EARLY LANGUAGE GAPS: SOURCES AND SOLUTIONS

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on “Bridging the Thirty-Million-Word Gap”

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Executive Summary

By the time American children enter kindergarten, there is a well-established and pervasive gap between the average oral language skills of children from higher versus lower socioeconomic status (SES) backgrounds. This SES-related language gap is of great concern, as it persists throughout the school years creating disparities in academic and occupational success. There is increasing scientific consensus that intervening early to prevent the gap from developing is a more promising approach than intervening later to remediate the gap. To effectively plan policies and programs that will address the language gap, we need to understand its sources and consequences. The current report summarizes the literature in this area with a focus on the following issues:

- **Caregiver input in the home is a significant source of the gap** – Language acquisition depends on the amount and nature of language exposure. A seminal study by Betty Hart and Todd Risley (1995) found that children from low-income homes were exposed to an average of thirty million words fewer than children from higher-SES homes during the early childhood years. Further research in this area confirms that variation in the quantity and quality of communicative input that parents direct to children explains a substantial portion of the SES-related differences in children’s early oral language skills.

- **Oral language skills are highly predictive of later literacy and school success** – Decades of research has established a close relation between children’s oral language skills including vocabulary, syntax, phonological awareness and narrative ability and their later literacy acquisition and school success more generally. Children who start kindergarten with better oral language skills develop better literacy skills and show greater learning across the school years in a wide range of subjects. Skills beget skills in language and literacy development.

- **The gap is particularly large for language minority children from low-income homes** – Many children from low-income homes are children of immigrant parents. These children with one or two parents who are native speakers of a language other English will not have had the same quantity or quality of English exposure as children from monolingual homes by the time they enter school. We need to provide means for these children to be exposed to English, while strengthening and preserving their heritage language skills.

- **Working with parents is an effective way to prevent the language gap** – Parent-focused interventions are shown to have stronger effects on early child outcomes than interventions without a parent component. Studies of small-scale interventions find that working with parents can result in an increase in parent talk to children. Further research is necessary, specifically longitudinal randomized controlled trials, to establish the pervasiveness of effects on parent input and to examine the extent to which the language gap can be prevented through this approach.

- **Need high-quality preschool environments for all children from low-SES homes** – Research shows that children from low-SES homes have less access to high-quality preschool environments. Research also shows that teacher input can benefit the language skills of children from monolingual English-speaking and language minority homes. Thus, increasing the availability of high-quality preschool for all children should help close the language gap.

With significant investments in parent-focused early interventions targeting language use in the home and significant investments in making high-quality preschool programs available to all, researchers, practitioners and policy makers can make a significant contribution to reducing SES-related disparities in language skills. These approaches will not only benefit parents and individual children, but will improve the quality of the nation’s workforce for future generations.
Early Language Gaps: Sources and Solutions

Why do some American children start kindergarten with vocabularies five-times the size of their peers’ vocabularies? What consequences arise from such early variation in children’s oral language skills? And, what can we do to help ensure that all children enter kindergarten with the oral language skills necessary to excel in American schools? The goal of this report is to provide empirical evidence on: the status of the early language gap in the United States, predictors and consequences of that gap, interventions designed to close the gap, and remaining issues that need to be explored. In writing this report we are mindful that the United States is a multicultural society. Cultural differences in child rearing practices must be respected, and differences between children from different backgrounds can be strengths, not merely deficits. In addressing gaps in children’s early language skills, we adopt a pragmatic approach in which the interpretation of differences and recommendations regarding intervention are guided by data on the causes and consequences of those differences as reviewed below.

The Nature and Consequences of the Early Language Gap

Children who come from a lower socioeconomic status (SES) have language trajectories that are different from those of children from middle-class homes, and, on average, they have different language skills when they reach school age (e.g., Brooks-Gunn, Rouse, & McLanahan, 2007; Hernandez, Denton, & Macartney, 2007). SES differences in children’s language skills are evident as early as 9 months of age (Halle Forry, Hair, Perper, Wandner, Wessel, & Vick, 2009), widen until age 5, and then level off, resulting in a large average SES vocabulary gap in kindergarten and first grade (Farkas & Beron, 2004). For many children from low SES homes in the U.S., exposure to another language is also a factor that shapes their language trajectories and language skills at school entry. For low-income children who are also learning two languages, the gap in English language skills may be a particularly serious problem (Castro et al., 2011). Below, we briefly summarize the nature of the early language gap for children from different SES and language backgrounds.

Oral Language Skills and SES

In 2012, over 1 in 5 American children lived below the poverty line (US Census Bureau, 2012). Children from low-SES homes show lower levels of oral language skill than do children from more advantaged backgrounds on measures of language processing, language comprehension, and language production from infancy through the early childhood period (Fernald, Marchman, & Weisleder, 2012; Hart & Risley, 1995; Hoff, 2006; Huttenlocher et al., 2010). By first grade, SES is strongly related to children’s language skills, yet also shows weaker relations to skills in other cognitive domains including memory, visuospatial skills, and cognitive conflict (Noble, McCandliss, & Farah, 2007). SES is typically measured as parent education, family income, or parent occupation (Duncan & Magnuson, 2003). These multiple facets of SES are often associated with different proximal variables that may affect developmental outcomes through different mediating factors (Hoff, Laursen, & Bridges, 2012). Research has historically found strong relations between children’s oral language skills and parent education (see Hoff, 2006 for a review). However, while the relation between parent education and the achievement gap has remained stable over the past fifty years, there is evidence that income’s role in the achievement gap has grown during recent years and currently plays almost as strong a role as parent education (Reardon, in press). The achievement gap due to income is large by the time
children enter kindergarten and then remains stable across the school years (Duncan & Magnuson, 2011; Farkas & Beron, 2004). Further, longitudinal examinations of changes in family income indicate that a family’s income during the early childhood period has the largest effect on child outcomes, even long-term outcomes (Duncan, Ziol-Guest, & Kalil, 2010). The relation of SES to early language also appears within and across different ethnic groups, suggesting that although SES and minority group status are frequently confounded, the effects of SES are not merely ethnic differences, relabeled (Hoff, 2006). Currently the SES-achievement gap in the United States is twice as large as the black-white achievement gap, whereas the opposite was true fifty years ago (Reardon, 2011).

