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Does promoting parents' contingent talk with their infants benefit language development?

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For the academic paper reporting this study please see:

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Executive summary

1. This study demonstrated that the social gradient in language ability emerges during the second year of life. While 11 month olds' communication skills are not related to the socio-economic status (SES) of their family, by 18 months children from low SES families tend to have smaller vocabularies than their advantaged peers. Existing work demonstrates that this difference persists as children approach school age, putting them at risk of educational disadvantage.
2. There are many reasons why language and social disadvantage are associated with life outcomes. Amongst the possible courses of action, parenting interventions have been proposed as having strong potential to improve language development and related outcomes.
3. This study tested whether showing caregivers a short video about talking with their children would lead to changes in both parenting style and child language development. Specifically, we promoted **contingent talk**, which involves a caregiver tuning in to whatever has captured their baby's attention and talking to them about it.
4. In a randomised controlled trial involving 142 families, we asked parents to engage in either a language intervention to promote contingent talk or in a dental health intervention. Parents in the language intervention watched a 10-minute video about contingent talk when their babies were 11 months old. A month later, these families were observed to engage in more contingent talk than those in the dental control group. This demonstrates that a low-intensity intervention can promote a type of parental talk that is associated with positive language development.
5. For lower socio-economic status families, this intervention had knock-on benefits for children's language development. Lower socio-economic status parents in the contingent talk intervention reported that their children had larger vocabularies at 15 and 18 months than children in the dental health intervention. Child language transcriptions suggest parental reports were reliable.
6. To assess duration of effect, we ran assessments a year after the intervention was run. The effect of the intervention did not last to the point at which the children turned 2 years old. This adds to educational research suggesting repeated intervention are necessary to ensure lasting benefits.

Background

Children's language skills as they enter school are a key determinant of their academic success, life chances and social wellbeing (Field, 2010). Unfortunately, by the age of three, children from disadvantaged areas already tend to have limited language skills compared to national norms, putting them at risk of educational disadvantage as they enter the school system (Locke, Ginsborg, & Peers, 2002). There is a wide range of opinion as to why socio-economic status (SES), parenting style and child outcomes are associated (e.g., Labov, 1972; Bourdieu, 1991; Clegg & Ginsborg, 2006). While the reasons for the association are not fully understood, recent studies suggest parenting interventions have the potential to help children develop strong language skills before they enter full time education.

Few parenting interventions to date have focused on children at risk of language delay due to social disadvantage specifically, and those that have have found equivocal results (e.g., Suskind et al., 2016; Ward, 1999; Wake et al., 2011). These interventions changed multiple aspects of parenting at the same time and so it is not clear why some worked and others did not – we do not know what the 'active ingredients' of effective interventions are. Meta-analyses of parenting interventions more generally suggest that the largest effect sizes are seen in interventions that promote parental responsiveness (Roberts & Kaiser, 2011). At the same time, a substantial body of naturalistic research has shown that one type of parental responsiveness, *contingent talk*, is especially strongly associated with early vocabulary development and therefore could form the basis of a theoretically motivated intervention.

Contingent talk refers to a style of communication whereby the caregiver talks about what is in the infant's current focus of attention. Between the ages of 9 and 18 months, this kind of talk should be particularly helpful for language learning as infants this age cannot readily redirect their attention in order to understand language. Correlational studies show that infants whose parents frequently engage in contingent talk during infancy (e.g., when they are 9 months old) go on to have substantially larger vocabularies as toddlers (McGillion et al., 2013). However, it was not known whether asking parents to increase the amount they engage in contingent talk would be feasible (or would have unintended

consequences or be ineffective), whether it would have a causal effect on child language and whether it would be equally effective for families of different socio-economic status (SES). Furthermore, we did not know at what age social gradients in caregiver speech and child language emerge (and therefore how early interventions would need to begin) or whether differences are similar in the UK compared to the US (where most research has been conducted to date).

The aim of this research was to address these questions by conducting a randomised controlled trial with typically developing infants from high- and low-SES families. By assessing infant and parent language before and after a low-intensity parenting intervention, we were able to build up a picture of early language learning in the UK and test both whether and how early parenting interventions work to promote language development.

Method

142 11 month olds and their caregivers took part from a pool of 1688 families who were invited to take part by post or email. This sample size was based on a power analysis set to detect a medium sized effect of the intervention, if it were present. The broader pool were contacted by a marketing company on the basis that they lived in South Yorkshire or North Derbyshire and had a child under the age of 11 months upon contact.

