently published in this form. Some development work may be necessary to facilitate data access.
Caveats	Note that currently, the routine indicator (health visitor service delivery metric C6ii) is the percentage of children who received the ASQ-3 assessment, rather than the result of the screen. Development work may be necessary to facilitate data access.

Social and emotional development

COF outcome	Overall social and emotional development
Indicators / measures	Proportion of children in the monitoring zone and proportion above cut-off on ASQ-SE (30 months questionnaire). Note that currently, in some locations the ASQ:SE is only used after the ASQ-3 indicates a potential problem. It is recommended that the ASQ:SE be routinely used alongside the ASQ-3, as this alone is not thought to adequately reflect social-emotional development.
Time point	2-2.5 years
Routine data source	Not currently part of routine publication, but ASQ-SE to be collected alongside ASQ-3 from October 2016 as part of the PHOF. The data are being collected, but local development work may be necessary to access.
Meaningful?	Unclear whether this appropriately captures the most important aspects of social and emotional development.
Valid?	No validation study of the ASQ-3 or ASQ-SE for England / UK could be located. Coverage may vary locally. Coverage of 2-2.5 year old visits should be reported alongside this indicator.
Pragmatic?	Data are collected but not currently published in this form. Some development work may be necessary to facilitate data access.
Caveats	Collection of ASQ-SE will become statutory in 2016 to feed into the PHOF. Note that currently, the routine indicator (health visitor service delivery metric C6ii) is the percentage of children who received the ASQ-3 assessment, rather than the result of the screen. Development work may be necessary to facilitate data access.

COF outcome	Child abuse and neglect
Indicators / measures	Children in need due to abuse and neglect at 31 March. Numerator: Number of children aged 0-4 assessed to be in need of social care services as a result of, or at risk of, abuse and neglect (also includes children at risk due to domestic violence). Denominator: Mid-year population estimates for a single year (ages 0-4).
Time point	Ages 0-4 (annual data)
Routine data source	DfE statistics: Children in need and child protection (COLLECT system, submitted by local authorities)
Meaningful?	This is a meaningful indicator of children in contact with services. Whether this is a good reflection of CAN in the wider population will depend on service capacity and local practice. Note that data are at the local authority level.
Valid?	While coverage and data quality appear reasonable at the national level, not all local authorities provided returns for 2014/15. This means that locally, data may not be available. A data confidence indicator is provided by local authorities, and this should be considered alongside the indicator.
Pragmatic?	Routinely collected data.
Caveats	See concerns around validity. This indicator should be considered in conjunction with other CAN indicators.

COF outcome	Child abuse and neglect
Indicators / measures	Children in care / looked after due to abuse and neglect at 31 March. Numerator: Number of children aged 0-4 looked after as a result of, or at risk of, abuse and neglect, including adoption and care leavers. Denominator: Mid-year population estimates for a single year (ages 0-4).
Time point	Ages 0-4 (annual data)
Routine data source	DfE statistics: Children looked after in England including adoption (based on SSDA903 returns, submitted by local authorities)
Meaningful?	This is a meaningful indicator of children in contact with services. Whether this is a good reflection of CAN in the wider population will depend on service capacity and local practice. Note that data are at the local authority level.
Valid?	Data validation rules are in place to improve data quality at the point of entry. However, information on data quality appears unpublished.
Pragmatic?	Routinely collected data.
Caveat	See concerns around validity. This indicator should be considered in conjunction with other CAN indicators.