Vocabulary size appears to be the aspect of language most sensitive to the effects of SES. Indeed, heritability studies show less genetic influence for vocabulary compared to other language skills such as grammatical competence (Stromswold, 2001), and detailed studies of SES-differences in vocabulary growth highlight the strong role of the early environment. Hart and Risley’s (1995) well known study documented differences in vocabulary size among children of professional, working class, and low-SES families that were observable from almost the beginning of speech and that increased with development. By three years of age, the children from higher SES homes in Hart and Risley’s study had produced over 1,000 different words, while those from low-SES homes had produced half that many, and these findings are not anomalous in the literature. Arriaga, Fenson, Cronan, and Pethick (1998) found that 80 percent of a sample of children from low-SES homes between 18 months and 30 months scored below the 50th percentile in productive vocabulary, using a test normed on a mid- to high-SES reference group. Other studies using spontaneous speech, maternal report, and standardized tests to assess productive and receptive vocabulary have also found SES-related differences, with the size of the difference in vocabulary depending on the size of the difference in SES represented in the sample (Dollaghan et al., 1999; Hoff, 2003; Hoff-Ginsberg, 1998; Huttenlocher et al., 2010; Pan, Rowe, Singer, & Snow, 2005; Rescorla, 1989). SES differences are also seen in children’s uses of gesture to communicate at one year of age, and variability in early gesture use helps explain SES differences in vocabulary several years later (Rowe & Goldin-Meadow, 2009). In addition to these SES differences in early language development at different child ages, there are differences in children’s rates of language growth, and starting out strong in vocabulary development is particularly important for children from low-SES families. In a longitudinal investigation of the role of children’s vocabulary growth rates between ages one and four and children’s vocabulary size at kindergarten entry, Rowe, Raudenbush, and Goldin-Meadow (2012) found that early vocabulary growth rates were strongly predictive of kindergarten skill for children from low-SES homes, however the relation was much weaker for children from middle and high-SES families. They argue that the higher-SES families might have other means of helping their children catch up if they start out behind that the lower-SES families do not have. These findings speak to the larger issue of the SES achievement gap—it is not only the skills children have when they enter school that matter for later success, but also the path they followed years earlier in getting to these skills.

Grammatical development is also affected by SES. Children from higher-SES backgrounds outperform children from lower-SES backgrounds on standardized language tests that include measures of grammatical development (Dollaghan et al., 1999; Morisset, Barnard, Greenberg, Booth, & Spišek, 1990); they produce more complex utterances and use a greater variety of syntactic structures in spontaneous speech (Huttenlocher et al., 2010; Vasilyeva, Waterfall, & Huttenlocher, 2008), and they perform better on tests of complex syntax.
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comprehension (Huttenlocher, Vasilyeva, Cymerman, & Levine, 2002). In Arriaga et al. (1998), 70% of the lower SES sample scored below the 50th percentile on a measure of the grammatical complexity of their utterances. Although the pattern of findings and effect sizes across multiple studies suggests that the SES effect on vocabulary may be larger and more robust than the effect on grammatical development, the effect on grammatical development is not necessarily small or inconsequential for the children. The low-income children studied by Snow (1999) were more than a year behind norms derived from a middle-class sample in the length of their utterances in spontaneous speech. As Hart and Risley (1995) found for vocabulary, these differences appear early and do not diminish with development—at least not before 54 months of age (Huttenlocher et al., 2010).

In addition to these SES-related differences in vocabulary and grammar, there are SES-related differences in children’s narrative skills and phonological awareness. Narratives produced by children from lower SES families are less sophisticated than the narratives produced by children from middle-class families of the same age, when assessed in terms of topic coherence and independence from the nonlinguistic context (Heath, 1983; Vernon-Feagans, Hammer, Miccio, & Manlove, 2001). Children from low-SES homes show lower levels of phonological awareness than do middle-class children, with the size of the SES-related difference increasing from the ages of 2 years to 5 years (Bowey, 1995; Lonigan, Burgess, Anthony, & Barker, 1998; McDowell, Lonigan, & Goldstein, 2007). It is important also to note that neither low- nor high-SES children are monolithic in their language skill, that substantial individual differences exist within both populations, and that the distributions of skills among lower and higher SES children overlap (Hoff, 2003; Pan et al., 2005). Nonetheless, the effect of SES on children’s early oral language skills is large, pervasive, and robust.

Oral Language Skills of Children from Language Minority Homes

In the United States, one in five children live in households in which a language other than English is spoken (Federal Interagency Forum on Child and Family Statistics, 2011). Among children aged 0 to 17 years living in poverty, 41 percent hear a language other than English at home (Child Trends, 2013). The majority of these children was born in the United States and have one or two foreign-born parents (Hernandez et al., 2007; Lesaux & Kieffer, 2010; Place & Hoff, 2011). Language use in these households can range from exclusive use of the heritage language to English dominance (Eilers, Pearson, & Cobo-Lewis, 2006; Lesaux & Kieffer, 2010; Oller & Eilers, 2002; Place & Hoff, 2011).

Early trajectories of language development among children who hear a language other than English at home vary widely. Some, who hear only the minority language at home, develop as monolingual speakers of their parents’ heritage language until they begin preschool or kindergarten. Many children from language minority homes develop as bilinguals, but they vary in the balance of their English and heritage language skills. Some bilingual children from language minority homes have English skills on a par with monolingual English-speaking children, but many do not. Studies of preschool children with sufficient sample sizes for statistical comparison find that on average, children who are acquiring two languages have lower levels of skill in each language than do monolingual children (Marchman, Fernald, & Hurtado, 2010; Thordardottir, Rothenberg, Rivard, & Naves, 2006; Vagh, Pan, & Mancilla-Martinez, 2009)—even when matched for SES (Hoff et al., 2012). Significant differences appear both in vocabulary and in grammatical development. It is important to point out that children learning two languages do not learn language in total at a slower rate. Measures of bilingual children’s
total language knowledge, combined across both their languages, show that bilingual children equal or exceed monolingual children in their rates of vocabulary development (Hoff et al., 2012; Pearson, Fernández, & Oller, 1993; Thordardottir et al., 2006) and, in one study, grammatical development as well (Thordardottir et al., 2006).

