Bridging the Early Language Gap: A Plan for Scaling Up

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Executive Summary

Disparities in academic achievement by socio-economic status (SES) are rooted in part in early life experiences, including the language environment that surrounds young children during their critical early years. Exciting new interventions address this early language gap by enriching the language environments at home and in child care and preschool settings. However, achieving an impact at the population level requires that we go beyond the intensive one-on-one interventions that have been developed so far. This white paper describes a multi-tiered set of interventions pitched at the population, community, and individual levels. This multi-tiered initiative would employ interventions at multiple touchpoints to ensure a broad reach across diverse communities and to offer strategies that are tailored to a child’s development stage. Its goal is to devise an initiative that is scalable and in which the components have considerable synergy, so that we can begin to see a population-level impact on the SES gap in school readiness within a decade.

In the early language initiative we propose, population-level efforts would create a broad public awareness about the importance of “parent talk,” using broad-based media campaigns, Internet-based interventions, and interventions that reach expecting and young parents as they access the healthcare system for prenatal, postnatal, and infant care.

Community-level interventions would work through local civic or community/neighborhood-based organizations to educate and support parents and caregivers. These interventions may use Internet- or video resources, but integrate them into programming with a face-to-face component, harnessing social processes of mentoring and peer support. Possible sites include public libraries, churches, and other civic or community-based organizations. Community-level interventions might also work with caregivers and teachers in child care and preschool settings.

More intensive, individual-level interventions, including home visiting interventions, would meet the needs of high-risk families. This kind of intervention could be integrated into existing home visiting programs including the Affordable Care Act’s Maternal, Infant, and Early Childhood Home Visiting (MIECHV) program, administered by HRSA, which supports evidence-based programs to promote goals including early education and school readiness.

Bringing this initiative to scale requires partnerships with public agencies at the national, state, and local level. It also requires collaboration with a wide range of private/nonprofit organizations across the healthcare, social work, and early education sectors. It will require regular assessment to determine whether the initiative is reaching all families in need and how effective it is at promoting language development and school readiness. It will also require sustained leadership, organizational infrastructure, and funding – a substantial investment, but one with the potential for critical impact on the inequality in language development, school achievement, and adult life outcomes.
**Bridging the Early Language Gap: A Plan for Scaling Up**

Socio-economic status (SES) is a powerful influence on school achievement, in part because of SES-related gaps in learning that appear even before children begin school.¹ Young children reared in poverty have slower vocabulary acquisition, lag in early literacy skills, and exhibit lower levels of school readiness. Lower rates of school readiness contribute to a persistent SES gap in academic achievement and school attainment, and have significant implications for disparities in income and occupational status as well as a wide range of later-life health and social outcomes.

There is growing evidence that a child’s early language exposure may be pivotal in language development, cognitive and educational achievement, and the later trajectory of a child’s life. A well-known study by Hart and Risley estimated that by the time they were three years old, high-SES children had heard 30 million words more than low-SES children. Recent studies demonstrate the value of early childhood interventions for children in disadvantaged families,²,³ and interest has grown in ways to promote language development and school readiness among children in their earliest years.

New interventions could address the early language gap by enriching the language environments surrounding young children. For instance, Dr. Suskind’s lab at the University of Chicago recently developed and tested a home visiting intervention using an interactive multi-media curriculum, coupled with linguistic feedback from a Language ENvironment Analysis (LENA) digital language processor – a kind of “language pedometer” – which quantifies key measures such as adult words, conversational turns, and child vocalizations. A small randomized trial of this *Thirty Million Words (TMW)* intervention demonstrated an increase in adult word count, conversational turns, and child vocalizations among families in the intervention group. Of course, more research is needed to understand whether this kind of intervention creates a lasting change in the home environment, and how it affects children’s school readiness and achievement. These early results are promising, however, and justify some optimism that interventions like this could improve school readiness among low-SES children by enhancing the home language environment during a child’s earliest years. This approach is already being adapted in Providence, R.I., in the “Providence Talks” project supported by an award from Bloomberg Philanthropies.

An important aspect of interventions to promote young children’s language development is recognizing that language develops within the context of parents’ responsiveness to children’s communicative signals. Children are more likely to learn new words when caregivers actively engage in warm and contingent back-and-forth exchanges around objects and topics of interest to the child. An intervention built on this kind of responsive framework is the Play and Learning Strategies (PALS) program developed by Landry and Smith which has been validated through
Four nationally funded efficacy trials. One study was done across 4 states with families at high risk due to poverty, low maternal education, maternal depression, and teen parent status. The PALS program uses a home visitation approach where parents view training videos with exemplars of responsive strategies to promote language, cognitive, and social development in their infants, toddlers, and preschoolers. Parents are then videotaped interacting with their children while receiving live coaching, and then review this footage to identify the PALS strategies that worked with their child. Results show clinically significant improvements in parents’ language stimulation skills. In turn, children’s vocabulary and complex language skills improved as measured by norm-referenced assessments and detailed observational measures. These positive results also generalized to parent and child behaviors in new contexts that were not targeted in the intervention (e.g., shared book-reading and children’s interactions with other adults). The program has recently been adapted to work with rural families through a remote Internet-based format.

