

SECTION 1

WHAT DOES RESEARCH TELL
US ABOUT EFFECTIVENESS
AND IMPLEMENTATION OF ECE
PROGRAMS ACROSS THE
BIRTH-TO-EIGHT CONTINUUM?

IN SECTION 1:

Chapter 1: What Does Research Tell Us About ECE Programs?

By Margaret R. Burchinal, Ph.D., University of North Carolina at Chapel Hill and Dale C. Farran, Ph.D., Vanderbilt University

Chapter 2: What Are Reasonable Expectations for ECE Program Effectiveness?

By Jeanne Brooks-Gunn, Ph.D., Teachers College and College of Physicians and Surgeons, Columbia University and Sarah Lazzeroni, Teachers College, Columbia University

Chapter 3: Using a Social Determinants of Early Learning Framework to Eliminate Educational Disparities and Opportunity Gaps.

By Iheoma U. Iruka, Ph.D., HighScope Educational Research Foundation

SECTION 1, CHAPTER 1

**WHAT DOES RESEARCH TELL US
ABOUT ECE PROGRAMS?**

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INTRODUCTION

Early care and education (ECE) now plays an integral role in early development, so it is important to understand how ECE affects children's learning and development. This chapter describes the extensive literature relating ECE quality and programs to both short- and long-term development. The findings from these ECE research and evaluation studies are contrasted and discussed in the context of factors that limit current ECE programs and policies from achieving the goal of promoting positive short- and long-term outcomes for all children.

ECE serves two primary functions: supporting parental employment and promoting positive cognitive and social development to reduce achievement gaps during the school years (Burchinal, Magnuson, Powell, & Hong, 2015). Its first function is to care for very young children while their parents work; in the United States (U.S.) and much of the world, most men and over two-thirds of women are employed outside the home (OECD, 2018). At this time, over 80% of preschoolers (three- to five-year-olds) and 35% of infants (zero- to two-year-olds) attend ECE programs (OECD, 2018). Many other children, especially infants, experience out-of-home care by relatives (Burchinal et al., 2015). Parents' decisions about ECE, as well as the options open to them, depend on cultural norms (Lamb, 1998). In northern Europe, for example, ECE is viewed as a community responsibility. Parents are offered generous, government-subsidized family leave and low-cost, high-quality child care (Waldfogel, Han, & Brooks-Gunn, 2002). In contrast, in the U.S. and much of the rest of the world, childrearing is viewed as primarily the family's responsibility. Most parents choose from a range of options in the private market, especially for infants, toddlers, and young preschoolers (Waldfogel et al., 2002). As a result, ECE has mostly remained a family responsibility in the U.S. (National Academies of Sciences, Engineering, and Medicine, 2018).

ECE's second function is to promote children's cognitive and social development before they enter elementary school (Burchinal et al., 2015). Experimental early intervention studies conducted prior to 1980 demonstrated that ECE could have long-term impacts on low-income children's educational and labor-market success (Heckman, 2011). Accordingly, ECE became a primary policy mechanism for addressing concerns that some children, particularly low-income children, arrive at school unprepared to succeed in elementary school, and that differences in school readiness have lasting consequences (Burchinal et al., 2015). It is argued that ECE programs generate benefits not only to participants but also to the economic and social health of communities (Barnett & Masse, 2007; Heckman & Masterov, 2007; Magnuson, Ruhm, & Waldfogel, 2007; Putnam, Frederick, & Snellman, 2012). As a consequence, a variety of programs have been publicly funded to increase access to high-quality ECE, including the federally funded Head Start program primarily for low-income children, state-funded pre-k programs typically for low-income children, and state Quality Rating and Improvement Systems (QRIS) designed to improve access to high-quality ECE for all children (Barnett, 2013).

The large ECE research literature has answered important questions about the quality of ECE programs and their impact on young children’s development. But ECE research has not fully examined implementation of programs or policies to determine how components, contexts, fidelity, and target populations relate to child outcomes. It is clear that young children thrive when caregivers are responsive and sensitive in their interactions and stimulate learning by providing and scaffolding age-appropriate activities. But only some research has asked whether specific program or ECE quality indicators relate to child outcomes differently for children of different races/ethnicities, social classes, or home languages or even whether different aspects of the ECE experience promote different child outcomes. Furthermore, most ECE research is based on a theoretical model that posits that structural quality (e.g., characteristics such as teacher education and ratio of children to adults) lays the foundation for process quality (i.e., the frequency and quality of interactions between caregivers and children), and that it is process quality that impacts child outcomes. But the evidence supporting this model using current measures of structural and process quality is quite limited. Thus, we do not know enough about what works (or not), for whom, and under what conditions in promoting which skills for young children. This volume addresses all of these questions and this chapter discusses the research regarding these issues.

WHAT’S WORKING IN ECE PROGRAMS?

ECE’s short-term impacts on early learning and development have been measured in several ways. One set of studies has examined associations between indicators of ECE quality, defined in various ways, and child outcomes; another set of studies has evaluated specific types of ECE, including early intervention programs and publicly funded programs and initiatives; and still other studies have focused on specific instructional practices and curricula. The magnitude of ECE’s estimated immediate impacts varies widely both within and between these sets of studies.

► ECE quality and child outcomes

Developmental theories suggest that ECE influences children’s learning and development through the quality of relationships between caregivers and children and opportunities to learn through hands-on, age-appropriate activities that adults scaffold (see Burchinal et al., 2015 & Hamre, 2014 for details). Attachment theory postulates that frequent, warm, and sensitive interactions with caregivers allow children to engage meaningfully with objects and people in their environment (Ainsworth, Blehar, Waters, & Wall, 1978; Howes & Spieker, 2008). Piaget’s constructivist developmental theory argues that early cognitive development requires children to actively engage with objects and people to learn (Gopnik, Meltzoff, & Kuhl, 1999). Vygotsky’s social-cultural theory describes how caregiver scaffolding aids learning (Vygotsky, 2001). Bronfenbrenner’s ecological theory emphasizes the critical role of primary caregivers at home and in ECE, as well as the continuity and connections between the two contexts (Bronfenbrenner & Morris, 2006).

Definitions of ECE have evolved from these theories and from developmental research. “Process quality” describes the quality of factors that directly affect children in ECE, either through the frequency and quality of their interactions with caregivers or through their access to engaging and informative activities. Certain program and teacher characteristics are thought to promote process quality, including factors such as caregiver education and training, child/adult ratios and group size, and curriculum. These “structural quality” factors indirectly affect children through their presumed impact on process quality. Simplistically represented, the following model suggests these causal links (NICHD ECCRN, 2002):



Structural quality. Structural quality is thought to be important because it provides caregivers with the skills, knowledge, and opportunity to provide the high process quality that can improve child outcomes (NICHD ECCRN, 1999, 2002). Structural quality indicators include the caregivers’ education and training, wages and benefits, the ratio of children to caregivers, the number of children in a setting, program leadership and administration, and parental involvement (Build Initiative & Child Trends, 2014; Burchinal, Tarullo, & Zaslow, 2016).

Research indicates that process quality is higher when structural quality is higher. Earlier research found that teacher education, teacher training, ratio of children to adults, group size, caregiver wages, and administrator experience and communication style had moderate-to-strong associations with both global environmental quality (Bloom & Sheerer, 1992; Burchinal et al., 2000b; Phillipsen, Burchinal, Howes, & Cryer, 1997) and ratings of teacher-child relationship sensitivity (NICHD ECCRN 1999, 2002a). But these associations have not always been observed (Mashburn et al., 2008; Pianta et al., 2005).

Whereas the pathway from structural quality indicators through process quality to child outcomes has been supported in at least one study (NICHD ECCRN, 2002a), many studies have examined associations between structural quality and child outcomes. They looked at the direct pathways from structural quality to child outcomes, in part because compared to process quality, the structural quality indicators can be more easily monitored and therefore are easier to use in licensing or performance monitoring of ECE programs. These studies provide some limited evidence of associations. In early

studies, preschool children's outcomes were modestly better when their teachers had more education (Burchinal et al., 2000b; Phillipsen et al., 1997; NICHD ECCRN, 2002a) and classrooms had fewer children per teacher (NICHD ECCRN, 2002a; Phillipsen et al., 1997). When the number of children in a preschool classroom was larger, behavior problems were reported more frequently (McCartney et al., 2010). In addition to individual studies, meta-analyses using large child care studies suggest that children's skills levels are higher when caregivers receive training, especially with intensive training or training aligned with a rigorous curriculum (Fukkink & Lont, 2007), and when teachers and administrators have more education (Burchinal et al., 2016). But they are not higher when child-adult ratios or group size are smaller (Burchinal et al., 2016). And even when the associations between structural quality indicators and child outcomes in the recent studies were statistically significant, their magnitude was quite modest—most effect sizes were .10 or smaller. In summary, some but not all evidence suggests that some structural quality indicators are very modestly related to some child outcomes.

Process quality. All ECE models assume that the quality of interactions between caregivers and children (process quality) determines the extent to which ECE experiences are positive for children and are the processes through which ECE impacts early learning and development (Burchinal et al., 2015). Process quality reflects the extent to which caregivers are responsive and sensitive with the children in their care, provide stimulating activities, and scaffold early learning and development (Hamre, 2014). There are two widely used tools for measuring ECE quality. The Environmental Rating Scales (ERS) (Harms, Clifford, & Cryer, 2005) focuses on the extent to which children have hands-on opportunities for learning and on the level of caregiver scaffolding during those activities. The Classroom Assessment Scoring System (CLASS) (Pianta, La Paro, & Hamre, 2008) describes the quality of the teacher-child relationship. The ERS focuses on children's access to a variety of age-appropriate activities and if/how caregivers engage with them during those activities. It includes the Early Childhood Environment Rating Scale (ECERS) (Harms, Clifford, & Cryer, 2005) to describe the quality of preschool center care, the Infant-Toddler Environmental Rating Scale (ITERS) (Harms, Cryer, & Clifford, 2003) to describe the quality of infant/toddler center care, and the Family Day Care Environment Rating Scale (FDCERS) (Harms, Cryer, & Clifford, 2007) to describe home-based care. These measures emphasize the types and variety of activities provided, the extent to which the child is an active participant in the learning process, and the extent to which adults engage with children in those activities. Each one also assesses the provider's sensitivity and responsiveness, health-related practices and the safety of the setting, and classroom-management practices. According to these measures, a high-quality classroom has at least five different interest centers, conversations during meal and snack time, a wide selection of books that are read in formal class activities and in informal interactions with the teacher, and activities that encourage children to think, talk, and reason about their experiences (Harms et al., 2005).

The CLASS focuses on the quality of interactions between children and their caregivers and the level of positive classroom management. It is an extension of a scale, the Observational Rating of the Childcare Environment (ORCE), developed by the NICHD Study of Early Child Care and Youth Development (NICHD ECCRN, 1997). It rates caregivers' warmth and sensitivity and the instructional support they provide, as well as the degree to which their classroom management is positive and effective. According to this measure, teachers in high-quality classrooms have frequent, warm, and responsive interactions with children. The teacher attends to each child, individualizing feedback to match his or her skill level. The teachers talk frequently with each student in multi-turn conversations in which the adult elaborates on the students' responses by asking open-ended questions (Hamre, 2014).

The associations between these process-quality measures and child outcomes have been examined extensively. The earliest studies reported moderate associations, typically between the ECERS and child outcomes (e.g., Burchinal et al., 2000a; Clarke-Stewart, 1998; Howes, Rodning, Galluzzo, & Myers, 1988; Peisner-Feinberg & Burchinal, 1997; McCartney, 1984). These studies were criticized, however, because they included only a few demographic characteristics and therefore failed to account for potential differences in the families that selected different quality levels of ECE for their children. That is, more advantaged parents choose higher-quality care and have children with higher levels of developmental skills, so the children's higher skill levels may have more to do with family advantage than with ECE quality (Duncan & Magnuson, 2004). The next set of studies included extensive family and child covariates and yielded statistically significant but modest associations between child outcomes and ECE quality (e.g., Howes et al., 2008; Mashburn et al., 2008; NICHD ECCRN, 2002; Votruba-Drzal, Coley, & Chase-Lansdale, 2004). Some of these studies asked whether a certain level of quality (i.e., a threshold) was necessary for quality to improve child outcomes. Some evidence of quality thresholds for the CLASS domain scores emerged, but it was inconsistent. And the associations between quality and outcomes remained modest even above the threshold (Burchinal et al., 2010; 2014; 2016; Hatfield et al., 2015; Weiland, Ulvestad, Sachs, & Yoshikawa, 2013). Most recently, several meta-analyses that reanalyzed large ECE studies also found reliable but very small associations with some child outcomes, with effect sizes of around .05 (Keys et al., 2013; Burchinal et al., 2016).

Specific aspects of ECE quality appear to enhance children's early development. Preschoolers showed modest but significant gains in academic and social skills when they experienced more frequent, warm, and responsive interactions with caregivers (Mashburn et al., 2008; NICHD ECCRN, 2002; Raver et al., 2011). Gains in academic skills are modestly larger when instruction includes detailed feedback, and sequenced and elaborated support for learning (Howes et al., 2008; Mashburn et al., 2008). Language and academic skills were higher when caregivers encouraged children to talk and engaged in multi-turn conversations that elaborated on a given topic (Justice, Mashburn, Pence, & Wiggins, 2008; Wasik &

Hindman, 2011). Finally, gains in language and social skills were larger when children were offered a wide range of age-appropriate activities such as reading with adults, pretend play with peers, and play with books, blocks, water, and sand, demonstrated gains in language and social skills (Sylva et al., 2012).

Policy applications of the ECE model. The major policy initiative designed to improve access to high quality care was developed using the conceptual model relating structural quality to process quality to child outcomes was used to develop QRIS programs. States and localities developed these ratings systems using structural- and process-quality indicators to describe the quality of participating ECE programs, and provided incentives and professional development to enrolled programs. All QRIS ratings include measures of process quality and structural quality (e.g., caregiver education and training, and group size or child-adult ratio), and many include measures of parental involvement, inclusion of children with special needs, and practices that align programs with the family practices for children who come from diverse backgrounds or who speak a language other than English at home (Build Initiative & Child Trends, 2014). Validation studies of QRIS systems in many states have found that ECE programs at higher QRIS-quality tiers had higher process quality as indicated by higher ERS or CLASS scores, providing reassuring validation for the rating systems (e.g., Lipscomb, Weber, Green, & Patterson, 2016; Tout, Cleveland, Li, Starr, Soli, & Bultnick, 2016; Yazejian et al., 2017). But these validation studies yielded little to no evidence of higher skills levels among children who attend programs at higher quality tiers, raising questions about the pathways from process quality to child outcomes in the ECE model underlying the QRIS systems (Karoly, Schwartz, Setodji, & Haas, 2016; Sabol & Pianta, 2015; Soliday Hong et al., 2015; Thornburg, Mayfield, Hawks, & Fuger, 2009; Yazejian et al., 2017; Zellman, Perlman, Le, & Setodji, 2008).

► **Child outcomes and ECE instructional practices and programs**

Other studies have examined the short-term impacts of specific early childhood teaching practices and ECE programs. A meta-analysis of all randomized clinical trials of early childhood interventions yielded an average effect size of about .35 for most of these ECE programs and practices (Duncan & Magnuson, 2013). Stronger impacts were found for studies of intensive curricula with scope and sequence. Evidence-based curricula, when combined with aligned training or coaching, were related to larger gains in children's literacy skills.

Teaching practices. Numerous ECE curricula have been developed and evaluated. Collectively, they demonstrate that a focus on teaching practices and aligned professional development can have substantial impacts on child development across a number of developmental domains. Examples include: a language curriculum with an effect size of .27 (Wasik & Hindman, 2011); a literacy professional development program with effect sizes of .91 to .99 (Powell, Diamond, Burchinal, & Koehler, 2010); a math curriculum with effects sizes of .47 to 1.07 (Clements & Sarama, 2008); and a social-emotional

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learning curriculum with an effect size of .63 (Raver et al., 2008). Integrating several evidence-based curricula has also had modest-to-large impacts on child outcomes. For example, the Boston Public Schools Universal Pre-K program integrated evidence-based literacy and math curricula and children showed moderate-to-large gains in those content areas (effect sizes of .45 to .82, respectively), as well as more modest gains in executive functioning (EF) (effect sizes of .21 to .28; Weiland & Yoshikawa, 2013).

