The Current State of Scientific Knowledge on Pre-Kindergarten Effects

2017

Consensus Statement from the Pre-Kindergarten Task Force

A Pre-Kindergarten Task Force of interdisciplinary scientists reviewed the evidence on the impact of state-funded pre-kindergarten programs. Members included: Deborah A. Phillips of Georgetown University, Mark W. Lipsey of Vanderbilt University, Kenneth A. Dodge of Duke University, Ron Haskins of the Brookings Institution, Daphna Bassok of the University of Virginia, Margaret R. Burchinal of the University of North Carolina at Chapel Hill, Greg J. Duncan of the University of California-Irvine, Mark Dynarski of the Brookings Institution, Katherine A. Magnuson of the University of Wisconsin-Madison, and Christina Weiland of the University of Michigan

The Task Force reached consensus on the following findings, conclusions, and recommendation:

Studies of different groups of preschoolers often find greater improvement in learning at the end of the pre-k year for economically disadvantaged children and dual language learners than for more advantaged and English-proficient children.

Pre-k programs are not all equally effective. Several effectiveness factors may be at work in the most successful programs. One such factor supporting early learning is a well implemented, evidence-based curriculum. Coaching for teachers, as well as efforts to promote orderly but active classrooms, may also be helpful.

Children's early learning trajectories depend on the quality of their learning experiences not only before and during their pre-k year, but also following the pre-k year. Classroom experiences early in elementary school can serve as charging stations for sustaining and amplifying pre-k learning gains. One good bet for powering up later learning is elementary school classrooms that provide individualization and differentiation in instructional content and strategies.

Convincing evidence shows that children attending a diverse array of state and school district pre-k programs are more ready for school at the end of their pre-k year than children who do not attend pre-k. Improvements in academic areas such as literacy and numeracy are most common; the smaller number of studies of social-emotional and self-regulatory development generally show more modest improvements in those areas.

Convincing evidence on the longer-term impacts of scaled-up pre-k programs on academic outcomes and school progress is sparse, precluding broad conclusions. The evidence that does exist often shows that pre-k-induced improvements in learning are detectable during elementary school, but studies also reveal null or negative longer-term impacts for some programs.

States have displayed considerable ingenuity in designing and implementing their pre-k programs. Ongoing innovation and evaluation are needed during and after pre-k to ensure continued improvement in creating and sustaining children's learning gains. Research-practice partnerships are a promising way of achieving this goal. These kinds of efforts are needed to generate more complete and reliable evidence on effectiveness factors in pre-k and elementary school that generate long-run impacts.

In conclusion, the scientific rationale, the uniformly positive evidence of impact on kindergarten readiness, and the nascent body of ongoing inquiry about long-term impacts lead us to conclude that continued implementation of scaled-up pre-k programs is in order as long as the implementation is accompanied by rigorous evaluation of impact.

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Introduction

The question of how the U.S. will develop a citizenry with the skills necessary to meet the challenges of the 21st century has attracted the attention of legislators, scientists, and educators. Answering this question leads inevitably to its roots: how well are we preparing young children to enter kindergarten ready to learn? Educators in k-12 school systems are faced with wide disparities in skill levels of entering kindergarteners, which means that all too many children are already far behind many of their peers. Findings in developmental science point toward the importance of early-life experiences in shaping brain development and suggest that if we knew how to provide these experiences in our early education programs, we could have a lifelong impact on children's success.

Our evidence-based era has produced a cacophony of evaluations that seek to determine whether, and under what conditions, the experience of structured, publicly-supported education in the year prior to kindergarten (called pre-kindergarten) helps to promote children's development. Legacy programs such as the Perry Preschool Project and the Abecedarian Project have shown that research-based, generously-funded efforts can enhance the development of small numbers of low-income children. These extraordinary programs, however, differ in important respects from most of the large-scale, publicly-funded programs that are being implemented today. State-funded pre-k education is sometimes portrayed as a monolithic strategy for preparing children for formal schooling. In practice, however, pre-k is better conceived as a funding stream that supports many widely divergent practices in different settings, with teachers who have experienced different types and amounts of preparation. Furthermore, in a given program, pre-k funds are often blended with Head Start, special education, and childcare subsidy funds that, collectively, support the early education of enrolled children. Under these circumstances, it is not surprising that different pre-k programs produce different patterns and magnitudes of impact.

The good news, according to numerous studies, is that children attending publicly-funded pre-kindergarten programs are better prepared for kindergarten than similar children who have not attended pre-k. While some studies have shown that the advantages persist well into elementary school, two reports—one based not on pre-k but on Head Start and one on the Tennessee Voluntary Pre-K program—have led some policymakers to question whether pre-k can provide the persistent effects that undergird an ambitious agenda for pre-kindergarten programs. Both studies found positive impacts on children's skills at the end of the pre-k year but not later in elementary school. These findings have caused policymakers and educators to turn to the scientific community for clarification about the likely impacts of pre-k programs and identification of those factors that might distinguish effective early learning programs.

Findings in developmental science provide the rationale for the hypothesis that a year of publicly-funded pre-k might promote both school readiness and longer-term educational success. Neuroscientists have estimated that the brain grows at an astounding rate over the first several years of life, reaching about 80 percent of its ultimate adult volume by age three. During the first several years of life, about 700 new neural connections are formed every second. This is a time when fundamental skills, knowledge, and beliefs about the world are developed. After several years of exploding growth, the brain begins to prune itself. So, although the early years are not the only time when a child's development can be influenced, this evidence suggests that the year before kindergarten is an opportune period.

The quality and reliability of early experiences and environments are the building blocks of early brain architecture. Parents and trained adult caregivers who are in tune with a child provide the "serve and return" stimuli through conversation, interactive play, guided exploration, and orderly progression that serve as the raw materials of early child development. Unfortunately, in many neighborhoods, violence, lack of services, and the stresses of poverty combine to make it difficult for a family to provide optimal stimulation and stability during a child's early years. The result is that a disproportionate number of children from low-income families lack optimal environments and stimulating experiences and thus enter kindergarten already behind their peers in intellectual and social-emotional development. In recent years, families across the entire income spectrum have experienced increasing stress due to such challenges as making financial ends meet, working multiple jobs, and/or raising a child as a single parent. In communities where child-friendly programs and services are unreliable, some parents struggle to provide the rich stimulation their child needs.

In addition, the skills children will require to become successful in a global 21st century economy have become more daunting in the years since the Abecedarian and Perry projects. As the National Research Council has commented, our shifting view of skills development results from "society's desire that all students attain levels of mastery—across multiple areas of skill and knowledge—that were previously unnecessary for individual success in education and the workplace." How to use the new phenomenon of pre-k to boost early learning and also to provide a stronger base over time for skill acquisition reflects our increased ambitions for the early years.

Eager to answer these questions, in the summer of 2016, Deborah Phillips, Ron Haskins, and Mark Lipsey set out to bring science to bear on the current state of knowledge and its implications for the path forward. With Phillips' leadership, they approached Martha Moorehouse and Kimberly Brenneman of the Heising-Simons Foundation seeking financial support to assemble a small blue-ribbon panel to review the evidence and write a report directed toward the policy world. They identified additional funding from the David and Lucile Packard Foundation. At the same time, but independently of the first group, Kenneth Dodge at Duke University was engaged in discussions with colleagues and others who were also eager to find answers. They decided to convene a group of scientists to write a report for the field. The first three invitations went to Phillips, Haskins, and Lipsey. Rather than produce two reports, they collectively decided to produce the report that follows here.

Organizers held several meetings and activities to ensure that the authors became exposed to all the evidence and perspectives on these issues. The group of developmental scientists noted above brought in additional colleagues for two meetings at the Brookings Institution to review the evidence. Lipsey assembled an annotated bibliography of each published study for the group to review. A somewhat larger gathering was held in Cary, North Carolina, with scientists from diverse disciplines and leading policymakers. A complete list of these participants can be found at the conclusion of this report.

The report begins with a concise description of the pre-kindergarten landscape in America today, authored by Ajay Chaudry and Rupa Ditta. A core group consisting of the four organizers (Dodge, Haskins, Lipsey, and Phillips) and five others (Daphna Bassok, Greg Duncan, Mark Dynarski, Katherine Magnuson, and Chris Weiland) took in all available information, reached consensus on the six major conclusions that form the basis for this report, and drafted the Consensus Statement summarizing the major findings. Subsequent topical chapters, commissioned and authored by individual scholars, offer insights to assist policymakers in reaching decisions and provide fodder for future scholarly inquiry. ■

1. The Current Landscape for Public Pre-Kindergarten Programs

AJAY CHAUDRY AND A. RUPA DATTA

The landscape of public pre-kindergarten and center-based preschool education for children ages three and four across the United States is complex. Nearly 60 percent of three- through five-year-olds not yet in kindergarten attend center-based preschool. The remaining 40 percent are either in home-based child care arrangements with relatives or other non-parental care providers or only in parental care.[1] Getting a handle on this amalgam of preschool services is difficult in the absence of any single clear and complete source of data.[2] Moreover, the current system is a mix of public and private provision for services, and, in many cases, multiple funding sources may support the individual care of children, even within the same preschools or classrooms. While the depiction of the preschool and public pre-kindergarten landscape requires significant explication, one conclusion is clear: Any summary evaluation of the impact of public pre-kindergarten programs on children's outcomes must recognize that such programs vary greatly across states and are directed to different kinds of children.

In this chapter, we describe the current landscape for center-based public pre-kindergarten for four-year-olds within the overall broader context of all center-based preschool. We focus on the enrollment of children in state- and locally-administered pre-kindergarten, which we refer to as "public pre-kindergarten." We also look at all center-based preschool services, including private centers as well as other publicly-funded settings, and we refer to this larger universe as "preschool." In addition to state and locally-funded public pre-kindergarten, two other primary public funding sources for center-based preschool are Head Start and child care subsidies, and funding from these programs can be combined or "blended" in varied ways. Finally, many preschool-age children attend other forms of non-parental care, including relative care and family-child care, primarily in home-based settings, that are not the focus of this overview. This chapter lays out the context for the chapters that follow. We highlight which children participate in public pre-kindergarten and other preschool services. We examine the demographic and risk characteristics of preschool-age children and those enrolled in public pre-kindergarten and other center-based preschool programs, and we describe and the significant variations in the landscape of how preschool is organized and who is served across states and local school districts.

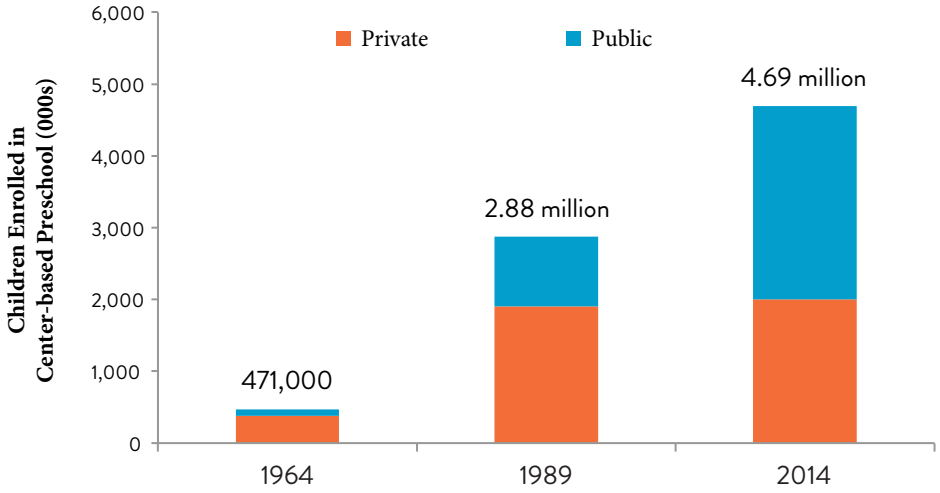
Who is in Preschool and Participates in Public Pre-Kindergarten Programs?

In 2014, 4.7 million three- and four-year-old children attended preschool, with 2.0 million in private preschool and 2.7 million in publicly funded center-based preschool (see Figure 1).[3,4] The number of children in preschool has increased dramatically from less than one-half million children who were in preschool programs, or what were more commonly called nursery schools, in 1964.

By 1989, the number of three- and four-year olds had increased by more than 2 million and by nearly 2 million more over the next 25 years. Yet, as of 2014 there were still 3.7 million three- and four-year olds in the U.S. who were not attending any type of center-based preschool. Figure 2 shows the trend line.[5,6]

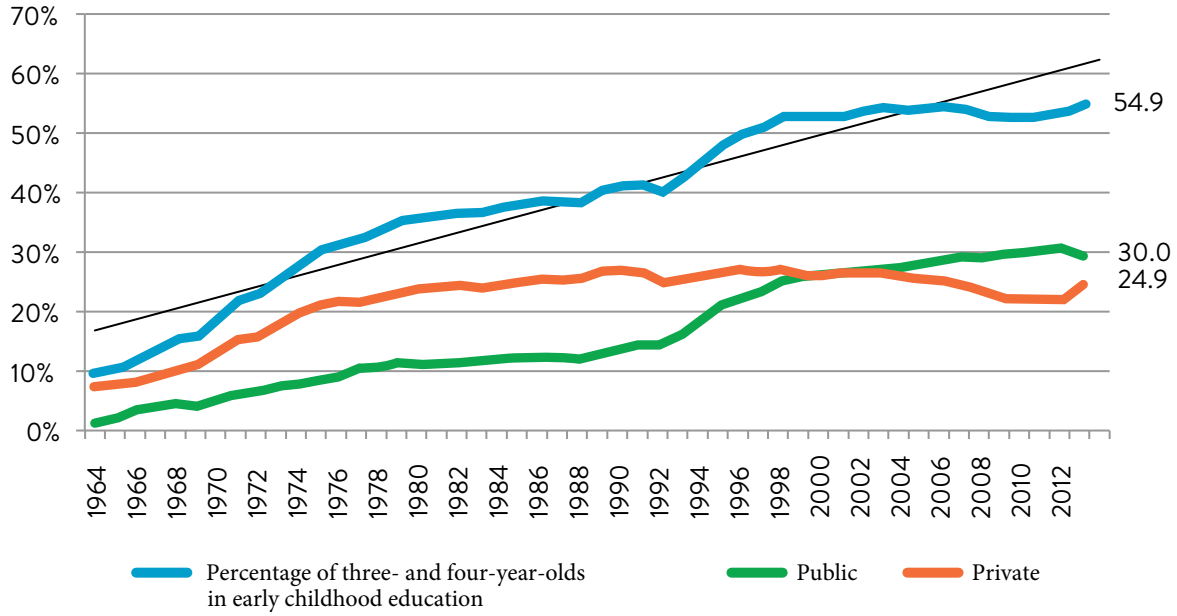
What is often lumped together as public preschool is actually comprised of multiple programs that vary widely in their program models and financing. The main programs include public pre-kindergarten, typically funded by states but also by municipalities and school districts. Other programs include federally-funded Head Start programs as well as federal and state subsidized child care that provides financial support for

Figure 1. Three- and Four-Year-Olds Enrolled in Center-based Preschool in the U.S., Selected Years, 1964-2014



Source: Authors' compilation of Current Population Survey data, October Supplements (1964-2014).

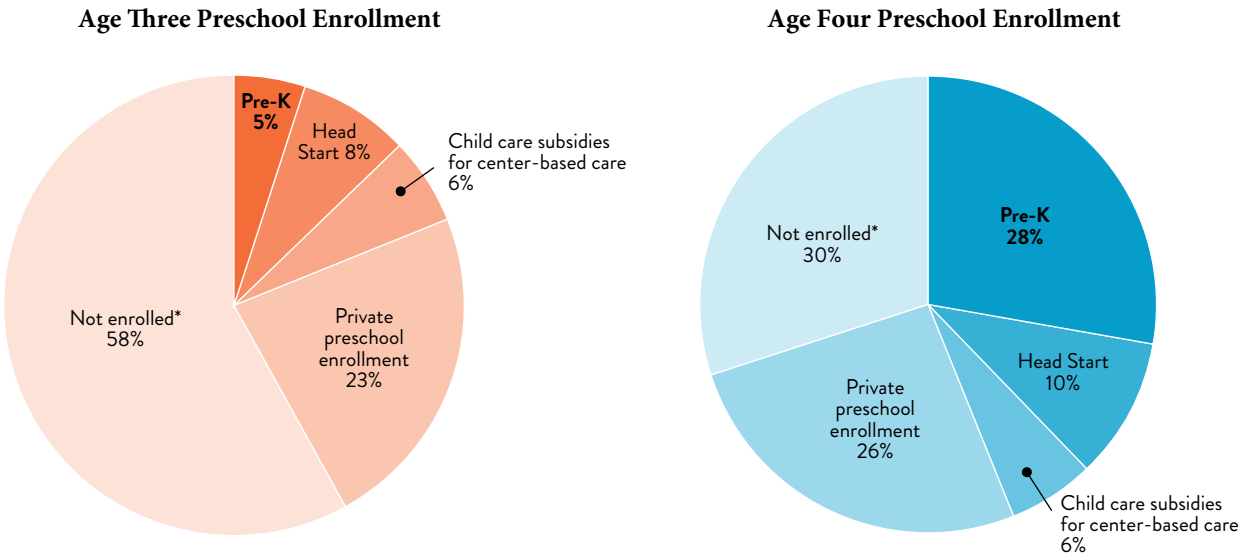
Figure 2. Percentage of Three- and Four-Year-Olds Enrolled in Center-Based Preschool Programs in the U.S., 1964-2013



Source: Authors' compilation of CPS data, October Supplements (1964-2013).

children from low-income families, including for attending center-based preschool. The latter are often sponsored by community-based, non-profit organizations. Both providers' costs and individual children's enrollment can be funded from more than one program source, and fully disentangling how many unduplicated children are receiving care from which sources is very difficult. Figure 3 provides the breakdown for enrollment by the types of public programs, private preschool enrollment, and those not enrolled in center-based preschool for all children ages three and four.[7]

Figure 3. Distribution of Preschool Enrollment for Children Ages Three and Four, 2015



Sources: Data compiled from CPS, October 2015 Supplement; Office of Head Start. "Head Start Services Snapshot (2014-2015);" Administration for Children and Families. 2015. "Child Care and Development Fund Statistics." Chien, 2015; Barnett et al. 2016.

*Note among the "not enrolled" in preschool at ages three and four are children in non-parental home-based care providers and some who are in no regular non-parental care.

Forty-two states and the District of Columbia had public pre-kindergarten programs, serving a total of 1.35 million children in the 2014-15 school year.[8] The number of children in public pre-kindergarten nearly tripled between 1990 and 2005 but since then has changed only minimally. Many states have pre-kindergarten programs that only or disproportionately serve four-year-olds, so 29 percent of four-year-olds were served compared to 5 percent of three-year-olds.[9]

There is wide variation in nearly all aspects of public pre-kindergarten programs, including the size and availability of programs across states and cities.[10] In addition to eight states that do not have any public pre-kindergarten, another 10 serve less than 5 percent of the three- and four-year-olds in their states. Eleven states served more than 25 percent of their three- and four- year-olds in public pre-kindergarten, including eight states that served more than half of their four-year-olds and accounted for 33 percent of all four-year-olds enrolled in state pre-kindergarten nationally.[11]

Head Start is the largest and longest existing preschool program in the U.S., serving approximately 750,000 children ages three and four for one or two years. The program was initiated in 1964 as part of the War on Poverty to offer developmental opportunities to improve the skills, capacities, and school performance of disadvantaged children living in poverty.[12,13] Overall, about 10 percent of all four-year-olds and 8 percent of all three-year-olds attend Head Start, representing approximately 40 percent of all eligible preschool-age children from families with incomes below the federal poverty level (FPL).

Child care subsidies are financed through a combination of federal block grant funding and state matching funds, with families paying a share of the cost based on their income. The subsidy program can be used for the support of children from infancy through age 13 for a wide range of center- and home-based care arrangements, with 27 percent of all subsidies supporting the costs for preschool-aged children, mostly in centers.[14,15]

Altogether 70 percent of four-year-olds and 42 percent of three-year-olds were attending preschool in 2015. The most significant differences in program enrollment by children's

age have been for public pre-kindergarten programs, which serve 29 percent of four-year-olds compared to 5 percent of three-year-olds. Similar patterns are found among children in private preschool, Head Start, and subsidized center-based care and education.

Demographic and Risk Characteristics of Preschool-Age Children

There is wide variation in how public pre-kindergarten and center-based preschool services in the U.S. are targeted and impact different populations of children.

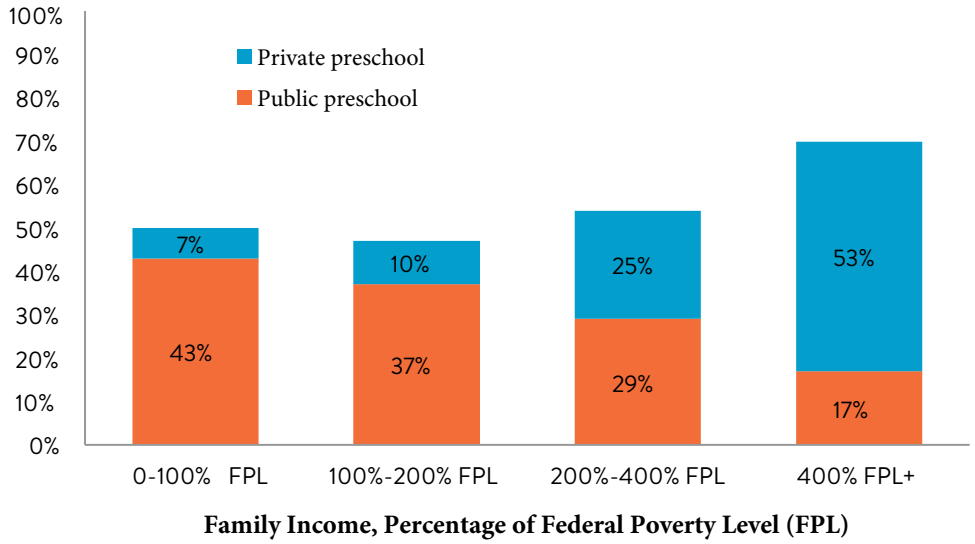
Targeting of Families in Adverse Circumstances

Children whose families are poor and facing particularly adverse circumstances are often targeted for services or prioritized in many public preschool programs. Children who come from economically disadvantaged backgrounds, particularly those whose families are in poverty, receive priority for enrollment in many public pre-kindergarten programs, and the Head Start and child care subsidy programs are specifically directed to children from such families. Some (but not most) public pre-kindergarten programs target or prioritize eligibility for children from low-income families for enrollment.[16,17] Indeed, while Head Start programs are more likely to be located in areas of higher poverty density, public pre-kindergarten locations more closely mirror the population of children overall.[18] Head Start is designed to primarily serve children living in poverty in order to improve the skills, capacities, and school performance of disadvantaged children, and the majority of child care subsidies go to families living below or near the federal poverty level.

Half of all children ages three and four in poor families with incomes of less than $24,250[19] attended center-based preschool in 2015, and six out of seven of those enrolled were in public preschool, including Head Start, state pre-kindergarten, and child care subsidy-funded programs (see Figure 4). A slightly lower proportion, 47 percent, of children in low-income families—those with incomes between one and two times the federal poverty level or between $24,250 and $48,500 for a family of four in 2015—were enrolled in preschool, most of them in public preschool programs.

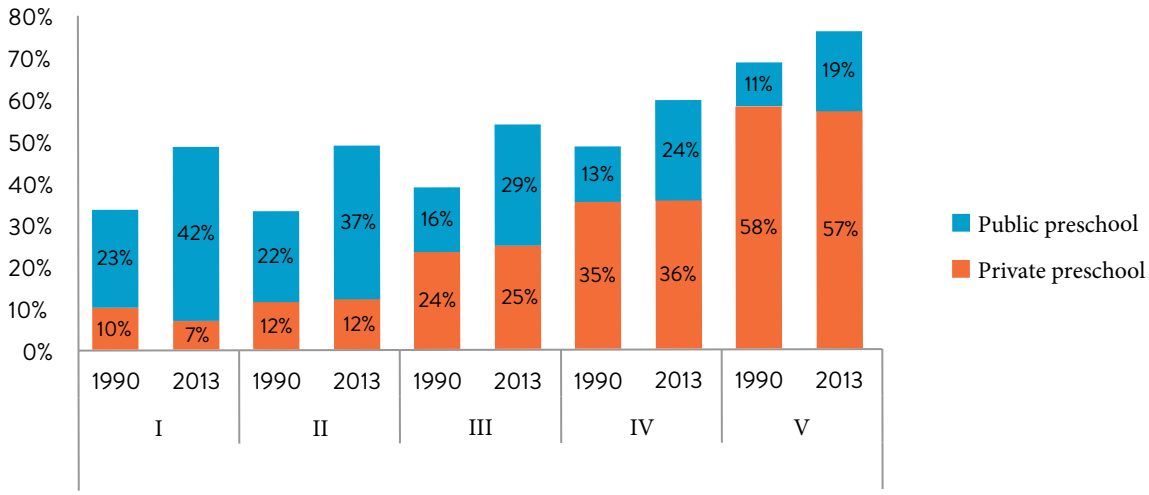
In addition to favoring children from low-income families, state and local pre-kindergarten programs and Head Start both specifically prioritize children who are identified as having special needs such as a disability or developmental delay.[20] Twenty-two percent of children enrolled in pre-kindergarten, and 12 percent of children in Head Start are identified as students with disabilities or special needs.[21] In

Figure 4. Children Ages Three and Four in Public and Private Center-Based Preschool by Family Income, Percentage of Federal Poverty Level (FPL), 2015



Source: Authors' analysis of CPS data, October 2015.

Figure 5. Children Ages Three and Four in Public and Private Center-Based Preschool by Family Income Quintile, 1990 and 2013



Source: Authors' analysis of data from U.S. Census Bureau, Current Population Survey, October Supplements, 1990, 2013.

addition, Head Start currently further prioritizes families and children facing other adverse circumstances for enrollment. For example, approximately 4 percent of all children served in Head Start experienced homelessness at or during the time they were enrolled. Two percent of enrolled children were in foster care during the program year, and a larger percent were referrals from child welfare agencies.[22]

Disparities by Family Income

Large disparities remain in access to preschool by family income for low- and middle-income families. While the provision and targeting of public preschool programs help to narrow the gaps in access for low-income families, sizeable gaps persist, and they are nearly as wide for moderate-income families. Among families with incomes between $48,500 and $97,000, 54 percent of children were enrolled in preschool, with a majority of this 54 percent in public preschool programs and with overall enrollment not very different than the rates for low-income families. Preschool enrollment of children from families with incomes over $97,000 in 2015 outstripped those of the other family-income bands by 16 to 23 percentage points, with more than three-quarter of these families who had children in preschool paying for private programs.

The provision of publicly funded pre-kindergarten has narrowed disparities in preschool access. As shown in Figure 5, nearly all of the growth in preschool enrollment since 1990 across all income categories has resulted from the increase in public provision, with growth concentrated in the lower income quintiles. Despite these increases, the disparities in preschool enrollment for children of low- and middle-income families remain substantial.

Enrollment Gaps by Race and Ethnicity

Gaps in overall preschool enrollment for children from racial/ethnic and language minority groups and immigrant families exist, but not for enrollment in public programs. Figure 6 below shows the distribution by race and ethnicity of all children ages three and four in the U.S, as well as the distribution for all children living in poor families and for public pre-kindergarten and Head Start enrollment. Overall enrollment in public pre-kindergarten nationally more closely reflects the overall racial and ethnic distribution of children, and Head Start enrollment resembles the distribution among children living in poverty, among which black and Hispanic children are both disproportionately represented.

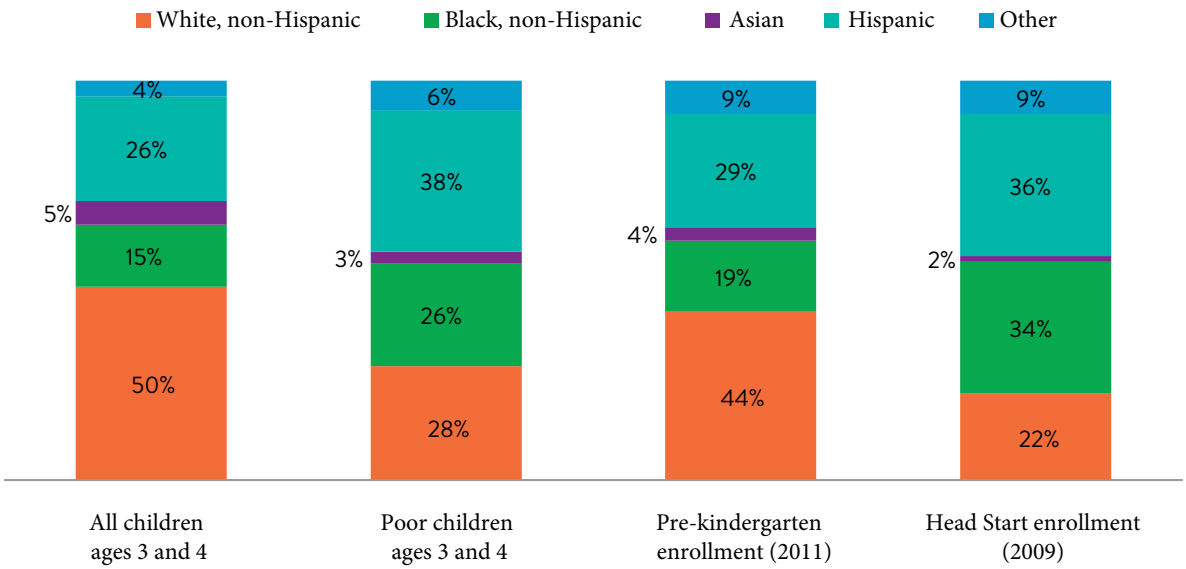
Overall, Hispanic children are less likely to attend preschool, even though they are enrolled in public pre-kindergarten programs and Head Start at close to their proportion of the population of all children and of those in poor families. The overall enrollment rate for Hispanic three- and four-year-olds in preschool was 45 percent compared to the overall enrollment rate of 55 percent, and it was lower than the rates for children from white, black, and Asian racial groups (see Figure 7). Hispanic children have the lowest rates of enrollment in private preschool of any racial or ethnic group, thus contributing to the overall disparities in enrollment. In addition, Hispanic mothers' labor force participation is lower than the overall rates for all mothers;[23] and children in Hispanic families are less likely to be in any non-parental care. When they are in non-parental care, they are more often in a care arrangement with a relative than other groups.[24,25]

Among children of immigrant families, there is a similar level of disparity in overall preschool enrollment, but there is little disparity in the level of enrollment in public programs including public pre-kindergarten and Head Start.[26]

In terms of home language, 12 percent of children in public pre-kindergarten are identified as English Language Learners, for whom English is not the primary language spoken at home. This is true for 28 percent of Head Start children, including 22 percent for whom Spanish is the child's primary home language.