These developments are encouraging, but there remains a profound problem of scale. With more than 6 million children aged 0-5 living in poverty and an additional 5.5 million who are “near poor,” it would be too costly to provide an intensive home visiting intervention to all children in need. Even if funds were available, it would take years to build the capacity to deliver such an intervention at scale.

Here we describe an alternative approach – one that blends elements of a public health initiative and a social movement in a multi-tiered set of interventions pitched at the population, community, and individual levels. In this approach, population-level efforts would create a broad public awareness about the importance of “parent talk,” while community-level programs would offer resources and support for parents and caregivers who want to promote language learning among young children. More intensive, individual-level interventions, including home visit interventions like TMW, would meet the needs of high-risk families. The initiative would employ interventions at multiple touchpoints as children grow from birth to age 5, to ensure that all parents receive the message and to offer strategies that are tailored to a child’s development stage. The objective is to devise an initiative that is scalable and in which the components have considerable synergy, so that we can begin to see a population-level impact on the SES gap in school readiness within a decade.

This white paper presents a comprehensive vision for this intervention, drawing on research on language development and on behavior change interventions. It identifies key initial steps to pilot new interventions and develop essential partnerships and infrastructure. It also begins to frame longer-term priorities for this initiative, including strategies for organization, funding, and partnerships at the national, state, and local levels.

An Approach to Scaling Up
This proposed initiative combines elements of a public health initiative and a social movement. Similar to other public health initiatives, it would work at multiple levels to educate the public and identify policies that promote early language learning. It would also mobilize professionals in healthcare, social work, and education to assess language learning among young children and identify families who would benefit from extra support. Ultimately the goal would be to make early language learning a public health indicator, so that all children will be assessed and those who need extra services are identified well before they get to kindergarten. As a social movement, this initiative would use conventional and new media strategies to build broad awareness of the importance of parent talk and leverage peer-to-peer, social capital approaches to enhancing the home language environment. Small-scale partnerships of parents, community organizations, city officials, child advocates, and technology innovators could adapt interventions to local conditions, while creative and effective ideas would be shared across communities.

**Population-level dissemination.** The purpose of population-level strategies is to disseminate information about how the early language environment shapes children’s learning, and to mobilize efforts to enhance the early language environment across families and communities. In this section we discuss media campaigns and Internet interventions as well as a more novel approach that would work through the healthcare system.

**Media campaigns** – Media campaigns are highly scalable and have been successful in promoting positive health behaviors. Such campaigns can include public service announcements as well as public relations campaigns that seek to shape the treatment of an issue by the news and entertainment media. As suggested by the youth-oriented “truth” campaign in tobacco control, targeted and innovative messaging can make media campaigns much more effective. Use of multiple media (network and cable television, radio, Internet) is necessary given today’s fragmented media environment. At the same time, the interconnections among these media – the snippet of television that goes viral on Youtube, the ad that becomes fodder for talk shows and blogs – can amplify a compelling message.

Media campaigns are most successful when they are combined with services or policy incentives that support the behavior being advocated. While broad campaigns can create an awareness of the importance of the language environment and motivate parents to take action, those parents are likely to need additional support to take the next step.

A media campaign to promote “parent talk” would benefit from working with celebrities and other public figures who are widely respected and trusted across diverse communities. Parents who have already participated in early language interventions may be excellent ambassadors for these programs.
Given current interest in promoting early childhood development and education, there are a number of opportunities for collaboration in developing broad media campaigns. For instance, Too Small to Fail is a joint initiative of Next Generation and the Bill, Hillary & Chelsea Clinton Foundation designed to help parents, caregivers, educators, communities and businesses take specific and meaningful, evidence-based actions that will improve the health and well-being of America's youngest children, ages zero to five, and prepare them to succeed in the 21st century. Too Small to Fail will soon launch a public action campaign that will cover a range of topics, spanning the areas of early learning, early health, and family support. This campaign will begin by first focusing on the vocabulary gap, and in particular on two key influences on income-related gaps in school readiness: parenting styles and home learning environments.

Next steps:
- Talk with organizations such as Too Small to Fail, ReadyNation, ZERO TO THREE, Alliance for Early Success, and the Children’s Defense Fund, which combine extensive reach and communications expertise and may be good partners in planning a strong public relations campaign.
- Identify public figures including celebrities who might be effective spokespersons for this initiative.
- Consider a “dual launch” – a media campaign coupled with an Internet or community-based intervention that allows interested parents learn more.