ECE programs. Between 1960 and 1980, ECE intervention programs demonstrated large short-term outcomes. These include the Perry Preschool/HighScope program (Cunha & Heckman, 2007) and Chicago Parent-Child Centers (Reynolds, Magnuson, & Ou, 2010), which combined child care and parenting programs for preschoolers and their mothers, and the Abecedarian Project (Campbell et al., 2012), which provided full-time child care and onsite medical care from infancy to kindergarten. Abecedarian yielded large short-term impacts on cognitive development, and the other projects obtained moderate short-term impacts on cognitive and social outcomes.

Statistically rigorous evaluations of publicly funded programs have also found modest-to-large short-term impacts for Head Start and some state pre-K programs. An experimental study of Head Start, the federally funded program for low-income children, yielded modest impacts at the end of one year of the program (Puma, Bell, Cook, & Heid, 2010). State pre-K programs vary widely from state to state (Barnett, 2013), so it is not surprising that estimates of immediate impact vary from nil to very large (Phillips et al., 2017). Children attending the pre-K programs that meet most professional guidelines tend to show moderate-to-large immediate gains, with the largest gains among dual language learners and children from low-income families (Phillips et al., 2017). Most pre-K evaluations report statistically significant moderate-to-large impacts on rote reading and math skills, but smaller or no reliable impacts on language, social skills, and EF (Burchinal, 2017).

Interpreting ECE program evaluations can be complicated by the timing of program implementation and methodological issues. The studies with the largest short-term impacts are the small, experimental ones conducted in the 1960s and early '70s. Duncan and Magnuson (2013) warn that generalizing the results from those findings to today's programs is problematic because the comparison groups in these studies are very different from the comparison groups of today. In the earlier studies, the comparison groups consisted primarily of low-income children who stayed home before kindergarten; the comparison

group in studies conducted in the past year consists of low-income children who attend other types of center care. Given that center care appears to be beneficial, especially for low-income children (Magnuson et al., 2007), this change in the counterfactual makes it more difficult to detect impacts (Duncan & Magnuson, 2013). For example, immediate Head Start impacts appear to be much larger if Head Start children are compared to children who did not attend center care, especially if they spoke Spanish at home (Bloom & Weiland, 2015). In addition, quasi-experimental studies used to evaluate pre-K programs rely heavily on statistical assumptions in estimating pre-K impacts, and those impacts may be inflated due to violations in those assumptions, such as differential attrition in the treated group (Phillips et al., 2017). The evaluation of Boston's pre-K program, which attempted to address differential attrition, yielded somewhat smaller effect sizes than those reported in some of the other evaluations (Minervino, 2014).

► **Potential reasons for larger ECE effects in studies of programs and practices than in studies of quality**

In summary, the studies relating process and structural ECE quality to short-term child outcomes report very small associations, whereas at least some of the studies of programs and curricula report moderate-to-large associations. These findings challenge our current models of how ECE influences child outcomes, which argue that process quality—the quality of teacher-child interactions and access to hands-on learning experiences—determines children's learning and development in ECE, and that other ECE factors, such as instructional practices and programs, have their impacts through improving process quality (e.g., Hamre, 2014). Despite the widespread belief that when ECE programs positively impact child outcomes these impacts occur because the programs are of high quality, little evidence actually links program efficacy to measures of process quality. Furthermore, the impacts of the effective programs are much larger than observed associations between process quality and child outcomes (Burchinal, 2017). This raises questions about whether current quality measures are adequate or whether our ECE models need to be expanded (Burchinal, 2017).

Psychometric issues. Limited variability on existing scales has created psychometric problems. Designed to be aspirational, the widely used ERS and CLASS systems measure a full range of very bad (i.e., a rating of 1) to very good (i.e., a rating of 7) quality on each item. Consequently, most classrooms tend to be rated somewhere in the middle, within a small range of the overall scale. The small standard deviation for each item tends to be less than 1 point. Raters are certified as reliable when 80 to 85% of their item scores are within 1 point of the trainer's rating or the gold standard. This creates large variability among raters, and inter-rater variability often accounts for more than 25% of total variance in classroom-quality ratings (Burchinal, 2017).

Restricted scope of ECE quality measures. Larger impacts in evaluations of curricula and pre-K programs with a stronger instructional component suggest that the quality of intentional teaching needs to be measured more carefully (Burchinal, 2017; Yoshikawa et al., 2013). Professional development randomized clinical trials that improved the quality of teacher-child interactions as measured by the CLASS failed to improve child outcomes (Pianta et al., 2017; Yoshikawa et al., 2015), suggesting that improving process quality as measured by the CLASS may not be sufficient to change academic skills in particular. Because specific curricula and pre-K programs show much larger impacts, ECE quality measures may need to focus more on the frequency and quality of intentional teaching. Furthermore, it may be necessary to examine instruction within content areas because teachers may differ in their ability to cover subjects like literacy, math, and science.

Recently, several measures have shown promise for expanding the measurement of ECE quality. They involve behavioral counts rather than ratings, and they vary in terms of whether the unit of observation is the teacher or multiple children in the classroom. Connor et al., 2011 developed an integrated system involving child monitoring, classroom observations, and instruction that has been shown to substantially improve reading skills in early elementary school; a preschool version is in the works.

Observational measures that describe how children spend their time and how teachers interact with them appear promising. One, the Snapshot (Ritchie, Weiser, Kraft-Sayre, & Howes, 2001), describes how much time individual children spend in different types of activities in terms of content area and instructional format. When districts used the Snapshot to create pre-k to third-grade programs, child outcomes improved and parents became more involved (Manship, Farber, Smith, & Drummond, 2016). Two other measures, the Language Interaction Snapshot (LISn) (Sprachman, Caspe, & Atkins-Burnett, 2009) and Observation Measures of Language and Literacy Instruction (OMLIT) (Goodson et al., 2004), describe the frequency and quality of linguistic interactions in ECE classrooms. Children who have more frequent and complex linguistic interactions with their teachers showed moderate to large gains in their language skills (Abt Associates, 2007). The Child Observation in Preschool/Teacher Observation in Preschool (COP/TOP) (Farran & Son-Yarbrough, 2001; Bilbrey, Vorhaus, Farran, & Shufelt, 2010) measures how much and to whom the teacher talks and listens, the types of tasks in which the teacher or assistant is engaged, the level of ongoing instruction or assessment, the content area, and the tone of the interactions. Results from this measure have been associated with both short- and long-term gains in self-regulation (Fuhs, Farran & Turner, 2013; Spivak & Farran, 2016) as well as academic outcomes (Farran et al., 2017).

LONG-TERM ECE IMPACTS ON CHILD OUTCOMES

Research on the long-term impact of ECE quality, instruction, and program has yielded mixed findings. Early studies demonstrated important long-term impacts into adulthood on education, employment, family formation, and health (Campbell et al., 2012; 2014; Cunha & Heckman, 2007; Reynolds et al., 2010). On the other hand, later studies of process quality, instruction, and programs have suggested that impacts may fade over time.

Three large studies of process quality documented very small but reliable associations between preschool quality and child outcomes in elementary school (Belsky et al., 2007; Peisner-Feinberg et al., 2001; Sylva et al., 2012) and high school (Vandell et al., 2010). Follow-up studies of the pre-k programs indicate smaller but still significant, longer-term effects for some of the most rigorous programs (Phillips et al., 2017). Long-term quasi-experimental studies suggest that Head Start has positive impacts into adulthood (Ludwig & Miller, 2007). Yet many studies do not show long-term gains. The meta-analysis of all early childhood interventions reported that the average impact declined during the elementary years and was not significantly different from zero by the end of elementary school (Duncan & Magnuson, 2013). The follow-up study of the experimental evaluation of Head Start indicated that all impacts disappeared early in elementary school (Puma et al., 2012). One of the most rigorous evaluations of any pre-K program, that of the Tennessee Pre-K Program, showed negative impacts on outcomes in third grade (Farran & Lipsey, 2015).

Inadequate attention to some school-readiness skills. The child outcomes that ECE seeks to improve have changed over time. Early programs, such as Abecedarian and HighScope, focused on improving general knowledge and language skills. Teachers engaged in frequent conversations with children and, through conversations and activities, actively scaffolded children's learning. (Ramey & Ramey, 1998; Lazar et al., 1982). Head Start originally focused on improving nutrition and social skills to provide the basis for success in school (OHS, 2018). Head Start and most child care programs added a primary on academic skills starting about 20 years ago based on evidence that having these academic skills at entry to school was the basis for school-age academic achievement (Burchinal et al., 2015). Thus, it is not surprising that, as described above, the immediate impacts of ECE programs tend to be on academic skills, rather than language, EF, or social skills.

The focus on teaching basic reading and math skills in preschool programs likely contributes to fade-out because it appears these skills are also taught in kindergarten. Despite the fact that more than three-fourths of children in a nationally representative study entered kindergarten with basic literacy and math skills, kindergarten teachers spend most of their time teaching those skills (Claessens, Engel, & Curran, 2013; Engel, Claessens, & Finch, 2013). Indeed, the only children who made substantial gains in literacy in during kindergarten had not mastered those skills prior to entry to school. Thus, it is likely that the lack

of continuity between instruction in preschool and kindergarten that accounts for much of the fade-out in academic skills.

In addition, focusing on academic skills may contribute to fade-out if other skills are important academically and socially during the school years. A comprehensive review (National Research Council, 2008) differentiated between rote skills, such as basic literacy and numeracy learned through direct instruction, and higher-order skills, such as oral language and EF acquired through extended, scaffolded interactions with caregivers. Evidence suggests that higher-order skills at school entry predict acquisition of later academic skills better than basic skills (Blair & Raver, 2012; Snow & Oh, 2010). Other studies have also related multiple school-readiness skills to academic and social skills in elementary school. The school-readiness skills most consistently related to school-age skills were

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language (Pace et al., 2017), general knowledge (Grissmer et al., 2010), and self-regulation and EF skills (Fuhs, Nesbitt, Farran, & Dong, 2014).

Though math skills have also been found to predict subsequent reading and math outcomes (Duncan et al., 2007), later work suggests that including cognitive skills in the analyses would have yielded different conclusions (Bailey, Watts, Littlefield, & Geary, 2014; Grissmer et al., 2010). Along with the early intervention studies, these studies suggest that

doing more to promote general knowledge, language, EF, and self-regulation might give children skills that improve their academic and social outcomes during the school years.

An important question to answer is the degree to which fade-out is related to a lack of alignment in reading and math instruction from preschool to kindergarten, or to the focus on academic rather than higher-order skills in preschool. To the extent that kindergarten teachers teach skills that children learned during their preschool years, it is not possible now to determine the relative contribution of these two explanations.

Characteristics of preschool programs. Preschool programs operate in ways that may make it difficult to meet expectations regarding child outcomes. These programs typically follow the school model of offering up to six hours of care per day for up to nine months per year. The opportunities for learning during those six hours are limited by the time required for naps, toileting, and meals, and in the worst programs children spend much of their time transitioning among activities (Early et al., 2006). Many preschool programs focus on large-group, didactic instruction that is not developmentally appropriate for preschoolers (Farran & Lipsey, 2015).

Preservice preparation for ECE teachers, including college and certification programs, is a matter of deep concern; problems include a lack of focus on producing ECE teachers and a lack of consistency and rigor in courses, teaching staff, and certification requirements (Early et al., 2007). Similarly, we lack evidence that in-service training programs are effective, despite huge expenditures on professional development and technical assistance.

Last, preschool teachers' low salaries in both community settings and several state-funded programs limit ECE quality by determining who becomes and remains a preschool teacher. Wages are low because parents typically pay for community-based ECE, and most parents cannot afford to pay the higher fees that allow for higher wages for teachers. Child care vouchers for low-income children to attend ECE while their mothers work or go to school are often indexed to average fees in the community (Burchinal et al., 2015). Public programs, such as Head Start and state pre-k, often offer slightly higher salaries, but pay is still typically below that of certified elementary education teachers (Burchinal et al., 2015). Consequently, it is difficult to recruit and retain highly qualified ECE teachers, which constrains ECE quality in community-based organizations and publicly funded programs (National Academies of Sciences, Engineering, and Medicine, 2018).

WHAT NEEDS TO BE UNDERSTOOD ABOUT ECE?

We need to understand many other issues if we are to meet ECE's promise to ensure that children enter school ready to succeed in primary school and beyond. One such issue is the extent to which children's race/ethnicity and home language may require attention to different or additional factors (McCabe et al., 2013). For example, there is considerable evidence that dual language learners benefit from practices that promote their first language while they learn their second language, especially during early childhood (Espinosa, 2013; McCabe et al., 2013). Evidence is mixed regarding the degree to which having an ECE provider from the same ethnicity/race improves young children's ECE experiences, but developmental theories suggest that continuity between home and ECE should make it easier for children to develop and learn (Gillanders, Iruka, Ritchie, & Cobb, 2012; Schick, 2014).

We also need to pay more attention to practices that facilitate the transition to elementary school (transition papers) and continuity of care from preschool through third grade (Bogard & Takanishi, 2005; Reynolds et al., 2010; Stipek et al., 2017). Transition activities like communication between the preschool and kindergarten teachers improve child outcomes during kindergarten (Ahtola et al., 2010; LoCasale-Crouch, Mashburn, Downer, & Pianta, 2008). Continuity in expectations and learning opportunities between pre-K and the first four years of elementary school helps children both maintain preschool gains and make larger gains in elementary school (Reynolds et al., 2010). Careful alignment among evidence-based instruction, assessment, and professional development within and between years appears to maintain gains in elementary school (Bryk et al., 2010).

Another area that needs more attention is identifying which school-readiness skills promote long-term development and which ECE practices promote those skills. Current ECE quality models assume that children acquire cognitive, academic, and social skills when they experience high levels of process quality, but the models do not specify how quality experiences promote specific skills. The fact that we see much larger impacts on outcomes in studies of specific curricula (Duncan & Magnuson, 2013) than in studies of ECE quality (Burchinal, 2017) suggests that ECE can produce substantial gains in specific outcomes when it promotes those outcomes with evidence-based practices. Once evidence identifies which school-readiness skills are related to which school-age academic and social outcomes, we then need to identify ECE instructional practices that promote those skills. It is also important to ask whether those practices vary for children from different ethnicities, social classes, and home languages, and to adapt instructional practices accordingly. We suspect that evidence-based intentional instruction and aligned professional development will focus on teacher-scaffolded learning through rich, multi-turn conversations and sequenced, hands-on activities designed to promote general knowledge, language, EF and self-regulation among young children.

Last but not least, current policies rely primarily on center-based preschool programs that begin at ages three-to-four (e.g., Head Start or state pre-K) to address income and racial achievement gaps, despite clear evidence that a child's first three years are critical for building these foundational skills. By two-to-three years of age, we already see large gaps in language and cognitive skills between children from low- and higher-income families and between children of color and white children (Halle et al., 2009). Preschool programs like Head Start or pre-K can close, but not eliminate, those gaps (Burchinal et al., 2015; Phillips et al., 2017; Yoshikawa et al., 2013). Children's experiences as infants and toddlers at home and in ECE influence their cognitive, academic, and social skills at entry to preschool, so ensuring that children have access high-quality child care during infancy, as well as during the preschool years, may help narrow these gaps (Li et al., 2013).

CONCLUSION

The field focuses on current measures of ECE quality despite their very modest associations with child outcomes, rather than on the evidence-based curricula or specific types of ECE programs that have much larger impacts on child outcomes.

Early care and education can improve young children’s academic and social skills, with some evidence of long-term impacts during the school years and into adulthood. Yet there are many reasons to believe most ECE programs could be much more effective. The field focuses on current measures of ECE quality despite their very modest associations with child outcomes, rather than on the evidence-based curricula or specific types of ECE

programs that have much larger impacts on child outcomes. Identifying which preschool skills promote the acquisition of which specific school-age skills should lead to greater focus on promoting those skills in ECE. Models that pay greater attention to which specific instructional practices improve those skills are likely to be more successful than our current models when it comes to achieving ECE’s promise of promoting long-term development for all children.

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CHAPTER 1 WHAT DOES RESEARCH TELL US ABOUT ECE PROGRAMS?

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CHAPTER 1 WHAT DOES RESEARCH TELL US ABOUT ECE PROGRAMS?