There is little research on trajectories of bilingual development from 2 1/2 years to the age of school entry, and then the literature resumes—describing the English language skills of children from language minority homes at school entry. The clear and consistent finding from this work is that children exposed to a language other than English at home enter school with lower levels of English skill than do monolingual children (e.g., Castro, Pa’ez, Dickinson, & Frede, 2011). In the low income samples that are the focus of much of the research, Latino dual language learners at 4 and 5 years of age score one to two standard deviations below monolingual norms in receptive and expressive vocabulary and in auditory comprehension (Hammer, Lawrence, & Miccio, 2008; Pa’ez, Tabors, & Lo’pez, 2007; Tabors, Pa’ez, & Lo’pez, 2003). Low-SES Latino dual-language learners in prekindergarten and kindergarten programs have lower phonological awareness and letter identification abilities than do monolinguals (Hammer & Miccio, 2006; Hammer, Miccio, & Wagstaff, 2003; Pa’ez et al., 2007; Tabors et al., 2003). The findings of multiple studies in the United States have led researchers to refer to a “school readiness gap” between low-income bilingual children and monolingual middle-class children (Castro et al., 2011).

Consequences of the Early Language Gap for Low-SES and Language Minority Children

These early differences in oral language skills have long-lasting ramifications. In U.S. schools, many lower SES and language minority children underperform compared with their middle-class, English monolingual counterparts. Differences in language skills are often seen as a cause of these achievement gaps (see Morrison, Bachman, & Connor, 2005; Oller & Eilers, 2002). For example, a follow-up study of the children first studied as toddlers by Hart and Risley (1995) found vocabulary size at 36 months to be a significant predictor of reading and spelling skills from kindergarten through third grade, holding the effects of SES constant (Walker, Greenwood, Hart, & Carta, 1994). Analysis of data from the NICHD Early Child Care Study found that oral language skills at 54 months predicted first grade reading scores within SES (NICHD Early Child Care Research Network, 2005). A longitudinal study of 7,179 twin pairs found evidence for a direct causal influence of early language skill on subsequent reading skill (Harlaar, Hayiou-Thomas, Dale, & Plomin, 2008). And, Durham and colleagues (2007) found that the SES gap in second, third, and fourth grade reading and mathematics skills among children in the U.S., can be explained by the oral language abilities they bring with them to kindergarten (Durham et. al., 2007). This finding that children’s oral language skills at the beginning of kindergarten are strongly predictive of elementary school performance and beyond in multiple subject areas suggests that early oral language skills is a key variable for the inter-generational transmission of SES, and an example of a transactional model of the effect of SES (Hoff et al., 2012). In short, SES (measured primarily as parental education level) predicts children’s early oral language skills, which predicts their school success and educational attainment, which in turn predicts their children’s oral language skills. For language minority children as well, oral language skills at school entry predict academic achievement as far in the future as has been studied—currently through the 8th grade. Language minority children who have poor English language skills when they begin Kindergarten are at significant academic risk (Halle, Hair, Wander, McNamara, & Chine, 2012; Han, 2012; Kieffer, 2012). As scholars from
different disciplines have long observed, skills beget skills (e.g., Heckman, 2013; Stanovich, 1986), thus investing in early interventions designed to improve early oral language skills is really an investment in children’s educational attainment and outcomes for future generations.

It is not surprising that oral language skills at school entry are such a strong predictor of literacy and school success, as over thirty years of research has shown that oral language skills set the foundation for learning to read and prepare children to engage in the academic language used in school environments (Anderson & Freebody, 1981; Dickinson & Tabors, 2001; Scarborough, 2001; Stanovich, 1986; Snow, 2010; Snow, Burns & Griffin, 1998). The specific oral language skills related to later skills include vocabulary, grammar, narrative and phonological awareness (e.g., Snow, Burns, & Griffin, 1998). During early childhood these oral language skills develop in tandem with pre-literacy skills such as print awareness, phonics and decoding skills, and then both types of early skills (oral language and pre-literacy) contribute to literacy acquisition. Oral language skills play a very strong role in reading comprehension in particular (NICHD ECCRN, 2005; Storch & Whitehurst, 2002), however, studies also suggest that oral language skill broadly construed is a stronger predictor of literacy than any isolated component (Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003; Lonigan, Schatschneider, Westberg, & the National Early Literacy Panel, 2008; NICHD Early Child Care Research Network, 2005). Strong oral language skills also prepare children for the academic discourse of schools which requires the ability to make a verbal argument, comprehend a text or teacher explanation, to give a presentation, to integrate information across multiple passages, etc. (Snow, 2010). This form of spoken discourse used in classrooms is dense, syntactically complex, and decontextualized and draws heavily on children’s prior oral language skills, particularly their knowledge of vocabulary and grammar and their ability to tell a linear, coherent narrative (Cummins, 1984; Schleppegrell, 2004, Snow, 1990; Snow & Uccelli, 2009; Valdes & Geofffrion-Vinci, 1998).

In regard to language minority children, a recent systematic evaluation of the literature concluded that the relation of English language skills to the acquisition of English literacy in bilingual children is much the same as it is for monolingual children (August & Shanahan, 2006). There are also relations between bilingual children’s oral language skills in their home language and their acquisition of literacy in English. Phonological awareness, morphological awareness, and higher order comprehension skills acquired and assessed in the heritage language appear to transfer to the task of learning to read in English (Durgunog’lu, 2009; Geva & Wang, 2001; Riches & Genesee, 2006). Throughout elementary school, literacy skills in one language are correlated with literacy skills in the other language, more so than oral language skills correlate across languages (Oller & Eilers, 2002). Although there remain unanswered questions about the degree to which such language transfer may differ among different heritage languages and may depend on the level of proficiency achieved in that language (Oller & Jarmulowicz, 2007), the conclusion this work suggests is that bilingual children need to know the vocabulary and grammar of the language in which they will learn to read but that their prior experiences with language and literacy in another language will also confer benefits.

Although the focus of this paper is on the gap in English language skills, it is worth pointing out that for children who speak a language other than English, their skills in that language are also relevant to their academic and occupational success. Heritage language skills are important because children’s competency in their parents’ native language is related to the quality of relationships within the family and to measures of psychosocial adjustment in adolescence (Oh & Fuligni, 2010, Tseng & Fuligni, 2000). Additionally, high levels of skill in
both English and a heritage language is a desired outcome for children from language minority homes because bilingualism confers cognitive advantages (e.g., Akhtar & Menjivar, 2012; Bialystok, 2005, 2009), because bilingualism has economic value to the individual, and because a bilingually-competent workforce is necessary for the U.S. to successfully participate in the global economy.