Internet interventions – Internet-based interventions can be an important tool for early language interventions because of their low (per-person) cost and ready scalability, as well as their convenience and perceived privacy for participants. Interventions could use video and other online material to educate parents about how the language environment affects their children, and to illustrate techniques that parents can use. These interventions can build in interactive elements such as self-monitoring and social media. They can also include communication via text messages like those used by text4baby.org, which sends messages about prenatal care to pregnant women. An example of a language-focused parent intervention using these elements is InfantNet, an adaptation of the PALS program designed for remote coaching of rural families. In a small efficacy study, InfantNet produced increases in parents’ responsive interactions, including language input, as well as increases in infants’ engagement in interactions with their parents. An encouraging aspect of this approach was the low attrition rate for families in this program, and families’ self-reported high satisfaction with the flexibility of the program format.

Web interventions have been used successfully to promote health behaviors such as smoking cessation and weight loss and to help patients manage chronic illnesses such as diabetes, asthma, and depression. We should note that these interventions do have limitations. Attrition can be
high; after an initial burst of interest, some people disengage. As Internet-based interventions become more common, however, the research community is learning more about what works and what doesn’t.\textsuperscript{16-18} Some initial take-aways:

- Tailored messaging increases costs but can make an intervention more salient and engaging to parents. For an early language intervention, focus groups could help tailor the messaging for specific audiences, for instance for young fathers or language-minority families.
- Interventions that supplement Web-based communication with other forms of contact, including text messaging, face-to-face interaction, and even regular mail, tend to be more successful at maintaining engagement.
- Self-monitoring devices such as Fitbit allow users to upload, store, display, and share their daily exercise and sleep patterns. With advances in digital language processing technology, Web-based interventions could let parents do the same for their home language environment. As we have seen in the \textit{TMW} intervention, setting goals and tracking progress can be highly motivating for parents.
- The Internet offers powerful social media tools, but most health interventions do not make full use of this functionality. Collaboration with “tech” industry partners could create more sophisticated and appealing social media applications like those used in Facebook or Twitter.

Web interventions will not reach all families: the digital divide has narrowed, but low-SES families remain less likely than others to use the Internet. However, mobile devices including smartphones provide more ways to go online and are important especially for young people. In 2013, the Pew Research Center found, 80\% of adults aged 18-29 had broadband at home, and an additional 15\% accessed the Internet through smartphones. For maximum reach, Internet-based interventions should be designed for multiple platforms including smartphones and other mobile devices.

\textit{Next steps:}

- Talk with established programs such as text4baby.org to learn strategies and best practices and explore partnership in embedding further “parent talk” messaging in existing interventions.
- Explore delivery of current interventions such as \textit{TMW} through a web-based platform. This has the potential to extend the reach of “parent talk” messaging particularly to rural areas that would otherwise be challenging for home visiting intervention delivery.

\textbf{Healthcare interventions.} The early language initiative could also work with the healthcare system to reach parents who are expecting or who have young children. Video or multi-media educational interventions could be presented during prenatal classes or clinic visits, in the
hospital during postnatal care, and in primary care settings when parents bring their children for immunizations at 2, 4, and 6 months.

This kind of intervention has several advantages. It works with a child’s primary caregivers at a time when they may be especially receptive to information about promoting children’s cognitive and language development. In addition, parents would receive the intervention at the beginning of a child’s life, maximizing its impact on the critical period for language development – the child’s first three years. Lastly, these interventions could be integrated into the care routinely provided to new and expectant parents, enhancing scalability. For instance, the postnatal intervention could be coupled with an existing public health program, the universal newborn hearing screen, which reaches 98% of all children. Medical specialty societies and other professional associations such as the American Congress of Obstetricians and Gynecologists, American Academy of Pediatrics, and the American Speech-Language-Hearing Association could help bring this kind of intervention to scale.

Next steps:

- Work with American Congress of Obstetricians and Gynecologists, American Academy of Pediatrics, and the American Speech-Language-Hearing Association to develop models of perinatal intervention delivery in synchrony with antenatal and postpartum services.
- Pilot-test a perinatal educational intervention in obstetrics clinics, birthing centers, and pediatrics clinics to assess interventional feasibility and acceptability.

**Community-level interventions.** Community-level interventions work through local civic or community/neighborhood-based organizations to educate and support parents and caregivers. These interventions may use Internet- or video resources, but integrate them into programming with a face-to-face component, harnessing social processes of mentoring and peer support. Community-based interventions are flexible and can be tailored based on parents’ needs and interests, but might include events at which groups of new parents watch and discuss a video intervention, meet with a peer mentor, or share parenting experiences in a support group.

Libraries may be particularly good sites for community-based interventions because they are public and free of charge, and because they already attract young families to literacy-themed activities. Many libraries have computers and/or video equipment which could be used for viewing intervention materials, either by individuals or in a group. A library could even lend out a LENA device for home use, just as digital libraries are now beginning to lend e-readers. Successful interventions could be disseminated nation-wide through the Public Library Association and through networks of city government officials.
Interventions could also be based at other community organizations such as churches, neighborhood groups, or YMCAs, or could build on the informal ties among parents who share a neighborhood, playground, or child care center. These grassroots groups could receive educational materials, technical support, and referrals to peer mentors online or from a central resource center.