COF outcome	Child abuse and neglect
Indicators / measures	Crude rate of hospital admissions caused by unintentional and deliberate injuries in children aged 0-4 years per 10,000 resident population. Numerator: Number of finished emergency admissions (episode number = 1, admission method starts with 2), with one or more codes for injuries and other adverse effects of external causes (ICD 10: S00-T79 and/or V01-Y36) in any diagnostic field position, in children (aged 0-4 years). Denominator: Denominator: Mid-year population estimates for a single year (ages 0-4).
Time point	Ages 0-4 (annual data)
Routine data source	Hospital Episode Statistics (HES); PHE injury profiles tool; linked to PHOF indicator 2.7i
Meaningful?	The indicator likely captures injuries in children not resultant from CAN. At the same time, the indicator may not capture all morbidity suggestive of CAN.
Valid?	HES data may be inaccurate due to incomplete reporting (no presentation to hospital or incomplete case notes / incorrect ICD codes).
Pragmatic?	Routinely collected data.
Caveats	Note that the PHOF indicator is currently based on PHE injury profiles, which are split into age groups 0-4, 5-17 and 0-17. However, the PHOF indicator reports on ages 0-14 and 15-24, and PHE injury profiles will reflect this split going forward.

Appendix 3: Overview of measures

Perinatal maternal mental health

Edinburgh Postnatal Depression Scale (EPDS)

A self-rating screening tool measuring emotional distress and depression during the postnatal period, but appears to be recommended for use perinatally. It includes 10 items scored on a 4-point scale and covering the previous 7 days. Score range: 0–30. Note that EPDS is a screening tool, rather than a diagnostic tool.

Patient Health Questionnaire (PHQ-9)

PHQ-9 is a 9-item depression scale. Items are rated from 0–3. Scores range from 0–27 indicating either: no depression, minimal, mild, moderate, moderately severe or severe depression. Used to monitor the severity of depression and response to treatment.

Generalized Anxiety Disorder scale (GAD-7)

GAD-7 is used for screening and assessment of generalised anxiety (mother) and includes 7 items scored on a 4-point scale (0–3).

Whooley Postnatal Depression Scale

Assesses levels of postnatal depression using two questions from the Primary Care Evaluation of Mental Disorders patient questionnaire [115]. Previous NICE guidance (CG 45) stated that “Whooley questions appear to offer a relatively quick and convenient way of case finding for healthcare professionals who are not specialists in mental health.” While CG 192 no longer recommends these questions, there may be a benefit to retaining a legacy question where this is locally implemented.

Child development

ASQ:SE

The 30-item instrument measures various aspects of child development, including language development (communication sub-scale). Various questionnaires are available for children aged 1–66 months, with age-dependent screening cut-offs available. The measure is part of the Healthy Child Programme 2–2.5 year review.

Appendix 4: ESRC LuCiD Centre recommendation on language and communication

“What are the key developmental outcomes for children age 0–3 that should be measured and monitored at the population level as a major indicator of successful preventative intervention?”

Language and Communication

We suggest measuring and monitoring five developmental outcomes in language and communication. These are the most important communicative outcomes in the first 3 years and the outcomes most likely to be improved by preventative intervention.

Below we:

- a. describe each outcome
 - b. summarise the age at which children are most likely to achieve this outcome, together with the range of typical individual variation
 - c. Provide a brief explanation of the role of the environment, which explains why this outcome is likely to be improved by preventative intervention
 - d. Provide some suggestions for how these outcomes can be measured. Please note that we focus only on measures of each specific outcome. We do not cover more global measures of language development (e.g. Wellcomm, CELF–Preschool, Preschool Language Scale), unless they contain sub–scales that produce a score for each outcome individually.
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1. Vocalising