Finally, it is important to note that the oral language gap is likely to have important consequences for cognitive skills other than literacy and for the acquisition of knowledge more generally. One cognitive ability with a well-established relation to language skill is the ability to understand that other people have intentions, beliefs, and desires and that these mental states guide other peoples’ behavior. Children show beginnings of such understandings in infancy, but the understanding that others behave in different ways from oneself because they have different desires or beliefs is still developing in 3 and 4-year-old children. Individual differences in these understandings (termed Theory of Mind) are related to individual differences in language skill (Milligan, Astington, & Dack, 2007). Studies suggest that lower SES children lag behind higher SES children in developing Theory of Mind understandings (Shatz, Diesendruck, Martinez-Beck, & Akar, 2003) and, further, that mothers’ use of mental state language (i.e., words like want, hope, think, and know) is one source of individual differences in the development of Theory of Mind (Ruffman, Slade, & Crowe, 2002; Taumoepeau, & Ruffman, 2006). Another consequence of low levels of oral language skill may be a limitation on what children can learn from the talk of others. Many facts about the world and conceptual understandings cannot be learned from direct observation. When children know that the earth is round, that the brain is the location of thoughts and memories, and that the stomach digests food, it is because someone has told them. This knowledge is not merely a collection of factoids, but true conceptual understandings, such that an 8 year old child can reason that if a rabbit’s brain were transplanted to skunk, the skunk would have memories of being a rabbit (Gottfried, Gelman, & Schultz, 1999; Harris & Koenig, 2006; Johnson, 1990). Children’s access to the information that builds these conceptual understandings depends on their language skills.

**Causes of the Early Language Gap**

*The Importance of Children’s Early Language Experiences at Home*

The existence of language gaps based on SES and language minority status does not tell us about the mechanisms involved in substantiating these gaps. While genetic factors may play a role (Plomin, 1990), a growing body of research confirms that parental communication with children during early childhood is an important mediating factor between SES and child language skills (Hoff, 2006). It is not surprising that the early home environment, particularly parent communication, plays a large role in children’s language development, as children can’t learn language unless they hear language used around them. The social-interactionist perspective on language development stresses the importance of children’s early environments and social interactions in the course of language acquisition (Bruner, 1981; Snow, 1972, 1994; Tomasello, 1992; Vygotsky, 1978). Research adopting this perspective shows that the relation between SES and child vocabulary skill at school entry is due, in part, to the quantity and quality of speech that parents offer children during day-to-day interactions (Hart & Risley, 1995; Hoff, 2003; Huttenlocher, Vasilyeva, Waterfall, Vevea, & Hedges, 2007; Pan et al., 2005). The differences in words spoken to children during short interactions add up to substantial cumulative differences.
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in children’s communicative experiences during early childhood. For example, Hart and Risley (1995) estimated that children from the high-SES families they observed heard approximately 11,000 utterances in a day, compared to 700 utterances for the children from low-SES families. In a compelling analysis, Hoff (2003) explicitly showed that the mean length of utterance (MLU) and vocabulary that mothers direct to children mediates the relation between SES and child vocabulary development. On average, high SES mothers use longer utterances and more vocabulary words with their children than low SES mothers and, in turn, their children have larger vocabularies (Hoff, 2003). Higher-SES mothers also gesture more and gesture about more objects in the environment with their infants and toddlers than lower-SES mothers, and the children who see more gesture produce more gesture and have larger subsequent vocabularies (Rowe & Goldin-Meadow, 2009).

More qualitative differences in input are found across SES groups as well. On average, lower SES mothers address speech to their children more frequently for the purpose of directing their children’s behavior and less frequently for the purpose of eliciting and maintaining conversation (Hart & Risley, 1995; Hoff, 2006). In talking to their children, lower SES mothers make use of a smaller vocabulary and syntactic structures that are less varied and less complex, compared with higher SES mothers (Hoff, 2003; Huttenlocher, et al., 2007). Multiple studies have found that the properties of input characteristic of higher SES mothers are positive predictors of children’s language development—even within SES (Hoff, 2006; Huttenlocher et al., 2010, Pan et al., 2005). Further, while parents of all SES backgrounds support children’s developing language skills by communicating with them, the ways in which higher SES parents encourage language development are more consistent with the academic language environment of our formal school system (Schieffelin & Ochs, 1986; Heath, 1982; Heath, 1986). Thus, higher SES parents, on average, are equipping their children with the skills needed to participate in academic discourse by, for example, providing practice with producing more rare vocabulary words (e.g., Rowe, 2012; Weizman & Snow, 2001) more linear narratives (Heath, 1982; Heath, 1983), and asking more open-ended questions (Baker et al., 2001), than parents from lower-SES backgrounds. Thus, children are being socialized very early on to communicate more or less and in ways that are more or less congruent with the educational system and demands for literacy learning.

While most of the research on parent input and child language outcomes has been with mothers, there is evidence that fathers play a crucial role in their children’s language development as well. For example, one recent study with middle-class families found that the diversity of vocabulary fathers’ directed to their 24-month-olds made a significant contribution to children’s expressive language skills at 36 months, even after controlling for the diversity of maternal input (Pancsofar & Vernon-Feagans, 2006). Further, a more recent study by the same authors (Pancsofar, Vernon-Feagans, & The Family Life Project Investigators, 2010), but with low-income fathers, found relations between fathers’ use of vocabulary during a book reading interaction and children’s vocabulary both concurrently (child age 15 months) and predictively (child age 36 months). While mothers and fathers are generally very similar in the quantity, diversity and complexity of input they provide their children, within both low- and mid-SES families, fathers are found to be somewhat more challenging communicative partners than mothers in that they often ask their children more wh-questions (Leaper, Anderson, & Sanders, 1998; Mannle & Tomasello, 1987; McLaughlin, White, McDevitt, & Raskin, 1983; Rowe, Coker, & Pan, 2004). Exposure to wh-questions (e.g., who, what, where, when, why, how) is associated with language development, in that children who hear more questions of this sort are
better able to comprehend and produce these question types themselves (Valian & Casey, 2003). Further, various studies find significant relations between children’s vocabulary size and variation in mothers’ (Christofaro & Tamis-LeMonda, 2012) and fathers’ use of wh-questions (Leech, Salo, Rowe & Cabrera, in press). In sum, both maternal and paternal input influences children’s language development.