Next steps:

- Develop strategic assessment processes of community and neighborhood organizations to leverage existing community strengths and networks in intervention implementation.
- Adapt and pilot-test interventions to map onto and enhance existing community programming for group dissemination.

Child care and preschool. Another form of community-based intervention is measures to enhance the early language environment in child care and preschool settings. Many young children spend time with non-family caregivers or in group care. In 2011, among children aged 0-4 in poor families, 19% were in center-based care including Head Start and 7% received care from nonrelatives (including Family Day Care providers). The Obama administration’s Early Learning Initiative expands access to center-based care among lower-income families by providing high-quality preschool for all 4-year-olds below 200% of the poverty level, and by shifting some Head Start resources to children younger than 4. In addition, the initiative promotes partnerships between Early Head Start (EHS) and child care programs; these partnerships would provide the child care centers with access to Head Start technical assistance and professional development opportunities, and would ensure that the child care centers meet all Head Start standards.

Child care and preschool settings provide an important opportunity to promote children’s language development. Research is at an early stage, but there is evidence that the language environment in child care and preschool settings is associated with children’s later school achievement. For instance, a recent study by Dickinson and Porche found that measures of preschool teachers’ language, including use of sophisticated vocabulary, predicted children’s reading comprehension, vocabulary, and word recognition in fourth grade. This work is encouraging because it suggests that interventions to enhance child care/preschool language environment could make these settings more educationally valuable for young children. Recent attention to this area by the Institute of Education Sciences is resulting in the development of new interventions targeting child care staff working with very young children at risk for language delay. For example, the Toddler Language in the Classroom (“TLC”) project is currently piloting a 12-week professional development training for teachers of toddlers in child care centers serving families from low-income backgrounds. The “TLC” training program uses video exemplars, data-driven classroom-based coaching, and self-reflection strategies to enhance teachers’ use of language-promoting strategies and book-reading with toddlers.
Such interventions can build on recent efforts to develop best practices and quality standards for early childhood programs. The Obama administration’s Early Learning Initiative was described above. In addition, educators and state governments have taken steps to define Early Learning Guidelines, which describe expectations for learning among young children up to age 5. All states have ELGs for children 3-5, and many have developed guidelines for ages 0-3. These guidelines identify benchmarks for children and describe best practices for early childhood educators. In addition, more states are adopting Quality Rating and Improvement Systems (QRISs), in which child centers and early childhood education programs are rated on indicators such as staff qualifications, teacher-child ratios, and family involvement. The Obama administration’s Race to the Top-Early Learning Challenge awarded grants to states for investment in QRIS systems. Some QRIS programs go beyond evaluation to provide coaching for early childhood teachers and administrators.

There are several ways in which an early language initiative could build on these efforts. One is through staff education and professional development opportunities, with the development of a course or workshop that introduces new scientific knowledge about brain development and children’s language learning and highlights techniques for working with children. Ultimately this content could be incorporated into the standards for the Child Development Associate Credential, the entry-level credential in early childhood education. In addition, once measures of the child care language environment have been validated, they could be incorporated into states’ Early Learning Guidelines and QRIS systems. Partners in this effort could include the National Association for the Education of Young Children, the National Head Start Association, and the National Association for Family Child Care.

**Intensive interventions.** Intensive interventions typically involve one-on-one interaction, sometimes in multiple sessions. An example is the *TMW* home visit intervention piloted at the University of Chicago, in which a trained interventionist works one-on-one with a parent in a series of 8 weekly sessions. In each session, the interventionist uses a multi-media presentation to highlight the importance of parent talk for children’s development and illustrate evidence-based techniques parents can use to promote language learning. During the session, the interventionist and parent practice new skills using video modeling. The parent also receives quantitative feedback from weekly LENA recordings on key measures such as adult words, conversational turns, and child vocalizations. Each week, the parent reviews the LENA results and works with the interventionist to set goals for the following week. In a recent randomized-controlled trial conducted with 40 families, parents in the intervention group had an increase in knowledge about early language and brain development, as well as an increase in language measures such as the number of utterances, total word count, and parent-child conversational turns. Child vocalizations also increased in the intervention group.
This kind of intervention could be more cost-effective if it were incorporated into existing home visiting programs. The Affordable Care Act established the Maternal, Infant, and Early Childhood Home Visiting (MIECHV) program, administered by U.S. Department of Health and Human Services, which supports evidence-based programs to promote goals including early education and school readiness. If interventions like TMW and PALS continue to yield positive results on child learning, they could become eligible for HRSA funding under the MIECHV program. Private-sector partners could include the Visiting Nurse Associations of America and the National Association of Social Workers.