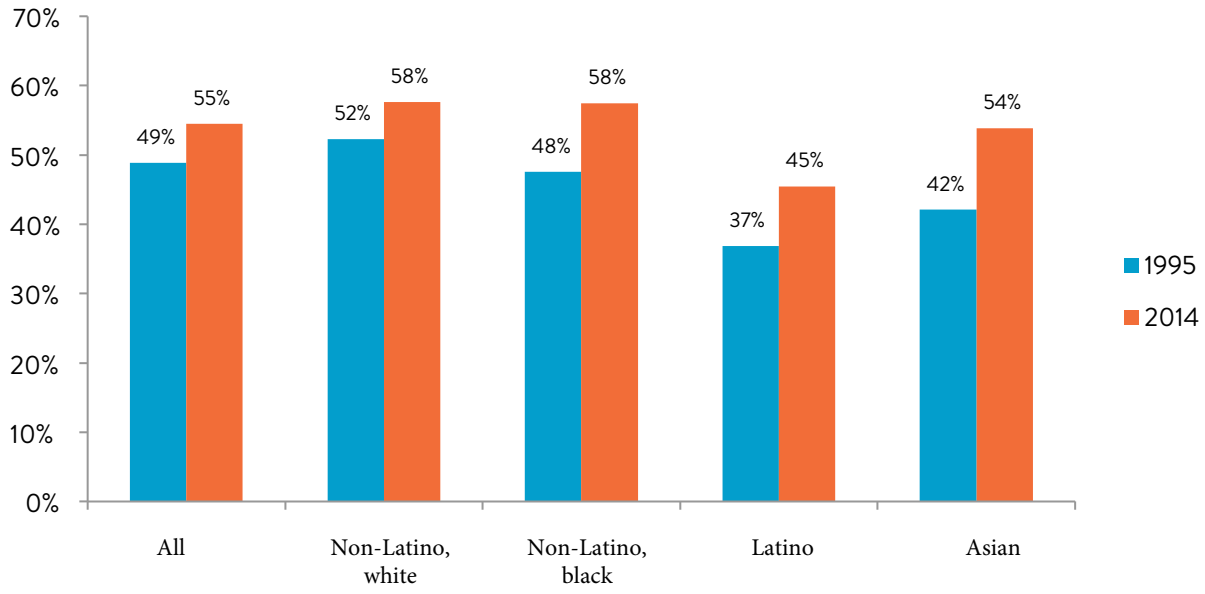
Children with working parents are relatively more likely to have their children enrolled in preschool, and those in families with mothers employed full-time hours use full-day

Figure 6. Racial and Ethnic Distribution of Children Ages Three and Four by Family Poverty Status and Program Participation



Sources: Tabulations from the Current Population Survey, 2010; Head Start FACES Technical Report 2009; U.S. Department of Education, Office for Civil Rights, Civil Rights Data Collection, 2011-12.

Figure 7. Children Ages Three and Four Enrolled in Center-Based Preschool by Race and Ethnicity, 1995 and 2014



Source: Authors' analysis of data from U.S. Census Bureau, Current Population Survey, October Supplements, 1995, 2014.

preschool more often. Overall two-thirds of mothers with preschool-age children were in the labor force in 2015, and families with working mothers were more likely to have their three- and four-year-old children enrolled in preschool, 59 percent compared to 48 percent.[27] Children with full-time employed mothers were even more likely to be enrolled in full-day preschool.[28] Children with non-employed mothers were just as likely to be enrolled in part-day public preschool as children with employed mothers.[29] Overall, 54 percent of all children in public preschool are in part-day programs.[30] Notably, 34 percent of all working mothers work non-standard hours (rates are higher for low-income working mothers), and their children are much less likely to attend center-based preschool.[31,32]

For children in rural areas, 47 percent of preschools receive Head Start and/or public pre-kindergarten funding. Twenty five percent receive Head Start funding only, while 18 percent have public pre-kindergarten only, and 4 percent had both Head Start and public pre-kindergarten funding. In high-density urban areas, this proportion with Head Start and/or public pre-kindergarten funding falls to 36 percent. Suburbs and other lower-density urban areas fall in between with 39 percent of preschools funded by Head Start and/or public pre-kindergarten.[33]

Characteristics of Settings That Provide Public Pre-Kindergarten

The previous section described patterns of children's enrollment in public and private preschool. We now turn to the characteristics of the numerous settings where preschool takes place. In contrast to the numerous data resources available for estimating children's enrollment from household surveys, there are fewer sources of nationally representative data collected from center-based early education providers across program types. Our discussion draws heavily from the most comprehensive of these resources, the 2012 National Survey of Early Care and Education (NSECE).[34]

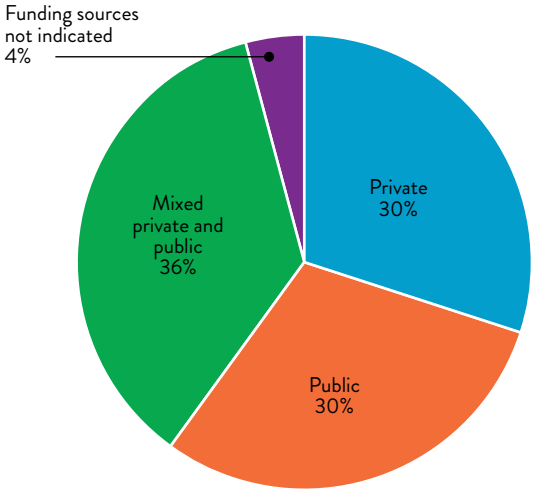
The NSECE data from center-based providers of early care and education show that there were 129,000 preschools serving children birth to age five, not yet in kindergarten in 2012. Almost 97 percent of these preschools serve children age three to five; indeed, 30 percent (39,000 preschools) serve this age group exclusively; while 67 percent (86,400 preschools) serve both preschool age children and those younger than three (with some also providing services for school-age children).

While a given child's enrollment may be characterized as primarily publicly- or privately-funded,[35] there are more shades of gray among the early education preschools those children attend. Among preschools serving children under five-years-old, not yet in kindergarten in 2012, 73 percent received at least some public dollars, including 30 percent who were predominantly funded by public dollars. (A preschool is predominantly publicly funded if its top two sources of revenue are both public sources, such as federal, state or local dollars.)

Figure 8 shows that while 30 percent of providers are predominantly privately-funded and an equal proportion of predominantly publicly-funded, 36 percent mix both public and private funds. Publicly-funded and privately-funded enrollment co-exist in these preschools, although the extent of mixing is not known from this data. For example, children funded by child care subsidies or public pre-kindergarten vouchers may sit side-by-side with privately-funded children in classrooms. In other settings, a preschool may operate a separate public pre-kindergarten classroom.

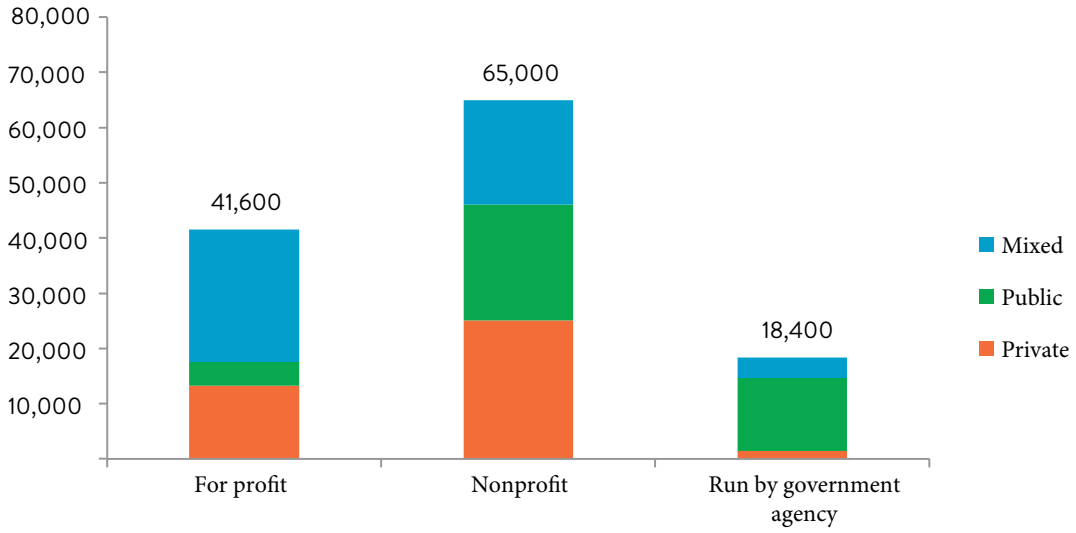
In addition to their mix of funding sources, preschools also vary in their auspice (see Figure 9). Just over half of all preschools are either non-profit organizations themselves or are operated by one; just under 13 percent of these non-profit preschools report sponsorship by a church or religious school.[36] Approximately one-third are for-profit entities that can range from large chains with dozens of preschools to sole proprietorship storefront preschools. Most for-profit preschools mix public and private funds and are more likely (almost 60 percent compared to less than 30 percent) to do so than non-profits. Among non-profit preschools, roughly one-third are primarily privately-funded, publicly-funded or have mixed funding sources. Finally, 15 percent of all preschools are run by government agencies, and of these, the majority (72 percent) are primarily publicly funded.

Figure 8. Private/Public Mix of Preschools' Top Two Funding Sources



Source: NSECE center-based provider questionnaire [N=129,000 centers].

Figure 9. Distribution of Preschools by Program Auspice and Top Two Funding Sources



Source: NSECE center-based provider questionnaire [N=124,600; excludes 4.400 preschools with an auspice other than one of the three categories shown here].

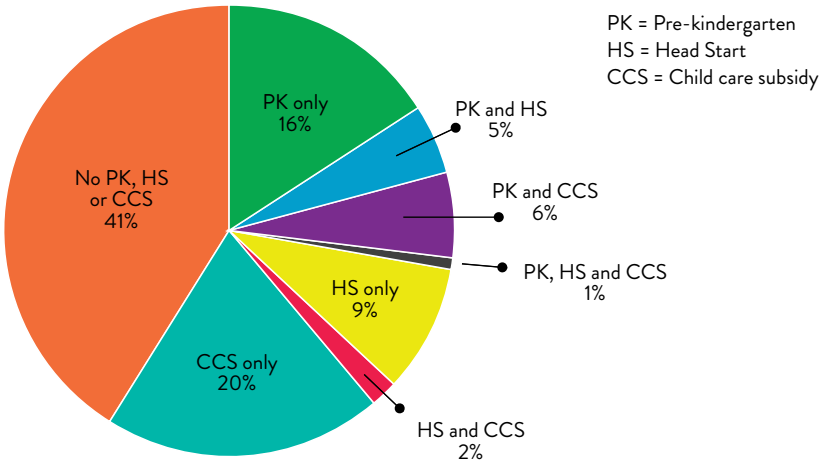
Not only do many preschools combine private with public dollars, but they may also combine different sources of public dollars in what is called "blended" or "braided" funding. The three main sources of public funding for preschool are described above: Head Start, child-care subsidies, and public pre-kindergarten funds from state or local sources. Within the public pre-kindergarten category lay a broad range of programs. These include programs based primarily within elementary schools and operated by public school districts, as well as programs offered in community-based settings or perhaps broadly dispersed through vouchers.

Beyond the variation in public pre-kindergartens, there is further heterogeneity in how funds are blended or braided within preschools. Head Start or public pre-kindergarten classrooms may operate quite separately from privately-funded classrooms, sometimes serving each age group from only a single funding source. It is also possible to coordinate use of funds within a classroom for the same children at different times; for example, a morning Head Start classroom followed by afternoon care funded by child care subsidy dollars for the same children. When vouchers or contracted slots are in use, children whose enrollment is supported by different funding streams may be sitting side-by-side in class with the same teacher, receiving effectively identical services from different funding sources and possibly different eligibility or reporting requirements. Finally, some states, localities and school districts have fully combined Head Start with public pre-kindergarten, pooling these funds fully to provide one integrated service.

Figure 10 shows the extent to which these three public programs co-exist within preschools, although not the ways in which the co-existence actually plays out. Among 35,600 preschools (28 percent) receiving at least some public pre-kindergarten enrollments, just over 20,000 (16 percent) receive public pre-kindergarten funding only, while the other 12 percent combine pre-kindergarten funding together with Head Start and/or child care subsidies. Furthermore, many of these preschools also have privately-funded enrollments.

The complex and varied landscape is even more evident when we consider profiles of preschools across states. Table 1 displays national and selected states' characteristics for all preschools as well as for those participating in public pre-kindergarten in 2012. There is significant variation across states in the funding sources and auspices (non-profit or for-profit status or run by a government agency) for preschools. While 30 percent of all preschools across the country are primarily publicly funded (the two largest funding sources), in the five large states for which data are presented here, this

Figure 10. Mixing of Major Public Program Funding Within Preschools



Source: NSECE center-based provider questionnaire [N=129,000 centers].

proportion ranged from 23 percent in Ohio (a state with a relatively small amount of public pre-kindergarten) to more than double that proportion (47 percent) of preschools in Florida, which serves many more children in public pre-kindergarten. There was similarly wide variation in the auspices of preschool across states: just 27 percent of preschools in Georgia were non-profit compared to 64 percent in Illinois.

The ratio of three-year-olds to four-year-olds in a state's preschools can be an indication of how its public pre-kindergarten approach affects the state's overall preschool enrollment. In Georgia and Florida, which had universal programs for four-year-olds, a significantly lower ratio of three-year-olds relative to four-year-olds were in preschool (70 percent and 83 percent respectively). In the other three states where public pre-kindergarten provision is more limited (with less than one-third of all preschools having any public pre-kindergarten funding), the ratios in these states were over 90 percent with nearly as many three-year-olds attending preschool as four-year-olds. The proportion of preschools in a state that received any public pre-kindergarten funding varied widely from just 21 percent of all preschools in Ohio to 77 percent in Florida.

The lower panel of Table 1 focuses specifically on the characteristics of preschools receiving public pre-kindergarten funds. As noted above, the size and scope of a state's pre-kindergarten programs vary considerably: from the 21 percent (1,000 of 4,600) of preschools in Ohio receiving any pre-kindergarten funding and serving less than 10,000 children statewide, to California and Florida, which serve more than 100,000 children.

As described above, contrasting three-year-olds and four-year-olds can reveal characteristics of a state's public pre-kindergarten offering. The panel shows the percentage of all three-year-olds in preschool who attend a preschool that receives public pre-kindergarten funds (though the individual three-year-old children may or may not be part of the public pre-kindergarten enrollment). The same numbers are shown for four-year-olds. There is wide variation in the fraction of an age cohort's preschoolers that attend a public pre-kindergarten-funded center. Nationally, 31 percent of three-year-old preschoolers are in a public pre-kindergarten-funded preschool, while the fraction is at least double in Florida and Georgia. Georgia also stands out in that four-year-old preschoolers are 12 percentage points more likely to be in public pre-kindergarten-funded preschools than are three-year-old preschoolers. This difference is 5 percentage points nationally, and smaller still in the other three states reported here (California, Florida, and Illinois). While these data do not allow us to identify the differences in the funding sources for children's enrollment within centers with funding from multiple sources, a clear conclusion is that in most centers receiving public pre-kindergarten funding the number of three- and four-year-olds being served are roughly similar across several states, including in those whose public

Table 1. Comparison of All Preschools and Preschools with Public Pre-Kindergarten Funding in Selected Large States

ALL PRESCHOOLS	National	California	Florida	Georgia	Illinois	Ohio
Number of preschools	129,300	12,300	4,700	4,100	5,500	4,600
Percent of preschools with top two funding sources both public	30	36	47	25	30	23
Percent of preschools with top two funding sources mixed, private and public	43	38	43	60	39	50
Percent of preschools non-profit	51	49	49	27	64	49
Percent of preschools for-profit	33	28	21	61	24	41
Ratio of three-year-olds to four-year-olds in preschool	94	96	83	70	97	95
Percent of all preschools having public pre-k funding	28	34	77	49	33	21
AMONG PRESCHOOLS WITH PUBLIC PRE-K FUNDING						
Number of preschools with public pre-k funding	35,700	4,200	3,600	2,000	1,800	1,000
Number of children served with public pre-k funding	1,050,000	150,000	112,000	83,100	79,500	9,200
Percent of all three-year-old preschool enrollment in preschools with public pre-k funding	31	38	79	62	45	--
Percent of all four-year-old preschool enrollment in preschools with public pre-k funding	36	37	81	74	44	--
Percent not receiving Head Start or CCDF funding	57	67	46	41	69	--
Percent of preschools with top two funding sources both public	57	58	52	--	68	--
Percent of preschools with top two funding sources mixed private and public	43	41	48	64	--	--
Percent of non-profit preschools	47	44	45	--	59	--
Percent of for-profit preschools	24	18	22	65	--	--
Percent free to all parents at preschool	50	56	33	--	65	--
Percent preschools serving only children ages three to five	37	32	30	--	62	--

Source: NSECE Center-based Provider Survey.
Note: -- cell suppressed due to small n.

pre-kindergarten funding only or primarily supports services for four-year-olds.

A preschool may be only a public pre-kindergarten, or it may have a range of preschool enrollment and programming, with a portion of children funded by state or local public pre-kindergarten dollars. Blending and braiding public funds was especially common in Florida and Georgia, where less than half of the preschools received only public pre-kindergarten funding (or more than half received Head Start or Child Care and Development Fund (CCDF) funding in addition to public pre-kindergarten program funding). By contrast, in California and Illinois almost 70 percent of public pre-kindergarten preschools received public pre-kindergarten funds and no Head Start or CCDF funds.

Nationally, 71 percent of all preschools with public pre-kindergarten are in non-profit (47 percent) or for-profit (24 percent) settings and not in schools or other government-run settings, and the auspices used for preschool can vary a lot among state public pre-kindergarten programs: In Illinois nearly 60 percent of public pre-kindergarten locations are in non-profit settings, while in Georgia more than 60 percent are in for-profit settings.

The two final rows of Table 1 offer additional lenses into the preschools in which public pre-kindergarten enrollment takes place. Both nationally and in California, about half of public pre-kindergarten preschools are free to all parents in those preschools, whether or not their children are public pre-kindergarten slots. Just one-third are free among Florida public pre-kindergarten preschools, but almost two-thirds in Illinois. Finally, about one-third of public pre-kindergarten preschools nationally (and within California and Florida) serve only children age three through five years, not yet in kindergarten. In contrast, Illinois preschools serve almost double (62 percent) of those ages three to five.

The five states discussed comprised 41 percent of the public pre-kindergarten slots nationally. Their individual profiles make clear that states have been making quite diverse choices in their public pre-kindergarten program designs, and that these affect the landscape of public pre-kindergarten settings and larger preschool contexts.

Conclusion

The current landscape of preschool services for young children is complex and has become even more so over the last 25 years. While families with relatively greater means have enrolled their children at ages three and four at high rates for decades, the emergence of state public pre-kindergarten programs has significantly altered the landscape. Overall, more children are now served through public preschool programs, with funding from multiple program sources.

Although the expansion of public preschool program resources has helped to narrow the sizeable disparities in enrollment that have existed by family income, race and ethnicity, sizeable gaps still exist for children from middle- and low-income families, Latino families, and for three-year-olds. It is especially important to note that enrollments of low- and moderate-income families in preschool are not very different than those from the poorest families, and significantly wide disparities exist across the bottom two-thirds of the distribution of families by income. Children from the highest income group are still more likely to attend preschool than children from lower income groups. Finally, the growth in preschool enrollment and narrowing of these disparities has slowed significantly since 2000, when 50 percent of all three-and four-year-olds were enrolled in preschool, to 55 percent in 2014. More than three million three- and four-year-olds are still not in preschool.

A dimension not addressed here but examined more extensively in subsequent chapters is the quality of the preschools within and across funding streams. Just as public pre-kindergarten programs vary in structural features, so too do these programs vary on measures of their quality as well as how much and how they regulate and monitor quality.[37,38] While Head Start preschools have been subjected to more consistent national standards, their quality variation has been documented as well.[39]

The widespread diversity of the nation's preschools is manifest within many of its largest states as well. The extent to which there may be no "one thing" that is public pre-kindergarten can make it difficult to learn lessons about effective designs and their impacts on children nationally. Still, it is critical that these discussions take into account many basic features of program design and what exists now. ■

[1] According to data from the 2012 National Household Education Survey (NHES), of 8.2 million children between ages three and five who had not started kindergarten 4.9 million were in center-based preschool, while 1.3 were in home-based non-parental care arrangements, and 2.0 million were in no regular non-parental care or education settings. Saida Mamedova and Jeremy Redford, "Early Childhood Program Participation, from the National Household Education Surveys Program of 2012." (Washington DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education, 2015).

[2] Several data sources looked at together can provide a more complete picture. These include *household surveys*, of which there are several that ask survey respondents to indicate whether their individual young children are in early care and education and the type of arrangement; *program enrollment data* for which particular types of programs aggregate enrollment at the state or national; and data from the 2012 National Survey of Early Care and Education (NSCECE) that surveys all types of providers, offering a comprehensive picture of *the supply of preschool education and care*.

[3] There are multiple national cross-sectional data sources that are often used to describe current levels of use of early care and education by type and family incomes, including the October Supplement of the current Population Survey (CPS) and the National Household Education Survey (NHES) of Early Childhood Program Participation, and the Survey of Income and Program Participation (SIPP). Together, these sources provide a broad set of descriptive data regarding preschool use. Across the surveys, there are differences in the surveys' timing, questions, and wording. For example, the CPS surveys enrollment annually every October, and has done so for decades ,and both Figures 1 and 2 are based on compilation of CPS data, which is asked annually, provides the most consistent data over time for the number of children ages three and four who are in center-based care and education settings. Both the NHES and SIPP are conducted periodically several years apart (for example the most recent available data for the NHES survey related to early childhood program participation is 2012 and before that it was conducted in 2005). The NHES and SIPP ask about program participation across the early childhood years from birth to age five and the CPS asks specifically about the preschool years. The CPS asks respondents about children's participation in "nursery school" or "preschool," while the NHES asks about participation in "center-based care", which might include day care centers, preschools, pre--kindergarten, or Head Start programs, in addition to non-center care.

[4] CPS School Enrollment in the United States Table 1 (https://www.census.gov/hhes/school/data/cps/2014/tables.html)

[5] Ibid.

[6] There was rapid growth in the use of private center-based preschool education for three- and four-year-olds in the 1970s and 1980s, and as of 1990 still more than two-thirds of all children who were in center-based preschool were in private programs before growth in private preschool enrollment plateaued. Growth accelerated again between 1990 and 2005 with the expansions in state public pre-kindergarten with the number of children in public preschool doubling over the 1990s alone, when Head Start and publicly funded child care subsidies were also growing. Since 2005 the growth in preschool enrollment has remained flat overall with the effects of the Great Recession on state budgets and family finances slowing growth (see Figure 2 in this chapter).

[7] This does not separate out the number of children enrolled in special education, some of which are counted in the other categories, particularly public pre-kindergarten.

[8] Steven W. Barnett, Alison H. Friedman-Krauss, Rebecca Gomez, Michelle Horowitz, G.G. Weisenfeld, Kristy Clarke Brown, and James H. Squires, *The State of Preschool 2015: State Preschool Yearbook* (New Brunswick, NJ: National Institute for Early Education Research, 2016).

[9] According to the NIERR data, of the 32 states and the District of Columbia states that served at least 5 percent of 3- and 4-year olds, 11 of the 33 served only four-year olds, and three more served fewer than 1000 (and less than 1 percent of) three-year olds. (Barnett et al., 2016)

[10] As discussed in the later chapter on policy and governance issues in pre-kindergarten programs, programs vary a great deal across states and localities, and there are not common program standards or consistent spending levels per child, but. These programs differ both in eligibility criteria, for example, targeting to low-income families vs. more universal programs with broader or no income-eligibility, the ages of children served, coverage, amount of services provided, the settings where children are served, and other program structure features.

[11] The eight states that served more than 50 percent of four-year-olds in 2014-1 were the District of Columbia, Florida, Georgia, Iowa, Oklahoma, Vermont, West Virginia, and Wisconsin. (Barnett et al., 2016)

[12] The Head Start program has historically taken a comprehensive approach to services for young children, so while preschool education is at its core, it offers a range of family supports, health and mental health, nutrition, and family engagement services geared to what poor families would need to support children's development.

[13] Edward F. Zigler and Susan Muenchow, *Head Start: The Inside Story of America's Most Successful Educational Experiment* (New York, NY: Basic Books, 1992).

[14] Altogether 27 percent of all child care subsidies in 2012 were used for the preschool age care of 313,000 3 year olds and 306,000 four -year-olds in 2012 and 79 percent of subsidies for this age groups were for center-based arrangements. Nina Chien, "Estimates of Child Care Eligibility and Receipt for Fiscal Year 2012." *ASPE Issue Brief. (November)*. (Washington DC: U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation, Administration for Children and Families, 2015) http://www.acf.hhs.gov/occ/resource/characteristics-of-families-served-by-child-care-and-development-fund-ccdf

[15] U.S. Department of Health and Human Services, Administration for Children and Families. 2015. "Child Care and Development Fund Statistics."

[16] 55 percent of all school districts with pre-kindergarten programs have no income requirements for eligibility; 25 percent of school districts target preschool programs to children from low-income families and 13% target children in Title I schools with disproportionate enrollment of children from poor families.

[17] U.S. Department of Education Office for Civil Rights, "Civil Rights Data Collection: Data Snapshot (Early Childhood)." (Washington DC: U.S. Department of Education Office for Civil Rights, 2014). *CRDC Issue Brief.* http://ocrdata.ed.gov/Downloads/CRDC-Early-Childhood-Education-Snapshot.pdf

[18] National Survey of Early Care and Education Project Team, "Characteristics of Center-based Early Care and Education Programs: Initial Findings from the National Survey of Early Care and Education (NSECE)." (Washington DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services, 2014). *OPRE Report #2014-73a.*

[19] The poverty threshold (weighted average) for a family of four in 2015 was $24,257. https://www.census.gov/hhes/www/poverty/data/threshld/

[20] By law, all school districts must provide special education and related services for preschool children with disabilities under the Individuals with Disabilities Education Act (IDEA), and Head Start regulations require that at least 10 percent of a grantee's program enrollment by children with special needs and that these children have priority in enrollment.

[21] U.S. Department of Education Office for Civil Rights, "Civil Rights Data Collection, 2011–12." (Washington DC: U.S. Department of Education Office for Civil Rights).

[22] U.S. Department of Health and Human Services, Administration for Children and Families, Office of Head Start, "Head Start Services Snapshot (2014-2015)." (Washington DC: U.S. Department of Health and Human Services, Administration for Children and Families, Office of Head Start, 2015).

[23] For all mothers with children under 18 the overall labor force participation rate was 70 percent in 2015 and it was 62 percent or eight percentage points lower for Hispanic mothers. U.S. Bureau of Labor Statistics, "Current Population Survey, March 2015." (Washington DC: U.S. Department of Labor, Bureau of Labor Statistics.) Annual Social and Economic Supplement.

[24] 45 percent of all children under age five were in no regular non-parental care or education arrangement, higher than the rates for children from white or black families, 38 percent and 31 percent, respectively. Among the 55 percent of children from Hispanic families, in any non-parental care and education arrangement, relatives were relied on for more than half the children, higher than the rates for children in white and black families.

[25] U.S. Department of Education, National Center for Education Statistics, "Early Childhood Program Participation Survey of the 2012 National Household Education Surveys Program," (Washington DC: U.S. Department of Education, National Center for Education Statistics, 2012). ECPP-NHES:2012.

[26] For all 3 and 4 year olds in 2011 there was a 10 percentage point gap in preschool enrollment between children with foreign-born and native-born parents, 42 percent compared with 52 percent, but little difference in public preschool enrollment and all the difference found for private preschool enrollment. Kimberly Burgess, Nina Chien, Taryn Morrissey, and Kendall Swenson. "'Trends in the Use of Early Care and Education, 1995-2011: Descriptive Analysis of Child Care Arrangements from National Survey Data." (Washington, DC: U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation, 2014). Appendix Table: https://aspe.hhs.gov/sites/default/files/aspe-files/41286/tableage3and4.xlsx.

[27] U.S. Census Bureau, "Current Population Survey, October Supplements 2015."

[28] 59 percent of children with full-time working mothers were enrolled in full school-day preschool compared with 49 percent overall. U.S. Census Bureau, "Current Population Survey, October Supplements, 2015."

[29] U.S. Census Bureau, 2015.

[30] Many public pre-kindergarten programs provide only part-day services, often for 2.5 to 3.5 hours per day, while others provide pre-kindergarten for the equivalent of a full school day or more than 6 hours per day. According to data collected by the U.S. Department of Education for the 2011-12 school year, of the nearly 10,000 school districts offering preschool programs, 57% offer part-day preschool only, 30% offer full-day preschool only, and 13% offer both full-day and part-day programs. U.S. Department of Education Office for Civil Rights, "Civil Rights Data Collection: Data Snapshot (Early Childhood)," 2014.