The above research is based primarily on monolingual English speaking children. Studies of bilingual development have indicated that bilingual development is not exempt from the requirement of language exposure—among bilingual children, their relative amount of exposure to each language is correlated with both their relative and absolute levels of development in each language (e.g., De Houwer, 2009; Gathercole & Thomas, 2009; Goldenberg, Rueda, & August, 2006; Hoff et al., 2012; Pearson et al., 1997; Place & Hoff, 2011; Saunders & O’Brien, 2006). Because children who are exposed to a language other than English at home are likely to hear less English than are children in monolingual English-speaking homes, their English language development lags behind that of monolingual English-speaking children. Language minority children’s English skills not only reflect how much exposure to English they have had but also the sources of that English exposure. Multiple findings provide evidence that input provided by native speakers is more supportive of language development than input provided by nonnative speakers. In two separate studies of bilingual 2 ½ year olds, Place and Hoff (2011, 2013) found that the proportion of the children’s English input that came from native English speakers was a positive predictor of their English vocabulary and grammar, over and above the effect of the amount of English input. In another study, Hoff et al. (2013) found that the amount of English use in bilingual homes was a strong predictor of 4-year-old children’s English skills if one of the parents was a native English speaker, while English use at home was only a weak predictor of children’s English skills if both parents were native Spanish speakers. Hammer, Davison, Lawrence, and Miccio (2009) found in a sample of Head Start children with Spanish-speaking parents that children whose parents spoke more English to them did not have stronger English skills, but they did have weaker Spanish skills. The properties of the child-directed speech that are influenced by native speaker status and that underlie these relations should be more fully explored, but one study found that mothers who are native Spanish speakers but fluent in English nonetheless use a larger vocabulary when talking to their children in Spanish than in English (Hoff, Coard, Señor, 2013; Hoff, Welsh, Place, & Ribot, in press). It is important to keep in mind that the input needs to be child-directed. That is, overheard speech does not facilitate language development (Weisleder & Fernald, 2013; Schneidman, Arroyo, Levine, & Goldin-Meadow, 2013; Schneidman & Goldin-Meadow, 2012).

Other findings in the literature are consistent with the hypothesis that native speakers provide more supportive input than nonnative speakers, particularly if we assume that native speakers are merely the extreme point on a continuum of proficiency and it is proficiency that matters. In a sample of 4- to 7-year-old immigrant children in English-speaking Canada, Paradis (2011) found that English input at home was not a significant predictor of children’s English vocabulary, but out-of-home contact with English speakers was (Paradis, 2011). Two other studies in the U.S. have found that the English proficiency of immigrant mothers predicts their children’s English vocabulary as children (Hammer, Komaroff, Rodriguez, Lopez, Scarpino, & Goldstein, in press) and as adults (Jia, Aaronson, & Wu, 2002). The finding of proficiency effects on the value of second-language speakers’ child-directed speech has important practical implications. It suggests that the advice often given to immigrant parents-- to speak the majority language at home-- may not benefit the children’s majority language development as much as the
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suggestions that language proficiency should be an important criterion in staffing early child care and education programs.

In sum, although the ability of children to acquire language is remarkable, it is not magical. Language acquisition depends on the amount and nature of language exposure. In the long run, exposure to two languages potentially yields the benefit of proficiency in two languages. In the short run, however, children exposed to and acquiring two languages will acquire each at a somewhat slower rate than will children acquiring one (Hoff et al., 2012), and many children from language minority homes will not have had sufficient exposure to English to achieve the same level of oral language skill as have monolingual English-speaking children by the time they enter school.

Why are there SES differences in Parent Input?

There are myriad parenting characteristics that vary by SES and help to explain the relation between SES and parent input. Parental beliefs and knowledge about child development differ, on average, by SES and contribute to how parents communicate with children (e.g., Heath, 1983). One potential predictor of parents’ behavior is their beliefs about whether their children’s abilities are fixed or malleable; that is, whether they are innately determined and relatively stable, or whether they can be improved with effort and exposure to positive environments. Parental beliefs about the general nature of intelligence have been shown to influence parental behavior during parent-child interactions, as well as their children’s self-beliefs and academic performance with older school-aged children (Moorman & Pomerantz, 2010; Pomerantz & Dong, 2006). One study also suggests that the more parents see their preschool children’s skills as malleable or influenced by the environment, the more they ask their children questions during interactions (Donahue, Pearl, & Herzog, 1997). Another study showed that parents’ knowledge of child development mediated the relation between SES and language-advancing aspects of child-directed speech in a diverse sample of families, with child language ability controlled. Thus, parents from different SES groups, on average, have different knowledge and beliefs about child development that contribute to the ways in which they communicate with their children on a daily basis. At a more general level, evidence suggests that lower-SES parents believe they have less control over the outcome of their children’s development than do higher-SES parents (Elder, Eccles, Ardelt, & Lord, 1995; Luster & Kain, 1987). Interventions should capitalize on this relation between parenting beliefs and knowledge and parent communicative behaviors by targeting parenting knowledge in an effort to increase the quantity and quality of input parents address to children. It is plausible that parent-targeted interventions may have widespread benefits, as not only will parents become more informed about child development and about the importance of talking to their children, but they will also see that their behavior has an effect on their children, thus altering their mindsets and putting their role in their child’s development in the forefront.

Parents from different SES groups also differ on average in their own verbal abilities. For example, several studies have shown that within and across SES groups, maternal language and literacy skills positively relate to mothers’ communication with children. Specifically, on average, more educated mothers have larger vocabularies and as a consequence use larger vocabularies, ask more questions, and use fewer commands when communicating with their children than less-educated mothers. (Borduin & Henggeler, 1981; Bornstein, Haynes, & Painter, 1988; Hoff-Ginsberg, 1991; Rowe, et al., 2005). One study, however, found that parental knowledge of child development was more predictive of parent input than was mothers’
verbal IQ (Rowe, 2008). Low-SES parents are also more likely than high-SES parents to be experiencing high levels of stress and depression (Berger, Paxson & Waldfogel, 2009). Research consistently shows that mothers experiencing higher levels of depression talk less to their children, are less responsive to infant vocalizations and are less likely to adopt intonational characteristics of child-directed speech in verbal interaction with their infants (Bettes, 1988, Breznitz and Sherman, 1987; Lovejoy et al., 2000; Rowe, Pan, & Ayoub, 2005). Thus, interventions targeting parents should be mindful of the role of other parental characteristics as potential moderators of intervention uptake.