Next steps:

- Continue intervention development and testing.
- Work with MIECHV, Visiting Nurse Associations of America, the National Association of Social Workers, and other well-established home visiting programs to develop interventional and programmatic collaboration.

Identifying the appropriate level of intervention. In some tiered intervention models (e.g. “Response to Intervention” or RTI), all individuals in a group receive a low-dose intervention, and those who do not respond satisfactorily are stepped up to more intensive treatments. Because the most critical period for language learning is the first three years of life, before children enter an environment where large-scale assessment might occur (i.e. kindergarten), the RTI model is of limited use. Instead, diagnostic tools are needed for early identification of children who might benefit from intensive intervention. Simple screening tools, which could be implemented in a variety of settings including healthcare and social service offices, would be of enormous benefit. Although these measures will inevitably be “noisy,” they could identify a subset of children for whom more detailed assessment of language development would be appropriate. Another possibility is to screen mothers during pre-natal examinations, using a parent knowledge instrument to identify those who would benefit from more intensive interventions.

Adapting Interventions for Diverse Populations

Some adaptation will be needed in both content and format to make interventions appropriate for diverse populations in the U.S. This section takes a first step by considering interventions for groups defined by language or cultural diversity, for fathers, and for rural families.

Respecting language and cultural diversity – A key priority is the development of interventions for language minority families. About 14 percent of young children in the United States have at least one parent who has only limited English proficiency; Spanish is by far the most common foreign language spoken at home, and Hispanic children face a high risk of school failure. A Spanish-language intervention could be an important tool for promoting school readiness among children in immigrant families.
Early language interventions do not require people to change cultural practices or idiomatic speech. Rather they focus on parent-child interactions that promote school readiness in all children, such as conversational turns and responsive parenting. Nonetheless, language practices carry symbolic resonance and can be potent signifiers of class and ethnic identity. Thus, early language interventions must be presented in a way that does not denigrate customary language practices. Visual components of the intervention strategy – advertisements, videos, etc. – should be inclusive, using parents, caregivers, and children from a variety of ethnic and racial backgrounds. In addition, targeted media campaigns can work with trusted figures in the community to ensure that these interventions are respectful of home cultures. “Alumni” parents who have participated in intensive interventions may also be effective representatives of these programs.

Including fathers – Whether or not they live with their children, fathers play an important role in supporting children’s language learning. However, early language research and interventions often focus on mothers or other female caregivers. It is important for early language interventions to include fathers, and it may be important to develop messaging specifically for men. To date, not much is known about effective ways to promote effective parenting among low-SES fathers; the focus of interventions with this population has often been on child support rather than parenting/caregiving patterns. However, studies are beginning to explore the factors that can make parenting interventions more effective. Focus groups are likely to be valuable for developing messaging tailored to this group. Expertise from the National Responsible Fatherhood Clearinghouse and the National Fatherhood Initiative may also be useful.

Reaching rural families – Rural and small-town children have relatively high poverty rates and tend to arrive at kindergarten with lower language skills. In rural settings, one-on-one home visiting programs may be difficult to arrange because of the distances involved. In this context, the Internet may be particularly important, allowing parents to access population-level interventions and even to participate in intervention “visits” via Skype or other Internet telephone services, just as some physicians use video-conferencing to provide medical advice from a remote location. For families who do not have broadband access, a relatively accessible community location – a school, public library, church, even a big-box store – could provide an Internet-equipped computer for parents to use. A LENA device could even be loaned out to parents, with the data uploaded for the parent and interventionist to discuss during video sessions.

Internet-based interventions developed for rural families could also be useful in an urban setting, perhaps after an initial face-to-face session to establish rapport and trust. If interventionists can work with parents remotely from a single location rather than incurring the time cost and
expense of travel to home locations, the cost of the most intensive interventions could be substantially reduced.

How Can We Address Family- and Child-level Barriers?

Even with careful tailoring for diverse populations, family- and child-level barriers could reduce the effectiveness of these early language interventions. Family-level barriers might include conditions that make it difficult for parents to spend focused time with their young children, including severe material deprivation (e.g. homelessness or overcrowded housing); long work and commuting schedules; other family needs or stressors, such as chronic illness and disability, family violence, or incarceration; and parental mental health or substance abuse problems. Low-SES families experience more material deprivation, and may also be at heightened risk for other barriers – such as maternal depression – or at least have fewer resources with which to address these challenges. Child-level barriers may include unmet health needs and food insecurity, which could interfere with attention and memory.

Initial trials of interventions are likely to exclude families facing these barriers; for instance, the University of Chicago TMW study excluded mothers whose CES-D10 scores indicated major depressive disorder. As early language interventions are extended to the general population, it will be important to address family- and child-level barriers that could impede interventions or reduce their effectiveness. For high-risk families, it may be best to integrate early language interventions into comprehensive case management/social service programs that can identify and respond to other family needs.

How Should We Train the Trainers?