This RCT was an efficacy study and we therefore controlled for factors known to be associated with language development by applying stringent inclusion criteria (which should be borne in mind when considering how to generalise findings). In order to test the effect of caregiver contingent talk on language development, we only recruited families where the child spent the majority of their waking hours with their primary caregiver. Inclusion criteria for recruitment were thus that: 1) infants were first born and singletons; 2) infants were born no more than 3 weeks prematurely; 3) infant birth weight was over 2.5kg (as low birth weight is associated with both SES and cognitive outcomes); 4) infants were monolingual, being raised as English speaking (necessary for standardised assessments); 5) primary caregiver worked less than 24 hours per week (both to ensure they were the infant's

primary source of language input and to allow a research assistant to visit the home during the week);
6) neither caregiver nor infant had any significant known physical, mental or learning disability.

Families lived in areas spanning the full range of the 2015 English Indices of Deprivation (IMD). One third of families lived in areas with a score in the bottom three IMD deciles, a further 30% lived in deciles 4-6, with the remaining 37% living in deciles 7-10. A principal components analysis (N=138) confirmed that IMD rank, primary caregiver education and annual income collapsed onto one factor and this factor was used as the measure of socio-economic status in analyses. The two intervention conditions in this study did not differ in terms of SES.

Infants were 11 months old at the first home visit during which baseline measures were collected. Following this visit, families were randomly assigned (following CONSORT guidelines) to either a language intervention or a dental health intervention (developed with the School of Dentistry at the University of Sheffield, who are separately analysing the impact of advice for parents on early dental health). Simple randomisation was used.

Families in the language intervention watched a 10-minute video about contingent talk and were asked to practice it for 15 minutes a day for a month. Families in the dental health intervention watched a matched video about promoting dental health and were asked to practice engaging in activities that promoted healthy teeth for 15 minutes a day for a month.

Parent communication was measured prior to the intervention when infants were 11 months old (baseline) and one month after it (12-month post-test). Naturalistic videos of caregiver-infant interaction were coded using ELAN video-annotating software as shown in Figure 1. Caregiver speech was transcribed. CLAN software was used to calculate the number of contingent word tokens and types heard by each child. Longer audio recordings (2 x 16 hour recordings) were collected using LENA recorders as a secondary measure at 11, 12, 18 and 24 months. LENA recorders are small audio recorders that sit inside a vest worn by the infant and record their acoustic environment for 16 hours. The recordings were analysed with LENA automatic speech recognition software to estimate the number of infant and caregiver vocalisations produced during that period.

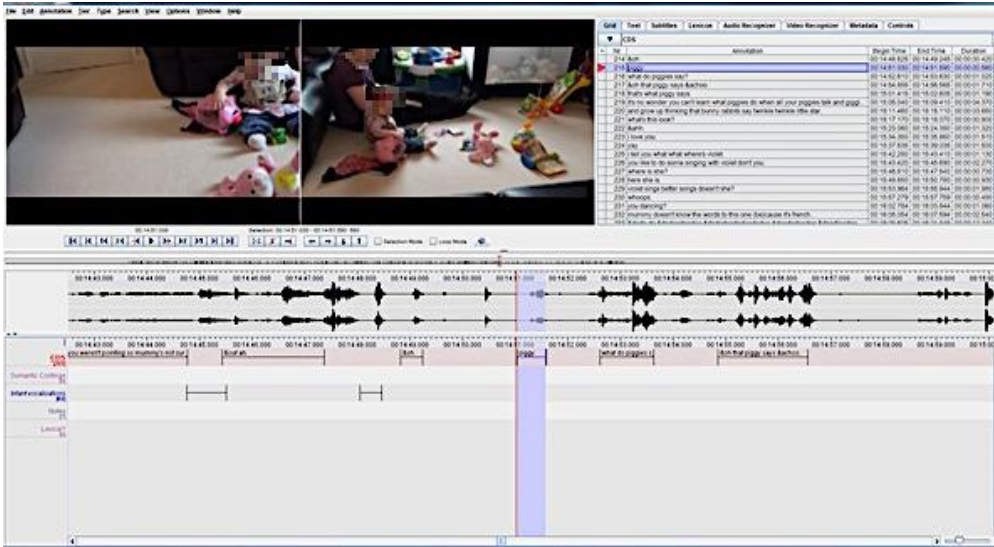


Figure 1. ELAN coding software used for naturalistic analyses.