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SECTION 1, CHAPTER 2

**WHAT ARE REASONABLE EXPECTATIONS
FOR ECE PROGRAM EFFECTIVENESS?**

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Early childhood education (ECE) programs in the U.S. have a long and rich history, as well as a robust evaluation literature. In fact, more well-designed evaluations have been conducted for ECE programs than for elementary or high school programs. Other chapters in this volume consider what we know about the quality of early childhood programs and child outcomes (Burchinal & Farran, Ch. 1), about instructional practices contributing to ECE quality (Farran, Ch. 4), and about how teacher training and professional development influence program quality (Pianta & Hamre, Ch. 5).

EVALUATING ECE EFFECTIVENESS

This chapter examines a slightly different but related topic: What are reasonable expectations for ECE program effectiveness? The overlap is evident in that asking about expectations raises questions about what is reasonable today given the state of ECE quality, as well as the variability in quality. In general, ECE program impacts are expected to be small-to-medium, but not large.¹ Our estimates are based on the current ECE evaluation literature (Elango, Garcia, Heckman, & Hojman, 2015; Love, Chazan-Cohen, Raikes, Brooks-Gunn, 2013; Marietta, 2010; Phillips, Gormley, & Anderson, 2016; Weiland & Yoshikawa, 2013; Yoshikawa, Weiland, Brooks-Gunn, 2016). We offer general, research-based estimates for ECE program effectiveness. We should see modest program effects for four-year-olds whose teachers receive continuous professional development, a BA or additional training, adequate wages, and training on well-defined curricula. Additionally, all ECE programs should offer full-day programming and strive for relatively low teacher turnover. Some programs should be expected to enhance child school readiness by at least one-sixth to one-third of a standard deviation (more on this metric below). These effects would be found in traditional evaluations (randomization to treatment or control); they would be most likely in communities that do not have preschool slots for all four-year-olds (i.e., where a significant proportion of children are being cared for by kith and kin or where there is an age-based cutoff for enrollment).

This effect size is most likely to be seen in measures of language, literacy, mathematics, cognition, and perhaps, executive function (EF), which encompasses attention, memory, and inhibition. Significant effects are not likely for general health or health care, as the vast majority of four-year-olds are relatively healthy and receive health care. By contrast, if ECE programs offer referrals to or are linked with dental care, we are likely to see effects (since most four-year-olds, especially those who are poor or near poor, don't receive dental care). We can't be sure whether ECE increases receipt of services for special needs, as two opposing counterfactuals exist. That is, if ECE improves language, literacy, and cognition, then the proportion of children classified as developmentally delayed would decrease; at the same time, ECE program staff are likely to identify children who could benefit from Individuals with

¹ Large effects are defined as differences of .40 or more of a standard deviation between a group receiving an ECE program and a group not receiving the program (control group), where each child is ideally put into one of the two groups by random assignment. Medium effects are defined as .25 to .40 of a standard deviation. A small effect would be between .15 and .25 of a standard deviation (yet statistically significant). For the purposes of this chapter, our expected range is between one-sixth and one-third of a standard deviation.

Disabilities Education Act (IDEA) services, while kith-and-kin caregivers are much less likely to have the knowledge or access to do so (Love, Chazan-Cohen, Raikes, & Brooks-Gunn, 2013). In any case, ECE aims to provide needed services to each child, which would favor the second outcome (providing IDEA services).

We chose one-third of a standard deviation or more based on the best ECE evaluation results to date; not all program evaluations achieve this, for a variety of reasons (Yoshikawa, Weiland, & Brooks-Gunn, 2016). Having a robust effect size is also important given the expected reduction in effect sizes throughout the elementary school years. Without additional services or improvements to early elementary school, the effect of ECE will fall to one-half of its initial size by the end of third or fourth grade. Therefore, an effect size of one-half will become one-quarter and an effect size of one-third will become one-sixth. Effect sizes that are lower than one-third are very unlikely to be sustained into the late elementary school years.

It is likely that we would see smaller declines if changes, some of which we list below, were made in early elementary school. Without such changes, sustained ECE effects will be very modest or not present at all. Sixteen years ago, one of us wrote an article titled “Do You Believe in Magic?,” with a thesis that no matter how wonderful a preschool program might be, one year of even the highest-quality services is not enough for children to succeed (Brooks-Gunn, 2003). Improvements must be made in the quality and often the quantity of education at both the preschool and elementary school levels (not to mention middle and high school, but that is beyond the scope of this chapter). More time in education settings may also be necessary (for example, full-day pre-K and kindergarten and after-school and summer programs during elementary school).

Asking about reasonable expectations is especially important because almost three-quarters of adults are in favor of preschool programs (Jones, 2014). Most people appreciate the idea that an early start is one of the most effective approaches to helping children learn. In this sense, developmental psychologists and early childhood educators have been wildly successful. A few benefit-cost analyses—underscoring the message that earlier is better—have cemented this belief. Economists James Heckman and Lynn Karoly have provided compelling evidence of long-term effects (Cannon, Kilburn, Karoly, Mattox, Muchow, & Buenaventura, 2017; Heckman, 2006; Heckman, Moon, Pinto, Savelyev, & Yavitz, 2010; Karoly, 2016). But underneath all the kudos lies a concern about what we should really expect from a preschool program in terms of children’s later well-being. Our success as educators and social scientists in communicating that an early start matters may have some unintended consequences. That is, expectations may outstrip results. Today’s ECE programs, even those showing short-term effects of one-third of a standard deviation, are unlikely to generate a 14:1 or even a 7:1 benefit-cost ratio, as the Perry Preschool Program did (Heckman, 2006). We believe that a more reasonable goal would be a 1.5 to 1 or 2 to 1 ratio of benefits to costs² (Karoly, 2016; Kilburn & Karoly, 2008; Steuerle, & Jackson, 2016).

Policy scholars debate (a) what effect sizes mean in terms of school achievement, (b) how large effect sizes need to be to translate into long-term indicators of success, (c) which ECE programs can deliver changes large enough to make a difference later on, and (d) whether our expectations for large effects are reasonable. We examine how ECE is defined, what types of evaluation are appropriate, how effect sizes are measured, what child outcomes are typically examined and what the results say (with a focus on differential effects), and what the implications are for pre-K to third grade education (Brooks-Gunn, 2003; Camilli, Vargas, Ryan, & Barnett, 2010; Duncan & Magnuson, 2013; Garces, Thomas, & Currie, 2002; Gormley & Gayer, 2005; Hill, Gormley, & Adelstein, 2015; Love, Chazan-Cohen, Raikes, & Brooks-Gunn, 2013; Reynolds, Magnuson, & Ou, 2010; Yoshikawa et al., 2013).

DEFINING ECE PROGRAMS

In this chapter, early childhood education refers to programs that provide center-based education to children from one to five years of age. Center-based programs for children under one year, although they exist (the most notable being the Abecedarian Programs, Early Head Start programs, and the current Educare programs) (Yazejian, Bryant, Hans, Horm, St. Clair, File, & Burchinal, 2017), serve only a very small fraction of infants, given both the high cost of care in the first year of life and parental preferences. At five years old, most U.S. children enter kindergarten or at least become eligible for kindergarten. Currently, the vast majority of four-year-olds attend preschool, and the number of three-year-olds in preschool is rapidly rising: about 60% of four-year-olds (Rathbun, Zhang, & Snyder, 2016) and 43% of three-year-olds (Weiland & Yoshikawa, 2013) are enrolled in preschool, according to recent estimates (Yoshikawa, Weiland, & Brooks-Gunn, 2016). One- and two-year-olds are much less likely to attend preschool. Therefore, we focus on four-year-olds and, to a lesser extent, three-year-olds. (Most evaluations focus on four-year-olds, although they are beginning to include more three-year-olds, who are receiving ECE in increasing numbers.)

ECE programs have many goals. The primary goal is to envelop children in a learning milieu that provides opportunities to master age-appropriate social, emotional, linguistic, physical, and cognitive skills. A closely related focus is the relatively low levels of school readiness among some groups. Children whose parents have low education, low income, and/or are from minority ethnic groups are, on average, likely to enter kindergarten with lower skills than children from other backgrounds (Duncan & Magnuson, 2005; Reardon & Portilla, 2016). They are also less likely to receive high levels of learning stimulation at home (Brooks-Gunn, Markman-Pithers, & Rouse, 2016; Hoff, 2006; Hoff, 2012; Kalil, Ziol-Guest, Ryan, & Markowitz, 2016; Votruba-Drzal, 2003), in large part because of

² Sibling and county comparisons have been used to follow children into adulthood, in order to look at long-term sustained effects of ECE. A handful of the small-program evaluations have also done so (Abecedarian Project and the Perry Preschool Program) (Belfield, Nores, Barnett, & Schweinhart, 2006; Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002; Heckman, Moon, Pinto, Savelyev, & Yavitz, 2010; Hill, Gormley, & Adelstein, 2015). The estimates of effect sizes from these two programs are frequently cited by ECE policymakers as well as by politicians (one mention being made by President Obama in a State of the Union address). Although impressive, these benefit-cost estimates are based on fewer than 150 individuals who were born in the 1960s and 1970s.

their parents' education, income, and/or cultural beliefs about parenting. Many ECE programs have been designed to enhance poor children's school readiness, Head Start being the most salient. Sometimes the focus is on the gaps or discrepancies between more and less disadvantaged children. However, these terms do not address the goal of raising skills in one group (gaps could also be closed by reducing skill development in more advantaged groups).

Another goal is to help children who speak a language other than English at home to become proficient in both English and their native language. Policy scholars disagree about whether education for English language learners (ELLs) should focus more on helping students become bilingual or on helping students become proficient in English as quickly and efficiently as possible (Barrow & Markman-Pithers, 2016). Depending on which objective they emphasize, educational programs for young ELLs are generally divided between programs that are taught in both English and another language and programs that are taught solely in English (Barrow & Markman-Pithers, 2016).

Higher labor force participation among women and more work hours have led to a need for safe, affordable, and educational child care, yet such care is not available to many... Our so-called polyglot system of early care and education is not conducive to supporting working parents.

Last, and often overlooked, is the need for quality care for young children whose parents work. The proportion of working mothers with children age five and younger is at an all-time high in the U.S. (Bureau of Labor Statistics, 2016a; Bureau of Labor Statistics, 2016b; Wen, Hetzner, Brooks-Gunn, 2019). About 70% of all mothers with children under 18 are in the labor force, including 64% of mothers with children between the ages of one and five years (Bureau of Labor Statistics, 2016a; Bureau of Labor Statistics, 2016b). Many mothers in the U.S. also return to work quite soon after giving birth—almost 60% are back at work within nine months, 26% within 2 months, and 7% within one month (Wen, Hetzner, & Brooks-Gunn, 2019). Working hours have also increased, by 35% in single-parent households with children under age 18 and by 16% in two-parent households with children under age 18.

Higher labor force participation among women and more work hours have led to a need for safe, affordable, and educational child care, yet such care is not available to many (Chaudry, Morrissey, Weiland, & Yoshikawa 2017). Our so-called polyglot system of early care and education is not conducive to supporting working parents (Chaudry et al., 2017).

Although definitions vary, many use the term pre-K to refer to all early childhood educational programs (Brooks-Gunn, Markman-Pithers, & Rouse, 2016). Four categories of programs can be identified, depending on who administers the program and how it is funded. (Sometimes these lines are blurred since programs may be funded by more than one source and may be subject to multiple administrative rules; for example, see New York City's Pre-K for All program [Reid, Melvin, Kagan, & Brooks-Gunn, 2019]).

1. State or city pre-K programs are, for the most part, overseen by state or city education departments; they are often universal, although some may be targeted to low-income children (Friedman-Krauss, Barnett, Weisenfeld, Kasmin, DiCrecchio, & Horowitz, 2018).
2. Federally funded programs include Head Start and its younger sibling, Early Head Start. The U.S. Department of Health and Human Services administers these programs, which are targeted to families with income below the federal poverty threshold (with 10% of the Head Start children having special needs, as a mandated set-aside) (Elango, Garcia, Heckman, & Hojman, 2015).
3. Community programs include a panoply of not-for-profit programs. They may be subsidized by community organizations or by the Child Care Development Block Grant program, in which federal money is passed on to the states to subsidize child care costs for low-income working parents (Matthews, Schulman, Vogtman, Johnson-Staub, & Blank, 2015).
4. For-profit early childhood programs have not been studied extensively, although the few observations available suggest that their overall quality is lower than that of the other three categories (Burchinal, Nelson, Carlson, & Brooks-Gunn, 2008; Rathbun, Zhang, & Snyder, 2016).

In the 1960s through the 1980s, ECE programs were developed mostly for children whose parents had low incomes and/or low education. Children from such families were observed to be less prepared for kindergarten (academically and socially) than children from more advantaged backgrounds. In fact, gaps in language skills are seen as early as age two, and perhaps even earlier (Fryer & Levitt, 2013; Klebanov, Brooks-Gunn, McCarton, & McCormick, 1998). It was thought that children from educationally and economically disadvantaged households received fewer opportunities—in their families, neighborhoods, and child care settings—to develop early skills that predict literacy and numeracy (Blau, 2003; Johnson, Martin, & Brooks-Gunn, 2013; Noble, Houston, Brito, Bartsch, Kan, Kuperman, Akshoomoff, et al., 2015). Families who have low incomes or live in low-income neighborhoods are also constrained in their child care choices, due to both income and availability. These ECE programs were premised on the idea that an educationally oriented preschool would provide experiences that would reduce the gaps between economically disadvantaged kindergarteners and their more advantaged peers. Hence the term “Head Start,” the goal of which was to level the playing field by enhancing the skills of poor preschoolers. Consequently, programs from this era targeted children from low-income backgrounds. Thus, almost all the program evaluations through the last century involved children from low-income families. Our knowledge about program efficacy, especially long-term efficacy, is based on poor and, to a lesser extent, minority children. As more universal state and local pre-K programs have been implemented, we’ve seen debates arise about whether programs are equally effective for children from more advantaged families.

CONSIDERING EVALUATION DESIGNS

► Commonly used designs

About 80% of the evaluations of ECE programs focus on four-year-olds (Camilli, Vargas, Ryan, & Barnett, 2010; Yoshikawa, Weiland, & Brooks-Gunn, 2016). Almost all the evaluations have been based on random assignment to a treatment or a control group. (A few well-known evaluations were not experimental—children were not randomized, and no data were collected prior to the treatment. The Chicago Parent-Child Program is the notable example [Reynolds, Temple, Robertson, & Mann, 2001].) These traditional evaluations are useful because they compare two equivalent groups of randomly assigned children. Therefore, any effects are unlikely to be due to unobserved differences between the two groups.

A few other designs have been used to evaluate ECE programs. One is based on sibling comparisons (looking at adolescent or adult outcomes of siblings who did and did not go to Head Start, for example) (Currie & Thomas, 1995), based on the premise that such comparisons control for family differences to a large extent. A few clever comparisons have employed variation in how programs were rolled out in a set of counties that were similar in poverty status, some of which received funding and technical assistance to open Head Start centers and some of which did not; this approach is a variant of the regression discontinuity design (Ludwig & Miller, 2007).

But such designs have limitations. Since parents voluntarily choose to send their children to ECE programs, the sample does not include families whose parents are unaware of a program, are distrustful of sending their children to a program, have few ECE programs available in their neighborhoods, do not speak English, or are concerned about immigration or child welfare scrutiny, to name a few of the reasons parents don't send their children to ECE programs. Consequently, we don't know how well an intervention may fare with all children of a specific age group. (Although citywide universal pre-K programs alleviate this concern to some extent, even in these circumstances, not all children are served.) And until recently, evaluations have focused on relatively small programs, offered in either just one site or in just a handful of sites. The national Head Start Impact Study (begun in 2002, even though Head Start itself began in 1965), which used a waitlist design, was the first to look at treatment and control children in hundreds of Head Start centers.

Evaluations of small programs are influenced by the community in which they are conducted. From an evaluation perspective, the biggest concern is the availability and quality of other ECE programs. If most children in a control group are likely to attend a different ECE program, then the effect sizes will be smaller than in situations where children in a control group do not attend an ECE program (Zhai, Brooks-Gunn, & Waldfogel, 2011). The other design that has been used to evaluate ECE programs is regression discontinuity, typically comparing children whose birthdays are near the mandated age cutoff for pre-K on either side. That is, children who receive ECE because their

birthdays are just before the age cutoff are compared to those who do not receive ECE because their birthdays fall right after it. Boston and Tulsa have used this evaluation design (Gormley & Gayer, 2005; Yoshikawa et al., 2013).

