

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-Yarborough, 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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