Infant communication was assessed at the 11-month baseline and at 12, 15, 18 and 24 months. Measuring language ability at these early stages is a methodological challenge. Since the most sensitive measure of infant language ability is parent report, we took this as the primary outcome measure at all time points, using a British adaptation of the MacArthur-Bates Communicative Development Inventory (CDI). The Infant Words and Gestures Form was used for 11, 12, 15 and 18 months and the Toddler Words and Sentences Form was used for 24 months LCDI (Meints, 2000). We checked the reliability of parent reports by transcribing video recordings of low SES infants' speech at 18 months in ELAN and found very high levels of agreement and no evidence that the intervention introduced bias in reporting, making it a good measurement tool.

At 24 months we also assessed children's language ability with 1) standardised language tests - the Reynell Comprehension Scale (Edwards, Garman, Hughes, Letts, & Sinka, 1999) and the Early Repetition Battery (ERB: Seeff-Gabriel, Chiat, & Roy, 2008) and 2) video-recorded naturalistic speech that transcribed followed CHAT guidelines for transcribing child language. Word counts were extracted using CLAN (MacWhinney, 2000). LENA measures of infant vocalisation were not associated with any other assessment of child language and thus were not made use of other than to

check equivalence and social gradients at baseline. An overview of the language measures taken at each time point is presented in the CONSORT diagram (Figure 2).

Finally, we also measured: caregivers' goals for their infant's future from a list of nine academic, socio-emotional and developmental focused statements; dental health (Huebner & Riedy, 2010); parental self efficacy (adapted from Teti & Gelfand, 1991); parent anxiety and depression (Hospital Anxiety and Depression Scale) (Zigmond & Snaith, 1983); 7) and parent perceived stress (Cohen, Kamarck, & Mermelstein, 1983). While over a third of parents met clinical criteria for anxiety or depression, and there was substantial variance in parental self-efficacy, these variables were not associated with caregiver speech or SES and are therefore not considered in the results section. Nonetheless, these findings are a reminder that parents with young infants are a vulnerable population who need support and this should be borne in mind when designing parenting interventions.