► The Counterfactual

The sibling and county comparisons also suffer from being based on ECE conditions almost 50 years ago. The sibling comparison analyses have tapped the Panel Study of Income Dynamics and the National Longitudinal Study of Youth—Child Supplement, which began in the late 1960s or the 1970s. The county comparison analyses were based on the first Head Start programs from the 1960s. Also, these studies focused on Head Start, which offers early childhood education only for children whose family incomes are at or below the poverty threshold. At the time, families with low income usually had no other options (few other programs were available in low-income neighborhoods, and even when other programs were available, families were often unable to afford them). Therefore, children who were not in Head Start were unlikely to be in other preschool programs or were in programs for only a few hours a day (see the ETS Head Start Evaluation from the 1970s as an example) (Lee, Brooks-Gunn, & Schnur, 1988; Lee, Brooks-Gunn, Schnur, & Liaw, 1990).

Today, children from low-income families have access not only to Head Start but also, in many cities and states, to universal pre-K programs, often run by or in collaboration with a department of education. Other partially subsidized programs also exist (some funded through the Child Care Development Block Grant). The two best-known, small-scale evaluations, the Perry Preschool and Abecedarian projects, also were initiated in the 1960s and 70s and also targeted poor children; very few of the children in the control groups received any other preschool experiences (Belfield, Nores, Barnett, & Schweinhart, 2006; Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002; Heckman, Moon, Pinto, Savelyev, & Yavitz, 2010; Hill, Gormley, & Adelstein, 2015).

All of this suggests that the counterfactual for treatment today is different from what it was previously. If children in control groups are enrolled in other preschool programs, the counterfactual is no longer preschool versus no preschool; it is a particular program (Head Start, universal pre-K) versus whatever other programs exist in a particular community. The heterogeneity within the control group vis-à-vis preschool experiences is important to quantify, and several nonexperimental analyses have been conducted to address it. Our group has done analyses with the Infant Health and Development Program (IHDP), the Head Start Impact Study, the Fragile Families and Child Wellbeing Study, and the Early Childhood Longitudinal Study—Kindergarten Cohort and Birth Cohort (Hill, Waldfogel, & Brooks-Gunn, 2002; Hill, Brooks-Gunn, & Waldfogel, 2003; Lee, Zhai, Brooks-Gunn, Han, & Waldfogel, 2014; Lee, Zhai, Han, Brooks-Gunn, & Waldfogel, 2013; Lee, Brooks-Gunn, Han, Waldfogel, & Zhai, 2014; Lee, Han, Waldfogel, & Brooks-Gunn, 2018). In all cases, we find the largest effects of Head Start, pre-K, or Learning Games (IHDP) occur in comparisons with children who received only parental or relative care, as well as in comparisons with home-based family care and home-based care with a nonrelative. These comparisons are

more akin to the analyses from the 1960s and 70s. Such findings—and their consistency across data sets—suggest that the effect sizes seen in the past are unlikely in current evaluations because more children in a control group are receiving some sort of preschool. Interestingly, comparisons of children in preschool or Head Start against children in kith-and-kin care show effect sizes in the modest range. Comparisons to children receiving other preschool do not.

Consequently, it may be unreasonable to expect effect sizes today that are similar to those in the past if most children are now receiving some ECE at three and four years of age. This does not mean that preschool is ineffective.

These findings have at least two implications. First, some preschool is better for children than none (even if quality differs across programs), as researchers have demonstrated in nationally representative longitudinal studies (Duncan & Magnuson, 2005; Duncan & Magnuson, 2013; Lee, Brooks-Gunn, Schnur, & Liaw, 1990; Lee, Zhai, Brooks-Gunn, Han, & Waldfogel, 2014; Yoshikawa et al., 2013). Second, although specific programs that are believed to be of high quality are likely to be better than other programs presumably of lower quality, these differences will be smaller than what was seen in the past, given that the counterfactual is different (Duncan & Magnuson, 2013). Consequently, it may be unreasonable to expect effect sizes today that are similar to those in the

past if most children are now receiving some ECE at three and four years of age. This does not mean that preschool is ineffective. It just means that traditional evaluations of treatment and control will find smaller effect sizes, since most children in the control group are receiving some sort of preschool.

► Alternative evaluation approaches

The evaluation approaches discussed above are often considered superior to others, but they do have limitations, the most serious having to do with external validity, generalization, and take-up. Other approaches include using district-wide achievement test scores to examine cohorts before and after a district-wide intervention is initiated (see the example of Montgomery County discussed below). Another is to employ much more short-term, small-scale interventions to test a particular innovation before implementing it on a broad scale, or even before a traditional randomized trial to test for efficacy. An example of this approach has been outlined by Fisher et al. (2016) and Shonkoff & Fisher (2013).

Yet another approach is to forgo assessment of children altogether and, instead, focus on documenting changes made on quality indicators (see Burchinal & Farran and Pianta, this volume). Of course, such an approach is based on a strong premise—that quality is associated with child outcomes and that increasing the former improves the latter. (For example, if child outcomes are enhanced only when a certain level of quality is obtained [threshold effect] or if only children who initially experience a very low-quality program are affected [baseline effect], then just documenting quality increases cannot be assumed to result in more school readiness). Indeed, the ECE evaluation field is still struggling with the question of how much and what types of quality improvement actually make a difference.

DESCRIBING EFFECT SIZES

► A definition of effect sizes

Evaluations typically report findings in terms of effect sizes as a function of the standard deviation; evaluation research often defines large effects as two-fifths to one-half of a standard deviation (with an assessment normed to have a mean of 100 and a standard deviation of 15, the treatment group would have a 6- to 8-point advantage at the end of an intervention compared to the control group) (Barnett, 2008).

► Effect sizes in everyday language

It is sometimes difficult for the public, policymakers, and educators to understand what an effect size means. For example, does an effect size of .40 on early indicators of achievement for low-income students mean they'll do better in elementary school, and how much better compared to high-income students? The same question, of course, could be asked for dual language learners or for minority students. Two approaches can help translate effect sizes into more concrete indicators. The first is to explain what might be seen in a classroom where low-income students' performance was one standard deviation below that of high-income students. As a heuristic, we are using the difference between students whose family incomes are in the bottom 10% and students whose family incomes are in the top 10% of the income distribution (Reardon, 2011). The following discussion is taken from Rock and Stenner (2005); they were comparing black and white students, not low-income and high-income students, but the general principle is the same. Based on a normal distribution (68% of scores will be within one standard deviation of the mean score, the difference between the peak of the distributions is one standard deviation, and the distributions for both groups are "normal"), the following estimates can be made:

First, randomly selecting one black child and one white child and comparing their scores will show the white child exceeding the black child 76% of the time and the black child exceeding the white child 24% of the time. Second, 84% of white children will perform better than the average black child, while 16% of black children will perform better than the average white child. Third, if a class that is evenly divided by race is divided into two equal-sized groups based on ability, then black students will compose roughly 70%, and whites 30%, of the students in the lower performing group. Fourth, if a school district chooses only the top-scoring 5% of students for "gifted" courses, such classes will have thirteen times more whites than blacks. Fifth, assume that a school district's student body mimics the national racial distribution (17% black, 83% white and other). The district chooses the lowest-scoring 5% of all students for a special needs program. Although 17% of the district's children are black, 72% of the special needs students will be black (pp. 26-27).

If low-income students benefit from an ECE program with an effect size of one-half of a standard deviation, then the difference between low- and high-income children would be reduced by one-half (assuming that the low-income students, rather than both groups, received the treatment, or that the low-income students responded twice as much to the treatment as did the high-income students). The corresponding changes in the differences between the hypothetical students in an example like the one above would be very large. Even benefits of one-third of a standard deviation would be considered large.

► Estimation of adult outcomes

Another approach is to take an effect size at the end of a preschool intervention and estimate the increase in the number of children graduating from high school or college or predict kindergarten achievement scores to high school achievement scores. Then the adolescent outcomes become the predictors for adult success (i.e., lifetime earnings). Brooks-Gunn, Magnuson, and Waldfogel (2009) used this estimation approach to see to what degree different effect sizes from preschool interventions are associated with gains in lifetime earnings. Card and Krueger (1996) used a similar procedure to estimate the long-term effects of reductions in elementary school class sizes, and Heckman et al. (2009) have done estimates using actual earnings data from the Perry Preschool Project. These estimates do not look at reducing the gap between groups of students, as the Rock and Stenner (2005) estimates do.

► Differential effectiveness for poor and nonpoor children

The example used here is based on one of the goals of ECE, which is to improve school readiness for disadvantaged children (whose parents are poor, have little education, are immigrants, do not speak English well, or are from minority backgrounds), targeting health and emotional, literacy, and cognitive skills. Some ECE programs are taking

a different approach, targeting an entire school district. If all four-year-olds receive quality ECE, the differences between advantaged and disadvantaged students are likely to be smaller, unless large differential benefits are seen among groups. That is, both advantaged and disadvantaged children will benefit (a rising tide lifts all boats). Remember that until very recently, ECE program evaluations have concentrated on groups likely to have

lower rates of school readiness. Universal services may need to be evaluated differently, or at the very least, the possibility of not attenuating differences between groups needs to be explicitly addressed, and it is important to examine the specific mechanisms that lead to such differences. For example, in the Boston program, effects differ based on subgroup status—the program had higher effect sizes for low-income children than for higher-income children for numeracy, inhibitory control, and attention shifting (Weiland & Yoshikawa, 2013).

If all four-year-olds receive quality ECE, the differences between advantaged and disadvantaged students are likely to be smaller, unless large differential benefits are seen among groups.

► Benefit-cost analyses

As another example, the varying estimates from benefit-cost analyses are confusing. Such estimates, of course, are based on myriad decisions (Steuerle & Jackson, 2016) on both the cost and the benefit sides of the equation. For example, benefit-cost estimates for the Perry Preschool Project range from 17:1 to 3:1, a huge range (and for the gender-linked estimates, the comparisons involve about 40 treatment and 40 control group boys and involve lower crime rates for the boys in the treatment group, meaning that the large benefit-to-cost ratios are based on about four fewer boys in the treatment group having been involved in a serious crime than in the control group) (Barnett, 1985; Belfield, Nores, Barnett, & Schweinhart, 2006; Heckman, Moon, Pinto, Savelyev, & Yavitz, 2010). And the chances that a preschool program today will result in even a 3:1 savings (let alone a 17:1 savings) are likely to be small, given the counterfactual. It may be time for those of us in ECE to manage expectations by making it clear that benefit-cost ratios are likely to be no greater than 2:1.

CHOOSING DEVELOPMENTAL OUTCOMES

What outcomes are preschool programs expected to influence, given that the goal is usually enhanced readiness for kindergarten and elementary school? School readiness is typically considered to encompass all facets of children's development—language and cognition, social and emotional development, physical growth and health, approaches to learning and persistence, enthusiasm, and motivation. Today, EF would be added as a separate facet, given its links to emotional and cognitive development (Raver & Blair, 2016). Educators and developmental psychologists may parse the domains a bit differently, yet they agree in looking at what they call the “whole child,” rather than at just academic achievement. At the same time, most preschool programs privilege some domains over others, with language and cognitive development—as reflected in achievement test scores—being the most desirable (and measured) outcome. Whether the implicit move away from the whole child approach is merited, given what we know about development and learning, is an open question. Most practitioners and evaluators are calling for less reliance on achievement test scores, and efforts to measure other domains continue. The relatively recent addition of EF outcomes to evaluations is a good example, as EF is thought to be central for learning and achievement. At the same time, emphasis on physical development and health is waning. We suspect that such changes are driven in part by the increase in state and local pre-K programs that are primarily administered through or with education departments rather than health and human services departments. Most educators subscribe to the belief that children need to be healthy to learn most effectively, but most programs don't emphasize health, per se.

All educational programs focus on language and cognition. Often these are defined in terms of achievement rather than developmental outcomes. Most curricula and teacher training emphasize literacy, numeracy, and science skills appropriate for each age group. Generic curricula are most often used in preschool programs, especially in Head Start (for example, Creative Curriculum). Preschool literacy curricula have the most extensive history (although, perhaps surprisingly, they have not been subject to evaluation; see Snow & Matthews, 2016). Specific numeracy

curricula have been developed and evaluated extensively (Building Blocks being the notable example), but science curricula for preschool children are less refined (Clements & Sarama, 2016). New approaches to enhancing EF are also being evaluated (Raver & Blair, 2016). In addition, some emerging curricula integrate learning across domains.

Head Start explicitly includes physical skills and health outcomes among its goals, whereas state and local pre-K are less likely to do so. Head Start funds services like occupational and physical therapy, and it offers health checkups and referrals for various forms of health care (like dental care). Such services are not the purview of schools, so they are less likely to be funded in state pre-K programs (although children who qualify for IDEA presumably would be referred for occupational and physical therapy, if indicated). When Head Start began, children from low-income families were unlikely to get regular health care; one of Head Start's successes in the past century was ensuring that high proportions of children obtained such services. Today, with more children covered by Medicaid and CHIP, differences in receiving health care between children in Head Start and not in Head Start are quite small (the exception being children whose parents are immigrants, who are less likely to receive health care than children whose parents are not immigrants). However, Head Start today does make a large difference in dental care, which many low-income children don't receive. Links to diagnostic and screening services may also increase the likelihood of receiving special education services through IDEA. Given Head Start's mandate to set aside slots for children with special needs, it is likely that Head Start serves proportionately more such children than do state and local pre-K (Reid, Melvin, Kagan, & Brooks-Gunn, 2019).

Interestingly, evaluations of ECE programs almost always include indicators of disabilities and individualized education plans. But we know little about whether teachers who have special needs children in their classrooms have received appropriate training or whether they provide specific or modified instruction for these students (Hebbeler & Spiker, 2016), let alone the additional services that children are receiving through IDEA. Few evaluations assess activities of daily living, a common measure in health surveys. Nor do they measure common health problems, such as asthma, which if not controlled is linked to school absence (Currie, 2005). Evaluations also measure more general indicators of health, such as weight for height (the concern being overweight and obesity, not underweight), nutritional intake (usually general measures), and exercise patterns. Whether programs actually emphasize such health behaviors is not known (Head Start does so, although very little is known about how much attention any individual program gives to health) (Lee, Zhai, Han, Brooks-Gunn, & Waldfogel, 2013).

Evaluations also often assess emotional development, most often in terms of aggression and inattention, as it is believed that disruptive behaviors impair the learning of individual children and in the classroom as a whole (Georges, Brooks-Gunn, & Malone, 2012; Duncan et al., 2007). We know less about how teachers actually manage such behaviors (and about how they are trained to do so) than about how teachers provide instruction in literacy and numeracy (Raver & Blair, 2016; Raver, Jones, Li-Grining, Metzger, Smallwood, & Sardin, 2009). Even so, reducing aggressive and inattentive behaviors is seen as an outcome of ECE programs. Likewise, what educators call "approaches to

learning,” or what psychologists term “motivation, enthusiasm, and persistence,” are often measured. As in the case of aggression, what teachers actually do to enhance motivation has not been studied very well.

One takeaway from this brief discussion of preschool outcomes is that links are often tenuous between expectations for children’s success or preparation for elementary school and what is known about curricula, teacher training, and even teacher behavior in the classroom. The notable exception is for literacy and numeracy achievement (Clements, & Sarama, 2016; Snow & Matthews, 2016). If we expect an ECE program to reduce aggression and inattention, enhance motivation and enthusiasm, promote healthy eating, increase EF, or decrease school absences due to illness, we will need to specify (and implement) classroom practices that explicitly target these outcomes.

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EXAMINING ECE EFFECT SIZES

Preschool’s efficacy has been examined in over 120 evaluations (Brooks-Gunn, Markman-Pithers, & Rouse, 2016; Camilli, Vargas, Ryan, & Barnett, 2010; Yoshikawa, Weiland, & Brooks-Gunn, 2016). In general, evaluations report significant effects for four-year-olds. Recent evaluations show that preschool has positive effects in the short term on language, literacy, and math skills, with higher-quality programs showing the biggest effects (Yoshikawa, Weiland, & Brooks-Gunn, 2016). Some evidence suggests that preschool may have positive effects on socioemotional behaviors (e.g., decreased aggressive behavior), although the research in this area is not as definitive (Yoshikawa, Weiland, & Brooks-Gunn, 2016). But the range of effects is large. Even the early programs from the 1960s and 70s exhibited a range, although we usually emphasize the successful programs from that era (Brooks-Gunn & Hearn, 1982; Stipek, Franke, Clements, Farran, & Coburn, 2017). This state of affairs continues today; as examples, we have only to look at the Head Start Impact Study results (small effects at the end of the program with few effects sustained into elementary school) (U.S. Department of Health and Human Services, 2010) and the Tulsa Head Start results (large and sustained effects seen through middle school) (Gormley & Gayer, 2005; Phillips, Gormley, & Anderson, 2016). How do we interpret such disparate findings? Other authors in this volume focus on program quality and implementation (the two are difficult to separate), curricula, and teacher training and oversight. The composition of students in a classroom also matters (via a process economists often call heterogeneity of effects). Some groups, such as students with developmental disabilities and dual language learners, have not received enough attention regarding effective ways of teaching and including them in classrooms (Barrow & Markman-Pithers, 2016; Hebbeler & Spiker, 2016).