Scaling this intervention will require interventionists and peer mentors who can talk with confidence and clarity about how parent talk contributes to early language development; interact respectfully and empathetically with parents; and model techniques that parents can use with their children. Specific human capital needs will depend on the character of the intervention. For home visiting programs, interventionists are likely to need training in use of technology and in the curricular content as well as procedures for working with parents. Home visiting staffing patterns vary, with some programs employing college-educated staff while others hire paraprofessionals. A community college-based certificate course could provide the necessary skills.

Community-based interventions might also use “peer mentors” who can connect effectively with parents, translating the science and purpose of the intervention into everyday language, demonstrating techniques, and providing encouragement, support, and guidance. These peer mentors may not need the same technical skills and content knowledge as interventionists do, but
can play a distinct and valuable role. Parents who have participated in the intensive intervention for their own children might be especially good candidates for this kind of role.

**How Should We Measure Progress?**

Evaluating a multi-tiered early language initiative requires two kinds of assessment. Some research studies should examine the efficacy of specific interventions. In addition, it is important to evaluate how well the initiative as a whole is working, and whether some segments of the population – defined by region, race or ethnicity, or language minority status – are being reached less effectively than others. This kind of assessment is particularly important given evidence of SES differences in the reach of broad-based campaigns; for instance, Aizer and Stroud found that information about the negative impacts of smoking while pregnant – which was made available by newspapers, television, and radio – failed to reach low-SES women.26

Regular assessment of parent beliefs and knowledge, home language environment, and child outcomes would be invaluable for gauging progress in bridging the language gap at the population level. This kind of assessment has been a cornerstone for the field of public health, which relies on several annual studies to track the health of Americans: the Behavioral Risk Factor Surveillance System, a telephone survey of more than 400,000 adults; the National Health Interview Survey, an interview study of 35,000-40,000 adults; and the National Health and Nutrition Examination Survey (NHANES), which interviews and conducts physical examinations of a sample of about 5,000 persons each year.

**Parent knowledge, attitudes, and behavior.** Research has found that the relation between parent SES and child-directed speech is mediated by maternal knowledge of child development – in other words, higher-SES mothers talk more to their children because they know or believe it is beneficial for child development.27 The *TMW* Questionnaire was developed to assess change in parent knowledge following participation in the intervention program. This thirty-item questionnaire asked mothers to report their level of agreement with statements about language development on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). The items included statements about the potential lasting impact of parent language input (e.g. “How many words 3-year-olds know can predict how well they might do in kindergarten”), methods for maintaining child engagement in interaction (e.g., “Babies should be able to see your face when you talk to them”), and realistic expectations of child language behavior (e.g., “By the age of 3, children answer questions just as quickly as adults”).

It would be relatively simple to track population-level change in parent knowledge and beliefs using a random digit dial telephone survey. Understanding the implications for parents’ language behavior is more challenging. It may be possible to develop valid self-report measures of parents’ language behavior, although such measures must contend with “social desirability bias,”
the tendency to respond in ways that will be viewed favorably by others. Alternatively, we might find that parent knowledge and beliefs are a good proxy for the language environment that parents provide. LENA-based measurement of the home auditory environment in a sample of households would, if feasible, allow validation of survey-based measures and/or tracking of population-level change in parent language behavior.

Next steps:

- Examine the validity of parent self-report as a measure of language behavior with young children.
- Examine what parent knowledge and beliefs are predictive of home language environment.
- Explore the feasibility of conducting regular assessment of home language environments using digital language processors such as the LENA.

Child outcomes. Educational psychologists have developed multiple measures of early language development (see Appendix), which are used primarily in research and individual assessment. Many of these measures are not valid for children under 2.5 years of age. The MacArthur-Bates Communicative Development Inventories (MCDI) is an exception, however. This parent report measure is used to track children’s receptive and productive vocabulary beginning in infancy and through the age of three. The benefits are that it is a relatively quick measure that parents can fill out at their own convenience, and it is shown to have good reliability and validity. The other measures included in the Appendix tap into a variety of children’s oral language skills including vocabulary, syntax, comprehension, and phonological awareness, all of which are shown to be influenced by parent input, and are found to predict later literacy skills.

Recent advances in developmental psychology and neuroscience provide us with novel, alternative ways to assess language processing in infants and toddlers. Research in Seattle at the University of Washington Institute for Learning & Brain Sciences shows the feasibility and sensitivity of brain measures of language processing, including EEG, MEG, MRI and DTI. Early brain measures in response to the sound, word, or sentences not only show structural and functional brain growth as language progresses, but also predict future language abilities. Brain studies show that SES is a strong predictor of 5-year-olds’ function in brain areas related to language and literacy. Longitudinal studies on enrolled families, both monolingual and bilingual, have linked the quantity and quality of parental language heard at home on infants’ later language growth. These studies could also be designed to assess other cognitive and social skills that are integral to language development (e.g., executive function), which are also necessary for success in school, and strongly linked to language learning. Brain measures provide exciting images of the physical brain changes that are associated with enriched language environments, and are potent for demonstrating the value of the intervention to parents, practitioners, policy-makers, and funders.
Most research on school readiness uses the National Education Goals Panel framework, which includes five dimensions of child readiness for school: physical health and motor development, social/emotional development, approaches to learning, language development, and cognition and general knowledge. Several large-scale cohort studies, including the Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K) and the Fragile Families Study of Child Well-being, have included high-quality measures of school readiness. For instance, children included in the ECLS-K were given literacy and math tests conducted by trained testers.