[31] For all children under five only 24 percent of mothers who worked non-traditional hours attended center-based education and care compared with 41 percent for those whose mothers worked traditional hours.

[32] U.S. Census Bureau, "Survey of Income and Program Participations, Panel Wave 8." Table 2. Preschoolers in Types of Child Care Arrangements by Employment Status and Selected Characteristics of Mother: Spring 2011. https://www.census.gov/prod/2013pubs/p70-135.pdf. .

[33] U.S. Department of Health and Human Services, "Which Early Care and Education Centers Participate in Head Start or Public Pre-Kindergarten?" (Washington DC: Office of Planning, Research and Evaluation, Administration for Children and Families, 2015). Exhibit 6 in National Survey of Early Care and Education Project Team (2015). *OPRE Report #2015-92a*.

[34] National Survey of Early Care and Education Project Team (NSECE). "National Survey of Early Care and Education: Summary Data Collection and Sampling Methodology." (Washington DC: Office of Planning, Research, and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services, 2013). *OPRE Report #2013-46*.

[35] Many individual children's enrollment in preschool involves both public and private funding sources as well, especially since most children receiving child care subsidies in some in public pre-kindergartens require parental co-payments, usually on a sliding scale, and some children may be in mixed set of preschool arrangements, such as half-day pre-kindergarten or in Head Start with wraparound services for which parents pay.

[36] NSECE Project Team (2014), pp.7-8.

[37] Ajay Chaudry, Taryn Morrissey, Christine Weiland and Hirokazu Yoshikawa, *Cradle to Kindergarten: A New Plan to Combat Inequality* (New York: The Russell Sage Foundation, 2017).

[38] Andrew J. Mashburn, Robert C. Pianta, Bridget K. Hamre, Jason T. Downer, Oscar A. Barbarin, Donna Bryant, Margaret Burchinal, and Diane M. Early. "Measures of Classroom Quality in Pre-kindergarten and Children's Development of Academic, Language, and Social Skills." *Child Development* 79 (3): 732–749.

[39] Howard S. Bloom and Christine Weiland. "Quantifying Variations in Head Start Effects on Young Children's Cognitive and Socio-emotional Skills Using Data from the National Head Start Impact Study" (Working Paper, MDRC, 2015).

2. Puzzling It Out: The Current State of Scientific Knowledge on Pre-Kindergarten Effects

A Consensus Statement

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Introduction and Background

Ensuring that young children benefit from their early learning experiences is essential to building a strong and productive society. Scientific research has established that if all children are to achieve their developmental potential, it is important to lay the foundation during the earliest years for lifelong health, learning, and positive behavior. A central question is how well our public pre-kindergarten (pre-k) programs are doing to build this foundation. This consensus statement draws lessons about the ability of these programs to boost children's development from the most current scientific evaluations of scaled-up public pre-k programs funded by states and school districts.

Forty-two states and the District of Columbia, through 57 pre-k programs, have introduced substantial innovations in their early education systems by developing the infrastructure, program sites, and workforce required to accommodate pre-k education. These programs now serve nearly 30 percent of the nation's 4-year-olds and 5 percent of 3-year-olds. The populations they serve are diverse, with 22 percent of enrolled children identified as having special needs and 12 percent identified as dual language learners (DLLs). (See Chapter 1 by Chaudry and Datta.) The promise of these innovations lies in the expectation that pre-k—as a first step into k-12 education—will boost children's school readiness, start children on trajectories of academic and life success, and produce a return on investment over time. Although state pre-k systems vary widely both within and across states, they share these aspirational goals.

In recent years, there has been increasing interest in assessing how well these short- and longer-term goals have been achieved. To what extent are pre-k programs not only providing a boost into kindergarten, but also serving as an enduring base for future learning? What should we expect pre-k to produce for our society? How can we ensure that children who attend these programs get as much out of them as they can? Today, these questions are the focus of attention among policymakers, practitioners, and scientists alike seeking to shape the future of pre-k education. Policymakers and practitioners are increasingly turning to scientists as partners in efforts to expand and improve their pre-k systems. Together we are striving to understand the role that pre-k can play in the larger educational enterprise and how to identify and replicate the most important features of successful pre-k programs in order to optimize this potential.

To be helpful, however, scientists need to resolve three unanswered questions arising from earlier studies. The first is the so-called "black box" question. Evaluations of small-scale early education demonstration programs that were designed and run by researchers during the 1960s and 1970s, such as the Abecedarian, Perry, and Early Training Project programs, documented impressive improvements in learning while children were in these programs.[2] Program attendees also showed later improvements in young adult outcomes like school completion and college attendance. As adults, they had higher earnings, less criminal activity, and better health. The benefits of these programs far exceeded their costs. This evidence continues to be cited as proof of concept that early education programs can produce both short- and long-term benefits. Despite our certainty that these early education programs caused these outcomes, we do not know what it was precisely about these programs that produced positive outcomes nearly 20 years later. What was it about the experiences provided by these programs that, apparently, put children on such a positive developmental trajectory? This is

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the "black box" question that scientists are now actively exploring. The answer is crucial to ensuring that pre-k programs are designed to optimize success.

We also need to address a second and related question about scaling-up from small scale to community-wide pre-k programs. The impressive results from small scale programs of the past have led many to ask what they can teach us about how to implement successful early education programs at a school district or state-wide scale in today's real world contexts. Transforming a small, well-funded and closely monitored program to a large-scale program offered to thousands of children is not easy. The challenges of scale-up are illustrated by the national Head Start program, for which consistently strong and enduring impacts have been elusive. Studies examining adolescent and adult outcomes for graduates of Head Start programs during the 1970s and 1980s found positive impacts into early adulthood, even in cases where test score gains were not evident in middle or high school.[3] But the results of a large-scale, randomized trial of Head Start launched in 2002 were much less encouraging. Despite a boost for children's academic skills at the end of their Head Start year, the Head Start Impact Study (HSIS) found that these initial gains rapidly dissipated once children began formal schooling.[4] More in-depth analyses of the HSIS are revealing wide variation in the extent of program exposure, program features, participant characteristics, and competing local alternatives from one center to another that combine to produce considerable variation in short-term Head Start impacts across children and sites.[5] Similar work on variation in longer-term impacts is in progress. But it is clear that scale-up brings with it wide variation in programs and that this variation must be considered in efforts to understand the conditions under which program impacts are the most positive.

The third question is how much we can draw on lessons from this existing evidence base on an earlier generation of programs to guide the development of today's pre-k programs. State and district pre-k programs differ from the early demonstration childhood programs and from Head Start in both design and scope. Most of the early education programs studied in the past consisted of localized prototypes staffed by university-trained teachers and closely monitored by the program designers. Head Start, while national in scale, offers more comprehensive services than most state pre-k programs and operates under a uniform set of performance standards, which is decidedly not the case with pre-k programs. Other differences concern the participating children. The demonstration programs served narrowly targeted communities of highly disadvantaged young children, and Head Start is restricted primarily to children living below the poverty line. Pre-k programs sometimes serve only disadvantaged young children but sometimes are universally available. Today's low-income parents typically have had several more years of education and smaller families. They have also had greater access than in the past to publicly-funded early care and education programs other than pre-k, such as subsidized child care and Head Start programs that do not receive pre-k funds. As a result of these differences in design, scope, characteristics of participants, and access to alternative early education programs, the bar that pre-k must exceed in order to be judged effective has been rising over time. Finally, because most state and district pre-k programs are too new for their graduates to have reached adolescence, let alone adulthood, they are currently unable to provide evidence of the long-term outcomes generated by the earlier programs.

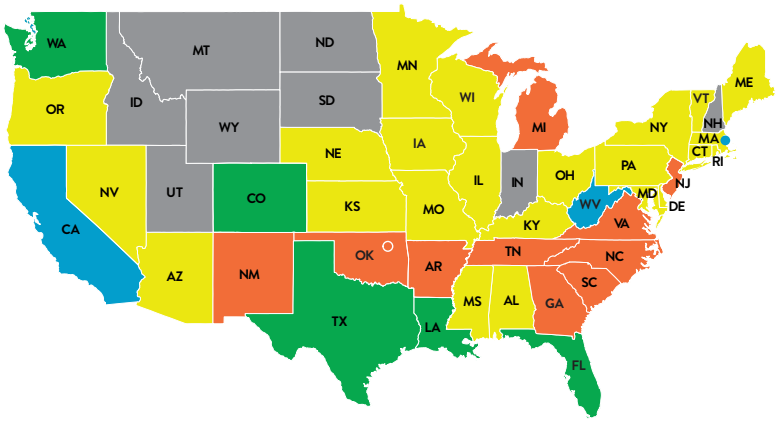
Understanding the impact of pre-k programs is thus an extremely complicated endeavor. Today, there are multiple puzzle pieces consisting of different pre-k delivery settings (schools, Head Start centers, child care centers) in different states with widely varying program features, teacher requirements, and performance standards, all of which need to be taken into account. Most programs are targeted toward disadvantaged children (with varying income cut-offs), but some are universally available; some serve much higher numbers of dual language learners and children with special needs. Funding levels also vary widely across states and districts.[6] Children enter pre-k with divergent prior early care and education—and home—experiences, and they move from pre-k into a vast range of elementary schools across the nation. If we ignore this variability in what happens before, during, and after the pre-k year, we run the risk of missing information that can help us understand how to design and re-engineer pre-k in specific locales to get the best results. In order to direct our energies and resources to the most promising directions for pre-k, we need to use a full

dashboard of research tools. This approach will provide us with the diversity of designs and assessments we need to accomplish three discrete if related tasks: to look inside the black box of pre-k for insights about effective classroom practices, to understand the challenges of scaling up early education programs, and to take account of the real-world complexity in which pre-k programs seek to foster children's growth and learning.

This chapter provides a summary of what is currently known about how state and district pre-k programs affect children's learning immediately after program completion and into the elementary grades. We begin by reviewing the scientific evidence about early child development in the years before children experience pre-k, the varied experiences across pre-k classrooms, and what happens after pre-k when children enter elementary school. Only by placing the pre-k year in the developmental context of what comes before and after can we understand what to expect from pre-k programs and why. Next, we review the evaluation studies of the immediate and longer-run effects of pre-k by summarizing findings and explaining their implications for policy and practice. Because most of the graduates of today's pre-k programs are still young and program evaluations are continuing, these findings, like pre-k itself, are a work in progress.

The authors of this report are among the social scientists who have engaged with local and state policymakers and practitioners to conduct research about state and district pre-k programs. These research efforts have been designed to learn more about how to optimize pre-k programs so as to do as much good as possible and so that children have a better chance of succeeding in school and beyond. We have struggled with the many challenges that are inherent to assessing the impacts of pre-k education. Given the ongoing nature of work in this area and the need to accommodate local conditions, we are keenly aware that the research methods that have been deployed to understand pre-k impacts are not yet as strong as we would like and that our conclusions have yet to stand the test of time. This summary of what we have discovered across a wide variety of states and districts is motivated by a shared goal: to foster continued and collaborative policy, practice, and scientific innovation that can accelerate discovery of the most effective strategies for fulfilling the promise of pre-k education for children, families, and the nation. For a national map of pre-k evaluation studies, see below; for an overview of the pre-k studies we have reviewed, see Bibliography at the end of the book.

National Landscape of Pre–Kindergarten Evaluation Studies



State Pre-K Programs That Have Been Studied
(Includes Boston, Massachusetts, and Tulsa, Oklahoma, district-level programs.)

- Both short term and long term study
- Long term study only
- Short term study only
- No studies of existing programs
- No state pre-k program

Percentage of Four-Year-Olds Served by State Pre-K Programs in 2015

Less than 5%: Minnesota, Mississippi, Missouri, Nevada, Ohio, and Rhode Island

Between 5% and 25%: Alabama, Arizona, California, Colorado, Connecticut, Delaware, Kansas, Massachusetts, North Carolina, Oregon, Pennsylvania, Tennessee, Virginia, and Washington

Between 25% and 50%: Arkansas, Illinois, Kentucky, Louisiana, Maine, Maryland, Michigan, Nebraska, New Jersey, New Mexico, New York, South Carolina, and Texas

Greater than or equal to 50%: Georgia, Florida, Iowa, Oklahoma, Vermont, West Virginia and Wisconsin

Source for information about percentage of four-year-olds served by state pre-k programs: Steven W. Barnett, Alison H. Friedman-Krauss, Rebecca Gomez, Michelle Horowitz, G.G. Weisenfeld, Kristy Clarke Brown, and James H. Squires, *The State of Preschool 2015: State Preschool Yearbook* (New Brunswick, NJ: National Institute for Early Education Research, 2016).

Optimizing Pre-Kindergarten Education

Pre-k does not happen in a vacuum. It builds on the base provided by children's prior levels of development and experiences, which vary widely within and across homes and classrooms. Moreover, as we've noted, pre-k experiences themselves are heterogeneous and are layered on to the broader circumstances of children's lives while they are in pre-k. Following pre-k, children are exposed to widely divergent k-12 experiences that can either support or undermine the gains made in pre-k. Understanding children's experiences before, during, and after pre-k can help policymakers better weigh the evidence from evaluation studies of pre-k impacts and consider the most promising next steps for optimizing pre-k education. The following three sections address the three phases, each of which affects pre-k impacts: what happens before pre-k (the developmental base), what happens during (the experience), and what happens after (subsequent experiences). Each section presents the authors' consensus statement, followed by the key scientific findings on which the statement is based. See the box on page 29 for the complete list of consensus statements.

Impacts of Experiences Prior to Pre-Kindergarten

Studies of different groups of preschoolers often find greater improvement in learning at the end of the pre-k year for economically disadvantaged children and dual language learners than for more advantaged and English-proficient children.

Children enter pre-k classrooms with widely varying prior experiences. The science is clear: early experiences in the home, in other care settings, and in communities are built into the developing brain and body with life-long effects on learning, adaptive behavior, and health. These experiences provide either a sturdy or fragile foundation upon which young children's pre-k teachers construct the next stage on their educational progressions. Supportive early-life conditions foster curiosity, trust, learning, self-regulation, and steady growth. Adverse early life conditions such as extreme poverty, exposure to violence, and parental disengagement disrupt developing brain networks and can undermine a young child's capacity to learn and to develop healthy relationships.[7]

At their most effective, pre-k programs can provide young children with the kinds of enriching and supportive early environments that protect and nurture the developing brain and thus foster all facets of healthy development. These experiences may matter more for children whose early experiences confront them with high or sustained levels of adversity or who lack the rich verbal and other cognitive inputs that predict young children's readiness for school. Researchers who study pre-k education often find that children who have had early experiences of economic scarcity and insecurity gain more from these programs than their more advantaged peers.[8]

Why might this be the case? The brain's basic architecture and circuitry develop rapidly during the early childhood years. Experiences in pre-k aimed at addressing the consequences of adversity and providing environments rich in language and cognitive stimulation thus have the potential to strengthen critical neural networks associated with learning. For children who have not had the benefit of these experiences in other home or child care settings, pre-k has the potential to boost early skill and behavioral development, which is manifested as relatively strong early learning gains from pre-k education. In effect, these children's development is powered up when they are afforded specific and supportive opportunities to acquire or strengthen the skills, knowledge, and attitudes that predict strong performance in school.

Dual language learners have also been found to show relatively large benefits from pre-k education.[9] Relative to their monolingual peers, DLLs tend to have stronger self-regulation skills, likely due to both cultural factors and the brain benefits of learning two languages. However, they tend to lag behind their peers in academic skill levels, thus bringing a unique mix of strengths and challenges to pre-k classrooms.[10] Research to date finds that pre-k enrollment can enable these children to make progress in English language proficiency and in their academic skills, each of which likely supports growth in the other. As a result, DLLs can experience especially rapid growth in early learning when exposed to supportive and rich learning opportunities in pre-k.

Does this mean that pre-k programs should only be offered to subgroups of children whose prior experiences suggest

that they will profit the most? Not necessarily. The early demonstration programs, with their strong evidence of effectiveness, were highly targeted. Yet, part of what might render a pre-k classroom advantageous for an economically disadvantaged child or a DLL, as well as for their more advantaged and English speaking peers, is the value of being immersed among a diverse array of classmates with whom to learn, for example, language skills and socially inclusive attitudes. (See Chapter 3 by Ladd for a fuller discussion of this issue).

Impacts of Experiences During Pre-Kindergarten

Pre-k programs are not all equally effective. Several effectiveness factors may be at work in the most successful programs. One such factor supporting early learning is a well implemented, evidence-based curriculum. Coaching for teachers, as well as efforts to promote orderly but active classrooms, may also be helpful.

The fundamental purpose of all education systems, including pre-k, is to build a productive and prosperous society by ensuring that all children acquire the building block skills, attitudes, and knowledge that will set them on a path towards success in school and in subsequent endeavors as workers, parents, and citizens. A primary rationale for pre-k education is to ensure that all children get off to a good start on this path.

Evidence from the developmental and education sciences supports this rationale. Children who have a solid grounding in early developing skills are in a better position to gain from instruction that is focused on more advanced skills. Learning letter words and sounds supports the development of vocabulary and the capacity to share well-formed narratives, while learning to count supports children's understanding of mathematical concepts such as cardinality, relative size, and problem-solving (calculating, measuring) skills. Learning to share and take turns prepares a child for collaborative projects. Strong conceptual skills—a rich vocabulary, a range of problem-solving strategies, a base of scientific and cultural knowledge, strong narrative skills—in turn make for more productive and efficient subsequent learning. Engaged young learners also display positive attitudes about school and about themselves as students, as well as foundational capacities to focus attention, remember and follow directions, avoid distractions, and get along with others. These attitudes and capacities scaffold learning and learning supports these attitudes and capacities. Learning, like development, is cumulative, continuous, and self-reinforcing.[11]

Yet, we know that not all pre-k programs successfully support early learning. It is decidedly not the case that just any pre-k program operating under just any circumstances will provide young children with the inputs they need to produce, let along sustain, early developmental gains. So, what components of a pre-k program are especially important to accomplishing these goals? What might be the factors that make one pre-k program more effective than another?

Developmental science tells us that a key ingredient is the instructional, social, and emotional "serve-and-return" interactions that occur daily between teachers and children, as well as among classmates. The odds for better outcomes are improved when these back and forth interactions are consistent and responsive. This brain building interplay motivates and deepens learning, enables children to organize and focus their attention and other capacities needed to learn, and promotes peer cooperation and support.

What, then, enables these kinds of interactions? Scientists are working to identify the circumstances that most effectively support educationally rich interactions and that can be affected by policy measures such as guidelines, standards, and regulations that aim to improve the effectiveness of pre-k teachers and the early education they provide. We have identified several factors that together seem to be "good bets" for supporting strong early learning in pre-k and other settings: the use of (1) curricula that are known to build foundational skills and knowledge, coupled with (2) professional development and coaching that enable teachers (3) to create organized and engaging classrooms.

Effective curricula provide engaging activities focused on skills and concepts that are ripe for learning by young children and that provide an essential foundation for more demanding, conceptually rich learning opportunities to follow. There is growing evidence that stronger achievement outcomes occur when teachers rely on curricula that focus on a given skill area

such as language/literacy, math and self-regulation as distinct from curricula that attempt to address and incorporate all domains of development simultaneously, sometimes referred to as "global" curricula. (See Chapter 4 by Jenkins and Duncan for a fuller discussion of this issue.) These outcomes are seen in the skill area of focus (e.g., math), and often in other areas as well (e.g., literacy). Because young children enter a classroom with differing starting points and rates of learning, effective curricula include carefully sequenced lessons that support, build on, and can be adapted to each stage in a child's learning progression.[12] Additionally, early learning is supported when children experience instruction that scaffolds the deeper, underlying processes that support learning at this age, such as reasoning and explaining, persisting when challenges are met, and transferring skills from one task to the next.[13]

The second effectiveness factor that we consider to be a good bet is professional development and coaching. Curricula are only as effective as their implementation. A teacher's effective use of curricula, including knowing how to tailor and differentiate instruction for individual children, requires training, guidance in classroom practice, and continuing education—just as pilots, physicians, and engineers need ongoing training and practice to adjust and refine their skills to meet changing conditions. Integrated, on-going professional development and coaching are equally important to the effective implementation of curricula.[14]

The third good-bet factor with strong potential to support early learning is an organized, positive, and engaging classroom. Time spent in transitioning between activities—which can consume large portions of the day in poorly organized classrooms—is time lost to learning and playing. Predictable routines enable young children to become increasingly independent as they initiate their own learning. Children who experience primarily positive, supportive interactions with their teachers are more comfortable exploring, making mistakes, and thus seeking out and persisting with challenging tasks.[15]

Current research indicates that this triad of evidence-based curricula, integrated training and coaching, and a positive, organized classroom offers a promising approach to achieving strong pre-k outcomes for all young children.

Impacts of Experiences After Pre-Kindergarten

Children's early learning trajectories depend on the quality of their learning experiences not only before and during their pre-k year, but also following the pre-k year. Classroom experiences early in elementary school can serve as charging stations for sustaining and amplifying pre-k learning gains. One good bet for powering up later learning is elementary school classrooms that provide individualization and differentiation in instructional content and strategies.

Increasing attention is being drawn to the contribution of children's post pre-k educational environments as they affect longer-term pre-k impacts.[16] It is logical, if we want the effects of pre-k to last, that we broaden our lens to examine what happens to pre-k graduates when they move on to elementary school. Few would doubt that the contribution of, say, 2nd grade to a child's middle-school achievement is affected by what happened before in 1st grade and later in 3rd, 4th, and 5th grades. Similarly, the long-term impacts of the pre-k year cannot be viewed in isolation from subsequent years of schooling. Under the best of circumstances, pre-k education has enabled children to master many of the routines (e.g. following directions, cooperating with other children) and pre-academic skills that will enable them to take advantage of both higher behavioral expectations and more advanced material in kindergarten. This assumes, of course, that they will be held to higher expectations and presented with more advanced material as they move into elementary school. The initial boost will have to be recharged.

So the key questions become: How can we ensure that we have an effective pre-k through elementary system? How can we remodel our education system to weave what we know about early skills development and appropriate early education practices into the fabric of subsequent stages of education? What supports do teachers who bridge early and elementary education need to ensure that young learners are able to build on their early gains?

In answering these questions, we need to be mindful of what scientists have learned about skill development and the importance of sustaining environments.[17] There is no point at which development proceeds on automatic pilot. Continued learning—maintaining initial skill advantages and gaining new skills—requires next-stage environments that build effectively on the base created by earlier environments. Pre-k provides the foundation on which the elementary grades build the next level of learning. Pre-k can thus be viewed as powering up early learning, for which the elementary grades need to provide essential charging stations that sustain and amplify the learning gains made by children in pre-k. Absent re-charging, progress will likely be stalled, and the benefits from any boost provided by pre-k education may be lost.

Integrating pre-k programs into the broader education system to sustain and expand pre-k gains as young children enter elementary school is among the most important tasks now facing practitioners and policymakers alike. A central challenge is to ensure that each child is carried forward in her learning from one grade to the next, starting with the transition from pre-k to kindergarten. Children not only need opportunities to demonstrate their mastery of skills, but also to be appropriately challenged. Absent explicit attention to ongoing learning for each child, children can spend precious classroom time exposed to material that they have already mastered or that is over their heads.[18] Too much redundancy or lessons that are too advanced run the risk of inadvertently creating learning dead zones that interrupt educational progress and may squander pre-k gains.

In sum, the odds of beneficial pre-k impacts are greatest when children's experiences prior to, during, and after pre-k are collectively considered as part of the equation for success. This entails understanding the circumstances of the young children who are entering pre-k classrooms, closely observing what happens inside the pre-k classroom to optimize children's experiences during their time in pre-k, and considering how the education systems in which pre-k is embedded can be remodeled to better support pre-k optimization. We now turn to the evidence on pre-k's role in providing both a boost into kindergarten and a base for supporting children's educational progress in the longer-term.

Evidence for Immediate and Longer-Run Pre-Kindergarten Impacts

A number of evaluations of the impact of state and district pre-k programs have been conducted in recent years. Their findings are often, but not universally, positive. However, we urge caution in interpreting their results. State and district pre-k programs vary widely in their characteristics, and we would therefore expect them to produce varied effects. Further, as described above, pre-k effects are influenced by the experiences the participating children have prior to pre-k and, for longer-term effects, by the experiences they have afterwards. With such diversity in programs and experiences, it is not meaningful to talk about state-sponsored pre-k as if it were a single intervention for which we would expect research to reach a general conclusion about whether it "works." What communities, localities, and states need to know is how well their programs are doing to boost children's school readiness and later success. And more general knowledge is needed about the program characteristics that are most essential for producing short- and long-run learning and the circumstances that adequately support the operation of such programs at scale.

Answering these questions will require a large body of differentiated evaluation research that is not yet available. While notable progress has been made, it is important to recognize that much work still needs to be done. Research on the effects of pre-k programs has mainly focused on academic outcomes, notably cognitive skills, achievement, and grade level promotion and retention. Less is known about effects on social-emotional outcomes that might be important for later academic and life success. Further, more studies have investigated the effects of pre-k at the end of the pre-k year or the beginning of kindergarten than have addressed longer-term effects.

Also clouding the picture is the methodological variation represented in the extant research. Studies have employed different methods, some stronger and some weaker, as ways to assess pre-k effects. This is not because researchers do not know the difference. Rather, it is because implementation of pre-k programs at scale makes research difficult to do, and the available resources and presenting circumstances often require

compromises. Gauging the effects of pre-k requires that outcomes for children who attended pre-k be compared with similar children who did not attend the program. The strongest research designs make apples-to-apples comparisons that ensure that any differences on the outcomes are because of pre-k participation, not because the participants and nonparticipants were different even before the pre-k year began.

Because of the diversity of pre-k programs, settings, and participants, as well as different strengths and weaknesses of the research methods for evaluating program impacts, it can be misleading to highlight the findings of a few studies and use them to draw general conclusions about the effectiveness of state and district pre-k programs. In the sections that follow, we provide an overview of the evidence found in the full body of research on the impacts of these programs. The studies on which this overview is based include all those we have been able to identify that report any estimate of short- or long-term impacts of such programs (See Bibliography at the end of the book for the studies).

Evidence for Impacts Shortly After Pre-K Participation

Convincing evidence shows that children attending a diverse array of state and school district pre-k programs are more ready for school at the end of their pre-k year than children who do not attend pre-k. Improvements in academic areas such as literacy and numeracy are most common; the smaller number of studies of social-emotional and self-regulatory development generally show more modest improvements in those areas.

The most frequently cited goal of state pre-k programs is enhancing "school readiness"—a concept that usually includes some mix of language, literacy, and numeracy skills; willingness to follow expected school behavior; and social-emotional capacities that enable children to take full advantage of the learning opportunities presented when they enter kindergarten. A school readiness goal does not necessarily imply that sustained effects beyond kindergarten entry are expected, though it is generally assumed that being school ready will facilitate academic progress in later grades.

Research on the immediate effects of pre-k, namely outcomes at the end of the pre-k year or the beginning of the kindergarten year, has focused mainly on literacy, language, and math skills. A few studies have also examined social-emotional outcomes or classroom behavior. These studies apply a range of research methods, most of which are generally viewed as capable of producing valid estimates of effects.

Despite the diversity of programs and the variety of methods, there is striking uniformity in the results. On the many academic skill outcomes measured across these studies, positive effects have been found in almost every instance. Moreover, the number of studies that have been conducted and the variety of state programs represented testify to the robustness of these findings. The effects on social-emotional skills reported in the few studies that addressed them were generally positive, but this evidence is not as robust or convincing as that for academic outcomes.

Evidence for Impacts in the Years After Pre-K Participation

Convincing evidence on the longer-term impacts of scaled-up pre-k programs on academic outcomes and school progress is sparse, precluding broad conclusions. The evidence that does exist often shows that pre-k-induced improvements in learning are detectable during elementary school, but studies also reveal null or negative longer-term impacts for some programs.

The convincing evidence showing immediate effects of so many state pre-k programs opens the door to the possibility that this early boost will lead to later benefits for the academic achievement of pre-k participants as they progress through the school years. The evidence on long-term effects of state and district pre-k programs, however, is mixed and relies on methods that vary from strong to problematic.

More than half of the studies of long-term effects have used retrospective designs to compare outcomes for children who had participated in pre-k with those for children who had not participated. Those studies have reported largely positive findings, but they fall on the weaker end of the methodological continuum. This is because they have no information about

the characteristics of the children and families prior to pre-k that would help ensure that the groups were comparable, that is, that apples-to-apples comparisons were being made. As a consequence, these studies are less reliable and do not support confident conclusions about long-term impacts.

Studies that used research designs generally recognized as capable of generating valid effect estimates by conventional methodological standards have reported more variable findings. For this group of studies, on which we based our consensus conclusion described above, positive effects favoring children who participated in the respective state pre-k programs are often reported, but so are null and even negative effects. Because most of the stronger studies focus on only one state or district pre-k program, this array of findings may stem from the specific research design used in a given locale or from differences across locales in the pre-k programs themselves, the characteristics of the children who participated, or the school experiences that followed after the pre-k year.

On balance, the available evidence about the long-term effects of state pre-k programs offers some promising potential but is not yet sufficient to support confident overall and general conclusions about long-term effects. The complexity of the pre-k puzzle requires scientists, policymakers, and practitioners to be forward looking in their attempts to build on current research and to scale up effective state pre-k programs. There is persuasive evidence from earlier small-scale programs like the Perry Preschool and Abecedarian programs that long-term impacts are possible under some circumstances. But the evidence that contemporary scaled up state or district pre-k programs can produce such impacts is not conclusive. The path ahead must combine well-documented program innovations at the state and district level with evaluation research of broader scope and greater rigor. Exploration of the potential of pre-k at statewide scale to yield sustained benefits for participating children, while still in its infancy, is filled with promise that ways can be found to attain those benefits.