Description	<p>During the first year of life, infants start to vocalise. This is initially cooing, gurgling and squealing, but turns into babbling (speech-like sounds) at about 7 months of age. Babbling is a strong predictor of later language production; children who babble early also tend to be children who start to talk early [87]. This, we think, is because babbling allows children to practice the sounds of their language.</p>
Age range	<p>Vihman (1996) suggests the following sequence of acquisition:</p> <p>2-4 months: cooing and laughter</p> <p>4-7 months: onset of vocal play sounds (squeals, yells, growls). Some babies may start some very simple babbling.</p> <p>7+ months: start of "canonical" babbling – strings of repeated syllables (<i>ba-ba-ba</i>, <i>da-da-da</i>) or mixture of syllables (<i>ba-da-ga</i>).</p> <p>The Hanen Society recommends consulting a practitioner if a child doesn't babble with changes in tone by 12 months of age (e.g. <i>dadadadadadadada</i>). (See appendix below for more warning signs)</p>
Role of the environment	<p>Infants vocalise more when parents are interacting with them. Hsu et al. (2001) founds that infants produced more syllabic, speech-like vocalizations when mothers were smiling and making eye contact with them. Goldstein, et al. (2003) similarly found that infants whose mothers responded to their vocalisations with behaviours such as smiling and touching produced more developmental advanced vocalisations.</p> <p>This suggests that interventions that focus on training parents and practitioners to engage in a lot of social interaction with babies should result in babies vocalising more frequently and producing more sophisticated vocalisations.</p>
Measurement	<p>It is possible to measure the onset of vocalisations (e.g. babble), its frequency, and its complexity.</p> <p>Vocalisation frequency and complexity are most commonly measured via observation; watching babies interact with an adult and measuring the number of times the baby vocalises in a set period of time [119] or the types of vocalisation they produce [87]</p> <p>The onset and complexity of babble can also be measured by parental report, where a checklist is given to parents (either on paper or online) for them to record the sounds their child can produce. We are currently validating a parental report babble checklist [120].</p>



2. Development of communicative gestures (non-verbal communication)

Description	<p>A baby's communicative life begins well before she starts to talk. Adults and babies have been engaging in successful communication for quite a few months before the first word, through gestures such as pointing, waving, shaking and nodding the head, and showing and giving objects to other people.</p> <p>These communicative gestures are the precursors to language development; early gesture use is a strong predictor of later language ability. For example, babies who start to use communicative pointing early also develop language earlier [88] and know more words at 18 months of age [87].</p>
Age range	<p>Babies start to communicate with gestures after about 7 months of age, following and interpreting the gestures of others, and their own gestures (e.g. pointing with eye gaze) to request objects and actions, and to share interest.</p> <p>Index finger pointing, which is viewed as a major milestone in communicative development, emerges between 7 and 15 months [121], [122]</p> <p>Note that there are large individual differences both in the frequency of use and in the complexity of gestures at different ages. However, the Hanen Society (see appendix below) recommend consulting a practitioner if a child doesn't use any simple gestures (e.g. shaking her head or waving bye-bye) by 12 months of age.</p>
Role of the environment	<p>We can find very little work that directly measures whether differences in caregiver input predict differences in gesture development, although Namy and colleagues [123] reported a strong correlation between caregivers' use of gestures, and their children's gesture production in interaction.</p> <p>However, given that early gesture use is such a significant developmental milestone, and given that it is such a strong predictor of later language development, it seems sensible to test whether interventions affect the development of communicative gestures. Gesture is also useful since it is quite difficult to measure the very early stages of language development, but relatively simple to measure gesture use.</p>
Measurement	<p>The onset of communicative pointing is the most important, well-studied gesture milestone, although it is difficult to measure the precise moment that an infant starts to point without training their parents to look out for it, or collecting data every day.</p> <p>It is possible to measure the complexity of children's gestures using parent or practitioner report measures like CDIs, which contain gesture sub-section and provide gesture scores (http://mb-cdi.stanford.edu/).</p> <p>It is also possible to measure gesture frequency and complexity by recording children interacting with others and counting and coding the gestures they produce (e.g. Cameron Faulkner, Theakston, Lieven, & Tomasello, 2015).</p> <p>It may be possible to extract gesture information from standardised tests, both lab-based and parent report (e.g. Preschool Language Scale, CELF-Preschool, ASQ-3, Wellcomm). However, although these tests ask questions about gesture use, they do not provide an separate gesture sub-score.</p>