The evaluation literature is replete with examples of differential effectiveness across subgroups within a center, across types of centers, and even across centers under the same auspices. Such variation makes it difficult to say

what expectations may be reasonable for outcomes in different programs. We provide a few examples, making comparisons within and across centers.

► **Comparisons within centers**

Within centers, comparisons have examined which subgroups benefit the most from ECE programs. Yoshikawa et al. (2013) looked at the effects of ECE programs on four sometimes overlapping subgroups: 1) poor and nonpoor children; 2) black, white, and Hispanic children; 3) dual language learners and children of immigrants; and 4) children with special needs/disabilities. Gaps in school readiness based on income and race/ethnicity appear as early as age two, when children from nonpoor families and white children perform better on measures of literacy and cognitive skills (Brooks-Gunn, Markman-Pithers, & Rouse, 2016; Garces, Thomas, & Currie, 2002; Snow & Matthews, 2016). Preschool enrollment is lower for minority children and children from low-income families than for white children and children from higher-income families, possibly contributing to this gap (Brooks-Gunn, Smith, Klebanov, Duncan, & Lee, 2003; Reardon & Portilla, 2016; Yoshikawa, Weiland, & Brooks-Gunn, 2016). However, preschool's positive effects in terms of literacy, math, and social-emotional skills may be most effective for children living in or near poverty (Yoshikawa et al., 2013).

Most early evaluations have examined ECE programs' effects on black children but not on other minority groups, and therefore they can't give full insight into differential ECE program effects based on race/ethnicity (Bassok, 2010; Yoshikawa et al., 2016). In response, recent evaluations of programs like Head Start, Tulsa Pre-K, and Boston Pre-K have made comparisons across racial groups. These programs showed positive effects for children of all racial/ethnic backgrounds, but the effects were highest for Hispanics at age three in Head Start and in both the Tulsa and Boston studies (Yoshikawa et al., 2016). Some studies found especially strong effects for minority children from low-income families (Love, Chazan-Cohen, Raikes, & Brooks-Gunn, 2013). Other studies found no racial differences for children living below the poverty line, but more benefits for black students than for whites or Hispanics among the nonpoor (Bassok, 2010).

Although research on ECE's effects on ELLs and children of immigrants is somewhat limited, some evidence suggests that ECE has positive effects on language development and cognitive skills for ELLs (Barrow & Markman-Pithers, 2016; Yoshikawa et al., 2016). Policy scholars debate whether language instruction should be conducted solely in English, or in a combination of English and children's first language, but Barrow and Markman-Pithers, (2016) find that the general quality of ECE programs may be more important than the language of instruction. Still, some evaluations show that dual language instruction does not hurt children's ability to learn English and may encourage bilingualism and even achievement overall (Hoff, 2012; Yoshikawa et al., 2016).

We also have few evaluations (especially randomized controlled trials) of ECE's impacts on children with disabilities (Hebbeler & Spiker, 2016). Head Start has shown positive effects on math and social-emotional skills for children

with disabilities, and Tulsa showed positive effects on their literacy skills (Gormley & Gayer, 2005; Yoshikawa et al., 2016). Some effective interventions include programs emphasizing language development and social-emotional development, which have been shown to be effective in promoting language/literacy skills and social skills, respectively (Raver & Blair, 2016). Additionally, specialized curricula and instructional strategies for children with disabilities have been shown to improve children's oral language, literacy, motor, and social skills (Hebbeler & Spiker, 2016). However, we need more evaluations of ECE's effectiveness for children with disabilities.

► Comparisons across Head Start centers

Comparisons are also being made across Head Start centers. Head Start has clear and extensive standards, which might lead us to expect that variation in impacts from site to site might be small. Yet such differences exist. In one analysis, inter-center variation was found for language and literacy but not for mathematics (U.S. Department of Health and Human Services, 2010). One possible explanation is that Head Start teachers generally are not doing much in the way of math instruction (see Clements, Sarama, & Germeroth, 2016, for evidence that in general, pre-K teachers are not spending much time on math and that when they do, they focus on simple math skills). Low math skills among students across the board would be evidence that such an explanation is correct. Head Start teachers do focus on language and literacy; the differences in outcomes suggest that some teachers are more effective than others. However, we need to know more about what exactly teachers are doing in literacy instruction (Snow & Matthews, 2016).

Another (nonexperimental) analysis from the Head Start Impact Study suggests that full-day programs had larger effects than half-day programs, which is not surprising (Yoshikawa, Weiland, & Brooks-Gunn, 2016; Yoshikawa et al., 2013). What is perhaps surprising is that teacher education (BA), teacher training (teaching license), and student-teacher ratios were not associated with inter-center program impacts (Yoshikawa, Weiland, & Brooks-Gunn, 2016). Still, a new analysis by Morris et al. (2018) suggests that Head Start's positive impacts are more variable than impacts shown in previous analyses, such as the U.S. Department of Health and Human Services' Head Start Impact Study from 2010. Morris et al. (2018) found that the effect sizes of Head Start on enrollment and exposure to high-quality care varied by site, with standard deviations of 21.4 percentage points (any center care), 22.3 percentage points (Head Start care), and 28.4 percentage points (nonrelative care). This variation may be due to differences in state regulations and implementation, as well as to variation in child characteristics (e.g., pretest scores and dual language learners).

► Comparisons across types of centers

Generally, children attending either Head Start, pre-K, or other center-based care performed better on academic-skill assessments than children in parental or relative care (Zhai, Waldfogel, & Brooks-Gunn, 2013), and recent studies have begun examining differences in the effects of different types of center-based programs. Children in Head Start performed better on reading and math assessments than children in parental care, pre-K, or other center-based care (ECLS-B data; Lee, Zhai, Brooks-Gunn, Han, & Waldfogel, 2014; Lee, Zhai, Han, Brooks-Gunn, & Waldfogel, 2013).

Additionally, children spent more hours in Head Start, on average, than children spent at non-Head Start centers (Lee, Zhai, Brooks-Gunn, Han, & Waldfogel, 2014). This increased exposure could be one of the mechanisms behind the finding that three- and four-year-olds attending Head Start fared better in classroom literacy and math instructional activities than children in non-Head Start centers (U.S. Department of Health and Human Services, 2010).

But other analyses conducted with data from the Fragile Families and Child Wellbeing Study showed that Head Start attendance was not significantly associated with cognitive gains when compared to attending pre-K or other center-based care (Zhai, Brooks-Gunn, & Waldfogel, 2011). Similarly, an analysis of Head Start Impact Study data found more substantial differences between children attending Head Start and children in parental or relative/nonrelative care than between children attending Head Start and children attending other center-based care (Zhai, Brooks-Gunn, & Waldfogel, 2014).

► **Understanding the reduction in effect sizes in elementary school**

Evaluations show that ECE programs have positive short-term effects. But multiple studies show that these effects fadeout (or decrease) by the third grade, with a decline of up to .03 per year in effect sizes for cognitive and test score outcomes (Camilli, Vargas, Ryan, & Barnett, 2010). Fadeout is also called the “convergence” or the “catch-up effect,” as the gap in achievement between children who attended (and benefited from) ECE programs and children who did not attend such programs decreases as the children get older (Yoshikawa et al., (2013). Eventually, children without any ECE perform as well as children who received ECE. However, receiving ECE is positively related to other long-term outcomes, such as higher earnings and a lower likelihood of criminal activity (Duncan & Magnuson, 2013; Karoly, 2016).

Across almost all experiments, effect sizes from ECE evaluations fall by one-half, on average, between the end of the program and the middle of elementary school. At the moment, this evidence is based almost exclusively on achievement test scores, although a few evaluations have reported a similar decline for aggressive behaviors and approaches to learning. Consequently, a reasonable expectation is that unless changes are made to K–3 education, sustained effects will be one-half the size of short-term effects.

The possible reasons for this decline include:

1. Children who did not receive ECE use kindergarten and first grade to catch up to their peers, mastering comparable skills later than children who received ECE (Duncan & Magnuson, 2013).
2. Early elementary school teachers may emphasize skills that children do not have (i.e., they direct teaching toward students with lower skills, including those who may not have had any preschool education) (Duncan & Magnuson, 2013).

3. Differences in curricular content and quality of instruction may also contribute to the fadeout of ECE's positive effects. Another potential cause is a lack of integration between preschool and elementary school curricula. Continuity between ECE and elementary school curricula is important for sustaining effects over time; some interventions, including one in Maryland's Montgomery County, have implemented such continuity (Brooks-Gunn, Markman-Pithers, & Rouse, 2016). When curricula are integrated, skills developed in ECE can be practiced and reinforced in elementary school.
4. In terms of instructional style, elementary schools may emphasize individualized learning less than preschools do. Preschool classes have lower adult-child ratios than elementary schools; preschool classes are often limited to 20 students, while elementary school classes often have 26 to 30 students (Pianta, Downer, & Hamre, 2016). In one study in Tennessee, smaller classes in elementary school were associated with better cognitive outcomes (Mosteller, 1995; Heckman, 2006). Individualized instruction has been shown to be most effective for learning outcomes (Clements & Sarama, 2016; Hebbeler & Spiker, 2016), and increased class sizes hinder teachers' ability to provide high-quality interactions with children. Moreover, low-income students are likely to attend elementary schools with larger class sizes, which are associated with lower achievement in general and may dilute preschool gains.
5. Instructional quality may also vary more in elementary school than in preschool, or quality may matter more for learning in elementary school (Pianta, Downer, & Hamre, 2016). For example, students from low-income backgrounds and students from racial/ethnic minority groups—for whom ECE was developed and who tend to benefit most from ECE—often receive low-quality instruction in elementary school (Burchinal, Howes, Pianta, Bryant, Early, Clifford, & Barbarin, 2008; Mashburn, Pianta, Hamre, Downer, Barbarin, Bryant, & Howes, 2008; Moiduddin, Aikens, Tarullo, West, & Xue, 2012). Students attending low-quality elementary schools cannot build on or sustain gains made in preschool, and the positive effects of preschool become less apparent. Low-income students who attended preschool may also be more likely to attend schools in communities where after-school programs, an extended school year, and other enrichment activities are not offered, making it difficult to sustain effects.
6. Elementary schools also tend to provide less support to parents than preschool programs do—especially ECE programs that primarily serve low-income families. For example, Early Head Start offers home visiting, referrals for health care, and parent education. Similarly, the Tulsa program offers parent education, health and vision screenings, and child care services. Such comprehensive supports have been shown to improve cognitive, academic, and health outcomes for children, but elementary schools don't often offer them (Phillips, Gormley, & Anderson, 2016). More comprehensive services for parents and families during elementary school might help sustain ECE's positive effects (Reynolds, Magnuson, & Ou, 2010), although little is known about the efficacy of such efforts (Magnuson & Schindler, 2016).

PROMOTING SUCCESS: A MULTILEVEL MODEL

► Multiple changes in pre-K to 3: A model for ensuring success?

Almost all ECE evaluations have assessed individual children, typically those who received an intervention and those who did not via random assignment, waitlist, or eligible age for entrance into preschool. But some have used administrative data as well. One interesting approach is to analyze school- or district-wide data from standardized testing to look at differences in achievement levels. In this way, comparisons can be made across time to see whether an intervention implemented at the school or district level has increased mean scores or competency levels. Such a design is a variant of regression discontinuity.

Such a cohort comparison was used effectively in the county-level effort in Montgomery County, MD (Marietta, 2010). The school district staff, after examining the proportion of the district's high school seniors who were ready for college, set a goal of having 80% of a graduating class college-ready. Working backward, they defined their goals for classes of pre-K to third-grade children. They aimed to increase the percentage of children reading at grade level in the early grades. They then made a list of possible reforms that based on research were likely to prepare their young students to eventually be ready for college.

The reforms were extensive, underlying the fact that no single change is likely to have large effects.

The county applied most of the changes recommended by early childhood educators. These included:

1. pre-K for all four-year-olds,
2. full-day pre-K,
3. full-day kindergarten,
4. after-school programs,
5. summer programs,
6. curricula aligned across the early grades,
7. student-teacher ratios of only 15 to 1 from pre-K to third grade,
8. pre-K teachers having a BA and being certified in ECE,
9. earnings of pre-K teachers at parity with teachers in kindergarten to third grade,
10. English as a second language courses for parents, and
11. welcome packets and curricular guidebooks for parents of entering kindergartners.

This intensive and extensive set of reforms doubled the percentage of children reading at grade level by third grade, and this proportion was sustained through the later elementary school years (Marietta, 2010).

Most system-wide initiatives have not taken Montgomery County's approach to evaluation. And such initiatives have not coupled school-level data with individual-child data. Putting the two together might, for example, let us discover which subgroups of children are most likely to see an increase in the share of students reading at grade level, or which set of services are most likely to produce a higher proportion of competent readers.

CONCLUSION

Programs that report sustained effects in elementary school and beyond typically have large effects at the end of an ECE program. Is it critical to have effect sizes of about one-sixth to one-third of a standard deviation at the end of a program to have any chance of seeing sustained effects? The evidence to date suggests that the answer is yes, absent changes in elementary school.

Therefore, we should try to amplify effect sizes in ECE programs, in the hope of improving both short- and long-term outcomes for children. Multiple steps could be taken to increase effect sizes in preschool. First, it is important to increase the dosage and duration of preschool. To increase dosage and duration, it is recommended that students attend preschool more days per year, and even that children attend two consecutive years of preschool. Additionally, there is some evidence that full-day programs are more effective than partial-day programs. Second, it is important to develop and implement more targeted and integrated curricula in preschool. Curricula should be developmentally appropriate and should aim to help children develop essential cognitive and social-emotional skills, as well as ensure that children have the necessary academic skills for elementary school. Moreover, preschool curricula and elementary school curricula should be integrated in an attempt to ensure continuity between the two programs. Third, to ensure the effective implementation of the targeted and integrated curricula, teachers need to be better trained. Fourth, programs should focus on teacher support and scaffolding of skills. Adequate support allows teachers to use structured, individualized teaching models that help children progressively build skills. Last, programs should target poor, minority, and immigrant children to narrow some of the early gaps in math and language literacies.

Although early childhood education programs like Tulsa's Head Start and Boston's Pre-K initiatives provide encouraging support for further investment in early childhood education, we should be specific in determining where and when to invest. Numerous studies have illustrated that it's important to increase young children's exposure to ECE while also working to ensure that quality is consistent across sites and types of programs. Further, the connection (in terms of curriculum, outcomes, and quality) between ECE and K-12 education should be strengthened to promote the maintenance of ECE gains. Policymakers should aim to use the lessons from previous evaluations to improve ECE programs in hopes of reducing achievement gaps and preparing young children for elementary school and beyond.

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SECTION 1, CHAPTER 3

**USING A SOCIAL DETERMINANTS
OF EARLY LEARNING
FRAMEWORK TO ELIMINATE
EDUCATIONAL DISPARITIES
AND OPPORTUNITY GAPS**

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The achievement gap is one of the greatest social problems in the U.S.. As currently constructed, the achievement gap indicates that White children and children from higher-income households perform better than Black, Hispanic, and Native American Indian children—and children from low-income households—on various indicators, such as reading, math, and science skills, as well as on adult outcomes later in life (e.g., health, income, educational attainment). Although most of the data substantiating this gap are gathered when children are in third grade or around age eight, there is evidence that the gap starts prior to age three. For instance, by kindergarten entry, many children from low-income and minoritized families¹ (e.g., Black/African American, Latino/a, non-English speaking) are months if not years behind children from White and higher-income families. We need to question how and why the achievement gap persists regardless of the academic outcomes being examined or whether we're looking at national, state, or local data. In fact, we need to stop discussing the existence of the achievement gap, or as Humphries and Iruka (2017) put it, “stop-gap gazing,” and examine the root causes of educational disparities and study how early care and education can potentially disrupt these trends.