Future Innovation and Evaluation

States have displayed considerable ingenuity in designing and implementing their pre-k programs. Ongoing innovation and evaluation are needed during and after pre-k to ensure continued improvement in creating and sustaining children's learning gains. Research-practice partnerships are a promising way of achieving this goal. These kinds of efforts are needed to generate more complete and reliable evidence on effectiveness factors in pre-k and elementary school that generate long-run impacts.

No one thinks we have yet devised the most effective possible pre-k program. Despite evidence that pre-k can provide an effective foundation for moving children along a successful path into school and some promising, though mixed, evidence of enduring impacts, we lack the kind of specific, reliable, consistent evidence we need to move from early models to refinements and redesigns. We need to draw on the full range of evaluation methods to measure the impacts of these innovative practices and programs to develop even more effective programs. The complexity of the pre-k puzzle also requires scientists and policymakers to take care in matching evidence to real world conditions. An important part of solving the puzzle of pre-k effectiveness will be evidence on how to scale-up successful small-scale programs so that impacts, especially long-term impacts, are maintained as the program expands.

There is reason for optimism in this regard. Basing policy on evidence is becoming the coin of the realm in policymaking at both the federal and state levels. Especially at the federal level, policymakers write legislative language requiring program evaluation, sometimes even specifying the outcome measures that should be studied and stipulating that the evaluation methods should be "rigorous." It is our hope that this report contributes to the definition of rigor, directing attention to important arenas of study and enhancing the comparability of data across states so that future pre-k programs can more fully benefit from new evidence.

Our report is notable for its frank assessment of evidence and our group's struggle to develop a consensus based on studies that often produce conflicting results. We believe that conflicting evidence is what drives science forward and fuels rather than retards innovation. Conflicting evidence on enduring pre-k effects is forcing us to think harder and more clearly about what is reasonable to expect of pre-k, to deploy the best scientific tools we have at our disposal to resolve the conflicting findings, and to adapt our theories to promote understanding of practices and strategies that increase the odds of producing both short-term and long-term impacts. A host of research teams and the Institute of Education Sciences' Early Learning Network[19] are hard at work pursing these goals.

In addition to understanding the effectiveness factors that produce and sustain pre-k impacts, at least two issues seem ripe for exploration. First, we urge evaluators and administrators to pay close attention to the instructional strategies pursued by the schools attended by children after they leave pre-k, as well as the broader characteristics of the schools and communities in which they are located. Children entering kindergarten can be arrayed along a continuum that represents their readiness to learn. Pre-k may have boosted the readiness skills of some of the children in a kindergarten class, but their classmates may begin school with fewer academic skills. We need to examine the strategies developed by local school systems to promote early-grade learning for children at all points along this continuum and to devise ways to test whether these strategies are successful. Concentrating all of a teacher's instructional efforts on children with the lowest academic skills can cause pre-k-powered gains to weaken. Fortunately, there is growing recognition among policymakers of the need to develop a coordinated early childhood-to-early elementary school approach that provides on-going charging stations for learning, thus enabling young children to retain, apply, and advance their new knowledge and skills. These efforts should be expanded.

Second, an important ingredient in the success of preschool and early elementary programs is the effectiveness of teachers in both pre-k and elementary classrooms. The field needs to know more about the characteristics of successful pre-k teachers: how they can best be recruited and trained, how they can continue to develop their skills and knowledge once they begin teaching, and how administrators can provide the kinds of support these teachers need to succeed and remain in the field.

Conclusion

Now common across the nation, pre-k programs provide a laboratory in which we can observe children learning and refine our practices and programs for future generations. We have a national platform on which to build next stage, increasingly effective, and longer lasting pre-k programs. The hard work of refining and improving these programs so that they can fully support the intellectual and social skills the nation will need in the future has just begun. Nonetheless, the scientific rationale, the uniformly positive evidence of impact on kindergarten readiness, and the nascent body of ongoing inquiry about long-term impacts lead us to conclude that continued implementation of scaled-up pre-k programs is in order as long as the implementation is accompanied by rigorous evaluation of impact. ■

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Consensus Statements

Studies of different groups of preschoolers often find greater improvement in learning at the end of the pre-k year for economically disadvantaged children and dual language learners than for more advantaged and English-proficient children.

Pre-k programs are not all equally effective. Several effectiveness factors may be at work in the most successful programs. One such factor supporting early learning is a well implemented, evidence-based curriculum. Coaching for teachers, as well as efforts to promote orderly but active classrooms, may also be helpful.

Children's early learning trajectories depend on the quality of their learning experiences not only before and during their pre-k year, but also following the pre-k year. Classroom experiences early in elementary school can serve as charging stations for sustaining and amplifying pre-k learning gains. One good bet for powering up later learning is elementary school classrooms that provide individualization and differentiation in instructional content and strategies.

Convincing evidence shows that children attending a diverse array of state and school district pre-k programs are more ready for school at the end of their pre-k year than children who do not attend pre-k. Improvements in academic areas such as literacy and numeracy are most common; the smaller number of studies of social-emotional and self-regulatory development generally show more modest improvements in those areas.

Convincing evidence on the longer-term impacts of scaled-up pre-k programs on academic outcomes and school progress is sparse, precluding broad conclusions. The evidence that does exist often shows that pre-k-induced improvements in learning are detectable during elementary school, but studies also reveal null or negative longer-term impacts for some programs.

States have displayed considerable ingenuity in designing and implementing their pre-k programs. Ongoing innovation and evaluation are needed during and after pre-k to ensure continued improvement in creating and sustaining children's learning gains. Research-practice partnerships are a promising way of achieving this goal. These kinds of efforts are needed to generate more complete and reliable evidence on effectiveness factors in pre-k and elementary school that generate long-run impacts.

[1] All authors participated in extended discussions of the evidence on pre-k impacts, the drafting of the consensus statements, and reviewing multiple drafts of the chapter. Authorship is in alphabetical order with the exception of the first four authors who were primarily responsible for the preparation of this chapter.

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3. Do Some Groups of Children Benefit More Than Others from Pre-Kindergarten Programs?

HELEN F. LADD

Many studies of pre-kindergarten (pre-k) programs focus attention on how they affect the average or typical child served but pay little or no attention to whether such effects differ for specific subgroups of age-eligible children. In contrast, some studies measure effects on one or more specific subgroups, such as low-income children or Hispanic children, or test for differences in effects between various subgroups. Analysis of how programs affect specific subgroups can be useful for several policy-relevant reasons.

First, policy makers may be concerned about the impact of a program on specific disadvantaged subgroups of children who, in the absence of publicly funded pre-k, would be least ready to enter kindergarten. A finding of positive effects for such subgroups would mean that a pre-k program could promote the distributive value of improving educational outcomes for children at the bottom of the outcome distribution.

Policy makers may also be interested in how pre-k programs affect children from more advantaged families. A universal preschool program intended to serve all children, for example, could potentially have either positive or negative effects on the subgroup of relatively advantaged children. It might have positive effects if the advantaged children enrolled in the program would not otherwise have had access to a high quality preschool program. Alternatively, the effects might be negative or neutral if, in the absence of the public program, the advantaged children would have attended a higher quality program. Further, even if a public pre-k program specifically targets disadvantaged students, advantaged children may receive positive spillover benefits, perhaps through the expansion of spaces in high quality preschool programs or the presence of larger proportions of children ready to learn in elementary school classrooms. Information about subgroup effects can thereby contribute to policy discussions about the appropriate designs for pre-k programs.

Finally, an understanding of how the magnitudes of the subgroup effects compare can inform policy discussions of whether preschool programs are likely to narrow or widen educational gaps. If, for example, the effects are positive for both disadvantaged and advantaged groups of children but are larger for the disadvantaged groups, a universal program could reduce educational gaps. Alternatively, if the effects for the advantaged group exceed those for the disadvantaged group, a universal preschool program might increase educational gaps even as it helps bring up the education level of the disadvantaged group.

Of course, a comparison of subgroup effect sizes alone cannot determine whether a public preschool program should be targeted or universal. That decision involves many other considerations such as values and costs as discussed in Chapter 6 by William Gormley.

What Subgroups Are of Interest?

The main subgroups of interest in this chapter are those defined by income and race, largely because studies show that low-income children and minority children are less likely to be ready for kindergarten than their more advantaged counterparts. In a recent study, Reardon and Portilla use national data from the Early Childhood Longitudinal Study - Kindergarten Class of 2010-11 (ECLS-K 2010) to measure the magnitudes of these income and racial skill gaps at kindergarten entry.[1,2] The authors measure gaps in two cognitive measures of school readiness—math and reading scores—for all subgroups. For many subgroups, they also document gaps for three measures of non-cognitive or socio-emotional skills reported by kindergarten teachers: self-control, approaches to learning, and externalizing behavior.

Patterns of School Readiness by Income

To examine gaps by income, Reardon and Portilla begin by comparing school readiness for very high income children, defined as those whose family income is at the 90th percentile of the income distribution, to that for poor children whose family income is at the 10th percentile.[3] The observed school readiness gaps measured in terms of cognitive skills between these two groups are very large—exceeding one standard deviation (SD) in both reading and math scores. A gap of one SD means that the average low-income child enters kindergarten with cognitive skills below those of about 85 percent of the very high income children. This large gap serves as a starting point for putting other gaps, such as those for other school readiness measures or for other subgroups, in perspective. For example, the comparable 90-10 income gaps in the measured components of socioemotional skills range from 0.40 to 0.60 SD, making them about half the magnitude of the cognitive gaps. How gaps of either type at the time of kindergarten entry translate into subsequent school success, however, is a far more difficult question that is not addressed here.

Reardon and Portilla also report gaps between children whose families are at the 50th percentile of the income distribution and those at the 10th percentile level. These 50-10 income gaps may be more useful for discussion of pre-k programs given that the very high income children at the 90th percentile of the income distribution differ so much from those who might potentially benefit from pre-k programs. Although the 50-10 percentile gaps in cognitive measures of school readiness are about half of the 90-10 income gaps, they are still large at 0.56 SD in math and 0.48 in reading. These gaps are similar in magnitude to gaps between white and black students but somewhat smaller than those between white and Hispanic students. Gaps in socioemotional skills at school entry are not available for the 50-10 percentile income comparisons.

Patterns of School Readiness by Race

Black children are far less ready for kindergarten than white students on all school readiness measures, with the magnitudes ranging from a high of 0.55 SD in math scores to 0.27 SD in approaches to learning, one of the non-cognitive measures. The gap in reading scores of 0.32 SD is approximately the same magnitude as the gaps in the other two non-cognitive skills of self-control (0.32 SD) and externalizing behavior (0.29 SD).[4]

With respect to cognitive skills, Hispanic children demonstrate even larger gaps than black children relative to white children with gaps of 0.67 and 0.56 SD in math and reading test scores respectively. In terms of non-cognitive skills, however, the Hispanic disadvantage relative to white children is far smaller (0.09 SD) for self-control and for approaches to learning (0.11 SD), and Hispanic children have a small (0.03 SD) advantage relative to white children in terms of externalizing behaviors.

Based on these gaps, it is reasonable to view children from low-income families and those who are members of underrepresented minorities as the disadvantaged subgroups. As I note below, the correlation between family income and status as a racial minority makes it difficult to isolate the effects of pre-k programs on students defined by race or ethnicity alone.

In the studies reviewed in this chapter, measures of economic disadvantage differ depending on the available data. Some studies identify disadvantaged children as those whose mothers have low education levels, while others use the child's eligibility for free or reduced price lunch (starting in kindergarten), the status of the household as a welfare recipient, or a composite measure of socio-economic status (SES). In addition to defining subgroups by their demographic characteristics, some studies also define subgroups based on other characteristics of the children or their families that could be related to the capacity of children to benefit from preschool. For example, some studies divide the Hispanic group of children into those whose parents speak English at home and those whose home language is Spanish. Children in the latter group could be in a stronger position to benefit from pre-k than the former because of the opportunity to develop English language skills along with general cognitive or socio-emotional skills.[5]

The preschool academic literature also examines other subgroups such as boys and girls, children with particularly low pre-kindergarten skills, and children with parents having different levels of emotional health but those subgroup differences are not described here.[6]

Analyses of Preschool Effects by Subgroup

Given that model preschool programs from the 1960s and 1970s such as Perry Preschool and Abecedarian were small scale and targeted at extremely disadvantaged children, they were not amenable to analyses by subgroup. In contrast, many of the subsequent district or state programs are far larger and serve a broader group of students. As a result, researchers have often been able to perform separate analyses by subgroup or to use interaction terms within their models to test for differential effects. It is worth noting, however, that in some studies the estimated subgroup effects do not meet all the standard requirements for causal effects and are best viewed as suggestive rather than definitive.

The most straightforward prediction is that preschool is likely to generate larger benefits for children from low income (or low SES) families than for those from higher income (or higher SES) families. Compared to low income families, higher income families have the capacity to invest more in their children's wellbeing and development. Such investment may come in the form of better health care, more reading in the home, more exposure to enriching experiences, or greater participation in high quality center-based care, all of which increase a child's readiness for kindergarten. As a consequence, the provision of a publicly-funded high-quality preschool represents a larger change from the alternatives available to low-income children than from the alternatives available to higher income children. Even within disadvantaged groups, however, effect sizes may differ depending on the quality of the alternative care available in different households.[7]

Predictions of differential effect sizes by race or ethnicity are more complicated.[8] To the extent that black or Hispanic children are more likely to be from low-income families than white children, the logic of the previous paragraph would predict that the estimated effects would be larger for the minority groups than for white children. Another consideration, though, is that there may be race-based selection differences. For example, if the children of one racial or ethnic group, such as Hispanics, are less likely to participate in preschool programs than those of another racial group, those who do participate from the underrepresented group may be positively selected. That is, they may be more likely to experience large benefits from the preschool program than other members of the same group. While it is possible for researchers using some study designs to control for this upward bias, it is difficult to do so within other study designs, including, for example, the regression discontinuity design. Another consideration is that there may be race-based differences in the intensity of exposure to, or in the quality of, publicly funded preschools. For example, if members of one racial group, such as black children, were more likely to live in communities with low quality preschools than white children, one might predict smaller estimated preschool effects for them than for whites. Recent evidence shows that pre-k programs serving poor or minority children tend to be lower quality on a range of classroom observational measures than those serving non-poor or non-minority children.[9]

Differences by Income and Race

I have identified 13 high quality preschool studies that examine differences in preschool or pre-k effects across subgroups. Three studies were based on random control trials, namely two reports from the national Head Start Impact Study and a study of the Tennessee Voluntary Pre-K program.[10] Three studies used regression discontinuity designs.[11] Because such studies identify effects by comparing children who were just barely age-eligible to enter preschool to those who were just slightly younger, such studies can look only at the short run effects—that is those at entry to kindergarten. Any subsequent effects would be confounded by the fact that the younger group used for comparison would be in preschool programs the following year. Other studies in this review are able to look at somewhat longer-run effects, such as performance in first grade or above.

Three studies by a single set of authors use a quasi-experimental approach based on North Carolina data for which they are not able to identify actual participants.[12] Those studies estimate the effects of state funding for the state's pre-k program, funding that was rolled out in different counties in different years, on age-eligible children at the county level for different outcomes, such as test scores in grade three, identification of special needs in grade three, and a range of outcomes in grades three to five. Finally, four observational studies use data from the nationally representative Early Childhood Longitudinal Study (ECLS), three from the kindergarten cohort and one from the birth cohort.[13] The preschool measures used in these observational studies

typically include all center-based care, not just the public pre-k programs that are the primary focus of this report. Some of the studies, however, report some findings separately by type of program.

Differences by Economic Disadvantage or Advantage

Many of the studies looking at subgroups find positive effects for the full sample, and eight find statistically significant larger effects for children in low income or otherwise economically disadvantaged families than for their more advantaged peers.

The studies that show differentially large effects for children from disadvantaged families include Weiland and Yoshikawa for Boston public schools,[14] Gormley et al. for Tulsa schools,[15] two studies by Magnuson et al. based on ECLS-K data, and one by Bassok based on ECLS-B data.[16] In addition, Ladd et al. find larger effects for children whose mothers have low education than for those whose mothers are better educated in terms of third grade test scores in North Carolina,[17] and Dodge et al. report similar findings for multiple outcome measures in grades 3-5 in North Carolina.[18] Of note is that the North Carolina studies also find positive effects for advantaged children despite the targeting of funding for the state's preschool program to low income children. This finding suggests the state program had spillover effects to other children in the community, perhaps because of the state's attention to quality standards for preschool or possibly because of better-prepared students in school classrooms.

These results contrast with the findings from the initial 2010 Head Start Impact study that found no differences for children defined by the household risk of the families.[19] By third grade a few differential effects emerged, but the results were mixed, with positive and statistically significant effects for children in the group of households defined as high risk and positive non-cognitive effects for children in families defined as low risk.[20] The reader should bear in mind, however, that all the children served by Head Start are disadvantaged.

One of the North Carolina studies looks specifically at the likelihood of children being identified for special education. While that study finds large effects of pre-k on the likelihood that a child will be identified for special education in grade three (where a reduction in the likelihood is defined as a positive effect), it finds no differential effect by mother's education level.[21] In addition, a study focused on immigrant children concluded that immigrant children benefitted from preschool, but with no differential effects by the education level of the mother.[22]

Differences by Race or Ethnicity

The most consistent positive or differentially positive effects by race or ethnicity emerge for Hispanic children, a group that at the national level is less likely to be enrolled in preschool programs than other racial or ethnic groups. In 2012, for example, only 52 percent of Hispanic children three to six years old attended preschool the year before kindergarten, far below the 63 percent for white children, 65 percent of black children, and 64 percent of Asian children.[23] In addition to two papers highlighted below, five other studies tested for differential impacts of preschool by the child's race or ethnicity. Among these studies, four found larger positive academic impacts on Hispanic students compared to the full sample or to non-Hispanic white students.[24] Two of these were regression discontinuity designs looking at short term Woodcock-Johnson scores.[25] The other two looked at North Carolina's pre-k program, with one examining third grade test scores and the other examining special education status in third grade. Only one study, the Head Start Impact Study, that tested for differential effects for the Hispanic subgroup did not find any such effects.[26]

Gormley (2008) focused directly on the effects of the Oklahoma pre-k program on Hispanic students in Tulsa. The gains for Hispanic students on pre-reading, pre-math and pre-writing skills were large and of the order of magnitude of the gains for blacks that have been widely reported for the Perry Preschool program. One possible explanation for that similarity is that in both cases the children in the comparison group were not likely to be enrolled in other center-based preschool programs. To the extent that participation rates of Hispanic children in the pre-k program in Tulsa followed national patterns and were typically lower than for other racial groups, one might expect Hispanic children who did participate to be among the children who would benefit the most from the program.[27]

Another possible explanation for the large gains for Hispanic children is that a preschool provides exposure to the English language. Some support for this explanation comes from the

fact that the gains in scores based on English language tests in the Tulsa study were larger for Hispanic students whose parents speak Spanish at home or whose parents were born in Mexico than for those whose parents speak English at home. Moreover, such gains were larger than those based on Spanish language tests. Because the latter gains were still positive and sometimes significant, however, not all the gains in school readiness of Hispanic children can be attributed to their early exposure to English.

Three other studies looked specifically at differential impacts of pre-k for dual language students, that is, children whose first language is not English. Two of the three studies showed larger impacts of pre-k on reading and math scores for dual language students, although one of these included only immigrant students in both their dual language and non-dual language populations.[28] The third study also found larger positive impacts on literacy for dual language learners following pre-k compared to non-dual language learners.[29] However, this random control study of the voluntary pre-k program in Tennessee found that after first grade this pattern had reversed and non-dual language speakers saw larger positive impacts of pre-k at the end of first grade. This is a strange finding. One plausible explanation is that elementary schools focus their resources on dual language learners with poorer literacy skills, thus decreasing the effect of pre-k on literacy for dual language students relative to their peers.

The patterns for black students are far more mixed than those for Hispanic students. The Head Start Impact Study did find persisting positive social/emotional impacts for black students in elementary school through the third grade, with no other subgroup experiencing this kind of persisting impact in social/emotional outcomes.[30] In terms of differential cognitive outcomes for black students, however, the results are inconclusive. One study found larger academic impacts.[31] Three others, however, found no differential academic impacts for black students,[32] and one study found smaller impacts on the likelihood of special education status for children with a black mother than for others, although the effects were still positive.[33]

One study attempted to sort out preschool effects by race and income on early literacy scores. Using the birth cohort of the ECLS, Bassok takes great care to control for any selection effects into preschool programs by using a rich set of control variables (reinforced by a propensity score matching approach) that allows her to explore racial differences in preschool (and also Head Start) effects defined relative to parental care.[34] For black children, she finds differentially large positive preschool effects compared to those for white children. For Hispanic children, she finds no differences relative to whites for preschool but differentially large effects for those who enroll in Head Start. Interestingly, when she restricts the sample to families with low income (below 130 percent of the poverty line), she finds large average effects for children of all races but no differential effects by race for either preschool or Head Start. Thus, at least part of the differential effects for racial subgroups that emerge from her study and, presumably from other studies as well, are attributable to their overrepresentation among families with low income. She concludes that "on average all low-income children—irrespective of race—respond positively and fairly similarly to preschool participation."[35]

Somewhat surprisingly, though, among the non-poor participants (those with income above 130 percent of the poverty line), she finds differentially positive effects of preschool for black children and for Hispanic children whose parents speak Spanish. One potential explanation, but one that remains to be investigated, is that the learning environments experienced by children in the comparison group (those in parental care) differ across racial subgroups, with the environments for non-poor Hispanic and black children less conducive for preparing children for school than those of non-poor white households.

Conclusion

This review of subgroup effects should be viewed as complementary to other chapters in this report that summarize the main effects of preschool programs, with careful attention to the strengths and weaknesses of the various studies. The main conclusion of this chapter is that pre-k programs are likely to generate larger benefits for economically disadvantaged children than for their more advantaged peers. The effects by racial subgroup—both the positive effects for Hispanic children in some studies, and the more mixed effects for black children—raise a number of interpretation issues that are not fully resolved in the research literature reviewed here. ■

[1] Sean Reardon and Ximena A. Portilla, "Recent Trends in Income, Racial, and Ethnic School Readiness Gaps at Kindergarten Entry" (Working Paper No. 15-12, Center for Education Policy Analysis, Stanford University, 2016).

[2] Although the authors focus on the trends in school readiness gaps, I focus here only on the gaps that emerge in the most recent year of the analysis.

[3] The results in this section are based on Reardon and Portilla, 2016. Tables 4 and 5.

[4] Reardon and Portilla, 2016. Tables 2 and 3.

[5] For an earlier summary of racial and ethnic differences in early childhood care and education, see Katherine A. Magnuson and Jane Waldfogel, "Early Childhood Care and Education: Effects on Ethnic and Racial Gaps in School Readiness," *The Future of Children* 15, no.1 (2005): 169-196.

[6] The gender differences are potentially of most interest. A new meta-analysis of the differences in effects of early childhood education program between boys and girls finds few substantive differences, with one exception. In the category of other school outcomes such as retention in grade and identification for special needs programs, preschool programs have far greater positive effects for boys than for girls. See K.A. Magnuson, R. Kelcher, G. Duncan, H. Schindler, H. Shagar, and H. Yoshikawa, "Do the Effects of Early Childhood Education Programs Differ by Gender? A Meta-Analysis," *Early Childhood Research Quarterly* 36 (2016): 521-536.

[7] Recent research using data from the Head Start Impact Study has begun to parse out the effects of different counterfactuals on effect sizes. For example, see Patrick Kline and Christopher Walters, "Evaluating Public Programs with Close Substitutes: The Case of Head Start," (Working Paper No. 21658, National Bureau of Economic Research, 2015) who find that Head Start's effects are greater for children who not otherwise attend preschool and for children that are less likely to participate in the program. Also see Avi Fellner, Todd Grindal, Luke Miratrix, and Lindsay Page, "Compared to What? Variation in the Impacts of Early Childhood Education by Alternative Care-Type Settings." (2016) Available at SSRN: https://ssm.com/abstract=2534811. They find strong positive short term effects on vocabulary for children in Head Start who would otherwise be in home-based care, but no impact for those who would otherwise be in center-based care.

[8] Daphna Bassok, "Do Black and Hispanic Children Benefit More from Preschool? Understanding Differences in Preschool Effects Across Racial Groups," *Child Development* 81, no. 6 (2010): 1828-1845.

[9] Rachel Valentino, "Will Public Pre-K Really Close Achievement Gaps? Gaps in Prekindergarten quality between Students and Across States," (Working Paper, Stanford University, 2015).

[10] U.S. Department of Health and Human Services, "Head Start Impact Study: Final Report," (Washington DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services, 2010); Mike Puma et al., "Third Grade Follow-Up to the Head Start Impact Study: Final Report" (Washington DC: Office of Planning, Research & Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services, 2012) *OPRE Report 2012-45*. Mark W. Lipsey et al., "Evaluation of the Tennessee Voluntary Prekindergarten Program: Kindergarten and First Grade Follow-up Results from the Randomized Control Design," (Nashville, TN: Peabody Research Institute, 2013).

[11] W. Gormley, T. Gayer, D.A. Phillips, and B. Dawson, "The Effects of Universal Pre-K on Cognitive Development," *Developmental Psychology* 41 (2005): 872-884; William T. Gormley, "The Effects of Oklahoma's Pre-K Program on Hispanic Children." *Social Science Quarterly* 89.4 (2008): 916-936; C. Weiland and H. Yoshikawa, "Impacts of a Prekindergarten Program on Children's Mathematics, Language, Literacy, Executive Function, and Emotional Skills," *Child Development* 84, no. 6 (2013): 2112-2130.

[12] Helen F. Ladd., Clara G. Muschkin, and Kenneth A. Dodge, "From Birth to School: Early Childhood Initiatives and Third- Grade Outcomes in North Carolina, " *Journal of Policy Analysis and Management* 33.1 (2014): 162-187; Clara G. Muschkin, Helen F. Ladd, and Kenneth A. Dodge. "Impact of North Carolina's Early Childhood Initiatives on Special Education Placements in Third Grade," *Educational Evaluation and Policy Analysis* 37, no. 4 (2015): 478-500; K.A. Dodge, Y. Bai, H.F. Ladd, and C. Muschkin, "Impact of North Carolina's Early Childhood Programs and Policies on Educational Outcomes in Elementary School." *Child Development* (2016).

[13] Daphna Bassok, 2010; Katherine A. Magnuson, M.K. Meyers, Christopher Ruhm and Jane Waldfogel, "Inequality in Pre-School Education and School Readiness," *American Educational Research Journal*, 41, no. 1 (2004): 115-157; Katherine A, Magnuson, Christopher Ruhm, and Jane Waldfogel, "Does Prekindergarten Improve School Preparation and Performance?" *Economics of Education Review* 26.1 (2007): 33-51; K. Magnuson, C. Lahaie, and J. Waldfogel, "Preschool and School Readiness of Children of Immigrants," *Social Science Quarterly* 87 (2006): 1241-1262.

[14] C. Weiland and H. Yoshikawa, 2013.

[15] W. Gormley et al., 2005.

[16] Daphna Bassok, 2010.

[17] Helen F. Ladd et al., 2014.

[18] K.A. Dodge et al., 2016.

[19] U.S. Department of Health and Human Services, 2010.

[20] Mike Puma et al., 2012.

[21] Clara G. Muschkin et al., 2015.

[22] K. Magnuson et al., 2006.

[23] Child Trends/Databank indicator/Early Childhood Program Enrollment. https://www.childtrents.org/indicators/early-childhood-program-enrollment/

[24] W. Gormley et al., 2005; C. Weiland and H. Yoshikawa, 2013; Clara G. Muschkin et al., 2015; Helen F. Ladd et al., 2014.

[25] W. Gormley et al., 2005; C. Weiland and H. Yoshikawa, 2013.

[26] U.S. Department of Health and Human Services, 2010.

[27] This argument is similar to the "selection" argument made by Daphna Bassok, 2010.

[28] K. Magnuson et al., 2006; Mike Puma et al., 2012.

[29] Mark W. Lipsey, et al., 2013.

[30] Mike Puma et al., 2012; U.S. Department of Health and Human Services, 2010.

[31] W. Gormley et al., 2005.

[32] U.S. Department of Health and Human Services, 2010; Helen F. Ladd et al., 2014; C. Weiland and H. Yoshikawa, 2014.

[33] Clara G. Muschkin et al., 2015.

[34] Daphna Bassok, 2010.

[35] Ibid., 1839.

4. Do Pre-Kindergarten Curricula Matter?

JADE MARCUS JENKINS AND GREG J. DUNCAN

Over the past 40 years, evidence of the long-term individual and societal benefits of early childhood programs such as Perry Preschool and the Abecedarian Project has shifted U.S. public opinion and prompted investments in public preschool programs.[1,2] In addition to funding programs such as Head Start or state-run pre-kindergarten, federal, state and local policy can influence the effectiveness of preschool programs through two main levers: prescribing curricula and regulating and monitoring classroom processes and quality. The chapter that follows by Dale Farran focuses on the latter. This chapter describes the various kinds of pre-k curricula and provides evidence on their relative effectiveness.

Types of Curricula

Curricula set goals for the knowledge and skills that children should acquire in an educational setting, and they support educators' plans for providing the day-to-day learning experiences to cultivate those skills through daily lesson plans, materials and other pedagogical tools.[3,4] Most preschool curricula are created by educational researchers and practitioners and then sold to practitioners by publishers. Others are developed less formally by preschool teachers and center directors themselves.

Curricula differ across a number of dimensions: philosophies, materials, the role of the teacher, pedagogy or modality (e.g., small or large group setting), classroom design and child assessment. State pre-k programs typically choose their own curricula, but their choices may be constrained by pre-approved lists developed by state agencies and accrediting bodies.[5] A recent survey of state education agencies revealed that states have fairly loose requirements for pre-k curricular decisions (e.g., "research-based" curricula, with "research-based" ill-defined), with basic guidelines for selection such as alignment to state early learning standards.[6,7]

In most cases, pre-k programs must train and mentor teachers to implement their chosen curriculum faithfully – often a challenging task. Nevertheless, curricular choice and support may be an important and relatively efficient policy lever through which states or districts can influence the quality and effectiveness of their preschool programs. We focus on the comparative impacts on children's school readiness of two broad categories of curricula: "whole-child" and more targeted, skill-specific curricula.