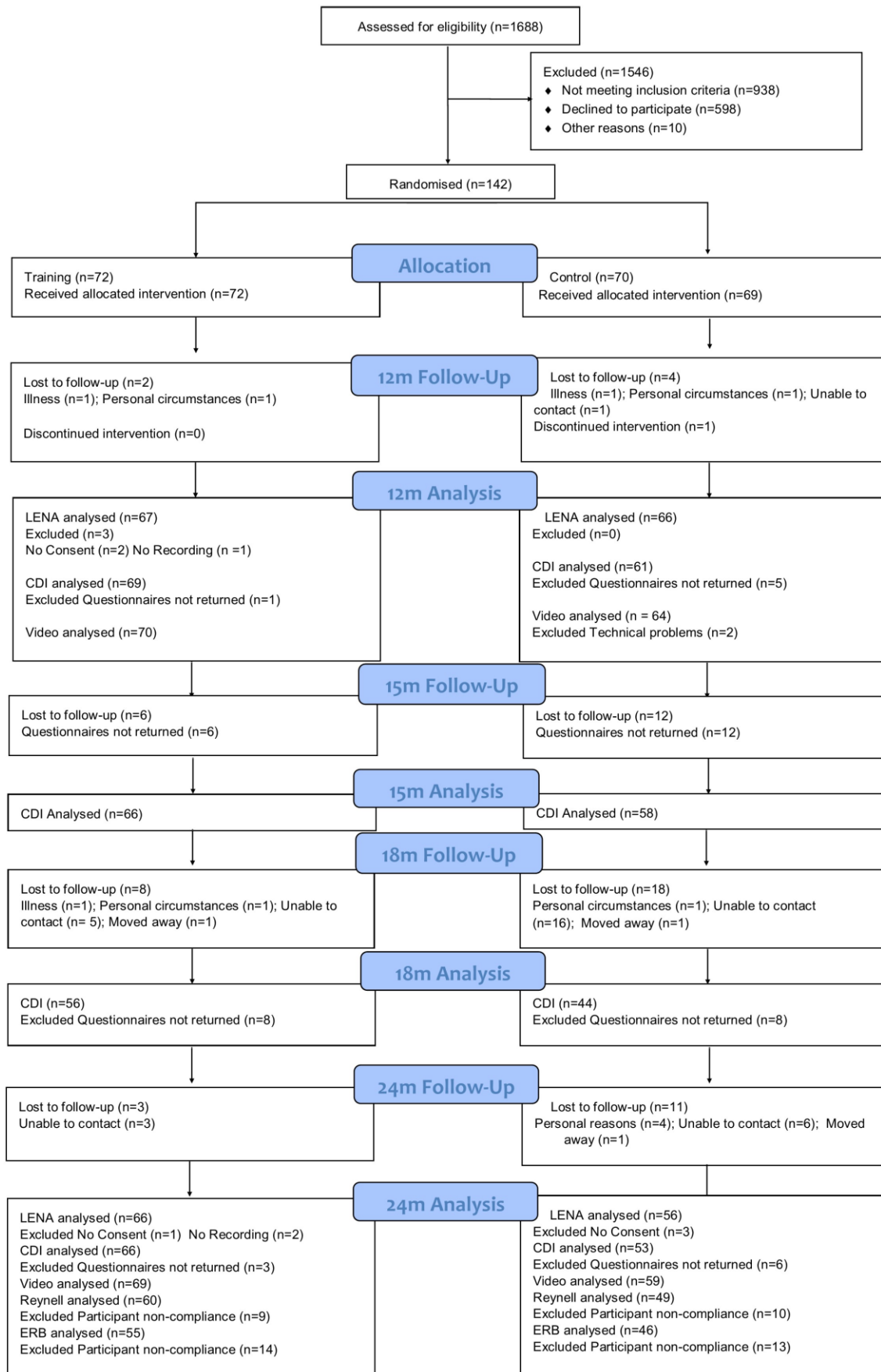


Figure 2. CONSORT diagram.

Results:

At the 11-month baseline, social gradients were observed in parent contingent talk such that the speech of higher SES parents tended to be proportionally more contingent on infants' attention (Sample size = 138 parents, $r = .26$). At this stage of development, there was no correlation between any measure of infant communication and socio-economic status.

Caregivers reported completing intervention activities most days (mean = 22 days) between the 11-month baseline and the 12-month post-test and this did not differ as a function of condition or socio-economic status. There was a significant effect of intervention on parents' contingent talk at the 12-month post-test such that parents in the language intervention engaged in more contingent talk than those who took part in the closely matched dental health intervention (Hedges' g , = 0.35, i.e., a small-medium effect. NB baseline differences were accounted for in all analyses). The effect of the intervention on parental behaviour did not differ as a function of socio-economic status.

A large set of child language outcome measures was collected at the final 24-month point including parent report, naturalistic transcription and standardised tests. There was no effect of intervention on any of the measures taken at 24 months. To test whether the intervention had an effect on language prior to 24 months, we looked at caregiver reports of expressive vocabulary (i.e., how many words parents say their children can produce on the CDI words and gestures form collected at 11, 12, 15 and 18 months). For lower socio-economic status families, caregivers reported significantly higher expressive vocabularies in the intervention condition compared to the control condition (see Figure 3, median split on socio-economic status used for visualisation). For the lower SES infants, reported vocabulary grew at a rate of 6.64 words per month in the control condition, and at a rate of 10.57 words per month in the intervention condition. The rate of learning of children in the intervention condition did not differ as a function of SES (high SES children in the intervention condition learnt at a rate of 11.07 words per month), suggesting that the intervention prevented the opening of a social gradient during the second year of life.