McKinsey & Company (2009) found that not closing the achievement gap between 1983 and 1998 cost the U.S. between \$1.3 trillion to \$2.3 trillion in economic output, representing 9 to 16% of GDP. With this economic and social cost of underutilized human potential and capability, the achievement gap, which is a symptom of systemic discriminatory policies and laws, needs to be treated as a public-health crisis. In this chapter, we adapt a framework used by the public-health sector—Structural Determinants of Health—to address inequities and support the well-being of U.S. citizens at a population level (e.g., infant mortality and morbidity, teen pregnancy, or smoking) to show how early learning can address the inequities in education. To effectively eradicate disparities and inequities in early learning, we must stop gap-gazing and instead examine how systems continue to perpetuate racism and inequities that reverberate throughout the early learning system and beyond. This means examining how certain policies and laws may reduce opportunities for certain groups to thrive and meet their potential.

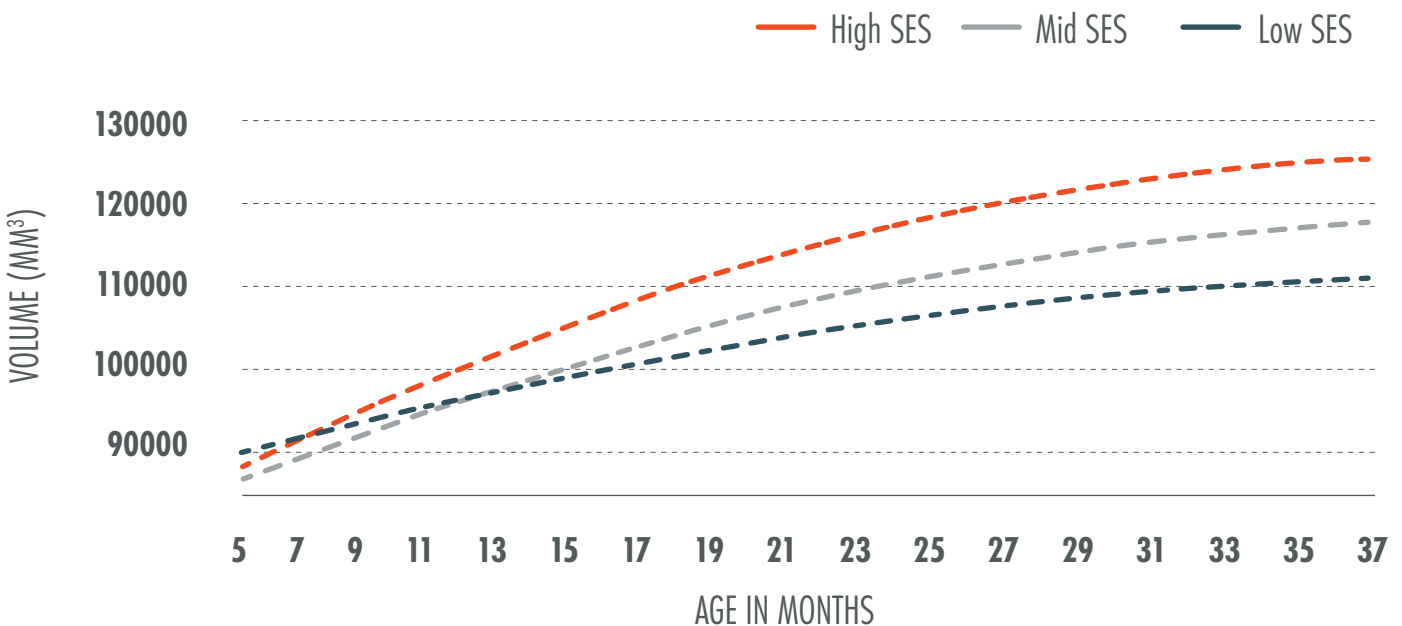
With this economic and social cost of underutilized human potential and capability, the achievement gap, which is a symptom of systemic discriminatory policies and laws, needs to be treated as a public-health crisis.

¹ Smith (2016) states that “groups that are different in race, religious creed, nation of origin, sexuality, and gender and as a result of social constructs have less power or representation compared to other members or groups in society should be considered minoritized.” People who are minoritized endure mistreatment and face prejudices that are forced upon them because of situations outside of their control. <https://www.theodysseyonline.com/minority-vs-minoritize>

WOULD STARTING EARLY ERADICATE THE ACHIEVEMENT GAP?

What is it about the U.S. that maintains these differences and gaps? Scholars suggest that the lack of opportunities for many children of color and children from low-income households—the opportunity gap—may lead to the achievement gap. Such opportunities include access to high-quality early care and education, living in economically stable households and communities, and having enriching home- and classroom-learning environments. For example, there is a movement to ensure that children receive high-quality early learning experiences before starting school via preschool and pre-k programs, as well as programs starting at birth, such as Early Head Start and home visiting. The rationale for such programs stems from evidence showing that prior to and after birth, experience starts shaping children’s genetic potential and lays an increasingly complex foundation for learning and development. Studies show an association between poverty and cognitive development, including brain development and functioning (Hanson et al., 2013; Luby et al., 2013). Luby and colleagues (2013) find that poverty is associated with less white and cortical gray matter and smaller hippocampal and amygdala volumes (see Figure 1), which are areas that support memory, cognition, and learning. Studies examining the link between poverty and brain development, including cognitive development and executive function (EF), emphasize the dire impact of poverty, and other associated factors, such as low maternal education, single parenthood, stressful home and community environments, and poor nutrition and health, among other factors (Atkinson et al., 2015; Jeon, Buettner, & Hur, 2014). More studies should examine the impact of racism on children’s brains and health in the early years.

Figure 1. Volume of parietal gray matter in the brain across socioeconomic status (SES) groups.



Early intervention studies suggest that for children who are living in concentrated disadvantage with limited learning opportunities, experiencing enriching, high-quality early education programs at an early age may serve as a buffer that lasts a lifetime, though this is not guaranteed. When placed in a larger context, many of the children (most of them African American) who participated in the Carolina Abecedarian Project and HighScope Perry Preschool Project did not perform at the same level as White children or children from higher-income households. For example, almost a third of children from the treatment groups were arrested multiple times and did not graduate from high school, and almost two-thirds required public assistance as adults. Thus, even when looking at the best seminal early childhood programs, it seems that more than high-quality early education is needed to disrupt the influences that lead to the achievement gap and other disparities in school and life outcomes.

Although we need to strengthen the impact of early learning with other supports and structures, children who experience intellectually stimulating and enriching environments are likely to benefit from these high-quality early learning experiences—especially children from low-income households (Camilli, Vargas, Ryan, & Barnett, 2010). This is particularly critical because we know that children’s acquisition of school skills and knowledge depends on development and learning that occur long before formal schooling (Cunha & Heckman, 2008). Early school outcomes affect every area of life, including later school outcomes, family formation, child-rearing capacity, career and work preparation and stability, physical and mental health, and becoming a civically engaged, contributing member of the community and citizenry. Though access to early learning opportunities has increased, academic and social gaps by income and race/ethnicity have not been eliminated. Education scholars see some reduction in these gaps, but “at the rates that the gaps declined in the last 12 years, it will take another 60 to 110 years for them to be completely eliminated” (Reardon & Portilla, 2016, p. 12). Thus, early learning in isolation will not close the achievement gap in a timely way. Researchers, in partnership with practitioners and policymakers, must uncover and address the root causes of racial and economic disparities, and find research-based specific practices and policies that can eradicate these gaps and inequities.

MINORITIZED CHILDREN’S EARLY LEARNING EXPERIENCES

By 2050, it is estimated, children of color will make up the majority of children in the U.S.; in 2014, children of color already made up the majority in public schools. With minority children becoming the majority, we urgently need to attend to the causes of educational disparities as early as possible. Although high-quality early learning is viewed as one strategy to ensure that children are prepared for school and life, research consistently finds that due to many stratification factors, minoritized children are at higher risk for poor outcomes than White, English-speaking children, and children from higher-income and more educated households. Race, ethnicity, and socioeconomic status (SES) are often confounded in U.S. society. Minoritized children are likely to live in concentrated poverty and disadvantage (Aud, Fox, & KewalRamani, 2010). Specifically, 34% of African American and 28% of Latino/a children and adolescents lived in poverty in 2016, compared to the 12% rate for non-Latino/a, White, and Asian children and adolescents (Koball & Jiang, 2018). African American and Latino/a youth are also more likely than

White and Asian youths to attend high-poverty, segregated schools (Urban Institute, 2019). Data from the National Center for Education Statistics consistently finds that ethnic minority children, especially African American and Latino/a children, are likely to be from single, female-headed households, live in poverty, have less-educated mothers, attend high poverty schools, and have less-educated teachers (Aud et al., 2010; McLoyd & Wilson, 1990). Additionally, low-income, ethnic-minority, and immigrant families are likely to live in racially segregated enclaves that may limit their ability to access quality early-education programs that meet their preferences (Meyers & Jordan, 2006). These disparities in social and familial characteristics are also more pronounced for dual language learners, primarily Hispanic children, compared to English speakers (Hernandez, Denton, & Macartney, 2008). Concentrated disadvantage places children at considerable risk for being less school-ready as indicated by proficiency in letter recognition and numbers and shapes, as well as for school failure and dropout (DeNavas-Walt, Proctor, & Lee, 2006; McFarland et al., 2018). If minoritized children need early learning opportunities, we must ensure that they experience the highest quality that meets their individual needs, lived experiences, and contexts.

To address the many risk factors facing disadvantaged children, federal and state programs like (Early) Head Start, Smart Start, and pre-k were developed or expanded to ensure that children placed at risk of poor school readiness and academic achievement have enriching early-childhood education programs prior to school entry (Barnett, Hustedt, Friedman, Boyd, & Ainsworth, 2007). Several studies point out that these early education programs are important for children's development and predict positive outcomes more strongly for disadvantaged children than for advantaged children (U.S. Department of Health and Human Services, 2010; Vandell et al., 2010). Not all studies have found this, however (e.g., Pungello et al., 2010), possibly because of the level of quality that disadvantaged children experience. Barnett and colleagues (2013), in a national study from the U.S. Department of Education, found that most children were in low- to moderate-quality care, but minoritized children were more likely to be in lower-quality care than were their White peers. This is concerning as many states and localities move toward universal pre-K or quality rating and improvement systems that align standards and resources for all early childhood education, including community child care (i.e., center- and home-based programs), Head Start, and pre-k programs. Although early-learning systems are being instituted, children of color and/or children from low-income households do not necessarily experience the highest quality, similar to what we see in K-12 education.

Rigorously designed early-childhood studies, such as the HighScope Perry Preschool Project and the Carolina Abecedarian Project, as well as state and municipal pre-K programs like Boston Public Schools Universal Pre-K, the North Carolina Prekindergarten Program (NC pre-K program), New Jersey's Abbott Program, and Tulsa, Oklahoma's pre-k program, have consistently and systematically shown sustained outcomes over time. But no current studies show a significant reduction in economic and racial academic disparities. For example, NC's pre-K program is a state-funded educational program for eligible four-year-olds, designed to enhance their school-readiness skills. The program operates on a school day and school calendar basis for 6.5 hours per day and 180 days per year. Local sites are expected to meet a variety of standards around curriculum, screening and assessment, training and

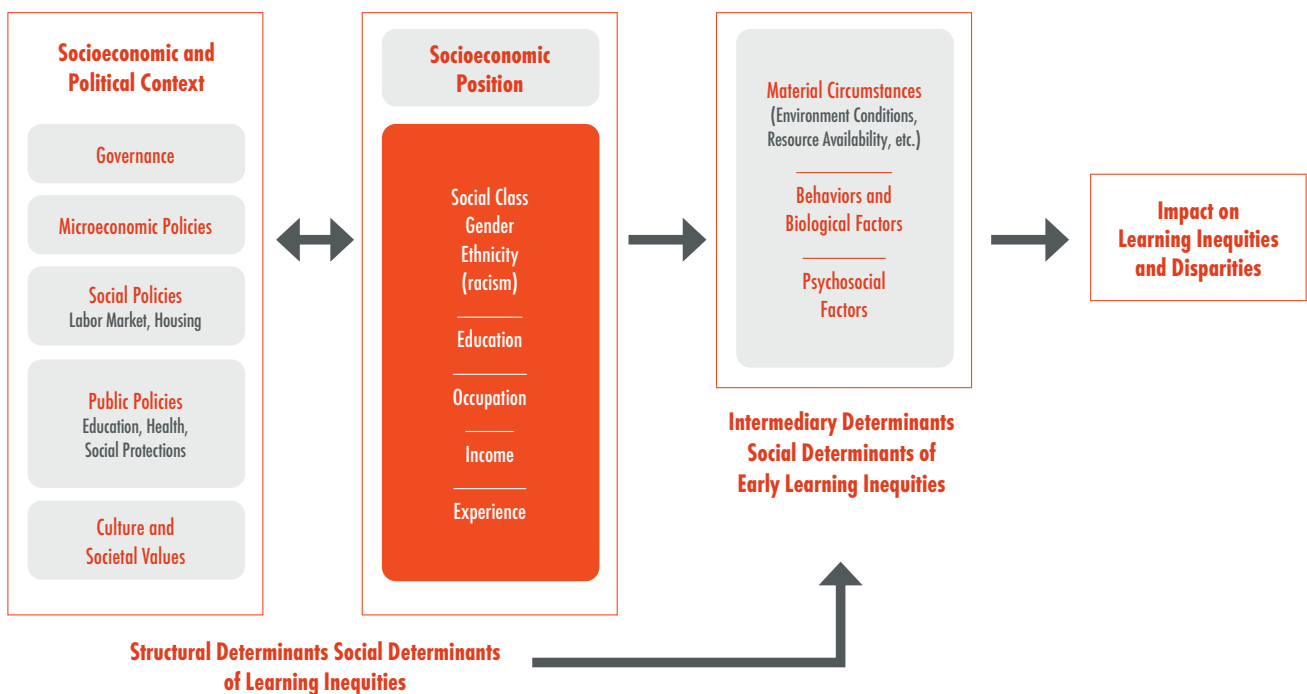
education levels for teachers and administrators, class size, adult-child ratios, North Carolina child care licensing levels, and provision of other program services. No treatment effects have been observed for language measures or teacher ratings of behavior skills at the end of kindergarten. But there are treatment effects in math and EF at the end of kindergarten for most measures, with children in NC pre-K scoring higher than matched children who aren't in the program. These effects are in the small range. Thus, while well-implemented studies show that children who get high-quality early learning do better than similar children, they don't show disruption of the achievement gap.

SOCIAL DETERMINANTS OF EARLY LEARNING

For early childhood education to truly address early-learning disparities at the systems level, we propose adapting the Social Determinants of Health framework (SDoH) to early learning, calling it Social Determinants of Early Learning (SDoEL) (see Figure 2).

The Centers for Disease Control and Prevention defines social determinants of health as “the complex, integrated, and overlapping social structures and economic systems that are responsible for most health inequities. These social structures and economic systems include the social environment, physical environment, health services, and structural and societal factors. Social determinants of health are shaped by the distribution of money, power, and resources throughout local communities.”

Figure 2. Social Determinants of Early Learning.



Source: Centers for Disease Control and Prevention

As Figure 2 shows, the concept behind SDoEL is that socioeconomic and political contexts (e.g., social policies about housing and education) lead to individuals' socioeconomic position (e.g., education, income, or occupation), which then impacts their resources and living conditions, greatly reducing some children's opportunities to thrive. This framework is further expanded below.