There is no regular national assessment of school readiness. The National Assessment of Educational Progress (NAEP), the largest regular and nationally representative evaluation of children’s academic achievement, begins with 4th grade. Perhaps the largest-scale effort to assess early learning has been the National Reporting System (NRS), intended to provide accountability for the Head Start program. In 2002, the Administration for Children and Families developed a 15-minute assessment of language skills (including spoken English, vocabulary, and letter naming) and early mathematics skills for use with 4-5 year olds in Head Start. (Indicators of socio-emotional development and approaches to learning were added later.) This assessment was discontinued after four years: it proved controversial among educators, who raised concerns about the reliability and validity of the measures as well as the burden on Head Start staff who conducted the assessment. A 2008 National Research Council study was commissioned to serve as the basis for a more rigorous approach to early childhood assessment for Head Start and other programs.

As of 2010, half of all U.S. states had some kind of assessment of school readiness at kindergarten. The instruments used vary within and across states, but virtually all evaluate language or reading skills. Most are administered by teachers. These assessments are not optimal for research or population-level surveillance because of uncertainty about bias and inter-rater reliability, but they do provide a resource that could be used in the short term. States that already collect information on school readiness could be pilot sites for population-level early language interventions. In lieu of a national assessment of school readiness, existing state-level measurement – even in a small number of states – could help us assess the impact of a national initiative.

Over the longer term, a regular national assessment of language learning and other aspects of school readiness is critical to understanding whether this initiative and other 0-3 efforts are beginning to bear fruit. It would be premature to propose a large-scale assessment of early childhood learning; as the National Research Council recently concluded, such an effort requires more study of the domains to be measured, psychometric properties of potential instruments, and the assessment of children from language or cultural minority groups and children with disabilities. Nonetheless, regular (perhaps biennial) assessment of a sample of young children,
using well-regarded instruments such as those included in ECLS-K, would provide a basis for tracking efforts to bridge the language gap. As an alternative, measures of early language learning could be added to other national studies, particularly those that involve in-home interviews.

**Next steps:**

- Convene a scientific panel representing expertise in educational psychology, linguistics, psychometrics, and other relevant fields to discuss potential designs and measures for a regular assessment of language learning in a small national sample of children aged 3-5.
- Evaluate the feasibility of adding measures of early language learning to existing national studies.
- Continue study of brain measures as a resource for understanding how early language environment interventions affect young children’s cognitive and language development.

**Study design for intervention evaluation.** States in which districts use a common instrument to measure school readiness and report data to the state are especially good candidates for the evaluation of the interventions to increase language development. If these districts have already established a common data collection infrastructure, the evaluation of interventions will require planning on how the interventions are implemented across locations. Because some of these interventions take time to be implemented, it is possible to use the time that it takes to roll out the programs as a source of “natural” experiment. Consider the following example. Suppose that a total of $N$ school districts will receive interventions A and/or B. In the first year of the initiative (say, year “1”), 8% of the districts get intervention A, 8% get intervention B, and 8% get both interventions A and B. Each subsequent year, the same fraction of new districts becomes part of intervention A, or intervention B, or interventions A and B. By year “4”, all $N$ districts are already covered by at least one form of intervention. But because it takes four years for some type of intervention to reach all districts, there will be variation in the amount of time children are exposed to some form of intervention. For example, some children will be exposed to interventions A and B for all years up to age three, while other children will receive no form of intervention until age three. So, using the data that states and districts already collect, it will be possible to evaluate the impact of receiving the combination of A and B for four years by comparing children who were born and raised in different districts. The evaluation will be more easily implemented if there is randomness in the selection process of the year and the type of intervention that each district will receive.

The framework described above allows for the evaluation of “synergies” and the existence of dosage effects. Because there is variation across districts that receive an intervention, it will be possible to compare children who were exposed to multiple interventions (A and B) to those who were exposed to a single intervention (A). If there is no synergy between interventions A and B, then the difference in outcomes between children who were exposed to A and B versus those
who were exposed to A should be exactly the same as the differences in outcomes of the children who were exposed to intervention B versus those who were not exposed to any intervention at all.

Also, note that some children will be exposed to an intervention for at least one year, others for at least two years, and so on and so forth. So, it will be possible to compare the costs and benefits of implementing an intervention from birth to three versus from age one to age three. The same is true for the estimation of synergies. For example, it is conceivable that the synergies are larger for the children who were exposed to A and B for three years rather than only two years.