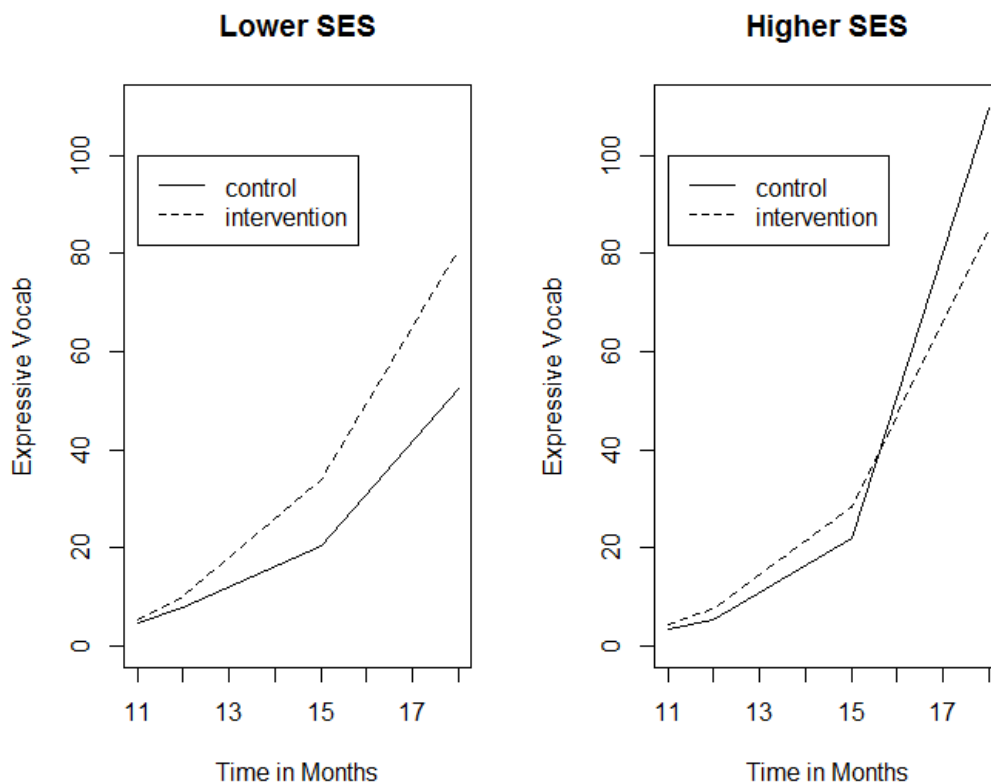


Figure 3. *Expressive vocabulary (CDI Words and Gesture form) as a function of condition and caregiver SES*

Since there was considerable variance in caregiver contingent talk at the 11-month baseline (more than could be induced through intervention), we tested whether this natural variance was associated with child expressive vocabulary at 24 months (using a single measure derived from parent report and transcribed child vocabulary). We found that 22% of the variance in language ability at 24 months was predicted by caregiver contingent talk at 11 months alongside infant vocabulary at 11 months and family socio-economic status at 11 months. This suggests that child language outcomes at 24 months are associated with natural variance in contingent talk at 11 months. Since the natural variance we observe was greater than that created by a 10-minute video intervention, this raises the question of whether repeated interventions at developmentally appropriate intervals would have a longer-lasting effect.

Conclusion:

Infant communication skills at the end of the first year of life do not tend to vary as a function of SES in the UK. Yet over the second year of life a social gradient begins to emerge such that higher SES children are able to produce more words. Existing research demonstrates differences in language ability persist and put lower SES children at a disadvantage as they enter the school system.

The degree to which parents engage in contingent talk in infancy is one factor that affects child language learning. It was possible to increase contingent talk through a low intensity intervention (10-minute video shown to caregivers when their child was 11 months old) and this was effective in promoting language development of lower socio-economic status infants when they were 15 and 18 months. However, the benefits had faded out by the time children turned 2 years old. This study was unusual in following up children for a year post intervention and the results indicate how critical such longer-term follow-ups are. The assumption of early interventions is often that promoting children's ability early on will permanently reset a trajectory. While, in principle, this is possible, in reality, many educational interventions tend to work for a while and then wear off (Ramey & Ramey, 1998). To make a difference, repeated support over the life course would be needed. Below, we consider the implications of these findings for future research, practice and policy.

Implications for future research

Future research should aim to make progress on three fronts: 1) finding out what works - which interventions are most effective and when, 2) better understanding the causes and consequences of different types of language ability and 3) understanding the maximum possible impact of educational interventions given societal and economic constraints.

What works Given limited resources in the health and education systems, our first goal should be to ask how and when to intervene for maximum impact. To achieve this we need to select target outcomes at specific time points (e.g., school entry, end of key stage 1). Taking educational opportunity at school entry as the target outcome, and assuming that intervention early in infancy alone

is likely to fade out, a helpful next step would be to assess the relative benefits of interventions run only during the preschool period leading up to reception compared to during both infancy and the preschool period combined. It is plausible that, if caregivers in the current intervention had received follow-up support at regular intervals, then the early gains observed would have been maintained. Such follow-ups would need to adapt over time in order to be developmentally appropriate. For example, promoting contingent talk for infants is appropriate, but we assume the current intervention would not have had an effect on parenting behaviours that become relevant as children enter the toddler and preschool years such as *recasting* and *expanding* children's utterances (Cleave, Becker, Curran, Van Horne, & Fey, 2015; Taumoepeau, 2016). Thus, a key question for future research is whether there is real educational benefit in intervening early in infancy and maintaining intervention across time, or whether greater effects would be achieved by spending the same amount of money on more intensive intervention during preschool – or even later (see Norbury, 2015 for a discussion of this question with respect to clinical interventions).