► **Structural determinants of SDoEL**

The first structural determinant of early education is socioeconomic and political context, which include macroeconomics, public policies, and societal values. That is, the political context at the federal and state levels impacts early learning. In their *Kids Share* report, Edelstein, Hahn, Isaacs, Steele, and Steuerle (2016) find that over the past 50 years, child-focused spending grew from 0.6% of GDP in 1960 to 2% in 2015, compared to 2% to 9% for adult-focused spending during this same time period. The majority of spending on children is for Medicaid, followed by three tax provisions: the Earned Income Tax Credit, the Child Tax Credit, and the dependent exemption. Early-childhood programs, such as Head Start, are not in the top 10 for federal spending for children. Edelstein and colleagues conclude that "total federal spending on children has been fairly flat over the past four years, in real dollars. In the future, overall federal spending is projected to increase substantially, but virtually none of the additional funds will be directed toward children" (Edelstein et al., 2016, p. 11). This lack of available funding for early-childhood programs at the federal level means that fewer children, especially those most in need, may be able to access high-quality ECE programs; there may be fewer supports to ensure high-quality ECE programming; and teachers and caregivers may not be adequately compensated and supported to provide stable, high-quality, enriching early-learning opportunities. The lack of federal spending means that states and localities are spending more because they see the economic and societal value in supporting the early learning of young children. In the *State Preschool Yearbook*, Friedman-Krauss and colleagues (2018) note that although states spent more on preschool in 2017 than in 2002, going from \$2.4 billion in 2002 to over \$7.6 billion in 2017, when adjusted for inflation per-child spending during this same period decreased. This reduction in per-child spending may be due to the attempt to increase access, which rose from 14% of the four-year-old state population served in 2002 to 33% in 2017.

Beyond macroeconomics, social and public policies also have implications for early-learning disparities and equity. For example, social policies about labor have implications for early learning, such as whether being an ECE teacher and provider should be considered a career, which in turn has implications for access to adequate compensation, benefits, federal funding, etc. Currently, a wide range of early childhood advocates, practitioners, and funders are focused on creating an economically sustainable professional pathway for those who teach and care for children from birth to age 8. If successful, these efforts could ensure that all children have access to highly qualified and well-compensated ECE providers. They could also lead to increased costs to families (and possibly to programs) to provide services to children. Other policies that effect early learning opportunities include standards for programs (e.g., licensing, group size, ratio, materials, curriculum, or assessment duration), workforce (e.g., credential,

bachelor's degree, or pre- and in-service hours), and eligibility (e.g., universal or targeted). Policies about housing, the workforce, transportation, the environment, and general education, to name a few, also have implications for early-learning disparities. For example, housing policies about what constitutes adequate living conditions, standards for renters and landlords, and availability of affordable housing, etc., affect children's well-being. Policies about affordable housing or the lack thereof could bear on who can live in a particular community. This impact may be particularly pronounced for low-resourced families. Coupled with transportation policies, such policies could impact a communities' ability to ensure that residents are gainfully employed, which affects the community's tax base—a potential source for early-learning funding.

When SDoEL is overlaid with critical race theory (CRT),² we can recognize that race and racism are enduring and pervasive in the U.S. and that power structures lead to systematic inequities (Matsuda, Lawrence, Delgado, & Crenshaw, 1993). Recognizing that race permeates the fabric of the U.S. and the lived experiences of minoritized groups, and finding ways to systematically address racism in education, including early learning, is pertinent to culturally responsive and sustaining practices and pedagogy. When we examine macroeconomic policies, such as housing and environmental policies, as well as their historical ramifications, we see that Black people and other people of color are often disenfranchised and marginalized. The U.S. policies that barred Black families from owning and renting in particular areas have resulted in Blacks living in segregated enclaves that are characterized by more poverty, crime, dilapidated housing, low-resourced schooling, low-quality air and water, and limited employment options. This residential segregation has had a detrimental impact on the opportunities of Black people for generations, including those who are highly educated and middle-class (Massey, Condran, & Denton, 1987). Segregation also affects early childhood. Over 50% of Black and Hispanic preschool children in public school-based programs attend racially segregated schools (Urban Institute, 2019). Reid, Kagan, Hilton, and Potter (2015, p. 5) note that “most children in public preschool programs attend economically segregated programs that are often segregated by race/ethnicity as well.” Studies have shown that programs serving high proportions of children of color and children from low-income homes are less enriching and engage in more routine-based activities (Early et al., 2010), further exacerbating early-learning disparities. Thus, the U.S. historical and contemporary culture of limited opportunities for children and families of color has lifelong implications for families' socioeconomic position, which directly impacts children's early learning and later outcomes, and the opportunities provided to them.

Families' socioeconomic position represents another structural determinant of early education; it includes social class, gender, ethnicity, education, occupation, and income, and is likely determined by the U.S. socioeconomic and political context. Policies about labor, employment, housing, and education, etc., have a direct impact on

² Critical race theory came out of legal scholarship that recognizes that racism is engrained in the fabric and system of the American society, that institutional racism is pervasive in the dominant culture, and that power structures are based on white privilege and white supremacy, marginalizing people of color and others due to sex, class, national origin, and sexual orientation.

families' socioeconomic position, and this impact varies based on their social class, gender, and ethnicity. For example, policies about the need for bachelor's degrees or higher for certain positions (e.g., teaching) could lead to stratification based on race and economic background; such stratification has long-term impacts, especially when many of these positions may have livable wages and salaries, benefits, and pensions. These policies are manifested in the education field. National data indicate that although minoritized children make up the majority of public school students, White teachers make up over 72% of the preschool and kindergarten teaching workforce (Black teachers make up 18% and Hispanic teachers even less; <https://datausa.io/profile/soc/252010/#demographics>). Taking a CRT perspective, the systematic barriers for people of color to access and afford higher education, which then influences the type of positions they are qualified for, shows how inequities are maintained through policies that directly impact access and opportunities for families of color and their children. Even when people of color qualify for particular positions, they are likely to earn less than their White counterparts. In the 2018 Early Childhood Workforce Index, Whitebook, McLean, Austin, and Edwards (2018) found that black center-based teachers are more likely than teachers from all other racial/ethnic groups to earn less than \$15 per hour, which has implications for their socioeconomic position. A pay rate of \$15 per hour results in an annualized salary of \$31,200 (without benefits), keeping one's income above the U.S. poverty threshold of approximately \$24,000 for a family of four.

► **Intermediary determinants of SDoEL**

Based on the conceptual framework of SDoEL, structural determinants influence individuals' and families' processes. For example, families' socioeconomic positioning affects their material circumstances (e.g., food, housing, and work conditions), behavior and biological functions, and psychosocial factors (e.g., stress). Scholars have found that families' investments and stressors are possible explanatory factors linking socioeconomic status to children's school readiness (Iruka, LaForett, & Odom, 2012; Mistry, Benner, Biesanz, Clark, & Howes, 2010; Raver, Gershoff, & Aber, 2007). Specifically, the family-investment model postulates that parents with more income, time, and education are able to provide enriching learning opportunities and resources that support children's learning. But families with fewer economic resources experience a lot of stress, which increases depression and detachment, minimizing the quality of interactions and relationships with their children and having a detrimental impact on children's development and learning.

Socioeconomic positioning is associated with early-learning disparities due to other factors and conditions in the environments in which children are born, live, learn, and grow up that affect the quality of their development and the risks they face. The social, economic, and physical conditions of children's homes, communities, and early-education settings affect children's learning opportunities. For example, children's economic condition determines the early-learning environments children can access. That is, the quality of children's environments at home or outside the home often determines the quality of the learning environments (e.g., safe, nurturing, and enriching) and interactions (e.g., responsive and language-rich) they are likely to experience. Higher-income families likely can afford better-quality environments (Barnett et al., 2018). In comparison to those with limited opportunities,

children who experience high-quality learning environments in their daily lives are likely to have better opportunities that set the foundation for school readiness and a better school trajectory. Access to other resources—such as safe and affordable housing, reliable transportation, employment, safe and nonviolent communities, healthy foods, health services, and environments free of life-threatening toxins—impacts families’ and children’s mental health and functioning, which in turn affects children’s learning and development trajectory over time. This pattern aligns with Bronfenbrenner and Morris’s (2007) bioecological framework, which emphasizes that children’s development hinges on multiple contexts and systems. Indeed, research has shown the interconnection between community contexts and child outcomes (e.g., Dupéré, Leventhal, Crosnoe, & Dion, 2010). First, “collective norms and socialization, as well as the relative level of stress and support in the neighborhood, are primary ways in which neighborhood characteristics may influence parenting and, in turn, achievement” (Dupéré et al., 2010, p. 3). Second, “community socioeconomic characteristics shape the composition and quality of local institutions whose mission revolves around children’s cognitive growth, such as child care and school, and that this, in turn, influences achievement. [In essence], neighborhood financial, human, and social capital all influence the strength and vitality of neighborhood learning institutions” (Dupéré et al., 2010, pp. 4-5).

HOW CAN THE SOCIAL DETERMINANTS OF EARLY LEARNING STRENGTHEN EARLY EDUCATION TO ADDRESS DISPARITIES?

To maximize the benefits of homes and communities and buffer children from negative factors, ECE environments, systems, and classroom environments can serve as intermediaries. That is, to reduce economic and racial disparities in the early years, ECE can serve as a place-based conduit and centralizing institution to ensure that children receive early-learning opportunities that take into account the structural determinants impacting their learning. In particular, ECE must attend to the racialized U.S. context, in which children from low-income households and minoritized children and their families face more challenges and inequities than higher-income and White children and families. Garcia Coll and colleagues (1996, p. 1895) emphasize the notion that to really deliver on the promise of early childhood to equalize opportunities for minoritized children, we must consider how environments like ECE can buffer children from the effects of low and marginalized socioeconomic positions (e.g., social class, gender, and ethnicity) that lead to segregated, inadequate communities caused by “pervasive social mechanisms of racism, prejudice, discrimination, and oppression.” Although individuals may have assets directly linked to children’s learning and development in the early years, we must acknowledge the systematic influences that set children’s trajectories based on factors outside their control (e.g., race/ethnicity, language, zip code, quality of child care, and ECE policies).

To reduce economic and racial disparities in the early years, ECE can serve as a place-based conduit and centralizing institution to ensure that children receive early-learning opportunities that take into account the structural determinants impacting their learning.

Thus, to truly ensure that all children have access to and equitably benefit from high-quality early-learning practices, and to address educational disparities, we need to consider these social determinants. We need to build on existing birth-to-age-five programs and systems with attention to SDoEL and how structural factors impact children's school readiness and later outcomes. Some of these programs and systems include home-visiting programs, birth-to-age-three programs (e.g., Early Head Start), and quality rating and improvement systems, which I discuss below.

► Birth-to-age-three and home-visiting programs

Evaluations of early intervention programs focused on infants and toddlers have shown mixed results, especially in regard to children's cognitive, language, and socioemotional outcomes. One example is Early Head Start (EHS), a two-generation program designed to provide high-quality child and family development services to low-income pregnant women and families with infants and toddlers. In 1996, the Early Head Start Research and Evaluation Project, involving 3,001 families at 17 sites, found some positive, albeit small effects for children's cognitive and receptive language. The program was found to have more favorable impacts on children's socio-emotional development in regard to their interactions, attention, and negativity with parents during play, as well as how aggressive their parents reported them to be. When children in EHS were examined two years later during the preschool years, evaluators still found significant impacts for socioemotional behaviors in the areas of behavior problems and approaches to learning; with the exception of a positive impact for Spanish-speaking children's receptive language, there were no other achievement-related outcomes.

The recent Home Visiting Evidence of Effectiveness study funded by the U.S. Department of Health and Human Services (<http://www.acf.hhs.gov/programs/ecd/home-visiting>) provides evidence of a positive and long-term impact from various home-visiting programs that focus on improving the quality of the home environment and increasing positive parenting. Over 30 home-visiting programs have been found to be evidence-based, as determined by at least two impact studies. The outcomes these home-visiting programs focus on included child health, child development and school readiness, family economic self-sufficiency, linkages and referrals, maternal health, positive parenting practices, reductions in child maltreatment and juvenile delinquency, family violence, and crime. Several of the programs' findings have been sustained over time and replicated with other samples, but we still need to ensure that these programs are lifting families and children out of poverty and setting them on a path to economic stability and life success (Avellar et al., 2016).

These birth-to-age-five programs produce the following evidence:

- starting sometime in the first five years of life is positive, especially for children from low-resourced households;
- home-visiting programs that start before or right after birth are beneficial for both children and parents across many outcomes;

- with the exception of small-scale, rigorously controlled early-intervention programs (e.g., Perry Preschool, Abecedarian), findings about the long-term impact of preschool/pre-K programs and the closing of the achievement gap have been limited and inconsistent; and
- many preschool programs show attenuation of findings over time, as early as the following year.

Various scholars have noted “fadeout” following these early experiences (Barnett, 2011). Some argue that fadeout is due to the minimal impact of early-childhood experiences (Whitehurst, 2013), while others suggest that it may represent a “catching up” of those who did not experience high-quality early education, or that there may be a “sleeper effect” of persistent impact evident later in life (Barnett, 2011). For example, some have argued that the impact of early-childhood programs such as Head Start may not be sustained because of the low-quality schools that Head Start children are likely to transition into (Currie & Thomas, 2000; Garces, Thomas, & Currie, 2002). Another theory is that teachers are focusing on children with the lowest skills to help them catch up, and these may be children who did not experience high-quality early learning. Fadeout indicates a need for continued alignment of educational programs beyond five years (e.g., birth-to-8 initiatives), but could also indicate that the things most predictive of school and life are not appropriately captured (e.g., persistence or social-emotional learning; Heckman & Karakapula, 2019).

► Prenatal to grade 3³

Research tells us that the brain develops most rapidly in the earliest years; that enriching early-learning experiences are critical for children’s long-term success (Shonkoff et al., 2012); and that longer-term benefits and outcomes both for the child and for society are seen with multi-year, high-quality programs across the early grades, at least based on small controlled studies (Vandell et al., 2010). The National Research Council Report From Neurons to Neighborhoods (Shonkoff & Phillips, 2000) makes the compelling case that the earliest years—birth through the primary grades—are critical to the long-term educational and life success of all children. And evidence suggests that if quality interventions and programming are provided, gains in cognitive and socioemotional skills may be greatest for children who are farthest behind (Reynolds, Temple, Ou, Arteaga, & White, 2011; Shonkoff et al., 2012). As I discuss above, evaluations from early intervention programs show that starting early does matter, especially with home-visiting and high-quality early education programs. With the exception of small longitudinal studies, there have been mixed findings regarding the longer-term impact of preschool programs⁴ or birth-to-age-five programs. Thus, as a way to consolidate the impact of high-quality early experiences, especially for children placed at risk for poor

³ “PreK-3rd Grade” is used interchangeably with “P-3.” Both terms are intended to reflect the importance of aligning across birth-to-five (0-5) and K-12 classrooms and systems.

⁴ We use preschool to denote programs or services provided to children from birth to age 5. Pre-k is used to refer to programs offered to four-year-old children or a year prior to children’s entry into kindergarten.

outcomes, the field has focused on alignment between preschool and the early elementary years (Ma, Shen, Krenn, Yuan, & Hu, 2015). This has resulted in many programs, strategies, and initiatives focused on prenatal to grade 3 (P-3) to better align “education practices (teachers), education policies (principals), and education standards (curriculum, instruction, assessment, and professional development) [and] make horizontal connections within each grade level and vertical connections across different grade levels in order to create seamless logical transitions that ensure academic and social success for students” (Ma et al., p. 1069). An indication of this approach is also seen in the establishment of the National P3 Center: “[T]he vision for P-3 approaches is to improve the quality and coherence of children’s learning opportunities, from the experiences children have in early learning (including pre-K, Head Start, child care, and other early-learning opportunities before—or “pre”—formal entry into school) and extending through elementary school” (<http://depts.washington.edu/pthru3/>). The premise for P-3 is that coherent, high-quality instructional approaches across this age-and-grade span will result in positive outcomes for children throughout their early years, and an increased likelihood that children will be minimally on track by the end of third grade toward school and life success.

► **Quality rating and improvement systems**

The fact that most children are likely to be in community-based programs, especially home-based and informal settings, suggests a need to establish early-learning systems that systematically address the structural determinants of early-learning inequities and disparities. The desire to ensure that all early learning programs are of high quality by operating under the same standards and expectations has led to the implementation of quality rating and improvement systems (QRISs). In developing these systems, state and local policymakers have used research linking high-quality early childhood education and children’s outcomes in developing QRISs. The idea is to ensure that all children, especially disadvantaged children, are attending high-quality education programs during their early years. Nearly all state QRISs measure staff training and education and assess the classroom or learning environment. States differ on whether and to what extent they include parent-involvement activities, business practices, child-staff ratios, or national-accreditation status. QRISs serve multiple purposes, one of which is to provide a standard way to rate program quality based on multiple criteria and make that information available to parents. The assumption underlying this function of a QRIS is that parents often lack good information about program quality and that if such information were available, they would be more likely to choose higher-rated programs. As a result, lower-quality providers would have an incentive to either improve the quality of their program or to leave the market (Zellman & Perlman, 2008). Also, QRISs represent a systematic approach to providing a range of technical assistance, resources, and incentives for programs to improve quality. Such efforts include consultation around quality improvement, increased investments for professional development scholarships, microgrants for other targeted quality-improvement efforts, and in some instances higher levels of subsidy payments for more highly rated programs. The goal is to foster and support providers’ efforts to improve the quality of care they provide. Thus, QRISs attempt to improve quality by affecting both the demand for high-quality care and the supply of such care.