Next steps:

- Examine the validity of school readiness assessments currently used by state departments of education, and identify states which could be used to track success of a population-level early language initiative.

Organizing an Early Language Initiative

A coordinating organization will be needed in order to create a coherent and sustained initiative. This Center would play a number of roles:

**Intervention development and evaluation.** The Center should take a lead role in developing interventions that can be used and adapted by local partners including small-scale community interventions. While local input will be important, developing multi-media interventions – which might include video production, animation, and Internet-based resources, potentially in multiple languages – is a resource-intensive task involving specialized skills and significant economies of scale. In addition to these technical and creative considerations, intervention development should be informed by the latest research both on the science of early language learning and on the efficacy of language interventions. Once interventions are developed, they can readily be shared in electronic form with community-based organizations throughout the U.S.

**Design of efficacy and evaluation studies.** The Center should take a lead role in designing the studies that will both assess the efficacy of individual interventions and track progress toward reducing the early language gap. To carry out this complex research agenda, we envision a consortium of research centers with complementary expertise – for instance in different measurement modalities. The Center will coordinate the work of these participating centers, and take a lead role in decisions about how to stage different forms of intervention across locations. As discussed above, this will be important for researchers to evaluate the impact of individual interventions as well as their combined effect.
**Support of local chapters.** A third priority for the Center is to support local-level innovation. A federated structure can do that: autonomous local chapters will allow formation of diverse local-level coalitions that reflect the distinctive profile, resources, and priorities of each community. These chapters can be idea generators by creating novel partnerships that might include parents, community-based organizations, child and education advocates, the “tech” community, and the arts. The Center can link these local chapters in a national network so that successful ideas can be shared through meetings and electronic communications. It can also provide technical assistance and intervention resources, including education materials and a referral service for peer mentors.

**Resources for policy action.** The Center would work at the national level to identify policies and develop partnerships to promote early language interventions. At the state level, it would provide resources for policy action, including model legislation/regulations.

**Funding**

This initiative will necessarily require funding from multiple sources. Federal agencies, including NIH, NSF, and IES, are likely to be the most important funders for basic and evaluation research, including the longitudinal studies that will be required to understand the long-term impact of this initiative on children’s school performance. In addition, private foundations have already provided critical start-up support for these efforts, and may continue to play a key role; in particular, many foundations have a local or regional funding program and may commit to support city-level interventions as an investment in the economic vitality and social well-being of their focal communities. The broad-based and multi-tiered intervention we envision could engage a number of disparate localities and professional communities, with a correspondingly broad set of potential funders. The Center discussed above could play a key role in coordinating efforts to sustain this initiative over time.
Appendix: Measures of early language learning and school readiness

<table>
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<tr>
<th>Assessment</th>
<th>Direct</th>
<th>Questionnaire</th>
<th>Observation</th>
<th>Interview</th>
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<tbody>
<tr>
<td></td>
<td>CELF - Clinical Evaluation of Language Fundamentals</td>
<td>CDI - MacArthur Communicative Development Inventories</td>
<td>Creative Curriculum Development Continuum for ages 3-5</td>
<td>unstructured natural play &amp; book reading*</td>
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<td>General</td>
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<td>WJ-III - Woodcock-Johnson III</td>
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<td>CTOPP</td>
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<td>Phonological</td>
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<td>awareness</td>
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<td></td>
<td>PPVT - Peabody Picture Vocabulary Test</td>
<td>CDI</td>
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<td>Vocabulary</td>
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<td></td>
<td>ROWPVT - Expressive One-Word Picture Vocabulary Test</td>
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<td></td>
<td>EOWPVT - Receptive One-Word Picture Vocabulary Test</td>
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<td>Receptive</td>
<td>CELF, TELD-3 - Test of Early Language Development</td>
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<td>SICD-R - Sequenced Inventory of Communication Development - Revised</td>
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<tr>
<td>Expressive</td>
<td>CELF, TELD-3</td>
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<td>RDLs - Reynell Developmental Language Scales</td>
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<td>verbal IQ</td>
<td>WPPSI-III - Wechsler Preschool and Primary Scale of Intelligence</td>
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<td><strong>Grammar</strong></td>
<td>DELV - Diagnostic Evaluation of Language Variation</td>
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<td><strong>Literacy</strong></td>
<td>STEP - Strategic Teaching and Evaluation of Progress</td>
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<td><strong>Words &amp; sentences</strong></td>
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<td><strong>Verbal expression</strong></td>
<td>K-ABC - Kaufman Assessment Battery for Children, Expressive Vocabulary Subtest</td>
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</tbody>
</table>

* Not a standardised test, but a standard measure in developmental psychology
References

17. Webb LT, Joseph J, Yardley L, Michie S. Using the Internet to Promote Health Behavior Change: A Systematic Review and Meta-analysis of the Impact of Theoretical Basis, Use