Table 1, based on a recent nationally representative survey of child care providers, shows the types of curricula used by state pre-k and Head Start programs.[8] Among pre-k centers, 41 percent use a whole-child curriculum; 25 percent use another comprehensive curricula or a skill-specific curriculum (focusing on math or literacy); and 34 percent use no curriculum at all or one that is developed locally. In the following sections we describe how these curricula differ in their approach and, subsequently, in their impacts on children's school readiness.

Table 1. Curricula Used in Pre-K and Other State and Locally-Funded Programs and in Head Start

CURRICULUM	Pre-K	Head Start
Whole-child curricula	41%	73%
The Creative Curriculum	32%	55%
High/Scope	7%	17%
Montessori	2%	1%
Other published curricula (including math and literacy curricula)	25%	20%
Other approaches	34%	7%
"A curriculum we developed ourselves"	12%	2%
Did not use curriculum	22%	5%
TOTAL	100%	100%

Source: The National Survey of Early Care and Education. Tabulated by Jennifer Duer.

Notes: Total calculations by curricula type are shown in shaded rows. These figures are a sum of the unshaded calculations, which break down the total number of centers reporting a specific curricula package/approach (i.e., Creative Curriculum is a type of whole-child curricula, and is used by 32% of the pre-k programs in the sample). Figures are based on program director responses to survey questions about curriculum. We designated child care providers as state pre-k programs based on survey questions regarding sponsorship and tuition payments. We defined state pre-k programs as providers that were sponsored by the state or local government or unspecified Head Start or pre-k, AND answered "yes" to one of the following questions: (1) whether tuitions were paid by local government (e.g., pre-k paid by local school board or other local agency, grants from county government) (2) whether tuitions were paid by state government (vouchers/certificates, state contracts, transportation, pre-k funds, grants from state agencies).

Whole-Child Curricula

Whole-child (sometimes termed "global" or "developmental-constructivist") curricula emphasize child-centered active learning that is cultivated by strategically arranging the classroom environment.[9,10,11] Rather than explicitly targeting developmental domains such as early math skills, whole-child approaches seek to promote learning by encouraging children to interact independently with the equipment, materials and other children in the classroom environment.

Implementing a whole-child curriculum effectively takes considerable skill on the part of teachers. Each child engages with components of the classroom environment in his or her own way, and the teacher's task is to support or "scaffold" learning with just the right amount of input—not so little that the child fails to learn, but not so heavy-handedly that the child's interest in a given task disappears because of a teacher's instruction. Moreover, the sequence of inputs provided by the teacher should promote *cumulative* development of academic or socioemotional skills over the course of the pre-k year—a goal that is perhaps most difficult of all to achieve. Montessori schools are famous for their whole-child approach. The Perry Preschool program was based on a version of the whole-child HighScope curriculum that is still used today.[12,13]

Whole-child approaches dominate preschool program curricula choices, in part because Head Start program standards require centers to adopt them; indeed, 73 percent of Head Start centers report using a whole-child curriculum (see Table 1). In addition, whole-child curricula reflect the standards for early childhood education put forth by the National Association for the Education of Young Children, the leading professional and accrediting organization for early educators.[14]

The Creative Curriculum is by far the most widely used whole-

child curriculum in both pre-k and Head Start classrooms (see Table 1).[15] The Department of Education's What Works Clearinghouse describes Creative Curriculum as "designed to foster development of the whole child through teacher-led, small and large group activities centered around 11 interest areas (blocks, dramatic play, toys and games, art, library, discovery, sand and water, music and movement, cooking, computers, and outdoors). The curriculum provides teachers with detailed information on child development, classroom organization, teaching strategies, and engaging families in the learning process."[16] Creative Curriculum also allows children a large proportion of free-choice time.[17]

Skill-Specific Curricula

Supporters of skill-specific curricula argue that preschool children benefit most from sequenced, explicit instruction focused on specific academic (e.g., literacy or math) or socioemotional (e.g., self-regulation or problem-solving) skills and provided in the context of play and exploration.[18] These curricula often supplement a classroom's regular curriculum, which could be Creative Curriculum or a teacher- or locally-developed curriculum. For example, the Building Blocks pre-k math curriculum adds roughly 15-20 minutes of daily math activities to an existing classroom curriculum.[19]

In focusing on specific skill domains, researchers and practitioners often conflate the content-specific curricular approach with highly teacher-controlled, direct instruction methods, such as large group worksheet-based academic activities, that have been linked with stress and reduced motivation in preschool children.[20,21] Far from the "drill and kill" methods justifiably admonished by child development experts, successful evidence-based, skill-focused curricula embed learning in playful preschool activities, including story-book reading, games, art, and discovery activities that are conducted in both small and large group contexts and grounded in a sound developmental framework. In contrast to the whole-child approaches, these curricula provide teachers with lesson plans to follow in which playful activities are strategically organized to present children with learning opportunities that are focused, sequential and cumulative.

Locally-Developed Curricula

Many states allow early childhood education providers to develop their own lesson plans or curricula rather than purchasing a packaged curriculum. These are designed by local districts or teachers themselves, but may incorporate components of various commercial curricula.[22]

How Effective Are Pre-K Curricula?

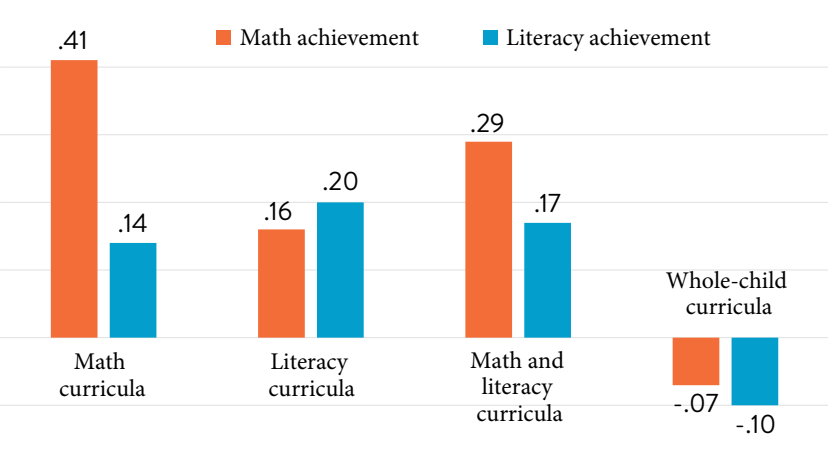
If a key purpose of pre-k programs is to promote the school readiness of their students, it is important to know whether pre-k curricula contribute to the development of children's concrete literacy and numeracy skills such as knowing letters and numbers, self-regulation skills such as the ability to sit still and engage in the material being taught and behaviors such as the ability to get along with teachers and fellow students. By far the biggest gaps in these kinds of capacities between kindergarteners from low- and higher-income families relate to achievement. Math and literacy skills of low-income children are a full year behind those of high-income children at the time of kindergarten entry, and these gaps do not diminish by the time the children reach eighth grade.[23] When scored with a similar metric, gaps in self-regulatory "approaches to learning" skills are about half as large as achievement gaps, and behavior gaps are about one-quarter the size of gaps in academic skills. Effective curricular interventions have the potential to boost the quality of instruction and the nature of teacher-child interactions in pre-k classrooms and, subsequently, close the income gap in these school readiness skills.

Impacts on Academic Skills

Based on meta-analytic data in Nguyen (2017), Figure 1 shows the impacts of various kinds of curricula on children's academic skills at the end of the program. Data are drawn from a variety of early childhood education settings, including pre-k but also Head Start and other kinds of programs.[24] Impacts are expressed as fractions of a standard deviation. Since the kindergarten-entry gap between low- and high-income students amounts to a little over one standard deviation, the ".41" entry on the first bar means that the math curricula could close about 40 percent of the low/high income gap in math achievement. [25]

The relative performance of different kinds of curricula shown in Figure 1 is consistent with the general pattern of results found in other recent meta-analytic studies.[26,27,28]

Figure 1. Impacts of Various Curricula on Academic Outcomes
(Shown as Fractions of a Standard Deviation)



Math curricula are often quite successful at boosting math achievement relative to either a whole-child or locally-developed curriculum; literacy curricula are modestly successful at boosting literacy achievement relative to these same alternatives; and, on average, children exposed to whole-child curricula do not out-perform children in classrooms where curricula are developed locally. This final result is remarkable. Despite the widespread use of whole-child curricula, existing evidence appears to indicate that they are no more effective at boosting school readiness than the assortment of activities that early childhood education centers develop on their own. Although the whole-child results in Figure 1 are based on only a handful of studies, they confirm the overall lack of empirical support for the effectiveness of the two most widely-used pre-k programs, HighScope and Creative Curriculum, based on rigorous standards.[29]

Two other noteworthy qualifications to these results merit attention. Especially in the case of the literacy curricula, these averages mask important variation in impacts. For example, impacts for literacy curricula range from .71 standard deviations down to negative (although statistically insignificant) impact – in the case of two curricula. All of the impacts of math curricula but none of the whole-child curricula were positive and statistically significant.

Second, in most evaluation studies involving real-world classrooms, curricula implementation may fall short of what curricula designers judge to be adequate. The policy infrastructure surrounding curricular requirements would therefore also need to involve on-site assistance and/or extensive training opportunities for child care providers if proven curricula are to be effective at scale.[30]

Impacts on Socioemotional Skills and Behaviors

Several recent experimental evaluations of supplemental curricula and teacher training modules directed at improving children's socioemotional skills and self-regulation have demonstrated success when compared with usual classroom practice. One of the most successful, Preschool PATHS, has demonstrated effectiveness on children's emotion knowledge, problem solving skills, behavior, and self-regulation.[31,32] Other curricula, such as Tools of the Mind, have not proven themselves to be consistently predictive of gains in children's socioemotional skills.[33,34] Taken by themselves, whole-child curricula have not been shown to boost children's skills in either socioemotional or academic domains.[35]

By devoting time and attention to academic skills, it might be feared that skill-focused curricula would preclude full development of children's socioemotional capacities. But for the most part, such curricula generate impacts only in the developmental domain they target, such as math curricula affecting math skills, but not literacy or socioemotional skills. Importantly, developmentally appropriate skills-focused curricula do not appear to generate negative impacts on children's development in socioemotional domains.[36] In other words, pre-k programs can provide important boosts to children's key academic skills with high-quality skill-focused curricula without sacrificing development in other social and self-regulatory domains.

Implementing Best Practices

Looking across strong evaluations of preschool curricula, two common features emerge as key ingredients for improving classroom experiences and child outcomes in preschool: incorporating intensive professional development for teachers with coaching at least twice a month (i.e., such as having expert teacher provide feedback and support for in-classroom practice), and using assessments of child progress to inform and individualize instruction.[37] Closing the pre-k achievement gap will involve promoting curricula-guided teacher practices at scale. The success of this scale-up depends greatly on providing teachers with the professional development and other supports that can help them more effectively promote early literacy, math, and socioemotional skills in the context of real-world preschool classrooms.[38]

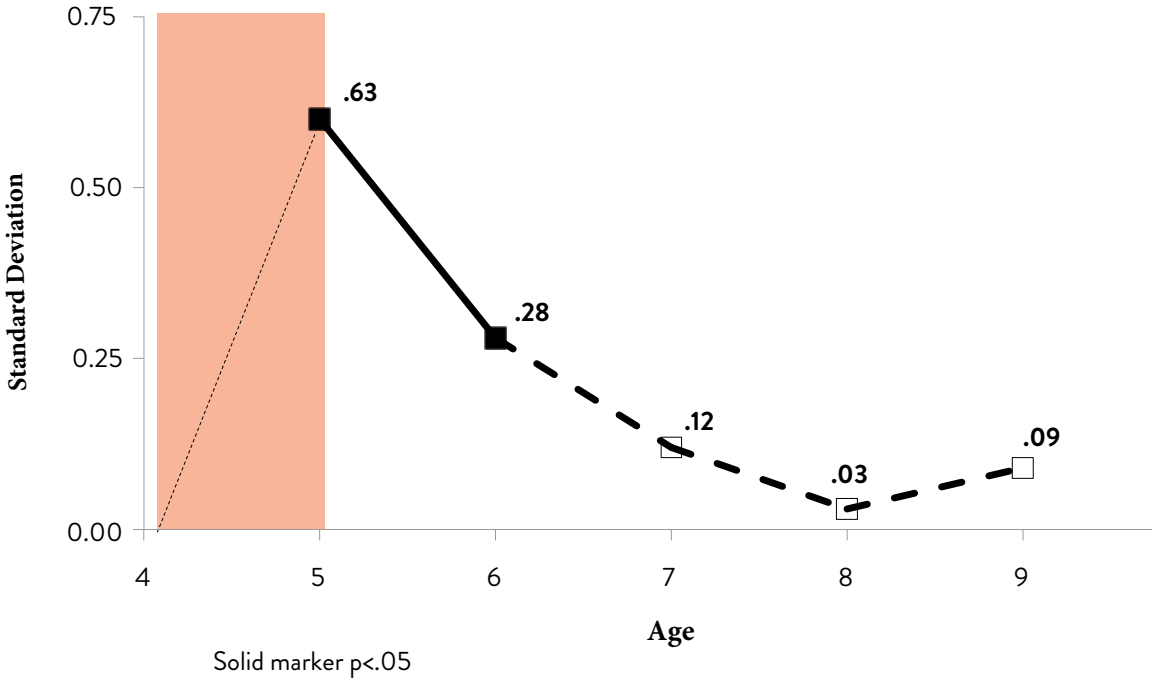
Fadeout and the Need for Curriculum Alignment

The Consensus Statement chapter points out that while most studies of pre-k impacts fail to assess students beyond the end of their pre-k years, those that do typically find smaller differences between pre-k and non-pre-k children during elementary school. These patterns of declining impacts are sometimes called "fadeout," although in the context of early-grade learning, when achievement gains are rapid for almost all children, converging achievement trajectories of children in the pre-k and comparison groups are better described as "catch up" on the part of comparison-group children.

Declining patterns of impacts also characterize results from the small number of pre-k skill-based curriculum studies that assess impacts in the elementary school grades.[39] Figure 2 plots impacts from a pre-k intervention model that featured the Building Blocks mathematics curriculum as its key component.[40] Difference in math achievement at the end of pre-k between children exposed to the Building Blocks supplemental math curriculum relative to "business as usual" pre-k amounted to .63 SD—a large impact. But impacts fall to about .28 SD by the end of kindergarten, and drop to statistically non-significant levels after that.

A possible explanation for this catch-up is the fact that elementary school curricula and teaching focus on math content that the Building Blocks children have already learned during preschool.[41,42] Another is that most teachers fail to differentiate instruction for beginning and advanced students, which will reduce the likelihood of continued academic growth relative to the expected growth of comparison children who have not learned the content in preschool.[43,44] Incorporating parents during the transition between pre-k and kindergarten, and providing them with specific strategies to facilitate children's development and transition, such as

Figure 2. Impacts of the Building Blocks Pre-K Math Curriculum



attention during child-directed play and helping children regulate emotions, may also be promising strategies.[45,46] With respect to curriculum, obvious remedies are to work on aligning early grade curricula with pre-k curricula and perhaps to support teachers' efforts to teach effectively in classroom with heterogeneous mixtures of lower- and higher-achieving students.[47]

Integrated Curricular Approaches: Boston's Pre-K Program

Looking beyond individual curricula, an appealing policy approach to promoting school readiness is to develop an integrated academic and behavioral curriculum and then focus on ensuring that it is implemented in classrooms as faithfully as possible. Classroom "quality" in this case is measured by the fidelity of the implementation of the curriculum. This has been the approach taken over the past decade by Boston Public Schools.[48,49]

System leaders developed a highly scripted play-based pre-k curriculum by combining proven literacy (Opening a World of Learning) and math (Building Blocks) curricula in ways that also promoted social skills. The academic components focused on concept development, the use of multiple methods and materials to promote children's learning, and on a variety of activities to encourage analysis, reasoning and problem-solving.[50] Pre-k classrooms were embedded in existing public schools and taught by credentialed teachers who received extensive professional development training and on-going coaching to ensure that they understood the curriculum and were able to implement it effectively in their classrooms.

An evaluation of the Boston pre-k system showed quite large impacts on vocabulary, math and reading at the end of the pre-k year.[51] Interestingly, the evaluation also found smaller but still noteworthy impacts on two elements of executive function: working memory and inhibitory control. Impacts of the Boston pre-k program beyond the end of the pre-k year have not yet been determined, nor has it been shown to be replicable at scale in other school systems serving predominantly low-income children. That said, Boston's evidence-based integrated curriculum approach would appear to be quite promising.

Conclusions

Given the large, persistent and consequential gaps in literacy and numeracy between high- and low-income children when they enter kindergarten, perhaps the most important policy goal of pre-k and other publicly supported early childhood education programs should be to boost early achievement skills and promote the socioemotional behaviors that support these skills. Federal, state and local policy can influence the effectiveness of preschool programs by prescribing curricula, as well as by regulating and monitoring early care settings. We have concentrated on curriculum policies.

Our review of the evidence highlights that curricular supplements focused on specific school readiness skills are more successful at boosting these skills than are widely used whole-child curricula. Recent data show no advantages in improving academic skills from popular whole-child curricula such as Creative Curriculum, compared with a "usual practice" curricular approach developed by the teacher or district themselves. These results lead us to question the policy wisdom of prioritizing whole-child curricula. While it is conceivable that some kind of effective global, whole-child curriculum will be developed, there is currently no strong evidence to support these curricula as they currently exist. In the absence of such evidence, it may be best to focus more attention on assessing and implementing proven skill-focused curricula and move away from the comparatively ineffective whole-child approach. ■

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5. Characteristics of Pre-Kindergarten Programs That Drive Positive Outcomes

DALE C. FARRAN

Questions about how to define quality in early childhood programs and the impact of different approaches on children's outcomes have engaged the research and policy communities since the 1970s[1] and 1980s[2], and, in many cases, persist to this day. This chapter will review different approaches—both structural and process-oriented—that have been used to assess the quality of pre-k programs and their relationship to immediate achievement gains in pre-k. It will also review research with longer term and/or different outcomes as the focus and discuss some of the major challenges facing researchers. Suggestions for new directions in assessing quality will follow.

Structural Characteristics

Structural characteristics of pre-kindergarten programs are relatively easy to observe and to regulate in order to improve the quality of programs and produce better child outcomes.

The History of Regulation

Determining the important structural characteristics that could lead to federal regulations of child care quality was the focus of the National Day Care Study (NDCS)[3] commissioned by the Federal Department of Child Development (subsequently the Administration for Children and Families). The study was a response to the storm of protests from states following a 1974 amendment to the Social Securities Act that outlined new Federal Interagency Day Care Requirements (FIDCR) that would have substantially revised both the maximum group size and the adult-child ratios in programs serving young children. To address the controversy, Abt Associates and SRI mounted several quasi-experimental studies. In one they changed the ratios and group sizes experimentally; in another they randomly assigned children to classrooms that varied in the level of preparation of the teachers.

The most important findings from the NDCS related to group size and specific training of caregivers in child-related areas. Researchers found that group size was the most important characteristic that affected outcomes. By contrast, staff-child ratios were not as important—with the caveat that the teacher-student ratios in classrooms in the study were relatively low (1:5-9) without enough variation to test. Likewise, the study also determined that teacher education and years of experience were not important factors. "There is a great deal of variability in the quality of human interaction in day care settings even when the composition of the classroom and the qualifications of caregivers are fixed," it reported.[4] However, training specifically about the development of young children (topics related to early childhood education, day care, special education, etc.) was related to more social and intellectual stimulation for the children and more gains on standardized tests.

NDCS findings continue to influence many of the regulations currently in use by states. An emphasis on features that lend themselves to regulation can be found today in in the National Institute for Early Education Research (NIEER) benchmarks[5] that many states use in expanding state funded pre-k programs. Recent Head Start regulations, for example, required that at least 50 percent of all Head Start teachers have a bachelor's degree by 2013.[6] But as in the earlier NDCS work, none of these benchmarks, including those involving teacher education and formal degrees,[7] either collectively or separately relate to child outcomes.[8]

Possible New Regulations to Consider

All of the aforementioned regulation work stems from a time when center-based childcare was predominately taking place in private centers, either non-profit or for-profit, or in Head Start centers. The most dramatic change in early childhood

education recently has been the increasing involvement of the public school system as the venue and source for the programs, including the Preschool Development Grants program begun in 2014.[9] If programs for three- and four-year-old children are housed in elementary schools and administered by school districts, there may well be new features to regulate that were not included in earlier structural investigations.

Many school districts historically and presently distinguish themselves from the regulatory control that governs childcare centers.[10] Thus, although some states like New Jersey[11] have developed regulations governing the physical location of pre-k classrooms, many have not. The consequences of this lack of controls can be serious. Understandably, school districts generally locate classrooms for administrative reasons and not necessarily for developmental ones. Elementary schools with empty classrooms are appealing locations for placement of a pre-k program, but they may not be suitable for young children. Often these buildings are old, with playgrounds inappropriate for young children, bathrooms at some distance from the room, and a requirement that children have their meals in the large cafeteria set up for older children. Recent research found that children can spend six to seven hours a day without ever going outside or having any gross motor activity, transition times are greatly increased, and negative behavioral controls are elevated.[12] Moreover, unless the district purposely develops an early childhood alternative, teachers may be subject to evaluation metrics from their principals that were not developed for classrooms serving children this young.

All of these aspects can be regulated, but only a few states have included playground accessibility, bathrooms and meals in rooms, and principal training in early childhood with appropriate evaluation instruments as they expand their public school programs. None of these features is included in the standard benchmarks.

Process Characteristics

In contrast to those of a structural nature, characteristics relating to process and interactions *within* a classroom, while important to quality education, are much harder to measure and regulate.[13]

Formal Curriculum

While the presence of a formal curriculum is sometimes included as a structural feature, in practice different curricula embody different perspectives on what children should learn and how they should learn it. The previous chapter in this volume by Jenkins and Duncan reviews what is known about the effects of different curricula.

Classroom Activities

One way to examine classroom processes is to focus on specific activities that occur in classrooms rather than on formal curricula. Activities can be categorized in terms of pedagogical strategies such as whole group instruction or in terms of specific content, such as techniques for reading books with children.

In terms of instructional strategies, much of the research information comes from data collected in the late 1990s and early 2000s just as states were beginning to house more of their pre-k classes in elementary schools. Across studies, those classrooms devoted about 30 percent of the time to free play and 25 percent or a little more to whole group activities.[14,15] The one exception to these findings is a study that included only classrooms in public schools, where 52 percent of the time children were instructed in whole groups.[16] For children from low-income families, the most effective activity for readiness gains involved giving children individualized instruction.[17] In general, the most effective organization of instruction across the day was a balanced approach, one that included whole and small group instruction as well as free choice time.

Book reading has long been considered an effective mechanism for creating gains in the important area of vocabulary development. While many researchers have investigated various strategies for increasing vocabulary through this method, a recent, thorough review of research on the effects of book reading concluded that the variation among the studies was too great to yield many concrete recommendations for practice.[18] Studies varied in the book reading styles and in the number of words targeted, but the overall conclusion was that children learned only some of the words targeted. Moreover, learning the targeted vocabulary did not generalize to vocabulary gains in general. Nearly

all storybook reading research has focused on children's oral vocabulary gains. A recent study asserts that the more valuable focus for young children's development might be comprehension.[19] Other researchers have stressed the importance of teacher language, as outlined in the next section.

Teacher Language

Researchers have focused on the language that teachers use in relation to book reading as well as more generally. The richness and type of language employed by the teacher predicted children's literacy growth in pre-k and continued to predict growth into kindergarten.[20] "Extra-textual" talk by the teacher during shared book reading was defined as talk surrounding the text that was both meaning- and code-based. "Code-based" talk included discussions of print and identifying letters and sounds in the text. Meaning-based extra-textual talk also included inferential requests to reorder and reason about the story, a focus on comprehension of the narrative.

Other research has examined teacher language more generally, but it has been more descriptive[21] or the subject of intervention efforts.[22] Less frequently has this research been examined as predictive of child outcomes. One exception is a longitudinal study of a small number of children into grade four. Teachers' use of sophisticated language during free play interactions with children predicted fourth grade language comprehension.[23] Interestingly, a higher *ratio* of child talk to teacher talk during free play predicted both kindergarten and fourth grade outcomes. This finding parallels a recent determination that the amount teachers listened to pre-k children predicted greater developmental gains in many areas.[24] Teachers in classrooms serving children from low-income families may need professional development to learn how to engage in more complex language interactions with children whose language skills tend to be lower.[25]

Instructional Interactions

The type of language teachers use with children figures heavily in the Instructional Climate subscale ratings on the Classroom Assessment Scoring System (CLASS). The CLASS is an observational rating system required in Head Start classrooms and used frequently in studies of pre-k classrooms. The Instructional Climate rating encompasses many of the aspects of teacher talk just described—the use of complex language, open ended questioning and the like.[26] Many studies have found associations between children's academic gains and their classrooms' Instructional Climate ratings.[27,28,29]

It is important to note, however, that the variations observed in CLASS Instructional Climate ratings across classrooms are quite narrow, and most of the ratings are low. As other researchers have found, teaching activities in classrooms serving children from poor backgrounds are more likely to be didactic than scaffolded[30]and focused on basic skills rather than inferential interactions. Instruction involving responsive interactions is linked to gains in social as well as academic areas,[31] but increasing this type of instruction in classrooms is exceptionally difficult.[32]

Child Engagement

One benefit of increasing responsive interactions between teachers and children is an increase in child engagement. Higher levels of such engagement are related to more gains in school readiness skills.[33,34] Children are least likely to be engaged during whole group instruction. Interestingly, children are not much more engaged during small group instruction, possibly because teachers do not adapt their instructional style to take advantage of the smaller group.[35] Helping teachers teach in ways that engage children's attention at higher levels will have both immediate and long-term benefits for children's learning.

Positive Climate

Several studies have shown that a positive emotional climate is an important contributor to children's growth, especially in the area of social-emotional development. Classrooms with the "warmest profile" had children who at the end of pre-k were rated the most socially competent.[36] More teacher approvals, fewer disapprovals and a more positive teacher emotional tone were collectively related to gains in children's self-regulation (executive function) skills over the pre-k year.[37] Two longitudinal studies have demonstrated that the emotional climate of the pre-k classroom affects children's social skills into kindergarten and first grade [38,39] Levels of behavior disapprovals have been observed to be quite high in pre-k classrooms, while the number of approvals was much lower. [40] Changing the ratio of disapproval to approval and improving

the emotional climate are both important classroom processes that should receive attention.

Summary

While a great deal remains to be understood, we do know a few important things about classrooms that relate to better outcomes for children.

First, it is clear that many of the features of classrooms that can be easily regulated and are present since the National Day Care Study do not themselves ensure quality. Classroom interactions vary in important ways for children across classrooms whose teachers have the same levels of education, with the same staff child ratios and group sizes and even using a formal curriculum. The assumption in the 1980s was that regulating these features would bring with it more positive uniformity, but that has not been the case. It is important to note, however, that pre-k is changing. As the public schools become a primary location for classrooms for young children, other features that can be regulated should perhaps be included. Features like bathroom and meal locations can reduce transitions and behavior disapprovals, both found to relate to children's developmental gains.[41]

Several within classroom processes have emerged across studies that appear to be important. These include the teacher's language complexity and level of instruction, the teacher's ability to create interesting activities for children that engage their attention, and the positive nature of the classroom, specifically more affirmation and warmth and less disapproving and behavioral controls. More work in this area is needed, especially in understanding what can bring about changes in teacher behavior. As Hughes wrote, "The identification of specific classroom transactions or processes that predict the growth in skills that enable children to make a successful transition to kindergarten and first grade is critical to realizing the promise of preschool education."[42]

Our ability to be much more specific about the classroom processes in pre-k that drive positive impacts is hampered by some current limitations in the research.

First, the effects of pre-k programs are usually measured based on outcomes just prior to kindergarten entry and only on a small set of academic skills. Thus, the best information we have on quality predictors relates only to those gains achieved in the pre-k year. This narrow focus could have potentially serious consequences. Concerns have been raised recently about the temporary effects on specific knowledge produced by pre-k programs achieved without changing the underlying processes for children's learning.[43] For longer-term effects to be obtained from early childhood programs, it is crucial that we discover how to equip children with the deeper learning skills that will matter for later success as well as how to measure those underlying skills.

Very little research on programs as they are currently implemented has focused on outcomes other than achievement, on longer-term effects, or on the alignment between pre-k and the early grades. When longer-term effects are studied, they are most often assessed with achievement and retention data from state databases.[44] None of these studies has observational data on pre-k processes to link to the longer-term outcomes. Thus, despite a recent flurry of research, the answer to the important question of what specific features of pre-k are causally related to either short- or long-term achievement outcomes is less precise than one would hope. Even less information is available to address the important "non-cognitive skills" that the pre-k experience hopes to affect as long term outcomes.[45]

A second situation limiting the research is the standard measures for examining classroom quality. Current tools were "developed on a conceptual basis by child development experts without detailed psychometric analysis."[46] These measures include the Environmental Classroom Rating Scale (ECERS), the previously mentioned CLASS and the less often used Early Language and Literacy Classroom Observation (ELLCO). Many of the characteristics identified in this paper as important can be found in individual items on all of these scales, but most summaries of their use finds them disappointing in their ability to capture quality.[47] Moreover, the training for their use is expensive and likely to be limited to a few individuals for evaluation purposes[48]

Educators and policy makers need to develop a practical system that early childhood coaches and administrators could use to improve the quality of their programs. Such a measure would be accompanied by clear policies for how often and how long it must be used to be valid. It would focus initially

on those classroom elements for which we have at least preliminary evidence that they relate to gains. To improve quality, this system should include direct links to strategies teachers and their coaches could use to change practices. School districts could be encouraged to maintain these data from pre-k classroom observations and to connect them with later child outcomes, thereby reflecting on whether the program is functioning as planned. Such a detailed instrument for use by coaches might also inform the system used by administrators for evaluating early childhood teachers. The early childhood field needs its own Measures of Effective Teaching (MET) project, just as the Gates Foundation is doing for k-12 teachers. [49] ■

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6. Universal vs. Targeted Pre-Kindergarten: Reflections for Policymakers

WILLIAM GORMLEY

Since the dawn of the 21st century, state and local governments have significantly increased their spending on early childhood education programs, especially programs that serve children in the year prior to kindergarten (pre-k). Indeed, enrollments in these programs doubled between 2002 and 2011 before leveling off.[1] Such growth begs the question of whether pre-k programs should be universal and available to all four-year-olds or targeted to low-income or at-risk four-year-olds only. The answer is likely to depend on values, politics, resources, and opportunity costs. Societal goals and beliefs, political support and opposition, fiscal constraints, and competing priorities are all likely to receive some consideration as different levels of government consider the best course of action.