One reason why early intervention could be worth persisting with is that most parents were generally happy to receive information and responded to the messages well. It would be possible to create brief video tips like the ones used in the current study that parents would receive on a quarterly basis (potentially after signing up during antenatal health visits). These could be combined with engaging material to maintain interest. Well-delivered, regularly repeated video interventions could be made available to a large audience relatively easily and could be cost-effective. They could be used to meet the key challenge of 'scaling up' that was recently identified in the Lancet Early Childhood Development Series (2016). The challenge here is that, while it is possible to devise intensive interventions that would make a difference, these are unlikely to be funded by government on a large scale. We could envisage a system where, over the first two years of life, video interventions delivered by mobile phones raise awareness of child language development across the board and then health and educational resources are targeted at children who are specifically at risk from the outset, or whose language development is delayed at school entry.

Such a programme of universal early intervention might also act as a gateway to later programmes. On this view, early intervention would be an opportunity for caregivers to form implementation intentions (“if I have the chance to support my child’s language development, I will take it”) that would then be acted on at later time points (e.g., when a preschool makes contact about a shared reading programme). Indeed, these early interventions are most likely to have lasting effects if coupled with quality pre-school provision from 2 years onwards. Effective pre-school interventions have been identified (e.g., Fricke, Bowyer-Crane, Haley, Hulme, & Snowling, 2013), and programmes have been developed to promote parenting through preschools (e.g., Hannon, Weinberger & Nutbrown 1991; Nutbrown, Hannon & Morgan, 2005). An important question for future research is whether low SES children would enter school with comparable levels of language to high SES peers if their parents received regular low-intensity intervention, and if they attended quality preschools from 2 years. To find out, what is needed now is systematic work to assess the best combination of intervention components, place of delivery, intensity, timing and duration.

A key challenge for future work that spans developmental stages like this is to retain the ability to detect the ‘active ingredients’ in interventions. As interventions become larger, they necessarily change many parenting behaviours at the same time, leaving us unable to tell which changes in behaviour were responsible for any positive effects. One benefit of the current research is that it promoted one behaviour for theoretically motivated reasons; and checked that the intervention had had an effect on parents’ behaviour and on children’s language. The mechanism of change was therefore understood in detail. Running interventions in this way, behaviour by behaviour, would be very expensive, so a balance needs to be struck.

Causes and consequences The inescapable conclusion from the current study is that to truly make a difference considerable resource would need to be spent on consistently promoting children’s language skills over the course of childhood. Given the effort required, it is important to make sure we are targeting precisely the right developments and doing so by identifying their principle causes (or at

least the principle causes that are open to change). To achieve this, the above intervention research should go hand in hand with longitudinal work that aims to understand the causes and consequences of specific types of language skills (good vocabulary and grammatical skills, good phonological awareness and pre-literacy skills, good pragmatic skills for social interaction).

To have the best chance of developing effective interventions, we need to know what causes individual differences and social gradients in language development. For example, relatively little is known about why the differences in parenting culture we observe exist in the first place. By better understanding this we will be able to target the primary causes of delay and identify those that are most open to intervention. Both qualitative work and quantitative longitudinal work with large sample sizes is necessary to better understand the likely pathways involved here and to ensure we target the right aspects of language at the right time.

In terms of outcomes, vocabulary was targeted in the current study with good reason. It is a measurable indicator of school readiness that predicts later academic outcomes and is fundamental to early literacy. However, other skills, particularly the pragmatic language skills required for effective interaction have been relatively neglected. Recent research suggests individual differences in pragmatic competence predict important social outcomes (peer relations, absence of behavioural problems) over and above formal language skills not only for clinical groups but also for the general population. Including these social outcomes alongside (or as part of) school readiness measures and educational results might help to ensure that intervention programmes deliver increases in social wellbeing.