3. Word learning

<p>Description</p>	<p>Word learning or vocabulary development is very simply the process by which we learn to understand and produce new words.</p> <p>Learning a word involves a number of tasks:</p> <ul style="list-style-type: none"> a) learning to recognise and produce the sounds of the words, b) learning the meaning of the word (e.g. dog = four-legged, furry animal that goes woof), c) learning how to generalise the word correctly (i.e. learning that “dog” can be used to refer to all different types of dogs but cannot be used to refer to any cats, no matter how similar they make look to dogs).
<p>Age range</p>	<p>Expressive vocabulary (what children say):</p> <p>Data from the Stanford Wordbank (http://wordbank.stanford.edu/) show that the fastest children have already produced their first word by 8 months of age. However, most children will learn to talk between 9 and 14 months of age. There is a huge amount of individual variation and it is not unusual for children to start talking much later (up to 18 months of age).</p> <p>Receptive vocabulary (what children understand):</p> <p>Most children can understand more words than they can say. Some infants begin to show sensitivity to the meaning of common words around six months of age [89]. Data from the Stanford Wordbank suggests that by 18 month, the average American English-learning child can understand 262 words.</p> <p>Again, there is huge individual variation in the speed of vocabulary learning. However, the Hanen Centre recommend seeking specialist advice if a child doesn't seem to understand any words at all at 12 months of age and/or says no words by 15 months (see appendix).</p>
<p>Role of the environment</p>	<p>Word learning is the most well-researched of all the outcomes. Input quantity is important; we have long known children whose parents talk a lot to them have faster vocabulary development (e.g. Hart & Risley, 1995). More recent work using more sophisticated analytic techniques supports this claim [126].</p> <p>However, input quality may be more important than input quantity. When studies test both quantity and quality together, input quality seems to be the better predictor, at least at later ages (see e.g. Rowe, 2012). Studies on input quality have variously found effects of the amount of contingent talk [128], vocabulary diversity, vocabulary sophistication (the number of rare words in the input) and the rate of decontextualized talk (i.e. words divorced from the here and now; including explanations, pretence, talk about the past/future, and narrative; [127]).</p> <p>However, children of different ages may require different types of talk. Encouraging adults to focus on contingent talk, for example, is very effective for younger children who are just learning to talk. Encouraging adults to use a diverse and sophisticated vocabulary is especially important for 2-year-olds who are building their vocabularies. Decontextualised talk is most effective with older children (3.5 years old; see [127]).</p> <p>These studies suggest that interventions that focus on training parents and practitioners to talk and interact with babies and young children, especially those that focus on teaching adults to use specific language-boosting behaviours in interactions, should result in children learning a greater variety of words more quickly [129].</p>

Measurement	<p>The best way to measure vocabulary is to test how many words children know at a particular point in time. Learning words involves two tasks; learning to understand words (so that you can understand the speech of others, receptive vocabulary) and learning to produce words (i.e. so that you can communicate yourself, expressive vocabulary). It's important to measure both of these since children often understand many more words than they can say.</p> <p>To measure vocabulary as an independent outcome, look for tests that measure receptive and expressive *vocabulary* not receptive and expressive *language*. Receptive and expressive language scales will give a more global measure of language proficiency, not specifically vocabulary size.</p> <p>Receptive vocabulary (what children understand) and expressive vocabulary (what children say) can be measured using standardised lab or clinic-based tests (e.g. the BPVS measures receptive vocabulary).</p> <p>Both can also be measured via parent report instruments like CDIs (http://mb-cdi.stanford.edu/). Most CDIs provide separate scores for receptive and expressive vocabulary. However, scores for receptive vocabulary become increasingly unreliable as children's vocabularies grow very large (after about 18-24 months), since parents find it hard to keep an accurate track of all the words their children know.</p> <p>Please note that the MacArthur-Bates CDI available at the Stanford website above is normed on American children and is not recommended for use with the UK population. A UK-CDI is being developed for UK infants 8-18 months; email Caroline Rowland at crowland@liv.ac.uk for more information.</p>
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4. Development of combinatorial speech (the first stage of grammar (sometimes called morphosyntactic) development)