Values

In general, universal and targeted pre-k systems tend to promote similar values. Both types of programs are consistent with the proposition that early childhood education programs are valuable to society as a whole by yielding short-term gains in school readiness and long-term gains in educational and work outcomes. They also make it easier for parents to work outside the home. In short, both strategies invest in the human capital of our youngest citizens and are likely to generate economic benefits, as measured by a cost-benefit analysis. The two types differ, however, in two key respects. While both programs promote equal educational opportunity, a targeted program focuses more explicitly on the opportunity gap between the haves and the have-nots. Both programs promote economic growth, but a universal program aims at increases in GDP more than decreases in income inequality.

Politics

A universal program is what James Q. Wilson would call a "majoritarian" program because it involves widely distributed benefits with widely distributed costs.[2] Basically, that means that many citizens pick up the tab for a program that also benefits many citizens. A targeted program also involves widely distributed costs, but the benefits are less widely distributed, at least in the short run. Theodore Lowi describes a targeted program as "redistributive" because it effectively redistributes resources from the rich and the middle class to the poor and the working poor.[3] A universal program also reallocates resources but does not limit benefits to disadvantaged families. For these reasons, the programs differ in their political implications. A universal program offers the prospect, at least in theory, of building a political coalition that encompasses multiple social classes, while a targeted program, in theory, should appeal primarily to the poor and those whose ideology leads them to favor what David Ellwood would call "poor support."[4]

Resources

A universal program requires more resources from taxpayers than a targeted program and in the short run is more expensive. It also requires a larger teacher work force, which means it is likely to be most feasible in jurisdictions that enjoy a good supply of well-trained, well-educated early childhood teachers.

In practice, targeted programs enjoy more financial support from the federal government, as exhibited by Head Start and Title I of what is now known as the Every Student Succeeds Act (ESSA), and less financial support from other levels of government. That is because state and local governments are generally less enthusiastic about redistributive programs that benefit the poor than the federal government is.[5] As a result, state and local governments can probably expect more financial support from the federal government for a means-tested, and thus targeted, program than for a universal

program. On the other hand, as noted earlier, a means-tested program may generate less political support within the state. A universal program, once established, may be difficult to cut back.

Opportunity Costs

Since any investment of public funds involves opportunity costs, discussion of the merits of universal and targeted pre-k programs should take place within the context of other meritorious government programs. When considering such early childhood education programs, public officials must consider them in conjunction with other education programs, such as k-12 career and technical and higher education, and other social programs such as health, nutrition, housing, and income support. The case for early childhood education programs is arguably stronger because they have often produced highly favorable benefit-cost ratios.[6] Nevertheless, it is perfectly reasonable for public officials to ask for evidence that universal or targeted pre-k programs are *more* cost-effective than other valuable programs.

The Case for Universal Pre-K (UPK)

Proponents of universal pre-k base their arguments on four pillars:

Everyone Benefits

It is sometimes argued that since their parents can afford other good pre-k or child care options, middle-class children do not really benefit from a universal pre-k program. If so, such a program would be a waste of the taxpayers' money. This argument was a key factor in the defeat of the universal pre-k initiative in California in 2006.[7] But empirical studies of UPK programs in Tulsa and Boston make it clear that middle-class children also benefit—and do so quite substantially—from participation in a high-quality pre-k program.[8] A statewide study of Georgia, a UPK state, reached a similar conclusion. It found that both low-income and middle-income students experienced substantial gains in school readiness, for a wide range of verbal and math skills.[9]

Even the Middle Class Needs Help These Days

Why do middle-class children benefit from UPK? Perhaps it is because the fortunes of the middle class have deteriorated in recent decades. One reason for this is the decline of middle-skill jobs, as documented by David Autor and others.[10] Another reason is the decline in state support for higher education, which makes it increasingly difficult for middle class parents to pay their children's college bills.[11] As Isaacs et al. have documented, middle class status is fragile in contemporary America.[12] Due to economic and technological disruptions, many of today's middle-class families may, unfortunately, be counted among tomorrow's disadvantaged families.

A Universal Program is Easier to Administer

Another advantage of a universal program is that does not require administrative expenses to distinguish between eligible and ineligible students. Gathering and verifying data on program eligibility takes time, especially if one seeks to stay current with families' changing financial circumstances. In contrast, administering a universal program is simpler and more straightforward.

Low-Income Students Benefit from Interactions with Middle-Class Students

Numerous studies of k-12 education show that disadvantaged children benefit from the presence of middle class peers in the same classroom. The Coleman Report was the first major study to articulate this relationship.[13] Since then, several other studies have confirmed the positive benefits of middle class peers in k-12 classrooms.[14]

A smaller number of studies have focused on pre-k in particular. These studies, in Georgia and the U.S. as a whole, have also found a statistically significant relationship, with disadvantaged preschoolers benefiting from the presence of middle class preschoolers in the same classroom and with kindergarten students benefiting generally from the presence of pre-k alumni in the same classroom.[15] In North Carolina, elementary school students who did not attend pre-k appear to have benefited from the presence of pre-k alumni in elementary school—a phenomenon the authors refer to as positive "spillover effects."[16]

In short, preschool peer effects may involve a double bounce. The first bounce occurs when the presence of middle class peers in the same programs improves the school readiness of disadvantaged students who interact with the middle class

students. The second bounce occurs when the presence of large numbers of pre-k alumni in kindergarten and beyond (both disadvantaged and middle class students) enables elementary school teachers to ratchet up their pedagogy and cover more challenging materials.[17] Elementary school teachers can aim higher if lots of their students have benefited from a high-quality pre-k program.

A recent study, comparing UPK and targeted pre-k programs in multiple states, is consistent with the double bounce hypothesis, though it does not directly prove it. Using data from 14 pre-k states and 22 neighboring states without state-funded pre-k at the time (2005-06), Elizabeth Cascio found that low-income children actually benefited more from pre-k in UPK states than in targeted pre-k states.[18] One reason for this is that UPK states have hired better-educated teachers and adopted relatively low teacher/student ratios, which may be linked to quality. However, even after controlling for these variables, Cascio found that UPK was more advantageous to low-income children. An obvious possibility is that these children benefited from direct contact with more fortunate peers or from classroom teachers who set the bar higher pedagogically because a higher percentage of their students had participated in pre-k.

The Case for Targeted Pre-K

Proponents of targeted pre-k programs also make four basic arguments:

Poor Children Benefit the Most from Good Pre-K

Although many children in the U.S. face difficult circumstances, poor children face the most formidable obstacles to success.[19] Not surprisingly, the preschool studies that report the biggest gains, especially in the long run, are studies involving extremely poor children, such as the Perry Preschool Program and the Chicago Child-Parent-Centers study. Studies of UPK programs in Tulsa and in Boston also find, in general, that poor children benefit somewhat more from a high-quality pre-k program than middle-class children do.[20] Results from Georgia are more equivocal, though the latest study suggests somewhat greater gains for low-income children than for middle-class children.[21] A programmatic emphasis on the poorest children is consistent with broader theories of justice, which argue that we should help our neediest citizens first.[22] Also, as noted earlier, a targeted pre-k program such as North Carolina's may produce some positive spillover effects for middle-class children.[23]

Pre-K Makes it Easier for Parents to Work

A key benefit of pre-k programs for families is that, like child care, it enables parents to work by providing a safe, stimulating environment for their four-year-old children. Such reassuring options are especially important for single parent families, which often live at the margins of economic viability.[24] These considerations are especially relevant when the pre-k program is full-day, which accommodates the needs of working parents.

Targeted Pre-K is More Likely to Reduce Achievement Gaps

In recent decades, the educational achievement gap between disadvantaged and middle-class children has widened, in part because of growing income segregation between schools.[25] A targeted program is, in principle, more likely to narrow the achievement gap between more and less affluent children by focusing educational gains on children who need help the most. Consistent with this, a North Carolina study found that its targeted pre-k program narrowed the achievement gap somewhat. It found that, as of third grade, differences between program participants and non-participants were somewhat lower for low-income students than for higher-income students—a comparison made possible because some middle-class children attended the same pre-k program as low-income children, though without subsidies.[26]

It is important to recognize, however, that much depends on whether the pre-k programs attended by disadvantaged children are as high in quality as those attended by middle class children. In practice, both instructional support and emotional support provided by classroom teachers tend to be lower in pre-k programs attended by poor children than in pre-k programs attended by non-poor children.[27] Also, as noted earlier, UPK programs are characterized by more favorable educational inputs than targeted pre-k programs.[28]

UPK Programs Require Classrooms to be Integrated by Social Class

The presence of middle-income students in the school district does not guarantee that such students will be present in a given school or a given classroom. If neighborhoods are

segregated by social class, then there is a good chance that schools and classrooms will be segregated as well. In Tulsa, Oklahoma, which inaugurated UPK in 1998, Gormley, Gayer, Phillips, and Dawson studied three cohorts of children in depth, including a cohort of students who attended pre-k in 2005-06. Among these children, only 25 percent sat in a pre-k classroom where 50 percent or more of the students were middle class (ineligible for a free or reduced price school lunch), and only 15 percent of low income children (eligible for a school lunch subsidy) sat in such a classroom. One obvious explanation for this is that the Tulsa Public Schools school district is a high-poverty school district in which 78 percent of pre-k students at the time were eligible for a school lunch subsidy. Another explanation could be considerable residential segregation by social class. In short, opportunities for positive peer effects do not appear to be present for most Tulsa students. In other communities, of course, either poverty or residential social class segregation could be lower.

Hybrid Options

The simplest choices available to state and local governments are either targeted pre-k or universal pre-k. However, some hybrid options are also possible for jurisdictions that conclude that both of these ideas have some merit. These hybrid options take at least four different forms:

Full-Day for Poor, Half-Day for Middle Class

In recognition of the fact that poor families need help more than middle class families, one strategy might be to provide twice the number of pre-k hours to poor families than to middle class families. This would help poor mothers, and especially poor single mothers, to work. It would also provide some benefits to middle class children and some relief to middle class families. In practice, the Tulsa Public Schools utilized this system and institutionalized it by locating most full-day pre-k programs in less advantaged neighborhoods while locating most half-day pre-k programs in more advantaged neighborhoods.

A potential drawback of this strategy is that it could result in social class segregation in pre-k classrooms, with poor children in full-day programs and middle class children in half-day programs. This could reduce or even eliminate any benefits that might flow to disadvantaged children from close association with middle class children.

Graduated Fee System

A different variation on the same theme would be to provide state-funded pre-k to all four-year-olds but to require a co-payment from more affluent parents. Co-pays have worked fairly well in health policy by recognizing differences in families' ability to pay for services. Setting the co-pay could be tricky, however. If the co-pay for middle class families were perceived as too onerous, middle class enrollments in state-funded pre-k could be quite low, which could limit benefits to society as a whole and reduce the likelihood of beneficial peer effects.

In Denver, all four-year-olds are eligible to enroll in pre-k, but local government subsidies vary dramatically by household income, and range from $38 to $379, monthly for children enrolled in the full-day version of the program.[29] In Seattle, pre-k tuition is free for families at or below 300 percent of the federal poverty level. Families at or above 760 percent of the federal poverty level receive only a 5 percent tuition discount.[30]

Begin with Targeted, Aim for Universal

A third strategy would be to establish UPK as the goal and then begin incrementally with a targeted pre-k system. In effect, this strategy would recognize the value of UPK, while also acknowledging the reality of scarce financial resources and the greater needs of poor families. Presumably, a timetable for this transformation would be approved. However, financial difficulties and political changes could make it difficult for state officials to adhere to such a timetable.

A good example of an aspirational UPK system that worked reasonably well is West Virginia, which established UPK as a legislative goal in 2002 but which also stipulated a very gradual phase-in period over 10 years. In 2012, as promised, UPK became available to every four-year-old in the state. During that period, pre-k penetration climbed from 24 to 61 percent. As of 2015, West Virginia's penetration rate was 69 percent.[31] Only four other states have a higher pre-k penetration rate for four-year-olds. A less enticing example

is New York, which identified UPK as a goal in 1998 but which struggled to reach that goal at the state level, with a 49 percent penetration rate as of 2015.[32] It wasn't until Bill de Blasio took office as Mayor of New York City in January 2014 that the state of New York began to move more quickly towards implementing UPK. And, even then, the big boost in enrollment was due primarily to de Blasio's commitment to the policy in New York City.

Geographic Targeting

A fourth strategy would be to target pre-k to disadvantaged communities, rather than to disadvantaged students. Thus, in low-income communities, all four-year-olds would be eligible, regardless of income. This proposal, recommended by Sara Mead, has been tried in New Jersey (the Abbott preschool program) and, to some degree, in Boston.[33] In New Jersey, the state supreme court specified that "poor urban districts" would be eligible for UPK.[34] On the advice of the state Department of Education, the New Jersey Legislature used student eligibility for school lunch subsidies and other criteria to make that determination.[35]

In Boston, the school district used several criteria, including student eligibility for school lunch subsidies, to determine which schools would provide UPK.[36] Geographic targeting has the advantage of reducing the kinds of administrative hassles associated with individual determinations of income eligibility. In contrast to some hybrid options, it is relatively easy to administer.

Conclusion

What, then, is the right choice for public officials? The good news is that both universal and targeted pre-k programs have produced substantial improvements in school readiness. Although the evidence on longer-term effects is still accumulating, most studies to date have found that both types of programs produce some sustained academic benefits for children. In short, either option can be a good one for children.

But which option is better? Ultimately, the answer to that question must come from state and local governments. The right solution in state X is not necessarily the right solution in state Y. States considering pre-k expansion differ in their values (e.g., public opinion), their politics (e.g., party control), their resources (e.g., the tax base), and their opportunity costs (e.g., other worthwhile programs). These factors are likely to tilt the balance towards universal pre-k, targeted pre-k, or a hybrid option. ■

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7. The Costs and Benefits of Scaled-Up Pre-Kindergarten Programs

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As enthusiasm for public sector investment in pre-kindergarten programs has grown in the last two decades, advocates have increasingly turned to evidence that effective programs not only benefit participating children, but also that such programs generate an economic payoff to society as a whole. It is common to hear references to social returns of $7 to $10 for every dollar invested in high-quality pre-k; returns as high as 17-to-1 are cited as well.[1] Such economic evidence—typically based on a benefit-cost analysis or BCA—extends what we know from impact evaluation of pre-k programs, and it demonstrates whether the value to society of pre-k program impacts (relative to a baseline condition or status quo) are sufficiently large to outweigh the program cost. But how large are the economic returns likely to be, particularly from investing in scaled-up pre-k programs implemented with public funding? (See more on financing early childhood programs in Chapter 10.)

In this essay, I present the available evidence from economic evaluations of the costs and benefits of scaled-up pre-kindergarten (pre-k) programs and the implications of the research for investing in those programs. I focus on center-based pre-k programs implemented at the national, state, or school district level for one or two years prior to kindergarten entry, and I include both universal and targeted programs. Although I refer to evidence from small-scale demonstration programs such as Perry Preschool, those findings are not part of the primary evidence of interest. Rather, like the other papers in this volume, the aim is to understand what we can expect from scaled-up real-world programs. In presenting the research evidence, I also seek to highlight key methodological challenges in conducting economic evaluations of pre-k programs and the implications of those issues for the estimated magnitudes of the economic returns and for the degree of certainty in those estimates.[2]

The sections that follow begin with a discussion of one side of the BCA equation: the cost of scaled-up pre-k programs. Next, I consider the other side of the equation: the demonstrated outcomes of effective pre-k programs as well as the economic valuation attached to those outcomes and who stands to gain or lose from those impacts. Next, I discuss findings from studies that have compared benefits and costs using economic evaluation methods. I conclude by drawing out the implications of our current knowledge of the economic returns for public sector investment in large-scale pre-k programs.

Cost of Scaled-Up High-Quality Pre-K Programs

A starting point for economic evaluation is a comprehensive assessment of program cost. In the context of pre-k programs, the goal is to capture the value of the direct and indirect resources required to deliver the program, including both resources that require cash expenditures and resources provided in-kind. The latter may include, for example, space that is donated or partially subsidized, as well as classroom supplies provided by families to supplement what the program can cover. The cost of facilities is often not captured in school-based programs because buildings are owned outright or because costs for utilities and maintenance are recorded as part of a school or district's overhead expenses. Other overhead expenditures for program administrators and support functions may also not be included when accounting for a pre-k program's costs. Program costs are not necessarily equivalent to the fees that parents may be charged or the reimbursement rates for publicly funded programs.[3]

Analyses of pre-k program costs across multiple studies consistently show that the one of the largest expenditure components is compensation (both salaries and fringe

benefits) for instructional personnel.[4] Consequently, key drivers of per-child pre-k program costs include the education level of the staff, the salary scale and generosity of the fringe benefit package, the teacher-child ratio in the pre-k classrooms, and program intensity (e.g., part- versus full-day programs, academic-year versus calendar-year programs). Pre-k teachers in public school programs typically receive higher compensation than teachers in community-based programs,[5] although some publicly-funded programs require private providers to compensate teachers on the same scale as their public school counterparts.[6] Syntheses across pre-k program cost studies indicate that per-child costs are also higher when programs provide ancillary services, such as the health services component in Head Start, but they may be lower in programs with higher enrollment because of economies of scale.[7]

Budget-based estimates of pre-k program cost, based on national prices and 2016 dollars, indicate that a high-quality program—where each classroom is staffed with a lead teacher with a bachelor's degree compensated at parity with public school teachers and a teacher-child ratio of 1-to-10—ranges from $4,700 per child for a part-day (three hour) program to $8,600 per child for a school-day (six hour) program (see Table 1).[8]

Reports of the cost for specific state and district pre-k programs with rigorous evidence of impact—all of which employ teachers with at least a bachelor's degree and pay public school salaries—indicate that expenditures for a high-quality program can be even higher. For example, the universal pre-k program in Tulsa, Oklahoma, is estimated to cost $5,400 and $10,800 per child in 2016 dollars for the part-day and school-day programs, respectively.[9] Expenditures for the Boston Public Schools and the New Jersey Abbott Districts pre-k programs, both of which are school-day programs, are estimated to be $12,400 and up to $15,350 per child in 2016 dollars, respectively.[10] These higher costs reflect, in part, cost differentials across different parts of the country as well as variation across programs in their structural features—such features as teacher education, teacher-child ratio, program intensity, and supplemental services—that then drive costs.[11]

Pre-K Impacts and Their Potential Economic Benefits

The next step in an economic evaluation is to identify the range of outcomes affected by a high quality scaled-up pre-k program, the time path of those outcomes, the economic valuation attached to each outcome, and who accrues the economic gain or loss associated with the outcome. As discussed in the Consensus Statement in this volume, effective pre-k programs may lead to immediate benefits for participating children in terms of improved school-readiness when entering kindergarten, as well as intermediate benefits during the school-age years such as improved achievement scores, reduced special education use, and lower rates of grade retention. Eventual longer-term gains may include higher rates of high school graduation and other improved life course outcomes. The latter may include higher labor market earnings, reduced crime and delinquency, reduced welfare use, and improved health and health-related behaviors such as substance abuse.[12]

One challenge in conducting economic evaluations of pre-k programs is that many of these outcomes do not generate immediate monetizable benefits. Rather, the economic gains

Table 1. Estimated Annual Cost per Child for Scaled-Up Pre-K Programs (2016 Dollars)

	Part-Day Pre-K Program (3 hours per day)	School-Day Pre-K Program (6 hours per day)
LEAD TEACHER COMPENSATION		
Paid typical kindergarten teacher wages	$4,712	$8,628
Paid typical pre-k teacher wages	$4,276	$7,756

Source: Gault, Mitchell, and Williams (2008) with inflation to 2016 dollars.
Notes: Assumes classroom with group size of 20 children with a lead teacher with a bachelor's degree and an assistant teacher with a CDA. See Gault, Mitchell, and Williams (2008) for additional assumptions about program features.

Table 2. Outcomes Affected by Pre-K Programs and Stakeholders That Gain or Lose

OUTCOME	Timing of Monetizable Effect	Stakeholders Who Incur Monetizable Effect		
		Program Participants	Taxpayers	Rest of Society
Reduced child abuse and neglect	Childhood	+	+	
Improved school readiness	Adulthood	(+)	(+)	
Higher achievement tests	Adulthood	(+)	(+)	
Reduced special education use	K–12 years		+	
Reduced grade retention	K–12 years		+	
Increased high school graduation	Adulthood	(+)	+	
Increased higher education attainment	Adulthood	–	–	
Higher earnings and taxes paid	Adulthood	+	+	
Reduced crime	Adolescence to adulthood		+	+
Reduced welfare use	Adolescence to adulthood	–	+	
Improved health and health behaviors[a]	Adolescence to adulthood	+	+	+

Source: Author's analysis.
Note: + denotes a favorable effect; – denotes an unfavorable effect. Parentheses indicate monetizable effect is indirect, i.e., through linkages to later outcomes.
[a]Examples include depression, smoking, substance abuse, mortality, and teen pregnancy.

that can be readily quantified occur at later points in the school-age years and beyond. These can take the form of savings for the education system from reduced grade retention and special education costs or, in adolescence and adulthood, reduced costs associated with crime or higher earnings (see Table 2). For example, the gains in school readiness are not easily expressed as dollar benefits realized when a pre-k participant enters kindergarten. Studies do link improved school readiness to later success through higher rates of high school graduation and higher lifetime earnings,[13] but these dollar benefits will not be realized for a dozen years or longer.[14] Thus, while the costs of implementing the pre-k program occur upfront, the benefits accrue over time. Indeed the breakeven point—the point where cumulative monetary benefits exceed the upfront investment cost—may not occur for a decade or longer.[15]

The potential economic benefits from an effective pre-k program produce a combination of private returns in the form of economic gains for the pre-k program participants as well as public sector returns through cost savings to the public sector (see Table 2). Pre-k program participants gain from higher education attainment in the form of increased lifetime earnings and other education-related benefits such as improved health. Taxpayers gain from lower education system costs when there is less grade retention or special education use. Some benefits to taxpayers are simply an offset to a loss on the part of pre-k program participants. This is the case for increased taxes on earnings and reduced welfare benefits – gains to the public sector in each case but ones that are offset by a loss to the pre-k program participant.[16]

The social benefits constitute the combined benefits to the pre-k program participants themselves, the benefits to taxpayers, and a third category of private benefits to other members of society who did not participate in the pre-k program. As example of the latter category of benefits is when a pre-k program reduces crime (see Table 2). In addition to the reduced public sector costs to law enforcement and the criminal justice system, there are also private benefits to the potential crime victims through reduced costs for injury or property loss as well as reduction in the pain and suffering experienced by crime victims, especially those associated with violent crimes.

Because it takes time for many of the favorable effects of a pre-k program to materialize, it can be challenging to conduct a BCA when there has not been sufficient time to observe the outcomes that occur in the school-age years and beyond. For example, when conducting a retrospective BCA of a pre-k program that has been implemented and evaluated, the length of the follow-up period will determine which outcomes will have been measured in the evaluation.

While long-term follow-up is ideal in order to observe potential beneficial effects during the school-age years and adulthood, initial evaluation evidence may be limited to the

Table 3. Features of Scaled-Up Pre-K Programs with BCAs and Their Evaluations

	Impacts and BCA from Single Evaluation			Impacts and BCA from Meta-Analysis	
FEATURES	Chicago CPC	Tulsa UPK (2012)	Tulsa UPK (2016)	Head Start	State and District Programs
Features of pre-k program					
Scale	At scale; public school district	At scale; public school district	At scale; public school district	At scale; national	At scale; state or school district
Targeted or universal	Targeted[a]	Universal	Universal	Targeted[b]	Varies
Intensity	One or two years, part day	One year, part or full day	One year, part or full day	One or two years, part or full day	One or two years, part or full day
Lead teacher minimum education level	Bachelor's degree	Bachelor's degree	Bachelor's degree	Varies	Varies
Features of evaluation used in BCA					
Preschool cohort(s)	1983–1985	2002	2005	Varies	Varies
Age at last follow-up	26	5	14	Varies	Varies
Counterfactual	Few in pre-k	Higher pre-k participation	Higher pre-k participation	Varies	Varies

Source: For Chicago CPC: Arthur J. Reynolds, Judy A. Temple, Barry A. White, Suh-Ruu Ou, and Dylan L. Robertson, "Age-26 Cost-Benefit Analysis of the Child-Parent Center Early Education Program," *Child Development* 82, no. 1 (2011): 379-404. For Tulsa (2012): Timothy J. Bartik, William Gormley, and Shirley Adelstein, "Earnings Benefits of Tulsa's Pre-K Program for Different Income Groups," *Economics of Education Review* 31 (2012): 1143–1161; for Tulsa (2016): Timothy J. Bartik, Jonathan A. Belford, William Gormley, and Sara Anderson, "A Benefit-Cost Analysis of the Tulsa Universal Pre-K Program," Upjohn Institute Working Paper 16-261, (Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 2016); and for Head Start and state and district programs: Noa Kay and Annie Pennucci, "Early Childhood Education for Low-Income Students: A Review of the Evidence and Benefit-Cost Analysis", (Olympia, WA.: Washington State Institute for Public Policy (WSIPP), 2014).

[a]Children in high poverty neighborhoods.

[b]Children in in families with income below federal poverty level.

immediate impacts on indicators of school readiness, such as measures of gains in cognitive and non-cognitive skills. In such cases, it may be possible to link the observed outcomes to later outcomes using other research evidence. For example, an initial BCA of the Tulsa universal pre-k program, based on a quasi-experimental evaluation of the effects on school readiness, used parameters estimates from the experimental Tennessee Class-Size Study (also known as Project STAR for Student-Teacher Achievement Ratio) to project future gains in lifetime earnings from initial impacts of the Tulsa pre-k program on early achievement.[17] Such linkages assume a causal relationship between the observed outcome and the outcome projected for the future, but causal estimates are not always available or may not be available for the same population that received the pre-k program.

Other research provides linkages from achievement test scores at older ages to educational attainment and lifetime earnings, from grade retention to later school success and criminality, and from adolescent crime to adult criminal careers.[18] Such linkages are required in the absence of longer-term follow-up evidence, but they do mean that there is greater uncertainty in the estimates of economic returns compared to analyses based on observed longer-term outcomes.

Evidence from BCAs of Scaled-Up Pre-K Programs

Estimates of the high returns from investing in high-quality pre-k programs largely rest on two pre-k program impact evaluations:[19] the Perry Preschool program where the returns based on the age-40 follow-up are estimated to be as high as 17-to-1,[20] and the Chicago Child-Parent Centers (CPC) program, where the impact estimates as of the age-26 follow-up indicate returns of close to 11-to-1.[21] The Perry Preschool program, while well known, is also acknowledged to be a small-scale demonstration program, implemented in the 1960s with exceptionally high standards and serving a highly disadvantaged population of children at a time period when children in the control condition do not have alternative pre-k options. For these reasons, the estimated returns represent more of a proof of the principle that high-quality pre-k programs can produced positive economic benefits, rather than definitive evidence of the economic returns that would be expected from scaled-up programs.

The Chicago CPC program is arguably a scaled-up part-day program operated by the Chicago Public School district and targeted to children in low-income neighborhoods (see Table 3).

One advantage of this program is that, with follow-up to age 26 based on the Chicago Longitudinal Study, there are many adolescent and adult outcomes that are observed and readily monetized. These include special education use, grade retention, juvenile and adult crime, and adult earnings — all of which can be readily linked to private and/or public sector monetary benefits (see Table 4).

Taking into account projected impacts beyond age 26 such as earnings and taxes on earnings, crime, depression, smoking, and substance abuse), the net economic benefits to society are estimated to almost reach $97,000 per child (in 2016 dollars) and the return is nearly $11 for every $1 invested (see Table 5).

However, the Chicago CPC program may also be viewed as exceptional because the program evaluation focuses on a cohort of children that attended the program in the early 1980s, with impacts that may not be replicated in today's environment. Among scaled-up pre-k programs evaluated with recent cohorts, the Tulsa, Oklahoma, universal pre-k (UPK) program is one of the few to have a formal BCA in two studies (see Table 3). A first BCA was based solely on linking impacts of the program on school readiness to lifetime earnings for the 2002 Tulsa UPK cohort, while a second linked effects on grade retention to lifetime earnings and lifetime crime for the 2005 Tulsa UPK cohort (see Table 4).[22]

The estimated returns from two studies of the Tulsa universal pre-k program are positive but smaller than those for Chicago CPC or Perry Preschool. The first study estimated a benefit-cost ratio as high as 4.08 for Tulsa UPK participants in the lowest income group (those eligible for a free lunch because their family income was below 130 percent of the federal poverty guidelines) who attended the part-day program. Returns were as low as 2.82 for the highest income subgroup (those with family income above 185 percent of the federal poverty guidelines) (see Table 5). The estimates from the second study found somewhat smaller returns ranging from negative for the part-day program (across children in all income groups) to a maximum of 3.10 for the middle income

group defined as those with family income between 130 percent and 185 percent of the federal poverty guidelines. Across both Tulsa universal pre-k BCAs, the economic returns were positive for children across the income spectrum, although the program impacts and hence the economic returns tended to be larger for the two lowest income groups for whom family income was below 185 percent of the federal poverty level.