Education in the broader picture A final but very important question for research is how much of an impact we can expect educational interventions to have in general. We assume that education alone is not going to solve the problems associated with poverty, gross social inequality or social immobility, but that, given the society in which we live, it can helpfully make a meaningful difference. An important question that should receive further empirical investigation is exactly how much of a difference education can make given the social and economic constraints of a country.

To address this question, psychologists need to work with sociologists and economists to consider the potential of education as one tool in the social wellbeing kit by conducting comparisons across countries. Two examples of recent research are helpful in setting out some of the issues involved. First, sociologists have argued that education in the UK has had limited effect on social mobility over the past 5 decades, potentially because more advantaged parents use their advantage to help their children to be advantaged also (Goldthorpe, 2016). Second, a review from LSE suggests that how much money a family has matters for child cognitive outcomes even when other factors are controlled (Cooper & Stewart, 2013, updated 2017). These studies focus on different outcomes, but both demonstrate how we need to understand educational interventions in the context of the broader social and economic environment in which they take place. Failure to consider mechanisms of change at this scale would result in a great potential for interventions to be misguided. To focus on the question of language development, we know very little of how the social structure of a country determines such things as parenting culture or whether relieving financial pressure would have a greater or lesser effect than raising awareness about parenting. Carefully designed control interventions, international comparisons and cross-cultural study alongside systematic and integrative reviews of the available evidence are needed to provide us with the broader picture.

Implications for practice

While there are many unresolved questions, there are practical recommendations that it is safe to make given the current state of research. This study demonstrated that showing parents a short video was effective in promoting the style of linguistic interaction we intended to target and parents had retained this message over a month later. This is promising as videos can be relatively cheap to produce and can be shown either during a visit from a health worker or disseminated electronically, for example, by sending links to mobile phones, which are becoming increasingly available across social strata. Videos are also a form of intervention that can be effective for parents with low literacy levels.

While the effect of promoting contingent talk did not last in the long term, the fact that it had an impact in the short term, alongside a wealth of previous longitudinal and experimental evidence, suggests that promoting this style of talking would be good practice. It can therefore be recommended to health professionals working with families including **health visitors** and **speech and language therapists**.

One place in which it might be particularly important for professionals to be aware of the benefits of contingent talk is in baby rooms in **day care settings**. If day care professionals have multiple infants under their care, then it can be challenging to engage in responsive proto-conversations with infants. Research with twins suggests that this explains the slight delay seen by three years in language development (Thorpe, Rutter & Greenwood, 2003). Therefore, making interaction a priority for staff working with babies in day care would be a good idea. The following article in Nursery World makes this message available to professionals in this setting: www.sheffield.ac.uk/polopoly_fs/1.731434!/file/NurseryWorld.pdf. One practical advantage of training day care staff is that they potentially reach very many children compared to training individual parents.

The findings of this research can also be applied to children who are at particular risk of language delay due to lack of access to responsive interaction for a variety of reasons. One such group is children in the care system. **Social workers** and **foster carers** could be trained to be aware of the role of responsive caregiving in supporting development and the need for good communication skills not only for positive academic outcomes but also social and emotional wellbeing. This is one area where resources have the potential to make a considerable difference to children at high risk of language delay, and for whom the ability to communicate is particularly important. Another group of children whose language development can be delayed due to environmental factors (including access to responsive language) for very different reasons are those with **hearing impairments**. While speech and language therapy for children with severe to profound hearing loss is a specialist area, it is well known that deaf infants with hearing parents are at risk of language delay. The landscape here is fast

changing due to technological innovations in early hearing screening and cochlear implants.

Consequently, there is very little up-to-date empirical evidence about how best to support effective caregiver-infant communication during the first two years of life (a time when contingent interaction is difficult to achieve for hearing parents) to ensure that children can access language that they are able to learn from. There are clear indications that failure to do so leads to marked, long-lasting consequences for language development that seem to have knock-on effects for other areas such as social cognition. Practitioners delivering parenting interventions for at-risk groups like this, such as **teachers of the deaf**, could receive more training on how hearing status, parenting practices and SES will potentially interact, and should be given the opportunity to feed back experiences of delivering interventions to the research community.

Implications for policy

A large body of work has demonstrated that language skills are profoundly important for children's educational opportunity and social wellbeing. This study, taken in the context of the broader literature, suggests that it is possible to promote language through supporting the environments in which it is learnt, but that doing so will require sustained support throughout childhood. This points to the following policy recommendations.