How do children make use of the input? Input effects on processing and brain development

We know from neuroscience research that experiences during the first few years of life are critical for brain development (Shonkoff & Phillips, 2000). Early childhood is a period of great plasticity when large numbers of synapses (connections among neurons) are formed. During this time heightened language input can have a large effect on brain functioning, as it protects the brain from the “pruning” of unused synapses which make learning more difficult (see P. Huttenlocher, 2002 for a review). Based on recent advances in neuroscience techniques, we now have clear evidence of the effects of input on brain development during language learning. Some of the earliest effects are seen in infants’ abilities to process phonetic units of speech, as shown by the work being conducted in Professor Patricia Kuhl’s laboratory at the University of Washington (see Kuhl, 2010 for a review). The studies build on previous findings that between 6 and 12 months of age infants’ are sensitive to statistical distributions in the input and their ability to detect these distributions aids in phoneme and word learning (e.g., Saffran, 1996). During this time, infants’ perceptual ability also transitions from being open to the phonetic information available in all languages, to being more attuned to the phonetics of the language(s) they are exposed to (e.g., Werker & Tees, 1984). That is, if children are not exposed to the sounds of a particular language, their ability to distinguish sounds in that language starts deteriorating early on, at the same time with more input their ability to distinguish speech sounds in their own native language increases. Kuhl’s work shows that individual differences in infant’s abilities to perceive phonetic distinctions in their native language at 7.5-months (measured using Event Related Potentials) is positively related to their later vocabulary growth from 18 to 30 months, whereas ability to perceive distinctions in a non-native language at this age is negatively related to later vocabulary growth (Kuhl, et al., 2005; 2008). Thus, infants who are better able to learn and process the sounds of their native language early on, show faster language growth than infants who are slower to develop indexed by their superior processing of non-native sounds and less superior processing of native language speech sounds. This early speech discrimination skill in the native language is also predictive of language and literacy skills at age 5 years (Cardillo, 2010), suggesting yet another example where skills beget skills in language and literacy development.

Importantly, the infant brain can learn to discriminate sounds in multiple languages if exposed to multiple languages via social interaction. Kuhl and colleagues found that 9-month-old American infants who spent a 4-5 week period interacting with Mandarin-speaking “tutors,” were able to discriminate phonemes in Mandarin at a native level (and significantly better than non-exposed American infants) even a month after their tutoring sessions ended (Kuhl et al., 2003). Importantly, the study also showed that if the Mandarin exposure was from a television or audio-only version of the tutoring, it did not improve infants’ ability to discriminate mandarin phonemes. Based on this result, Kuhl put forth the “social gating hypothesis” (Kuhl, 2007),
which highlights the effectiveness of social interaction in early language learning and the importance of child engagement during those social interactions. Indeed, further work found that during a Spanish exposure experiment, American infants who were more engaged with the tutor during the sessions in that they followed the speakers gaze more frequently (e.g., Baldwin, 1995; Brooks & Meltzoff, 2002; Tomasello & Farrar, 1986), showed greater neural discrimination in response to Spanish stimuli in the lab (Conboy & Kuhl, 2010). Based on these strong arguments for the role of social interaction and language input in language learning it is not surprising that a general review of the literature highlights significant SES differences in neuro-cognitive development, particularly in regard to language, and concludes that these differences are due to differences in children’s home experiences, specifically parental nurturance and cognitive stimulation in the home (Hackman & Farrah, 2009).

Recent behavioral work conducted by Professor Anne Fernald and her colleagues at Stanford University provides compelling evidence that exposure to input improves children’s language processing abilities, which in turn facilitates vocabulary learning. Language processing is measured by using the looking-while-listening task in the lab (Fernald, Zangl, Portillo, & Marchman, 2008). In this scenario, a child sits on the mothers’ lap and looks at a screen. The child sees 2 pictures on the screen, hears a word presented, and then the child’s looking behavior is recorded. Processing efficiency is measured as the proportion of time the infant is fixated on the target picture (i.e. the picture that represents the verbal word they heard and were reported to know by parents). Results suggest that that as early as 18 months there are SES differences in children’s processing efficiency that are equivalent to a six month gap between the higher- and lower- SES groups (Fernald, Marchman & Weisleder, 2013). Their work also shows that for both monolingual English speaking children, and language minority children (Hurtado, Marchman, & Fernald, 2008), infants whose mothers talked with them more at 18 months were more efficient in real-time language processing six months later. And, importantly, children who are better at language processing build their vocabularies faster than children with weaker processing abilities (Fernald & Marchman, 2012). Finally, in a recent study with low-income Spanish speaking families they found that the strong positive effect of parent input at child age 19-months on children’s vocabulary at 24 months was mediated by children’s real-time processing abilities measured in the lab at 19 months (Weisleder & Fernald, 2013). Thus, exposure to a high quantity of child-directed speech provides the infant with practice in interpreting language in real time. This practice sharpens processing skills used in online comprehension, enabling faster learning of new vocabulary. This finding is particularly striking, as this most recent study was conducted with an entirely low-SES sample suggesting that much larger effects would be found in a more heterogeneous sample. In sum, both neurological and behavioral data point to the conclusion that children who are exposed to more child-directed speech become more effective at processing spoken language which leads them to build their language skills faster than children exposed to less input.

The Importance of Children’s Early Language Experiences at Preschool

Currently, over 65 percent of all 3-5 year old American children are enrolled in some form of preschool or non-relative care (NCES, 2012). Aspects of the communicative environments in the schools also contribute to children’s oral language development. One study found that over the course of a preschool year, children whose teachers provided more syntactically complex language input, progressed more in their language over the course of the school year than children with teachers whose language use was less complex (Huttenlocher et
Another longitudinal study found that students in preschool classrooms where the teachers offered more language input and more language-advancing input, had greater language and literacy skills in fourth grade than students who had preschool teachers who talked less (Dickinson & Porche, 2011). This evidence of effects of teacher input on child language development suggests that the relation between input and language acquisition is causal, and not just a reflection of genetically based similarity in the verbal skills of mothers and children. Another recent study found that children with low language skills who attend preschool classrooms with children who have higher language skills, advance more over the course of the preschool year in language and literacy abilities than peers who start with similar language skills but don’t have more advanced children in their classrooms (Justice, Petscher, Schatschneider, & Mashburn, 2011). Thus, peers also have an influence on language development in the classroom. Further, for children from language minority homes, preschool offers an opportunity to experience more language input in English and more English input from native speakers than might be experienced at home. We know that children from low-SES homes and language minority children fare well in high quality preschool programs. One study of children from Spanish-speaking homes who attended a bilingual preschool found the children gained significantly in their English skills, without cost to their development of Spanish (Winsler, Diaz, Espinosa, & Rodriguez, 1999). Unfortunately, children from low-income homes and language-minority children do not always have access to high-quality preschool programs (Phillips, Voran, Kisker, Howes & Whitebook, 1994). Further, variability in preschool quality is vast, and targeted interventions to alter the language use of teachers in preschool classrooms have shown generally weak results to date (Dickinson, 2011).