Estimates for Washington State, which are based on meta-analyses of targeted pre-k program impacts (including smaller-scale model programs), and for the Washington State Institute for Public Policy (WSIPP) benefit-cost model also suggest returns in this same range: from about $2 to $4 for every dollar invested (see Tables 3 to 5). The estimated return for the Head Start program, which largely serves children in families with income below the federal poverty level, was 2.63 and the return for state- and district-pre-k programs serving low-income children was 4.20.

The WSIPP meta-analyses include studies with longer-term follow-up, hence its BCA estimates include observed, linked, or projected outcomes for special education use, grade retention, high school graduation, and crime (see Table 4). With this fuller accounting, the WSIPP estimates for state and district targeted pre-k programs indicate that the benefits to taxpayers alone of about $9,400 per child in 2016 dollars exceed the program cost of about $7,200 per child. However,

Table 4. Outcomes Valued in Scaled-Up Pre-K Program BCAs

	Impacts and BCA from Single Evaluation			Impacts and BCA from Meta-Analysis	
OUTCOME	Chicago CPC	Tulsa UPK (2012)	Tulsa UPK (2016)	Head Start	State and District Programs
Child abuse and neglect	O, P	–	–	–	–
Achievement tests	X	L	–	L	L
Special education use	O	–	–	O	O
Grade retention	O	–	L	O	O
College/adult education net savings	O	–	–	–	–
High school graduation	X	–	–	L	L
Earnings (and taxes)	O, P	(L)	(L)	(L)	(L)
Crime	O, P	–	(L)	O, P	O, P
Welfare use	–	–	–	–	–
Depression	O, P	–	–	–	–
Smoking	O, P	–	–	–	–
Substance abuse	O, P	–	–	–	–
Teen birth	–	–	–	O	–
Mortality	–	–	–	–	–

Source: Based on the sources cited in Table 3.
Note: Abbreviations: L = outcome linked to another outcome indicated by (L); O = observed outcomes; P = projected outcomes; X = excluded from valuation. – = not measured or no significant effect.
[a]Based on the most recent BCA for those with BCAs at multiple ages.

Table 5. BCA Results for Scaled-Up Pre-K Programs

PROGRAM, SUBGROUP IF RELEVANT	Per Child (in 2016 dollars) PDV Cost to Society	PDV Benefits to Society	NPV Benefits to Society	Benefit-Cost Ratio for Society
Chicago CPC	9,853	106,748	96,895	10.83
Tulsa UPK (2012) part-day, free lunch subgroup	5,411	22,077	16,666	4.08
Tulsa UPK (2012) part-day, reduced-price lunch subgroup	5,411	16,179	10,768	2.99
Tulsa UPK (2012) part-day, full-price lunch subgroup	5,411	18,614	13,203	3.44
Tulsa UPK (2012) full-day, free lunch subgroup	10,822	33,439	22,618	3.09
Tulsa UPK (2012) full-day, reduced-price lunch subgroup	10,822	37,335	26,513	3.45
Tulsa UPK (2012) full-day, full-price lunch subgroup	10,822	30,518	19,696	2.82
Tulsa UPK (2016)	9,461	17,904	8,444	1.89
Tulsa UPK (2016) part-day	5,712	(1,996)	(7,708)	–0.35
Tulsa UPK (2016) full-day	11,425	12,074	649	1.06
Tulsa UPK (2016), free lunch subgroup	10,088	17,483	7,394	1.73
Tulsa UPK (2016), reduced-price lunch subgroup	9,038	28,059	19,020	3.10
Tulsa UPK (2016), full-price lunch subgroup	7,886	9,081	1,195	1.15
Head Start (meta-analysis)	8,952	23,470	14,518	2.63
State and district preschool programs for low-income Three- and four-year-olds (meta-analysis)	7,290	30,535	23,244	4.20

Sources: Based on the sources cited in Table 3.
Notes: All dollar values were converted to 2016 dollars using the Consumer Price Index for All Urban Consumers. The benefit-cost ratios are the ratio of the present discounted value of total benefits to society as a whole (participants and the rest of society) divided by present discounted value of program costs. The discount rate is 3 percent and discounting is to ages three or four. In the two Tulsa UPK BCAs, the free lunch subgroup are children whose family income is below 130 percent of the federal poverty guidelines, those in the reduced-price lunch subgroup have family income between 130 percent and 185 percent of the federal poverty guidelines, and those in the full-price lunch subgroup have family income greater than 185 percent of the federal poverty guidelines.

most of the return to taxpayers comes from the higher taxes paid out of the increase in pre-k participants' lifetime earnings. The estimated savings to the education system from reduced special education use and grade retention are not enough to cover the pre-k program costs. In general, the available BCAs suggest that the benefits to the public sector from high-quality pre-k programs derive mostly from improvements in participants' longer-term outcomes, especially earnings.

The 2012 Tulsa BCA further demonstrates that, if the estimated linkage between early cognitive skills and lifetime earnings employed in the study is accurate,[23] a pre-k program with moderate impacts could potentially generate positive net benefits to society solely through the effect on participant earnings, even without accounting for potential economic benefits in other domains. For instance, with estimated returns of about 3-to-1 for the full-day Tulsa universal pre-k program, the impacts on the cognitive assessments could have been about one-third as large, and the program would have at least broken even. That is, the present value of its benefits would be at least equal to present value cost.[24]

Is it possible that longer-term follow-up of recent cohorts of pre-k participants would show economic returns on par with those estimated for Perry Preschool or even Chicago CPC? Meta-analyses document that the estimated impacts of pre-k programs have declined in more recent cohorts relative to earlier cohorts. This pattern is attributed to several factors, including the increased exposure to early learning and care programs among children in the control or comparison condition, as well as to improved home environments in low-income families.[25] Lower impact estimates of pre-k participation for outcomes such as crime will substantially

reduce the estimated returns. For example, 46 percent of the net present value benefits for the Chicago CPC program based on the age-26 follow-up impacts were from the reduction in crime, compared with about 17 percent in the 2016 Tulsa benefit-cost analysis or the WSIPP BCAs for Head Start and state and district pre-k programs.[26]

On the other hand, it is worth noting that the series of BCAs for both Chicago CPC and Perry Preschool conducted at each follow-up age indicate that the projection methods used to forecast longer-term benefits beyond the last observed impacts tended to understate the future favorable impact of each program, especially on earnings, possibly because of the application of conservative assumptions.[27] Further, BCAs based on projections from short-term impacts, such as those conducted for the Tulsa UPK program, are likely to underestimate the full economic benefits from the program because they do not account for other short- and longer-term outcomes. This demonstrates the importance of having longer-term follow-up data from which to measure later outcomes rather than having to rely on projections based on short-term follow-up information.

A final point regarding the estimates of economic return is that there can be considerable uncertainty regarding the estimates of net benefits and the benefit-cost ratio. One source of uncertainty is that the impacts of the pre-k program on short- and longer-term outcomes have both a point estimate and a confidence interval based on the program evaluation findings. Thus, when program impacts are imprecisely estimated, the associated estimates of net benefits will also be uncertain. There is also uncertainty when outcomes are projected to the future and in the economic values assigned to any given outcome. Some BCAs take these and other sources of uncertainty into account and report a confidence interval for estimates of net benefits or the benefit-cost ratio.[28] For example, the WSIPP model, based on Monte Carlo simulations, indicates that the probability of realizing positive net benefits is about 90 percent for both the Head Start program and state and district programs.[29]

Implications for Investing in Pre-K Programs

The cost to implement a high-quality full-day pre-k program can be substantial, at least $8,500 per child in programs with proven benefits in such states as Oklahoma and New Jersey. Moreover, districts may spend more per child where teacher education levels are higher, salary costs are greater, or more extensive services are offered. Although economic returns from 7-to-1 up to 17-to-1 are frequently cited for high-quality pre-k programs, the available estimates for scaled-up programs serving more recent cohorts suggest more realistic estimates of the returns are in the range of 2-to-1 to 4-to-1.[30] Estimated returns in this range still justify public sector investment in high-quality pre-k programs if the requirement is that a pre-k program produce positive net benefits to the public sector and to society as a whole.[31]

At the same time, it is important to recognize that while we have an extensive and growing base of impact evaluations of scaled-up pre-k programs, we have relatively few economic evaluations, especially for scaled-up programs implemented with more recent cohorts of children. Despite this limitation, the evidence base we do have has several potentially important implications for ongoing and future investments in pre-k programs:

1. Economic returns can be expected to vary across states and districts implementing scaled-up pre-k programs. Even after accounting for variation in prices across different parts of the county, differences in program features means that we can expect per child costs to differ across scale-up pre-k programs. Likewise, as documented in other chapters in this volume, including those by Ladd, Farran and Gormley, we know that the impacts of pre-k programs will vary as well. Consequently, we would expect to see a range of realized net benefits or benefit-cost ratios across scaled-up state and local pre-k programs.

2. Positive economic returns are unlikely for low-quality pre-k programs. The estimated positive returns for targeted and universal pre-k programs produced to date derive from moderate- to high-quality programs with at least moderate impacts on outcomes such as school readiness. Lower-quality programs, while costing less, are less likely to generate favorable impacts on shorter- and longer-term outcomes, and therefore less likely to generate positive net benefits to the public sector or to society, than those of higher quality.

3. Per-child economic returns are likely to be higher for economically disadvantaged children, but total benefits to society can be larger for universal programs compared with targeted ones. Although the net present value benefits per child tend to be larger for children at greater risk of poor education outcomes, when benefits are aggregated across all children served, the aggregate net present value to society can be larger for universal programs compared with targeted ones.[32]

4. Unless impacts on school outcomes (e.g., special education placement) are exceptionally large, the intermediate-term savings to the education system are not likely to be large enough to cover the cost of a high-quality pre-k programs. The effects of participation in a high-quality pre-k program on special education placement, for example, are likely to depend on how special education status is assigned, the process of reassignment when special education services are no longer needed, and whether reductions in special education services on the part of some students actually result in reductions in spending on special education services.[33] These factors will affect the ability of financing mechanisms such as social impact bonds to rely on short-term education savings as a source of payback for investments in high-quality pre-k programs.[34]

5. The economic returns to high-quality pre-k programs accrue to multiple stakeholders in the public and private sectors. As with human capital investments, more generally, a large portion of the economic returns to high-quality pre-k programs accrues to program participants in the form of higher lifetime earnings. The public sector gains from higher taxes paid out of the earnings gains, but the nature of the current tax system is such that much of those tax benefits accrue to the federal government, while the bulk of the pre-k program investment may be borne by state and local governments. This potential mismatch between the level of government that accrues the costs and benefits of pre-k investments may also apply across government sectors, with pre-k program costs paid for out of an education agency's budget but with benefits accruing not only to that agency, but to other government sectors as well, such as the criminal justice and social welfare systems and the tax authority. The use of BCA as a tool can help make the case for the relative contributions to a pre-k program investment across the various levels of government, as well as across multiple government sectors. ■

[1] See for example: Barack Obama, "Remarks by the President in the State of the Union Address" (speech. Washington DC, February 12, 2013), Office of the Press Secretary, The White House, https://www.whitehouse.gov/the-press-office/2013/02/12/remarks-president-state-union-address; Business Roundtable and Corporate Voices for Working Families, *Why America Needs High-Quality Early Education* (Washington, D.C.: Business Roundtable and Corporate Voices for Working Families, 2009); Institute for a Competitive Workforce, *Why Business Should Support Early Childhood Education* (Washington, D.C.: U.S. Chamber of Commerce, 2010).

[2] For more in-depth discussion of the methodological issues involved in economic evaluation of early childhood programs, see Lynn A. Karoly, "Toward Standardization of Benefit-Cost Analyses of Early Childhood Interventions," *Journal of Benefit-Cost Analysis* 3 (2012). A more general treatment of economic evaluation of programs that invest in children, youth, and families can be found in Eugene Steurle and Leigh Miles Jackson, eds., *Advancing the Power of Economic Evidence to Inform Investments in Children, Youth, and Families* (Washington DC: National Academies Press, 2016).

[3] There is relatively little research to examine how the scale of a preschool program affects its costs or how expanding preschool funding to serve more children in a state or locality affects costs (e.g., through effects on wages or facilities costs as demand for those resources increase in the short-term before supply can expand).

[4] See Barbara Gault, Anne W. Mitchell, and Erica Williams, *Meaningful Investments in Pre-K: Estimating the Per-Child Costs of Quality Programs* (Washington DC: Institute for Women's Policy Research, 2008); and Pia Caronongan et al., *Assessing the Implementation and Cost of High Quality Early Care and Education: A Review of Literature*, (Washington DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services, 2016). *OPRE Report 2016-31.*

[5] Estimates of mean annual salary for teachers with a bachelor's degree show a 50-percent premium for pre-k teachers in school-sponsored pre-k programs compared with teachers working in non-school-sponsored early childhood programs serving three- to five-year-olds (almost $43,000 versus about $29,000 in 2012 dollars). See Marcy Whitebook, Caitlin McLean, and Lea J.E. Austin, *Early Childhood Workforce Index 2016* (Berkeley, CA: Center for the Study of Child Care Employment, University of California, Berkeley, 2016).

[6] W. Steven Barnett, et al., *The State of Preschool 2015: State Preschool Yearbook*, (New Brunswick, N.J.: National Institute for Early Education Research, 2016).

[7] Pia Caronongan et al., 2016.

[8] The estimates are from Barbara Gault, Anne W. Mitchell, and Erica Williams, 2008, where their estimates in 2007 dollars have been inflated to 2016 dollars using the Consumer Price Index for All Urban Consumers (CPI-U).

[9] The estimates are from Timothy J. Bartik, William Gormley, and Shirley Adelstein, "Earnings Benefits of Tulsa's Pre-K Program for Different Income Groups," *Economics of Education Review* 31 (2012): 1143–1161, with inflation from 2005-2006 values to 2016 values using the CPI-U.

[10] The estimates are from Jim Minervino, *Lessons from Research and the Classroom: Implementing High-Quality Pre-K that Makes a Difference for Young Children* (Seattle, WA: Bill and Melinda Gates Foundation, 2014), again with inflation from 2013 values to 2016 values using the CPI-U.

[11] The regional price index published by the Bureau of Economic Analysis shows that as of 2014, compared to the national average (index value of 100), non-housing service costs in the Tulsa metropolitan area are below the national average (index of 94.2), while costs are above the national average in the Boston metropolitan area (index of 108.7). The equivalent statewide index for New Jersey was even higher (index value of 115.4). Applying these indexes to the cost estimates for the Tulsa and Boston pre-k programs results in per-child cost estimates, at national prices, of about $11,400 for Tulsa and $11,200 for Boston. The range of cost estimates for New Jersey, at national prices, would be $10,600 to $13,100.

[12] One category of potential benefits that is typically not accounted for in BCAs of pre-k program is any favorable effects on parents' employment and earnings. This is largely because adult-related outcomes are typically not included in impact evaluations of scaled-up pre-k programs.

[13] This method of linking school readiness to lifetime earnings is used by the BCA of the Tulsa UPK program conducted by Timothy J. Bartik, William Gormley, and Shirley Adelstein, 2012. A linkage from school readiness skills or other achievement scores to high school graduation and earnings is also used in the BCA model developed by the Washington State Institute of Public Policy (WSIPP). See Noa Kay and Annie Pennucci, *Early Childhood Education for Low-Income Students: A Review of the Evidence and Benefit-Cost Analysis* (Olympia, WA: Washington State Institute for Public Policy, 2014).

[14] In a BCA, future dollars are discounted to present dollar values recognizing that dollar in the future is worth less than a dollar today. The assumed discount rate is typically 3 percent, although some BCAs estimate how high the discount rate can be before net benefits become zero (also known as the internal rate of return). See Lynn A. Karoly, 2012.

[15] The breakeven point is typically not reported in BCAs of pre-k programs. An estimate for the Perry Preschool program indicated the breakeven point did not occur until age 20, 15 years after the program ended. See Lynn A. Karoly et al., *Investing in Our Children: What We Know and Don't Know about the Costs and Benefits of Early Childhood Interventions*, MR-898 (Santa Monica, CA: RAND Corporation, 1998).

[16] A BCA would also account for the net savings to the public sector from lower administrative costs for the welfare system, along with the net change in deadweight loss associated with the tax and transfer system. See Karoly, "Toward Standardization" for a discussion.

[17] The Bartik, Gormley, and Adelstein, 2012 study uses estimates of the effect of a standard deviation change in kindergarten test scores on lifetime earnings from Raj Chetty et al., "How Does Your Kindergarten Classroom Affect Your Earnings? Evidence from Project STAR," *Quarterly Journal of Economics* 126 (2011): 1593–1660.

[18] See for example, the linkages applied in the WSIPP BCA model (Noa Kay and Annie Pennucci, 2014) or in the updated Tulsa pre-k BCA conducted by Timothy J. Bartik et al., "A Benefit-Cost Analysis of the Tulsa Universal Pre-K Program," Upjohn Institute Working Paper 16-261 (Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 2016).

[19] Lynn A. Karoly, "The Economic Returns to Early Childhood Education," *Future of Children* 26 (2016): 37–55.

[20] For the initial Perry Preschool age-40 BCA, see W. Steven Barnett, Clive R. Belfield, and Milgros Nores, "Lifetime Cost-Benefit Analysis," in *Lifetime Effects: The High/Scope Perry Preschool Study Through Age 40,* ed. Lawrence J. Schweinhart et al., Monographs of the High/Scope Educational Research Foundation 14 (Ypsilanti, MI: High/Scope Press, 2005), 130–57. For a somewhat smaller estimate, see the reanalysis of the Perry Preschool impact evidence by James J. Heckman et al., "The Rate of Return to the HighScope Perry Preschool Program," *Journal of Public Economics* 94 (2010): 114–128.

[21] Arthur J. Reynolds et al., "Age-26 Cost-Benefit Analysis of the Child-Parent Center Early Education Program," *Child Development* 82 (2011): 379–404.

[22] Bartik, Gormley, and Adelstein, 2012, and Timothy J. Bartik et al., 2016, respectively.

[23] As discussed in Bartik, Gormley, and Adelstein, 2012, the estimated relationship between early test scores and lifetime earnings based on the Tennessee STAR study are consistent with estimates from other studies and also provide accurate forecasts of future earnings for the Perry Preschool and Chicago CPC program participants relative to the observed impacts in the follow-ups to age 40 and age 26, respectively.

[24] The effect size for the average test score percentile across children in all income groups and for both the part- and full-day programs estimated by Bartik, Gormley, and Adelstein, 2012 was about 0.90, so an effect size of at least 0.30 would have produced a benefit-cost ratio of at least 1.

[25] See, for example, Greg J. Duncan and Katherine Magnuson, "Investing in Preschool Programs," *Journal of Economic Perspectives* 27 (2013): 109–132.

[26] Arthur J. Reynolds et al., 2011; Timothy J. Bartik et al., "Benefit-Cost Analysis;" and Noa Kay and Annie Pennucci, 2014.

[27] Lynn A. Karoly, "Economic Returns."

[28] Estimates of net benefits are also sensitive to the assumed discount rate which, as noted earlier, is typically 3 percent for BCAs of early childhood programs. A higher discount rate will reduce the estimated returns, especially given that benefits from pre-k programs accrue over time. The 2012 BCA for the Tulsa program showed that net benefits would still be positive with a 5 percent discount rate. Indeed, the internal rate of return was estimated to be about 6 to 7 percent depending on the income subgroup and part- versus full-day attendance. See Bartik, Gormley, and Adelstein, "Earnings Benefits."

[29] Noa Kay and Annie Pennucci, 2014.

[30] Estimated returns from several prospective BCAs of universal pre-k programs also fall in this same range. See Lynn A. Karoly, 2016.

[31] If a government decisionmaker is comparing the returns to a pre-k program relative to alternative uses of the same funds, it is possible that the pre-k program, despite having positive net benefits, would not be as cost-beneficial as the alternative.

[32] This result is demonstrated in forecasts of the economic returns from universal versus targeted programs in California and Cincinnati, respectively, produced by Lynn A. Karoly and James H. Bigelow, *The Economics of Investing in Universal Preschool Education in California*, MG-349 (Santa Monica, CA: RAND Corporation, 2005); and Lynn A. Karoly et al., *Options for Investing in Access to High-Quality Preschool in Cincinnati*, RR-1615 (Santa Monica, CA: RAND Corporation, 2016).

[33] School districts may elect to increase the intensity of special education services for a smaller pool of students, rather than see their special education funds decline.

[34] For further discussion of social impact bonds and other pay-for-performance contracting mechanisms see Jeffrey B. Liebman, *Social Impact Bonds: A Promising New Financing Model to Accelerate Social Innovation and Improve Government Performance* (Washington, D.C.: Center for American Progress, 2011).

8. Challenges to Scaling Up Effective Pre-Kindergarten Programs

W. STEVEN BARNETT

A significant concern for early education policy is how to ensure that scaled-up public programs produce the large gains in learning and development that have been found in the most widely cited small-scale studies of preschool programs, including the Perry Preschool and Abecedarian projects, and Chicago Parent-Child Centers.[1] Some scaled-up public preschool programs have produced smaller impacts on children's cognitive abilities than have been found for small-scale programs subject to long-term term follow-up and benefit-cost analysis.[2] Moreover, some major studies, including multi-site randomized trials, have found only modest initial impacts and failed to find meaningful persistent impacts after even a few years of exit from preschool programs whether they begin with infants and toddlers or with older preschoolers.[3] The findings from the small-scale studies show that long-term positive impact is possible, but the sobering findings from some studies of scaled-up programs indicate that barriers must be overcome to reproduce the success of the initial programs.

This chapter examines specific potential obstacles to scaling up a program, their likely roles in reducing the effectiveness of preschool programs, and how each might be overcome or mitigated.

What Might Explain the Observed Differences in Impact?

Multiple explanations have been offered for these apparent differences in outcomes, only some of which relate to the challenge of scale-up. This chapter deals with the two most relevant explanations. The first is that times have changed, and differences in population and context for both the "treated" group and the "control" group may alter the expected results of programs. The second is that current scaled-up programs too often differ from the older, smaller programs in ways that reduce their persistent impacts. Only the latter explanation is a problem of scale-up. The remainder of this section considers each category, but it is not an exhaustive list of the possibilities and is presented only to indicate the potential for each category to be a substantive influence.

Populations and Contexts Differ

Differences in population and context are relevant in two ways. One is that the specific samples and contexts of the older small-scale, single-site studies may have been particularly favorable to larger program impacts. For example, more than 80 percent of the Abecedarian families reported a smoker in the home.[4] This rate is extraordinarily high. Might taking the child out of those homes for up to 10 hours a day for most days in the first five years have improved health and development by reducing exposure to secondhand smoke? The communities in which the Perry, Abecedarian, and even the Chicago Longitudinal studies were conducted may have had elements that contributed to success.

Applying the results from any study conducted decades ago to policy and programs today is also problematic because of substantial changes in both the population and the circumstances in which it lives. The most obvious change is a tremendous increase in the immigrant population and in the percentage of children and families who are Hispanic. Yet, there are other important changes, as well. For example, the education levels of the parents of African-American children are much higher today than 30 to 50 years ago. The percentage of children born to teen mothers is much lower, and parents are less likely to smoke during and after pregnancy. The broader contexts in which children and families live also have changed. Access to health care has improved, as has health care itself. The air and water are cleaner, and children are less exposed to such environmental toxins as lead today, even if

some problems remain. All of these changes are likely to have contributed to improved child development among children who do not receive the "experimental" preschool program, which could reduce the potential for detecting program impacts.

Another important change over time is that children have much greater access to formal early care and education outside the home, including many publicly-funded programs. A study that tests an "experimental" program must produce an impact that is greater than the impact of these readily-available programs. Forty years ago, the "non-experimental group" (that is, the control group) had little access to any education; today, the control group has better access, thus raising the bar for an experimental program to clear. Changes in access to center-based programs and other services such as home visiting together with changes in home environments substantially alter the counterfactual in recent early care and education studies compared to those from many decades ago. All of these changes would tend to reduce the potential impacts of any public early care and education program.

Programs Differ in Important Respects

In several obvious respects, public programs today are not comparable to those programs that produced positive evidence in the past. Children often attend such programs for at most one school year, and even though Head Start is offered for multiple years, many children do not attend multiple years. Significantly, the national Head Start impact study examined the impact of just one year. (The large-scale randomized trial of Early Head Start in which children attended the program for up to three years is an exception, but focused on a younger age range.) By contrast, the Perry Preschool program was two school years and Abecedarian was birth to five, year-round. The Chicago Child Parent Centers offered two school years of preschool education.

The Perry, Abecedarian, and Chicago programs had well-paid, well-educated teachers with strong supervision and very strong ratios (especially for Perry and Abecedarian).[5] The Perry Preschool had one highly qualified teacher for roughly every six children. Both Perry and Abecedarian were much more expensive than typical programs. The Chicago program was not nearly as expensive as the other two, but even it is toward the high end of current public programs in terms of cost, teacher qualifications, supervision, and student-teacher ratios. In order to expect the level of positive impact that was achieved by these programs, contemporary scaled-up programs may need to be funded at the same levels with similarly-credentialed teachers.

For none of these three widely cited programs do we have detailed data on observed quality of teaching that can be compared to data from research on current public programs. The fact that Perry and Abecedarian were designed and implemented specifically for study could lead one to suspect that quality of implementation was high. Despite debate about the contributions of duration, structural features, and process quality to about program effectiveness, all of the features noted in the original programs that have been degraded during scale-up could be expected to increase program impacts relative to current large-scale public programs.[6]

Implications for Expectations

Overall, policy makers, practitioners, and the public should expect less remarkable results from today's large-scale public programs than from the most frequently cited studies of yesterday. This does not mean, however, that expectations should be lowered to the extent that investments in high-quality programs are viewed as unjustified. Preschool programs need to produce only a modest portion of the larger impacts on learning and development produced by the well-known small-scale models—particularly given their much more modest costs.

A survey of more recent studies indicates substantial variation in program outcomes that can be influenced by design and implementation.[7] Moreover, while the logic of the previous section dictates only that outcomes from today's large scale programs should be somewhat lower, it does not indicate how much lower.

The remaining sections of this chapter are devoted to understanding how major policy obstacles limit the effects of public early childhood programs. The goal is to identify policy changes that might reverse this situation to enhance program outcomes.

Why Are Scaled-Up Programs Not Optimally Designed or Implemented?

Three broad factors explain the shortfall in results when taking preschool programs to scale: insufficient knowledge, policy design failure, and program implementation failure. Fortunately, all three factors can be remedied. They are general problems for public policy, and multiple literatures inform us about them from the perspectives of different disciplines and different professions, including medicine, public health, and education.

Recently, Weiland has addressed all three issues in exploring the development of "preschool 2.0" explicitly focusing on what can be done to improve programs at scale.[8] The field's common distinction between structural quality and process quality can be viewed as roughly aligning with the distinction between design failure and implementation failure. The comparison is by no means exact, however, because a strong educational focus and curriculum, both of which are important aspects of design, may be viewed as either process or structure depending on one's perspective.

Program Designers Do Not Specify Necessary Components of the "Model" Sufficiently

The first plausible explanation for smaller effect sizes in scaled-up programs is that large-scale programs have inadvertently neglected important features that contributed to success of small-scale programs, including the ways in which program impacts may vary with characteristics of the children and family served and the larger context in which the program operates. The empirical literature on how variations in program features affects outcomes offers less than perfectly clear guidance.[9] Relations between children's learning gains and the most commonly used measures of classroom environment and teaching are modest.[10] Empirical relations with such program structural features as teacher education level and class size or ratio are even weaker.

There are some other obvious limitations of the research base. Relative to other fields such as medicine, there is just too little research. An inherent limitation of small-scale studies is that in and or themselves they cannot provide us with information about how context affects results. A common limitation of randomized trials is that they do not in fact follow the model of a true experiment. In such studies, the treatment is not defined with enough detail to replicate the program. Often they weakly control the treatment and do not control at all—and frequently do not even measure—the "control" condition. This problem afflicts much of the preschool curriculum research that tests a "model" or brand against an alternative that is either not defined at all or is also defined by a label.

In addition, as the Planned Variation Head Start and Follow-Through studies revealed, there is considerable variation within curriculum models and substantial overlap across models that adds to the difficulty of drawing conclusions about what is more effective generally.[11] If the alternatives and their counterfactuals are not clearly defined, or if they vary (perhaps necessarily) with local context, it is difficult to draw useful general conclusions for policy and practice.

Identifying Characteristics of Effective Scaled-Up Programs

An alternative approach to scaling up small programs is to ask what are the common features of programs that have produced large gains in learning and development Both meta-analyses and conventional literature reviews can provide this type of information. They have yielded some useful guidance, but the level of specificity that they can provide is limited.[12]

How much specificity is required? I would argue that we know enough, and have enough examples of scaled-up programs that "work," to be able to specify reasonably effective models at the classroom level in enough practical detail that if implemented as designed impacts on learning and development would be substantially larger than in many current programs. No doubt these are not the only effective approaches, but it is sufficient to have some, including examples at scale.[13] The question then becomes what else is necessary to ensure that these models operate consistently at scale. Unfortunately, as Fullan has noted more generally: "We know a great deal about individual school success; we know far less about school system success."[14]

What additions to research would help? Several are suggested. First, embed randomized trials and other strong designs within large-scale programs to test variations at scale systematically. Second, move from studies that compare

models or "brands" of programs and curricula to studies designed to test specific theories of learning and teaching that can be operationalized as well-defined generic practices. Third, invest in research on the problem of going to scale. Coburn has suggested an approach that would lead to greater knowledge about four interrelated dimensions: depth of implementation including adoption of pedagogical principles; sustainability over many years; spread of norms, beliefs, and principles; and ownership by teachers and administrators throughout a system.[15] Finally, in each of these research domains increase the number of studies of failure, or "post-mortems," to learn more about what prevents us from producing the desired results, particularly what may be missed from a focus on "success."[16]

Scaled-Up Program Design Failure

Scaled-up programs intentionally are designed in ways that do not replicate the models that proved effective in small-scale studies. Program design is a highly political, not just a technical, process. One result of this difference is that programs are designed to be less expensive than models found to be highly effective and to differ in their input mix, curriculum, and other features in ways that appeal to various constituencies. When decisions are made to alter program design to reduce cost and satisfy constituents rather than based on what has been found effective, a reduction in effectiveness should be expected.