First, raising public awareness of the importance of language skills and the role of caregivers in supporting them would be valuable. Awareness could be raised from ante-natal classes onwards and could be maintained through health visitors by making informative video content available (a potentially cost-effective method that maximises use of health worker time).

Second, this early intervention work should connect up to quality day care provision. In day care settings, providing responsive childcare will be a challenge where there are multiple infants per staff member. Where staff-child ratios are good, and staff have an awareness of factors affecting child development and are able to interact in a responsive manner, child language will benefit. Good ratios should be maintained and a new focus on quality of provision is needed. Recommendations regarding

staff training and qualification were made in the Nutbrown report (2012). Rolling out new provision in a way that allows systematic evaluation of its effectiveness would allow us to make more rapid progress in optimising preschool provision.

Third, programmes to support children who are at risk of language delay entirely or partly due to difficulty in accessing quality interaction (due to a wide variety of reasons – e.g., looked after children or some cases of hearing loss) are urgently needed. Some groups of children are at high risk of negative outcomes that are avoidable and they need to be a priority.

Summary

In summary, a social gradient emerges in the speech of British children during the second year of life. From this point onwards, more socially advantaged children tend to have better language skills that put them in a position to derive greater benefit from education. Contingent talk plays a causal role in promoting vocabulary growth and is one important factor in explaining differences in early vocabulary development. It is possible to intervene to increase contingent talk in a way that benefits low SES children's vocabulary specifically. However, these benefits fade out with time and so, if effects are to last, it would be necessary to provide regular follow-up support. Assessing the effect of such follow-ups with families and in early-years educational settings would be a valuable next step in establishing how best to ensure that all children reach school with the strong language skills that permit full access to education and social activity.

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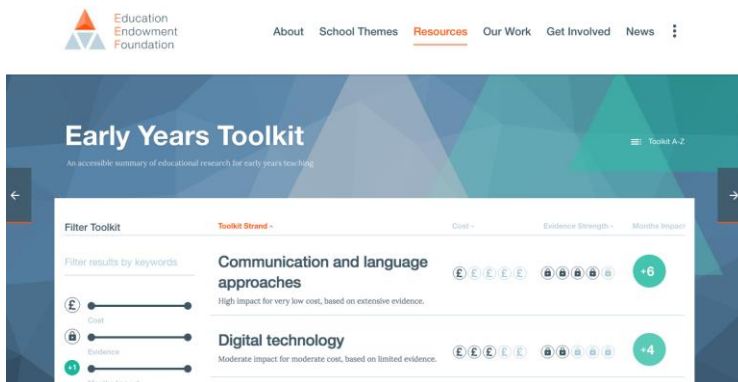
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Resources:

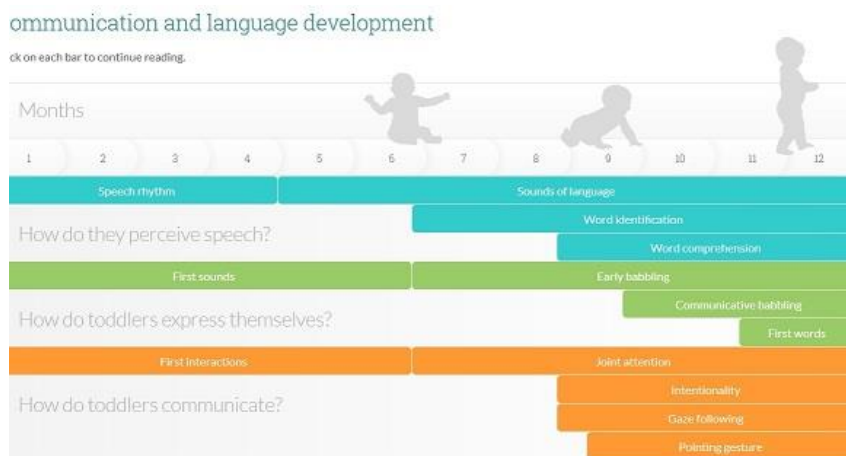
A helpful guide to early educational interventions for practitioners:

<https://educationendowmentfoundation.org.uk/resources/early-years-toolkit>



A site for parents and practitioners interested in early language development (not an intervention).

www.beforefirstwords.upf.edu



While this study focussed on typical language development, many children struggle to learn language due to a developmental disorder. These are not thought to be caused by parenting. The RALLI campaign to raise awareness of language learning impairments makes helpful videos available:

<https://www.youtube.com/user/RALLIcampaign>