Of course, their success rests on their ability to accurately identify and measure key aspects of quality and on the willingness of providers to participate in a rating system (Zellman & Perlman, 2008).

The evidence that QRISs lead to better program quality, child growth, and school readiness is mixed. A recent compilation of validation studies from 10 states found the following (Tout et al., 2017):

- (a) levels of quality in the medium range;
- (b) significant, albeit small associations between ratings and observed quality in center-based programs, with differences in the areas of environments, interactions, and activities in ECE programs at different rating levels;
- (c) ratings generally distinguish between lower and higher quality, but no support for the idea that each level of a QRIS reflects a meaningful difference in quality from other levels; and
- (d) inconsistent evidence of small positive associations between QRIS measures and child outcomes, mostly for ratings of social-emotional development and assessment of executive function.

The differences in system designs across states make it difficult to draw general conclusions from the eclectic validation studies. Furthermore, most of the states have few programs in the highest level of quality, resulting in two categories of quality, low and high, that may impact the links to child outcomes. Other limitations include the focus on three- and four-year-old children compared to infants and toddlers within a small time frame of about six months; the need for other measures of children's learning and development; limitations of quality measures that may need more calibration and refinement of area; and use of classrooms to indicate center-level quality.

QRISs have the potential to be a conduit for early learning, family support, and health and well-being to ensure that children of color, children from low-income households, and children from other marginalized communities have equitable opportunities to thrive and be successful. But many QRISs are voluntary, indicating that most programs serving children with high needs may not participate unless mandated (e.g., as part of a subsidy system). Programs with the highest standards and best workforces may not participate in a system that is accessible by many families of color or low-income families. Last, the standards in QRISs have not been considered with the SDoEL framework in mind. For example, how are the standards ensuring that these systems are not privileging certain groups and penalizing others? Are programs serving children who have the greatest needs and who are in the neediest communities being provided with resources to meet their needs? To what extent is segregation being addressed to ensure that families have diverse high-quality choices to meet their needs and ensure their children are excelling?

SETTING A RESEARCH PRACTICE-POLICY AGENDA FOR ECE PROGRAMS AND SYSTEMS TO DELIVER ON THE PROMISE TO PROVIDE EQUITABLE OPPORTUNITIES USING THE SDOEL FRAMEWORK

(1) ECE research must consider racism and discrimination using the SDoEL framework. For too long, most ECE research has indicated that many children of color and children from low-income households are not prepared for school and need early care and education programs. Unfortunately, most of the research, especially about children of color and their families, has been done with a deficit perspective, without consideration for the social determinants that lead to the disparities witnessed even after interventions. The results have often shamed and blamed children, families, and communities for low scores on language and cognitive assessments without considering the historical legacy of racism and discrimination and white supremacy that couches all aspects of early learning. Not even minimal consideration has been given to the resilience and perseverance of children of color and their families, who continue to thrive even when they are subjected to systems and institutions that limit their opportunities and don't consider their assets. When it comes to minoritized populations, are we asking and answering the right questions in the right way? Are there areas in which children of color and other marginalized groups are overperforming that are not considered or addressed (e.g., oral language and storytelling, or bilingualism and biculturalism)? For instance, one would assume that children who have to learn to operate one way at home and another way at school must have strong cognitive skills, but these skills are not captured in discrete assessments, nor is credit given for children who have a home language or dialect and then have to switch to another dialect and language in other settings. Thus, in addition to examining how ECE can help minoritized and marginalized children, research needs to examine how structures and policies promote or hinder families' and communities' ability to thrive and promote children's learning. Research can also help determine what standards can ensure that all children equitably thrive, rather as opposed to standards based solely on Eurocentric ideals of what is good and appropriate. A sole focus on what occurs in the classroom without an understanding of how macrosystems and policies impact it does not help increase ECE's impact—hence the importance of the SDoEL framework to guide research studies.

(2) Engage in cross-sector collaboration with the SDoEL framework. Inequities and disparities are not created because parents are “lazy” or “uncaring.” Rather, structural features work in concert to impinge on the abilities and processes of families and communities; these features include policies that increase poverty and reduce economic mobility, housing and education patterns that maintain low-income segregation, and limited transportation options that restrict the ability to find and maintain employment. Thus, while parents may be able to support their child's healthy development and learning, factors beyond their control (e.g., economic stress, community safety, environmental toxins, or unstable and non-standard unemployment) may limit this ability. As with health disparities, similar structural and process determinants

lead to early-learning disparities and inequities. The root causes of these disparities and inequities often lie in historical and contemporary policies and structures (e.g., education, housing, employment, health systems, public safety, income, and wealth), and some of them are vestiges of U.S. institutional racism. These root causes have not been focused on or studied in ECE research. Although early-learning programs and systems have been shown to mitigate some challenges in the home environment by providing children with consistent, sensitive, and cognitively enriching learning opportunities, such opportunities are not always accessible or of high quality, especially for low-income and minoritized groups, and especially for Black children. Thus, we need to examine how supports can be effective for children and their families, for example, by understanding how health systems and family systems interact with ECE systems to promote positive and optimal child development and learning.

Potential steps for engaging in cross-sector collaboration:

- build a coalition with multiple agencies and organizations that intersect with the SDoEL (e.g., family support, early learning, education, housing, workforce, child welfare, and criminal justice)
- identify coalition leaders and potential ways to integrate work into current funding or organization infrastructure
- determine collective impact outputs (e.g., healthy and safe early childhood, kindergarten readiness, third-grade reading, family stability, diverse schools, livable wages, and affordable housing)
- develop a data process and system to monitor challenges and changes
- develop a continuous quality improvement process at multiple levels
- develop policy changes aligned with communication strategy and resource needs

(3) Using the SDoEL framework for ECE systems and workforce. The bulk of this chapter focuses on the social determinants experienced by families. But we need to recognize that the ECE workforce is also impacted by the same systems that lead to early-learning disparities. Studies have shown that many ECE professionals, particularly those working in community-based programs, are living at or below the poverty level and seek social benefits and services similar to those sought by the families they serve. Thus, they are likely experiencing economic stress and poverty, which affect the quality of their interactions with children and the instruction they provide in the classroom, as well as turnover (i.e., instability), which has also been associated with quality. Poverty and stress are more likely to impact ECE professionals who are members of historically marginalized groups and, by extension, children of color and those from low-income households. Furthermore, these programs and providers may have less access to resources. Rather than focusing solely on the challenges experienced by children in programs and schools, we also need to pay attention to the challenges experienced by ECE professionals.

This means that ECE programs and systems may need to examine the demographic makeup not only of children and families, but also of educators and leaders. It may also mean advocating for more resources for programs, as well as economic resources for ECE professionals, to ensure that social determinants are not being perpetuated throughout the system. For example, the Early Childhood Workforce Index (Whitebook et al., 2018) indicates that teacher assistants and teacher aides closely mirror the children they serve in race, ethnicity, and language, in comparison to lead teachers and education leaders. These lower-level positions, while important for children's experiences, also maintain a status quo that preserves inequities in families and communities of color. Thus, we should pay attention to leadership opportunities in ECE programs, schools, and systems, for many reasons. One is the need to have diversity of minds and experiences to strengthen programs and schools, and to create a different narrative about the value of people of color; another is to ensure that upward mobility is equitably available.

(4) Integrating CRT and culturally responsive pedagogy (CRP) in early-learning systems and programs.

Because economic and racial disparities are part of the social and educational challenges of our lifetime, we need to understand how early-learning systems and programs could help alleviate some of the root causes that maintain inequities. Because the lives and learning styles of children of color are often marginalized, early learning program leaders and educators could fruitfully examine the extent to which programs, schools, and systems can better incorporate CRT and CRP in their standards, assessments, curricula, learning-environment structures, policies, accountability systems, quality indicators, etc. It is critical that early-education systems, programs, and educators eliminate racism and inequities in structures and processes. Important questions include: Whose standards are we using, and what is the evidence and relevance for underserved and marginalized children? For example, does emotional support look the same across different communities? How does bias look in observational assessments?

Early learning is viewed as a potential strategy to mitigate gaps by income and race/ethnicity. But at the rate we are going, it would take about 100 years to eliminate the achievement gap, and even that is not guaranteed. Racism, discrimination, and inequities are complex issues. As more children are living in low-income homes, especially among minoritized populations, the challenges of living in low-resourced and historically segregated communities affect children's early learning and eventually their later development. With minoritized children becoming the majority, early-learning programs and systems need to consider whether and how ECE programs and systems are integrating a culturally responsive perspective that rejects bias. This perspective is particularly important when studies continue to show that links between classroom quality and child outcomes are minimal—possibly because we have paid too little attention to how individual children—especially underserved and marginalized children whose culture and lived experiences are often not considered in ECE programs' and schools' curriculum—are experiencing the learning environment. For example, how is the lived experience of a Black boy in the rural South considered in the

implementation of curricula, activities, literacy tools, interactions, and assessments? Or is it assumed that all children just require the same amount and type of sensitive and cognitively enriching interactions and instructions, without acknowledging their health, family and home condition, community environment, or narrative about their race or neighborhood? Even more important, what roles do racism and discrimination play in the lives and early-learning experiences of minoritized children, and their later outcomes? Understanding and clarifying the empirical links between racism and discrimination could set the course toward ensuring that programming and practices consider these issues in all aspects, in the same way that trauma-informed care addresses toxic stress. One can't address what one does not fully acknowledge.

With this perspective in mind, Brown-Jeffy and Cooper (2011) propose a culturally relevant pedagogy that ECE professionals should consider in all aspects of their work. The model comprises five themes: (1) Identity and Achievement, (2) Student Teacher Relationships, (3) Equity and Excellence, (4) Developmental Appropriateness, and (5) Teaching the Whole Child. It requires teachers to understand cultural differences between them and their students, as well as their own potential biases and stereotypes about their students.

In the Identity and Achievement area, the authors stress the notion that everyone has a multicultural identity; however, race plays a central role in many people's identities. Thus, we have to recognize the stereotype or bias about individuals from an ethnic minority group and how that may impact the quality of instruction and interaction; we also need to recognize the importance and value of affirming different cultures and lived experiences.

The Student Teacher Relationship is the mechanism that supports children's active engagement in a classroom or program, especially when children spend many hours per day over months and years with the same teacher or teachers. These relationships create a classroom culture that extends into children's lives, shaping how they view and interpret the world, others, and themselves. Equity and Excellence focuses on the notion that teachers (and systems) have to provide what children and families need in multiple forms, rather than focusing solely on equality.

Developmental Appropriateness emphasizes children's learning zones (what they have mastered and are on the verge of mastering) and considers the assets children bring as well as an understanding of how the remnants of racism may impact and influence children's learning and development (e.g., viewing children's home language, such as African American English vernacular, as evidence of unintelligence). Teaching styles should be integrated with children's learning styles, and teachers should be aware that some children's learning styles may not be viewed favorably from a noninclusive white, Eurocentric perspective.

Last, *Teaching the Whole Child* emphasizes the importance of recognizing that culture in all aspects of children’s systems—from the home to the community to society—causes them to receive, respond, perceive, and prioritize meaning and behavior in different ways. In essence, “teaching the whole child will require not only that teachers recognize, understand, and intentionally acknowledge cultural group behaviors, but also observe and interact with students as individuals” (p. 77). With this framework in mind, research can help ascertain the extent to which these five themes enhance minoritized children’s educational experience.

(5) Implementation should consider the quality of inputs and structures. Due to their various root causes, early-learning disparities are complex. They require a complementary, cohesive system and approach that asks the right questions, conducts the right research, and implements the evidence in a cohesive way. At present, advantaged families can access programs and schools that provide high-quality, personalized instruction with highly educated, stable, and cognitively stimulating educators. These families can also create separate learning systems, schools, and programs that maintain privilege and the status quo. For example, Montessori and Reggio-inspired programs are often found in highly-affluent communities, though these pedagogical approaches were created for children from low-income and challenged families. In these programs, teachers are expected to be fully credentialed, with at least a bachelor’s degree, and go through several years of preservice practicums with continued in-service work to maintain their credentials. Most teachers stay for decades, and their leaders often embrace the autonomous nature of teaching and create an affirming and comfortable work environment. A level of standards is expected regardless of state, city, or locality, and families are willing to pay the necessary amount for such an educational experience. Alternately, publicly funded programs and schools are subject to federal and local policies and funding, as well as standards that may not take into account the needs of communities and families or the available resources or capacities. Most early learning programs cannot afford the highest quality staff, or the resources needed to ensure that quality is sustained over time, especially with their relatively high turnover rates. Although we have evidence-based curricula, we have no general pedagogy about how best to teach and support young children, especially children with diverse needs, learning styles, and experiences. Early-learning standards and expectations vary across and within states, creating further challenges about what it takes to create and maintain a high-quality early learning system and program. Even the measures and systems created don’t provide precision about the actual quality of a program and how to increase it.

Rather than focusing on points and ratings—although they may be helpful for communicating with families, educators, and policymakers—we need to focus on the quality and capacity of the workforce to provide equitable learning opportunities. We need national standards about what early learning should and can be expected to provide across diverse settings and groups. We need to gauge the cost per child of providing quality early-learning experiences and ensuring that equity rather than equality is the approach taken with funding and resources. We need to encourage systems to align workforce, resources, and data to meet the needs of children’s learning and development. Implementation of high-quality early learning

should focus not only on classroom instruction, but also on the infrastructure that supports processes, including leadership, funding, standards and regulation, data, and partnerships across programs. We should pay attention to how these factors create barriers to or disincentives for equitable early-learning opportunities. For example, do licensing or standards ban blended classrooms or mixed ages, which may be beneficial for some groups of children and have implications for the types of programs that would be allowable? Should these programs be expected to prevent or reduce learning disparities prior to formal school entry in isolation?

CONCLUSION

Early learning is a promising approach, but it is impacted by social determinants that maintain inequities and thus ensure disparities. These structural factors limit resources and supports that directly impact children's outcomes, especially for low-income and minoritized children and their families. The return on investment and effectiveness of early-learning programs were primarily established with Black children; however, Black children are still likely to perform more poorly on almost every marker of learning and optimal development than their White peers. Furthermore, they are likely to experience an intractable cycle of racism and discrimination that has not been fully fleshed out and examined in ECE research. To truly ameliorate early learning inequities and disparities, we must recognize systems that invisibly maintain and perpetuate inequities from housing to education; build cross-sector collaboration and partnership through a racial equity–research lens; and develop a collective birth-through-elementary school (if not, arguably, birth-through-career) strategy to ensure that all children, regardless of race, ethnicity, language, gender, or community, have the opportunity to reach their potential. Early-learning programs and systems are the first formalized institutions that children and their families likely experience; thus, they should take charge in creating a culture that ensures racism and inequities are considered and addressed, in coordination with other sectors.

For ECE programs to meet these expectations, the ECE field has to engage in more thoughtful, meaningful, and racially responsive research focused on understanding the causes and solutions for learning disparities and gaps. This will require the ECE research community to take an equity perspective that includes diverse voices and perspectives—especially those from minoritized communities—to examine how social and structural determinants impact children's outcomes. Although researchers may be interested in microlevel factors, such as classrooms and families, we need a critical examination of how macrostructures and policies may impact such microlevel systems and thus children's outcomes. The “color-blind” approach to research by “controlling” for race, ethnicity, language, and gender must be minimized because it undermines experiences based on these social markers. Furthermore, scholars must undertake interdisciplinary ECE research that engages multiple sectors (e.g., education, health, social work, and workforce development) and disciplines (neurobiology, public health, urban planning, economics, medicine, and implementation science). The solution to pernicious disparities and inequities must be thoughtful, with attention to history and with collaboration from multiple disciplines. All children deserve to start off right and have an equitable opportunity to learn and thrive.

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CHAPTER 3 USING A SOCIAL DETERMINANTS OF EARLY LEARNING FRAMEWORK TO ELIMINATE EDUCATIONAL DISPARITIES AND OPPORTUNITY GAPS

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