Importance of Early Intervention

Our growing understanding of the robust role of children’s very early experiences in language learning has led to a call for a shift from focusing on schools as a way to eliminate SES achievement gaps to a focus on the role of parents in early development. Renowned scientist including economist James Heckman argue that, “the logic is quite clear from an economic standpoint. We can invest early to close disparities and prevent achievement gaps, or we can pay to remediate disparities when they are harder and more expensive to close… Investing early allows us to shape the future; investing later chains us to fixing the missed opportunities of the past.” (Heckman, 2011a, p. 47). We agree wholeheartedly with this statement. Our review of the literature on early language gaps suggests that the origins of the language gap are seen in the early home environment and thus the most direct route to ameliorating the gap is by impacting caregiver input. However, we are mindful that there is not one answer for all, and that for language-minority children increased input in the heritage language at home is important, but exposure to input in the majority language is also essential. With this in mind we turn to a review of the literature on interventions targeting early language gaps. We begin with a review of parent-focused interventions and then briefly review findings regarding the importance of high-quality preschool experiences for language-minority children.

Approaches to Intervention

Parent-focused interventions to increase language input and language development

Examinations of early intervention programs with a home/parenting component have shown the effectiveness of intervening early in the home. For example, James Heckman...
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regularly cites the positive long-term impacts of the Perry Preschool program and the Abecedarian project on participants social, academic and earnings outcomes (Heckman, 2011a, 2011b, 2013). While parent-focused interventions have played a prominent role in the disparities literature, the emphasis has typically been on generalized parental behaviors, such as nurturing and discipline, with child-directed language behavior a component of the intervention rather than the primary behavioral target (Brooks-Gunn & Markman, 2005). For example, programs have focused on teaching parents how to respond constructively and contingently to children’s behavioral cues, and have demonstrated positive changes in child behavior as a result of intervention (Phillips, 2011). One of the best-documented programs is the evidence-based Play and Learning Strategies (PALS), a responsive parenting intervention that has demonstrated positive socio-emotional, language, and cognitive effects on children (Landry, Smith, Swank, & Guttentag, 2008). This intervention uses a trained parent facilitator and video of parent-child interaction to strengthen the parent-child bond and ultimately child development. A more recent intervention led by Helen Neville and her colleagues with children from low-SES families also deserves mention, as it found that an 8-week family based intervention targeting children’s attention skills had a large impact on the parents themselves, the children’s attention (measured with ERPs), and the children’s receptive language abilities (Neville, Stevens, Pakulak, Bell, Fanning, Klein, & Isbell, 2013). In this study the family based intervention program had much better results than regular Head Start or another intervention program that did not have a parent component. The authors conclude that the parenting component is essential and that school based interventions that do not include parents are less likely to realize large gains for children (Neville et al., 2013). While this intervention was targeting children’s attention and not language development, the positive effect on language is not surprising, as children rely on attention to process language input as noted above.

Interventions that aim to develop child literacy skills have been a particular focus among disparity researchers. Parent-directed literacy interventions typically encourage parents to read books with their children (Dickinson & McCabe, 2001; Whitehurst & Epstein, 1994). Book-reading interventions have demonstrated significant improvements in child vocabulary and emergent literacy skills (National Early Literacy Panel, 2008; Whitehurst & Epstein, 1994). However, these interventions target parent-child language interactions only in the context of book reading, and it is not known whether these parent language behaviors generalize beyond reading activities into everyday life. In general, narrowly focused parent-directed interventions have shown “only modest, if not minimal impacts” in ameliorating the impact of poverty on children’s educational outcomes (Brooks-Gunn & Markman, 2005; Furstenberg, 2011).

In contrast to these narrowly-focused efforts to improve literacy skills in typically-developing children from low-SES backgrounds, parent-directed interventions for children with language delays or disabilities related to hearing loss, autism, and specific language impairment target a wider range of parental language behaviors and the overall enrichment of a child’s early language environment. A meta-analysis of 18 language intervention studies in which parents were trained to implement interventions with their language-delayed children demonstrated positive effects on receptive and expressive language (Roberts & Kaiser, 2011). Despite this success, Roberts & Kaiser (2011) note that these studies focused exclusively on children with known disabilities and the majority of participants were from middle-class backgrounds, limiting their relevance to low-SES typically-developing populations. Nonetheless, the success of parent-directed language interventions for children with disabilities raises the possibility that this may also be effective for typically-developing children from low-SES backgrounds.
Some promising results come from the *Thirty Million Words Project*, a parent-directed home-visiting intervention led by Dr. Dana Suskind at the University of Chicago. The intervention is designed to impact SES disparities in early language environments. A randomized controlled trial was used to evaluate whether the intervention improves parents’ knowledge of child language development and changes the way parents talk with their toddlers. Twenty-three mother-child dyads (12 experimental, 11 control, age 17-36 months) participated in 8 weekly hour-long home-visits. Parent knowledge and language input increased significantly, as assessed through video-coding of 3 parent-child play sessions and 14 LENA home recordings during the course of the intervention. The *Thirty Million Words Project* thus has the potential to positively affect the language parents in low-income households use with their children, which could, if sustained, eventually impact child language and literacy outcomes. Recently, the city of Providence Rhode Island was awarded a Bloomberg Philanthropies grant for “Providence Talks,” a home-visiting program with a similar approach as *Thirty Million Words*. The project is in its initial stages, however, so there are no results at this point.