<p>Description</p>	<p>When children have learnt between 50 and 100 words, they start to put these words together into small phrases. These phrases are usually about two or three words long (e.g. <i>want juice, where car, no more, daddy do it</i>), though children may use a handful of rote-learned longer sequences (e.g. <i>this little piggy go market</i>). Most phrases will have missing function words (e.g. articles like <i>the/a</i>, pronouns like <i>I, we, you</i>) or word endings (e.g. children say <i>want juice</i> instead of <i>I want juice</i>, and <i>that go there</i> instead of <i>that goes there</i>).</p> <p>*Caveat: in some languages, children do not miss out word endings at all, especially languages like Turkish and Spanish that use a lot of different word endings (morphologically rich languages). Here, children start using the (mainly) correct word endings from the start [130], [131].</p>
<p>Age range</p>	<p>Children usually start to combine words into phrases at about 24 months of age, though the time of onset depends on the speed of their vocabulary development. Children tend to start combining words when they have between 50 and 100 words in their vocabulary, so slower vocabulary learners will tend to start later.</p> <p>The DoE's Early Years Outcomes guide [90] suggests that children should start combining words into simple sentences between 22 and 36 months of age. However, children should start to understand simple sentences much earlier; between 16 and 26 months of age [90].</p> <p>The Hanen Centre recommend contacting a specialist if a child doesn't understand simple commands like "Don't touch" by 18 months, and/or isn't consistently joining two words together like "Daddy go" or "shoes on" by 24 months.</p>
<p>Role of the environment</p>	<p>Just like word learning, the amount and type of speech to children determines how quickly they start putting words together into phrases. Combinatorial speech requires the child to already know a certain number of words (usually between 50 to 100). Therefore, children who learn words faster enter the combinatorial stage earlier [132].</p> <p>Thus, interventions that focus on training parents and practitioners to talk and interact with babies and young children, especially those that focus on teaching adults to use specific language-boosting behaviours in interactions, should help children start to combine words earlier and more often. Interventions that boost early vocabulary learning should have a knock-on positive effect on combinatorial speech.</p>
<p>Measurement</p>	<p>Some standardised, clinic/lab-based tests can be used to measure the complexity of a child's grammar. Some provide a detailed profile of children's early combinatorial abilities (Rhode Island Test of Language Structure, Early Repetition Battery). Other language tests contain subscales that measure grammar (TACL and TEXL, CELF Preschool).</p> <p>Parent report checklists like the MacArthur-Bates Words & Sentences contain short sentence complexity measures that can be used to test whether children are putting words together into sentences at all, as well as test the complexity of children's early sentences. (http://mb-cdi.stanford.edu/forms.html)</p> <p>It is also possible to measure a child's grammatical ability using recordings of the child in conversation with a caregiver. Measures like mean length of utterance (MLU) (http://www.sltinfo.com/mean-length-of-utterance/) and IPSyn (http://childes.psy.cmu.edu/grasp/ac105-ipsyn.pdf) can be calculated on transcripts of children's speech, either by hand or using the automated programs available free on the CHILDES website (http://childes.psy.cmu.edu/). For example, children at the combinatorial stage should have a MLU between 1 and 2 morphemes [133].</p> <p>Finally, a webinar and guide to some simple informal techniques to get a more detailed picture of children's grammar are here: http://www.lucid.ac.uk/resources/for-practitioners/sitlearn/</p>