Intervening early with parents is likely the best route to preventing gaps for monolingual children. It also will be helpful for bilingual children’s parents’ knowledge about child development and for the children’s heritage language development. Parent-directed programs will not be sufficient to close the English skills gap for children whose parents are not highly proficient speakers of English. Preschool programs have a role to play in providing children from immigrant families with high-quality exposure to the majority language. Currently, most preschool programs attended by children from language minority homes are English-only programs. Studies of children from Spanish-speaking homes who attend English-only immersion Head Start have found that the children’s English skills do increase over the two years of the program, but often their Spanish skills decline (Hammer, Lawrence, & Miccio, 2008; López, 2012). Other research on children in true bilingual preschool programs, where the curriculum is delivered in both English and Spanish, has found that English skills can be promoted without cost to children’s development of Spanish skills (Winsler et al., 1999). Clearly more work is needed to identify and provide programs that will optimize the language development of children from language minority homes.

In sum, the literature suggests that parent-centered interventions to increase parental knowledge of child development and parental understanding of the importance of using a large amount of high-quality talk with their children will have positive effects on parents and children and is likely our best route to preventing the SES gap in language development from substantiating. Further, for language minority children this type of intervention focused on their home language should be coupled with access to high-quality preschools where they are exposed to the majority language.

**An Agenda for Research: What We Need to Learn**

Based on the above review, there are two areas that stand out as important areas of focus for future research. First, we need more high-quality randomized controlled trials of parent-focused interventions targeting child language development. Second, we need more evidence of the most efficient way to promote both heritage language and majority language skills for language minority children.

*A need for randomized controlled trials of parent-focused interventions targeting language gaps*
Research driven Randomized Controlled Trials (RCTs) that focus on early intervention with a home-based component show short- and long-term benefits to the participating children and families and, benefit-cost analyses (BCAs) show positive economic returns to society more generally (Karoly, 2012; Karoly, Kilburn, & Cannon, 2005). Thus, the empirical work on language gaps and the economic benefit-cost analyses on more general RCTs in early childhood concur that the benefits outweigh the costs for this type of approach. With that in mind, we need to focus our attention on the next steps for research to move the field forward.

The Thirty Million Words project is a good starting point, yet it also sheds light on some issues that need to be pursued in future work. First, the interventions themselves should be developed through systematic and iterative approaches with significant formative input from the target population. We need interventions that are longitudinal to determine the persistence of effects on parents’ behavior. Do parents only increase in their quantity and quality of talk to children during and soon after the intervention, or is the intervention having a long-term impact on parental communicative behavior? If the intervention has a long-term impact on parental behavior, is it due to its’ affect on parenting knowledge or another mechanism? Further, we need to learn more about whether the interventions are more or less effective for some parents than others. For example, did parents with more depressive symptoms benefit from the intervention as much as parents who do not show depressive symptoms? These types of questions can be answered with carefully implemented, longitudinal RCTs designed to affect parenting knowledge and parents’ talk with children.

Longitudinal studies are essential to assess the intervention effects on child outcomes as well. For example, one can examine children’s language growth during the course of the intervention, but the goal of the intervention is to have a lasting impact on children’s skills. We assume that skills beget skills with language and literacy development, but the question is how much of a boost from an intervention is necessary to see a significant impact when children enter kindergarten? Ideally, studies will collect outcome data on children’s oral language and pre-literacy skills at a variety of ages during early childhood to answer this important question. Larger-scale studies could follow children through the school years to determine literacy outcomes and school success in general.

We need studies with different intervention “dosages” to determine how much time and money should be spent on the intervention phase of the project to yield results. Does an 8-week intervention induce enough change in parental behavior and the home environment to make a lasting difference in children’s language and literacy development? Does it close the gap in oral language skills at kindergarten entry between high- and low-SES children? Or, is a 16-week intervention necessary, or 4-weeks? Or, do some parents need more of a dose than others and what parental or child characteristics will indicate that? Relatedly, at what point would it be most effective for an intervention to begin? Input clearly affects children’s language processing and development from birth despite the fact that children do not speak their first words until their first birthday. Would it make more of a difference to work with parents soon after the children are born, rather than waiting until the children are beginning to talk? Or, should the intervention target parents at different points in the child’s early development, perhaps focusing on parents’ gesture use between child ages 6-12 months (Rowe, 2013), and then targeting parents’ speech between ages 12-18 months. These are questions we need answers to so that we can determine the most cost-efficient way to scale-up an intervention of this sort to effectively prevent the language gap from substantiating.
Finally, in an ideal world, children would transition from a home environment rich in talk to a high-quality preschool environment where teachers provide similar language-advancing input. However, we know this is not always the case. Our longitudinal interventions need to consider children’s other care situations in their analyses, and the interventions themselves should consider the effectiveness of continued services to parents via schools during the preschool years. Further, as a society we need to do what we can to try and be sure that all children from low-SES or language-minority homes have access to high-quality preschool programs to help foster their language and pre-literacy skills.

A need for evidence on promoting heritage and majority language skills in language minority children

For language minority children we need to foster their heritage language while also making sure that they are exposed to the majority language. Thus, there is a need for similar research to determine the effectiveness of parent-focused interventions to increase parent input in the child’s heritage language on children’s heritage language learning. Helping the children to build their heritage language will not hurt them in the long run, but can only help them. Research should also be conducted to determine how much of an effect this type of intervention alone will have on the children’s ultimate English language learning later on via transfer, or via influencing parents’ knowledge and potentially parents’ decisions to seek out English exposure settings for their children. Interventions with language minority populations could have an extra intervention component teaching parents the importance of their role of providing a large amount of high quality talk in the heritage language, but also of seeking out English experiences for their children. Do interventions with this additional component have better outcomes than interventions without this component?

Critically, language minority children also need exposure to English from native speakers on a regular basis. One obvious way to provide this exposure is through high-quality preschool environments. We need more research to determine the best type of preschool program for language minority children in terms of whether bilingual programs or English-only programs would have the best results for language minority children in general, but also for children who are already experiencing a boost in heritage language exposure at home via an intervention of the sort discussed above. In this vein, longitudinal studies will also be essential here to answer these complicated questions of effects of home and preschool language environments on closing the language gap for language minority children.

In sum, there is an urgent need for high-quality RCTs of parent-focused interventions designed to impact parenting knowledge, parenting communication with children, and child language development during the first few years of life in low-SES and language minority families in the U.S. The second report in this series, “Bridging the early language gap: A plan for scaling up” offers some suggestions for accomplishing this goal.
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