5. Development of more complex sentences

Description	<p>At some point between 2 and 3 years of age, children will start to produce longer, more complex sentences. At the same time, they will start to include function words (e.g. articles like <i>the/a</i>, pronouns like <i>I, we, you</i>) and word endings (e.g. <i>cars, going</i>) in their sentences.</p> <p>At this point, children's language starts to sound more adult-like, both in terms of the structure of their sentences and in terms of the topics they can converse about (e.g. using talk to connect ideas and give explanations).</p> <p>At this stage, however, children also make errors. They make errors in word choice, for example using full noun phrases (e.g. <i>the dog</i>) where a pronoun would be more appropriate (e.g. <i>he</i>, Matthews, Lieven, Theakston, & Tomasello, 2006). Also, they may use the wrong word endings (e.g. <i>Mummy, I runned instead of Mummy I ran</i>, Marcus et al., 1992), use the wrong pronouns (e.g. <i>me do it instead of I do it</i>, Rispoli, 1994) or mix up the word order of questions (e.g. <i>Daddy, why you don't like peas?</i>, Rowland, 2007). However, these errors are a sign of progress not of a problem; they show that children, using trial and error, are figuring out the grammatical rules of language (see Pine, 2015)</p>
Age range	<p>As always, comprehension precedes production. Between 22 and 36 months of age, children start to understand more complex sentences (e.g. <i>Put your toys away and then we'll read a book</i>). They probably won't begin to produce more complex sentences, or use a range of tenses (e.g. <i>play, playing, will play, played</i>) until 30-50 months [90]. At the same time they will start to talk about more sophisticated subjects; they will start to "Use talk to connect ideas, explain what is happening and anticipate what might happen next, recall and relive past experiences." [90]</p> <p>The Hanen Centre suggests that parents should consult a professional if their child isn't using some adult grammar by 30 months (e.g. <i>two babies, doggie sleeping</i>), and if they're not asking questions or using full sentences (e.g. <i>I don't want that, my truck is broken</i>) by 36 months.</p>
Role of the environment	<p>Children who hear more diverse language and more complex language develop language more quickly.</p> <p>For example, Huttenlocher, Vasilyeva, Cymerman & Levine (2002) showed that four-year-old children whose parents produced a lot of complex utterances containing more than one clause tended to be good at producing and understanding complex sentences. Interestingly, the researchers performed the same analysis on the children's teachers' language and found a similar effect. Four-year-old children developed syntax more quickly when their teachers used a lot of complex, multi-clausal sentences.</p> <p>This relationship also holds for the acquisition of function words and word endings too. Children seem to learn more frequent forms first and make fewer errors with them (see e.g. Kirjavainen, Theakston, & Lieven, 2009; Räsänen, Ambridge, & Pine, 2013)</p> <p>These results suggest that interventions that train parents and practitioners to talk and interact with young children, especially those that focus on teaching adults to model more sophisticated language and a greater variety of sentence structures and word endings, should result in children learning to produce and understand more complex grammatical sentence types more quickly [142].</p>
Measurement	<p>See previous section – measurement of combinatorial speech. The same measures can be used to assess the development of more complex sentences.</p>

Warning signs of speech and language delays

The Hanen Centre (<http://www.hanen.org/Home.aspx>) recommends that parents and practitioners seek professional advice if a child exhibits the following warning signs.

These do not necessarily indicate a long-term problem. Between one third and one half of late talkers catch up with their peers before they enter school without any specialist intervention. However, these warning signs may indicate a problem, so it is wise to talk to a health visitor about them.

Extract from [Hanen](#):

“We strongly recommend that you seek help from a speech-language professional if your child:

By 12 months

- doesn't babble with changes in tone – e.g. dadadadadadadada
- doesn't use gestures like waving “bye bye” or shaking head for “no”
- doesn't respond to her/his name
- doesn't communicate in some way when s/he needs help with something

By 15 months

- doesn't understand and respond to words like “no” and “up”
- says no words
- doesn't point to objects or pictures when asked “Where's the...?”
- doesn't point to things of interest as if to say “Look at that!” and then look right at you

By 18 months

- doesn't understand simple commands like “Don't touch”
- isn't using at least 20 single words like “Mommy” or “up”
- doesn't respond with a word or gesture to a question such as “What's that?” or “Where's your shoe?”
- can't point to two or three major body parts such as head, nose, eyes, feet

By 24 months

- says fewer than 100 words
 - isn't consistently joining two words together like “Daddy go” or “shoes on”
 - doesn't imitate actions or words
 - doesn't pretend with toys, such as feeding doll or making toy man drive toy car
-

By 30 months

- says fewer than 300 words
- isn't using action words like "run", "eat", "fall"
- isn't using some adult grammar, such as "two babies" and "doggie sleeping"

3-4 years

- doesn't ask questions by 3 years
 - isn't using sentences (e.g., "I don't want that" or "My truck is broken") by three years
 - isn't able to tell a simple story by four or five years"
-

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