Our knowledge about this problem is informed by research on public policy implementation. Strong political will is a key condition for taking what works to scale.[17] Head Start and Early Head Start are two of the better-funded and most policy-transparent early childhood programs, but given the broad missions they have been given, neither is adequately funded or has the features of proven small scale programs.[18] Head Start pays teachers and assistant teachers near poverty level wages, is often of very limited duration, and has low instructional quality. Many state-funded pre-k programs can be similarly criticized and can fall even further short of the models found to be highly effective.[19]

Politicians always face the temptation to promise the results achieved from a particular model or models while allocating available resources in such a way as to maximize the number of voters and special interests who benefit. The inevitable result is that per child expenditures are inadequate to fund a program replication. Rarely does political conversation regarding expenditures on early childhood begin with an analysis of financial adequacy, the amount per child required to produce a program that will produce the desired results for the population to be served. The public often has too little information to discern the difference between what is promised and what is enacted, and elected officials have incentives to limit such information from evaluation.[20]

Consider the following example. The Perry Preschool program is perhaps the most successful and well-known model of preschool education in terms of its long-term effects, and it has been cited to support virtually every publicly funded early care and education program. Yet, no public program has ever attempted to implement the Perry program model at scale. The Perry program served most children for two years beginning at age three, and had two highly qualified public school teachers for every 12 children, weekly home visits in which children received individual tutoring, and an expert curriculum team that developed the curriculum and worked with the teachers on implementation. It is much more expensive than any current public program outside of preschool special education.

Schweinhart, the developer of the Perry model, suggests that something less than a full replication might produce reasonably similar outcomes with such an approximate replication serving children at ages three and four with a certificated teacher and assistant for no more than 16 children, a research-based curriculum in which they have had substantial training, and extensive parental outreach including weekly visits with the children.[21] To date, New Jersey's Abbott preschool program is the only large-scale program that even approaches this approximation, and it resulted from a court order.

Yet, even the elements outlined by Schweinhart would be sufficient to implement the program only at a single site and not at scale in a system.[22] Minervino captures some of the additional factors required to take a program to scale as a system with the 15 essential elements that he identifies based on a case study of "exemplars" of scaled-up programs.[23]

Beyond the classroom, this takes us to issues relating to governance, finance, preparation of the workforce, data systems, accountability and continuous improvement, and quality standards. Barnett and Frede outline much of this systemic capacity for New Jersey's Abbott program with the most detailed attention given to a continuous improvement system that begins with standards for learning and teaching and means for assessing performance at the child, teacher, center, district, and state levels.[24]

Implementation Failure of Scaled-Up Programs

It may frequently be the case that scaled-up programs are not implemented as designed. Our knowledge about this problem is informed by research on program implementation, including what is referred to as "implementation science."[25] The early care and education field could learn much from research on efforts to introduce evidence-based practice into medicine and fields other than education.[26]

Early childhood researchers have devoted some attention to the problem of implementation, but most of this research has been confined to what goes on in an individual classroom as influenced by individual teachers, curriculum, and professional development.[27] As Weiland discusses, there is great heterogeneity in process quality and large differences between scaled-up programs identified as successes and those found to have weaker effects.[28] The problem of producing fidelity system-wide and sustaining that fidelity over the long-term is not likely to be addressed fully at the classroom level alone because it requires the absorption of norms and principles and ownership of the "model" far beyond the classroom teacher.[29] It may also require that systems address – or modify their policies and practices to better accommodate—broader problems of the educational system, such as teacher churn, that are not specific to the early years or early childhood education.[30]

Currently, there is considerable interest in two particular approaches to improving implementation. One is the use of Quality Rating and Improvement System (QRIS).[31] The QRIS is designed to encompass early care and education systems very broadly; but its potential efficacy has been questioned, and research has so far not indicated that it is designed to support quality at levels that could be expected to produce large gains for children.[32] The other is increased use of well-defined, domain-specific curricula.[33] This recommendation sits at the intersection of the problems of design and implementation.

A comparison of the two strategies raises the issue of the level of detail regarding practice that policy should specify. At present, it is difficult to judge how productive it may be to specify a curriculum for each domain of interest based on the existing research. Such an approach could be effective when looking at one curriculum and domain at a time and not be effective in the aggregate. For example, the cognitive demands on teachers might be much greater overall. Or, when the focus is on one subject, this subject receives additional time and attention while other relevant subject matters and domains get crowded out. In addition, nearly all of the recent curriculum studies are short-term and small scale. These studies may not be a good guide to what is successful in a sustained effort of five to 10 years. It may well take five years for teachers to learn and commit fully to the underlying principles and to change teaching practices as required by a rigorous, comprehensive curriculum. Moreover, they might be willing to do so only if this is a permanent change to which they are personally committed, a condition that is difficult to replicate in an experiment.

Some Positive Examples

Finally, it will be useful to have some strong examples that have been studied intensively in order to learn to implement programs as designed at scale.[34] New Jersey's Abbott program may be particularly instructive about how to implement at scale with fidelity because the legal requirements of a state Supreme Court order emphasized fidelity of implementation in 31 primarily large school districts across the state. This court order led the state to develop the tools to assure substantial fidelity, including state staff members dedicated to this task. It also included detailed standards and guidance, communities of practice provided with technical assistance for administrators, and an aligned set of instruments for self-assessment and validation of implementation and for planning in a continuous improvement system that operated at classroom, district, and state levels.[35] State-funded preschool programs typically lack much of these resources, and state offices often do not have the capacity to develop and support such systems.[36]

Another positive example is the North Carolina pre-kindergarten program known as NC Pre-K. This statewide program provides financial support for low-income four-year-olds to attend pre-kindergarten, but only if the pre-kindergarten program meets standards for quality that are consistent with those specified by the National Institute for Early Education Research. The pre-kindergarten classroom programs are not created by the state but, rather, are created locally but with fidelity to state-specified and state-monitored criteria. Because qualifying children typically attend pre-kindergarten classrooms with non-qualifying children, the number of children exposed to the NC Pre-K program standard is increased. Evaluation of the impact of this program has involved comparison of the scores for the population of children in state-funded communities with those for the population of children in non-funded communities. Estimates of the impact indicate that children living in communities funded at the average level show gains in standardized achievement scores equivalent to several months of third-grade teacher instruction.[37]

The positive examples in New Jersey and North Carolina show that successful scaling up is possible, even if difficult. I close with these three conclusions:

1. Policymakers should have more realistic expectations for the impact of their programs;

2. Successful scale up requires expenditures, training, and monitoring at levels that are similar to those implemented during initial design; and

3. Continued study of the scale-up process will be necessary to move the field forward. ■

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9. The Promise of Preschool Education: Challenges for Policy and Governance

AJAY CHAUDRY

Investments in preschool education that extend earlier learning opportunities to all children have the potential to offer tremendous value to the states and nation, including the development of the highly skilled labor force needed for the 21st century and providing children with the foundation for improved learning and success in school and life.

While the potential benefits of high-quality preschool education are clear, tremendous challenges in the policy and governance of early care and education services across states and localities will need to be addressed in order to realize them. Current offerings across the U.S. for the early childhood education of young children are deeply fragmented and inadequate to supporting the learning potential of all children. As many states and local school districts have been expanding their pre-kindergarten educational services over the last 25 years, they have been building on top of an already inchoate set of services that includes Head Start, subsidized center-based child care, and private preschool and child care programs that existed prior to the development of most state pre-kindergarten offerings. States and localities cannot even agree on the meaning of "pre-kindergarten." In some places the term refers to a specific, largely separate, and stand-alone program of services run by a government agency and linked to k-12 education. In others it signifies just a funding stream that is often combined with other early care and education funding streams to support service provision.

This paper summarizes some of the major governance and policy challenges that public pre-kindergarten programs face and that will need to be addressed by states and localities as they design and implement their programs.

Governance Challenges

There is still no well-developed system of preschool education across the United States that serves most children or even looks similar across states. Most of the children who might benefit from high quality pre-kindergarten programs and services remain un-served or under-served. Besides being limited in its reach, existing services are fragmented in several ways and vary greatly from place to place. For example, market-based and privately financed services operate separately from publicly funded programs and look very different in terms of many key program elements and resource levels.

There is no common governance infrastructure of supports for children's development and learning until kindergarten entry into the school system. There is especially wide variation among publicly-funded programs, which include state pre-kindergarten programs, Head Start, and subsidized child care programs. These public programs overlap, and there is no systemic coordination between program models—each with its own financing and governance structure. Moreover, administrative oversight rests across different levels of government. Head Start is administered and funded by the federal government, which funds grantees directly and carries out most of the program oversight and monitoring. Child care subsidies are financed through a combination of federal block grant funding to the states and state matching funds, and they are governed at the state level within the parameters of federal legislation. State pre-kindergarten programs often combine state funding, in some cases with a local matching requirement, but may also combine federal funding resources for Head Start, special education and Title I. While responsibility for funding decisions may rest with the state, pre-kindergarten programs are often locally administered at the local school district level.

Governance structures and authority to set the program rules and clarify who is responsible for overseeing pre-kindergarten programs varies considerably from state to state. According

to the annual yearbook of information compiled by that the National Institute of Early Education Research (NIERR), the most common state agency leads are the states' education departments. For example, among some of the largest state pre-kindergarten programs – those in Iowa, Oklahoma, Vermont, and Wisconsin—the education departments that oversee k-12 education also oversee pre-k. In other states, such as Florida, another state with a relatively high level of coverage in its pre-kindergarten program, the agencies that administer social services or children and family services have primary responsibility for the program. In recent years, several states have created stand-alone state departments of early learning. These include Georgia, with its high levels of pre-kindergarten coverage, and the state of Washington, which in 2006 became one of the first to create an early learning department with cabinet-level authority. Finally, given the importance that pre-kindergarten has taken on as a state level policy and political priority, some governors have created special offices directly within their office to directly oversee or coordinate pre-kindergarten programs, including in Alabama.[1]

Adding further to this complexity, in many states, the responsibilities for most administrative decisions about the specific allocation of resources, monitoring, and oversight of pre-kindergarten is devolved to local education districts and other local government agencies.[2] The administrative role that states play and how much governance is centralized at the state level or decentralized to the local government and school-district levels also varies across states. Furthermore, in recent years, as the pace of state-level expansions in preschool began to lag, more local governments, including in Boston, Denver, New York City, Philadelphia, San Antonio, and Seattle have taken the lead in making new investments, possibly adding even more complexity to existing governance challenges.

This paper argues that establishing more comprehensive and coherent preschool education services that reach the great many children not served and developing higher quality offerings, requires a coherent, cross-cutting governance infrastructure with the capacity to finance the provision of high-quality services and leverage policies that can address quality and access gaps.

Another reasonable point of view, however, might suggest that the lack of any clear governance structure for preschool services need not be considered a particularly significant challenge. Under this view the mixed nature of preschool offerings within a less regulated market of services could be seen as beneficial. Policies that provide financial support in the form of vouchers to families unable to afford the market costs of the care they seek to use could be seen as a plausible alternative to state-run pre-kindergarten programs—one that would mitigate the need for some overall coordination or governance of preschool services. In fact, this is the situation now within the constellation of early care and education services described above because most child care subsidies used for preschool-age center-based care in states provide vouchers for families to use to offset a significant share of the costs for what they find and use.

This may be a plausible approach, and there really does need to be a reasoned strategy that seeks to integrate and improve statewide pre-kindergarten offerings together with a significant market-based set of preschool services such as those that now exist. As pointed out in the first chapter of this report, 2 million children currently attend private preschools—more than the number who attend state and local pre-kindergarten services—and the vast majority of those who can afford to pay the full cost of center-based preschool do so.[3]

There are, however, several difficulties with relying on a voucher-based approach in the case of preschool provision. First, as also shown in the first chapter, the significant costs that any center-based preschool program represent relative to families' earnings are very high, not only for low-income families but also for most middle-class families.[4] Related to this, the general lack of sufficient resources for most families to purchase or effectively demand sufficient or higher-quality preschool services limits both the quantity and quality of what the market alone offers. Finally, a voucher-based system of services does little to improve or assure that higher quality services are available in the marketplace. When the balance is tipped to the point that access and quality are constrained for the majority of those children needing what has become an essential component of education, there would seem to be a strong case for more universal provision. This would in turn require a governance structure that can effectively

and efficiently manage the complex mix of public and private provision.

Identifying and reforming key policy levers that can support higher quality provision in public preschool for many more children will require establishing more clear and coherent governance for early education. As such, it is important to identify the host of policy challenges that will need to be considered and addressed along with a stronger governance infrastructure.

Policy Challenges

There is substantial variation and fragmentation across nearly all dimensions of public preschool programs, including the determination of who has access and is eligible, the types of settings, or auspices, where preschool education is provided, the training and expectations of teaching staff, program quality standards and monitoring, and how preschool programs interact and align with k-12 education systems. Many of these create challenges that need to be addressed with an eye towards building the evidence base to support more effective and coherent preschool education services.

Program Access and Eligibility

Overall, according to the data aggregated across the United States by NIERR, approximately 17 percent of all three- and four- year olds were served in state pre-kindergarten programs in the 2014-2015 school year. Many states have pre-kindergarten programs that only or disproportionately serve four-year-olds, so 29 percent of these children were being served compared to 5 percent of three-year-olds.[5]

Forty-two states and the District of Columbia have some pre-kindergarten services. Eight states do not have any pre-kindergarten programs and thus serve no children, while another 10 serve less than 5 percent of the three- and four-year-olds in their states. Eleven states serve at least 25 percent of their three- and four-year olds. Included are eight states—the District of Columbia, Florida, Georgia, Iowa, Oklahoma, Vermont, West Virginia, and Wisconsin—that served more than half of their states' four-year-olds.[6]

Targeted vs. Universal Provisions of Programs

Besides the ages of children served, program access and eligibility varied considerably across states in terms of whether they were available universally or targeted towards more disadvantaged groups. Approximately half of the states with pre-kindergarten programs have no income requirements for eligibility, including all eight of the states that were serving more than half of their four-year-olds. Another half of states target their programs to children from families with low-incomes by restricting or prioritizing children from low-income families for enrollment. Such states typically use the ratio of family income to the federal poverty level, families' eligibility for free or reduced priced lunch, or other qualification for anti-poverty programs to define eligibility. For example, Texas, which has one of the larger programs, serving 233,000 children or 27 percent of all the three- and four-year-olds in the state, sets eligibility at 185 percent of the federal poverty level for family income, which is the eligibility threshold for free and reduced lunch. Besides low-income, some states prioritized eligibility for other risk factors. These include disability or developmental delay of child history of child welfare agency involvement including cases of abuse, neglect, or family violence; and family homelessness and family home language other than English. In addition, a few states, including in New Jersey, Massachusetts, and Pennsylvania, have programs that target communities that were high need, where a disproportionately large share of families were poor, or the corresponding school district was considered educationally disadvantaged.[7]

Program Structural Features

In addition to these differences in how many and who state pre-kindergarten programs serve, programs across states differ substantially in where, when, and what services are provided.

Service Settings

Pre-kindergarten programs can be housed in public schools, community-based centers, or a combination of both within states. In many states, both public schools and community-based program settings serve as auspices for pre-kindergarten programs, including in the high-coverage states of Georgia and Iowa where between one-third to more than half of children were being served in non-public school settings. In about a dozen states, funding is directed to public schools only, though in some cases the schools or the school district are able to sub-contract services to other providers, and thus

an even smaller number of states restrict programs to school settings. Among the states that were serving a large share of children in pre-kindergarten, Oklahoma, West Virginia, and Wisconsin provided funding directly to the local public schools to administer the programs, with some schools in the states sub-contracting to community-based providers.[8]

An important area for further pre-kindergarten research would be whether programs operated in public school settings differ in important ways and if they directly or indirectly lead to differences in children's school readiness outcomes. For example, one could imagine that pre-kindergarten located within public schools might lead to greater salary parity with other teachers. Such a policy could lead to more qualified staff or less staff turnover, which in turn could lead to better quality services and/or child outcomes. Similarly, one could seek to determine whether placement in community-based settings leads to a greater focus on developmental services focused on the preschool years or greater linkages for children and families with other services provided by community-based agencies.

Program Hours

Many state pre-kindergarten programs provide only part-day services, often for 2.5 to 3.5 hours per day, while about a dozen states provide pre-kindergarten for the equivalent of a full school day or more than six hours per day. Among the states that were serving more than half of four-year-old children in public pre-kindergarten, Georgia, Oklahoma, and the District of Columbia generally offer six or more hours per day in pre-kindergarten, while Florida, Iowa, Vermont, and Wisconsin offer part-day pre-k for approximately half of the school day for the most part. Several states, including West Virginia, allow local school districts to determine the service hours.[9]

Licensing Standards for Class-Size and Staff-Child Ratios

The programmatic dimensions on which there is the most uniformity are the licensing standards for maximum class-size and staff-child ratios, which are 20 or less and 1:10 or less in nearly all states with pre-kindergarten programs.[10] In addition, because all center-based providers are subject to licensing requirements, these requirements are not only consistent across state pre-kindergarten programs but apply to Head Start centers and private center-based care in states.

Curriculum

In terms of educational content there is not much consistency, and, arguably, there has been limited emphasis to date on how the time in the classroom is being spent, including the type of curricula that is used in pre-kindergarten. The two most commonly used curricula in pre-kindergarten as well as Head Start programs, the Creative Curriculum and High/Scope, have been around for many years. They are referred to as "comprehensive, whole-child-focused curricula" that provide a wide array of activities for early literacy and math and other areas of children's early learning.[11,12]

Despite the prevalence of their use, these generalized curricula have not been the subject of much systematic evaluation of their effectiveness, though, notably, the *What Works Clearinghouse*, which reviews rigorous research studies of educational curricula, rated the Creative Curriculum as not effective in promoting children's mathematic and literacy skills.[13] On the other hand, recent research on some domain-specific curricula specifically targeted and sequenced for children's literacy, mathematics, and socio-emotional developmental outcomes have been found in randomized control trials to produce significant effects for children's school readiness, particularly in Boston's pre-k program.[14,15]

Almost no pre-kindergarten or other preschool system requires adoption and implementation of domain-specific, evidence-based curricula. With needed changes in governance and continued experimentation, this is an area that could be a promising avenue for improving pre-kindergarten and generating greater consistency in conjunction with other policy domains. A deeper consideration of curricula is provided in the chapter by Jenkins and Duncan.

Workforce Policies

Substantial differences exist in early education workforce policies across states, including the requirements for teachers' education, compensation levels, and continuing professional development.

Teacher Educational Qualifications

Children in state pre-kindergarten and the full range of preschool settings are taught by teachers with varying levels of education and training in early childhood education.

States vary in the education attainment required for pre-kindergarten teachers, though the trend has been moving gradually towards requirements that lead classroom teachers across state pre-kindergarten programs and in the Head Start program have a four-year college degree. According to the NIERR yearbook, programs in 27 states have minimum requirements that lead teachers have a four-year degree and, in many cases, that the degree be in a related field such as early childhood education or child development and that teachers be certified or licensed as early childhood educators.[16] Among the states for which NIERR provides a breakdown of teachers' educational attainment levels, the requirement that teachers have a bachelor-level education or higher ranges from the low of 13 percent in Florida to 95 percent or higher in 13 states' pre-kindergarten programs.[17] Data from the National Survey of Early Care and Education (NSECE) indicate that only 45 percent of teachers in all center-based settings serving preschool age children had a bachelor's degree in 2012.[18] In public-school sponsored pre-kindergarten, 76 percent of lead teachers had a BA, and for those providing pre-kindergarten in non-school settings it was lower.[19] Seventy-three percent of Head Start's lead preschool teachers had a BA in 2015,[20] a sharp increase from the 50 percent that had a BA in 2009.[21]

While there has been significant debate about teachers' educational qualifications,[22,23,24,25] the research appears to be mixed and still limited.[26,27] There is some evidence that teachers with a BA and specialized training in early childhood have more sensitive and responsive interactions with children, that they employ higher-quality, less harsh and more encouraging teaching practices, and that they engage more in some classroom learning activities than teachers with lower educational attainment.[28,29,30] Furthermore, rigorous research on the effects of preschool programs that have found very robust positive effects on child outcomes—including those for the Perry Preschool Project, the Abecedarian Project, Chicago Parent-Child Centers, and recent evaluations of the preschool programs in New Jersey, Oklahoma, and Boston – show that the teachers across all these interventions had at least a bachelor's degree.[31,32,33,34,35,36] Yet, other research has examined the role of college degrees on classroom quality and child outcomes using broader non-experimental data sets, including the natural variation in teachers' education found in preschool settings, and the results appear mixed.[37] Some earlier studies that analyzed the characteristics in programs observed to be higher in quality found that quality was higher when teachers had a BA.[38,39,40] However, results from data looking across 11 states' pre-kindergarten programs found only small or statistically insignificant effects for a bachelor's degree on many child outcomes.[41,42]

The existing research is limited and further research is still much needed on the ways in which teachers' qualifications affect the quality of the education children receive and the measurable pre-kindergarten outcomes for children.[43,44,45] Future research should include experimental studies of the effects of random assignment to classrooms with different teacher characteristics. It should also employ better and more consistent use of measures of classroom quality and outcomes across studies, and it should incorporate a better understanding of the variations in teacher abilities among bachelors-level teachers and in classroom contexts.[46,47,48] It may be that having a BA is necessary but not sufficient for higher quality or better outcomes. It may be that teachers with a BA improve the quality of classroom interactions and child outcomes only modestly, but that they may have more significant effects in combination with other program elements, evidence-based curriculum and professional development, and better teacher compensation. The classic preschool programs that have been evaluated Abecedarian, Perry Preschool, and Chicago Child-Parent Centers, as well as the pre-kindergarten programs in New Jersey, Oklahoma, and Boston have had all or most of these design elements.[49,50,51,52,53]Research should look more closely at the combined and independent effects of teacher qualifications on quality and outcomes.

Teacher Pay

Wages and benefits for early childhood professionals are among the lowest of any occupation. This fact of life contributes to the challenges of having a workforce that draws too few better-qualified individuals and has high rates of turnover, especially when teachers lack equity with k-12 teachers pulling the most able candidates away.[54] According to Bureau of Labor Statistics data reported by Whitebook, Phillips, and Howes (2014), the average hourly wage for preschool teachers in 2013 was $15.11 and a mean annual salary of $31,420. This was just 60 percent of the wage level

of kindergarten teachers who earned $25.40 and had a mean annual salary of $52,840.[55] For the 18 states for which NIERR collected aggregated teacher salary information for 2014-15, the gap in pay between pre-kindergarten teachers in public schools and those in community-based preschool settings was nearly $12,000 in annual income.[56] The turnover rate among all early childhood education staff is 13 percent per year.[57]

Teacher Training and Professional Development

Closely related to the policy questions regarding teachers' educational attainment are questions about the quality of training teachers receive prior to becoming pre-kindergarten teachers as well as of the ongoing training and mentorship they receive while serving as classroom professionals. There has been limited research on the quality of the higher education teachers receive before entering the profession and on variations in their training and abilities. Further research on the specific course requirements and how much current instruction follows the best available knowledge about the most effective classroom practices would serve to identify ways to further improve the quality of teachers training.

In addition to what the initial training brings to their work teaching pre-kindergarten, an important workforce issue for which programs may have more direct policy leverage is how best to support the improvement and capacities of pre-kindergarten teachers with professional development once they are in service. Currently most states require a minimum number of hours, averaging about two to three days per year for continual professional development.[58] The amount of time allotted for training is minimal, and it is often met by attending one-shot workshops, for which there is almost no evidence these workshops are effective.

A relatively recent direction in professional development has been to provide more intensive, mentor-coaching for teachers by master-teachers who observe and coach teachers' practices on an ongoing, periodic basis.[59] In 2016, Christina Weiland writes about advancing what she calls "Preschool 2.0" programs that are higher-quality public preschool programs developed and implemented at a larger scale.[60] She discusses the pairing of domain-specific curriculum that follows a specific scope and sequence with an expert coaching mentor who supports teachers' curricular implementation and regularly observes and troubleshoots with teachers on their classroom practice. Such a strategy in the Boston Pre-Kindergarten program contributed to significantly large positive effects on reading, math and, social-emotional skills, with greater benefits found for children from low-income families.[61,62] It should be noted that these results were for teachers who had a bachelor's degree or higher in pre-kindergarten classrooms housed within public schools.

Quality Assessment and Monitoring

Overall, much of preschool education, including many state pre-kindergarten programs, have been found to be of moderate quality,[63] with the emotional climate of the settings on average found to be good, and the instructional quality generally found to be very low.[64,65,66] Also, children from low- and middle-income families experience lower quality care across multiple dimensions of measured quality, including the qualifications and training of teachers and lesser levels of teacher-child interactions that support learning.[67]

There is much room for improvement in the quality of preschool education, and higher quality preschool programs provide more positive and lasting benefits, especially for children from economically disadvantaged families. Recent evaluations have shown that relatively high-quality preschool programs, such as those for the Boston and Tulsa, Oklahoma, pre-kindergarten programs can lead to substantial gains for a range of school readiness outcomes for children in families of all incomes, with the greatest benefits accruing to children from more disadvantaged economic backgrounds.[68,69] By contrast, evaluation of the benefits to participants in Tennessee's pre-kindergarten program, which had relatively low scores on classroom quality, found much smaller initial cognitive and social-emotional benefits to children after one year of preschool, which were no longer apparent one y ear later.[70]

States vary in how they conduct assessment and monitoring of program quality. Many require some on-site observations of classrooms using a variety of assessment tools at different frequencies. Many also monitor programs by collecting periodic documentation reports on program- or child-level outcomes. Several participate in Quality Rating and Improvement Systems (QRIS) that provide star-ratings for

programs and consumers.[71] There is more work that needs to be done on the measurement of quality given that existing observational quality measures and QRIS scores have been found to have only a small relationship with child outcomes in pre-kindergarten programs.[72]

Many of the policy key levers that may be able to drive improved quality have been discussed earlier as prior policy issues—particularly teacher's qualifications, compensation, and retention, professional development, and curriculum. Teachers and their role in the classroom is the most significant input in pre-kindergarten education, and young preschoolers' interactions with their teachers and how the teachers structure their classroom time serve as potentially promising pathway to improved child outcomes. Future policy research agendas need to address how much each of these programmatic features individually or in combination help to make more pre-kindergarten higher quality and promote improved outcomes. It seems clear there may be strong inter-relationships among these programmatic factors especially around teacher qualifications and compensation levels and curriculum and professional development given many of the studies with the strongest evidence base have invested in these features in combination.

Other Policy Issues

Significant differences persist across states for several other important areas of program design and policies. One item that warrants brief discussion is the role that research and evaluation can play in helping to address some of the many policy and governance challenges.

Evaluation and the Use of Evidence to Drive Decision-Making

One consequence of the under-funded, splintered, and uncoordinated nature of early care and education services is that there is not enough research on many pertinent questions to guide policy decisions and there is limited use of the evidence that does exist.

As the large evaluation research base on program effectiveness clearly demonstrates, we have learned much over the last 40 years about whether preschool education can be effective. But we know much less about what programmatic components contribute to making pre-kindergarten programs more effective. As this review of ongoing policy challenges has shown, there are critical areas that need additional research. In seeking greater coherence across the governance and policy infrastructure that supports pre-kindergarten education, a key part of that infrastructure must be to support the generation and dissemination of rigorous research in the service of programmatic design and implementation.

As more states, cities, or school districts create, expand, or make their preschool programs universal, opportunities abound to further develop the evidence base. We need more research on which early skills are the most critical to develop in preschool to support later learning, as well as on how best to build these skills in preschool. Also, experimental research that randomly assigns children to teachers with different educational qualifications might give us a clearer sense of the role of teachers' qualifications on what children experience in the classroom and whether professionalizing the workforce necessitates both stronger qualifications and more competitive pay to draw and retain well-qualified teachers. Research on situations where teachers are paid on the same scale as elementary school teachers compared to a control group would be helpful. Similarly, more research could help to identify the most effective active ingredients or mix of ingredients in preschool programs, such as domain-specific, developmentally-focused curriculum paired with mentor coaching. These are just a few of the pertinent questions that arise from the review of existing policy dilemmas.

Summary and Conclusion

The widely scattered, underdeveloped, and opaque nature of the existing set of state pre-kindergarten programs makes presenting a coherent picture of what pre-kindergarten looks like difficult. Yet, without an understanding of what exists, what's known about the differences in program structures, and what different design features can best support children and family needs and child outcomes, it will be hard to develop a clearer infrastructure for more effective services.

Addressing the significant governance and policy challenges surrounding early childhood care and education programs, including state pre-kindergarten, could foster better child development. In the near-term it will be important to foster significantly more research to identify and improve key policy

levers for which there is so much variation now, as well as to build governance capacities with the leverage and resources to create the service systems that will most benefit children.

Preschool programs offer the promise of helping many more children become ready for school and make the most of the large investments in public education that follows, thereby improving their life prospects and the nation's needs. Making that promise real will depend on developing the evidence for programmatic reforms to produce a more coherent and comprehensive infrastructure for preschool education along with future investments to bring preschool to scale. ■

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[3] See Chapter 1: A. Chaudry and R. Dutta "The Current Landscape of Public Pre-Kindergarten Programs."

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10. Financing Early Childhood Programs

RON HASKINS

There is widespread agreement that intervention during the early childhood years can improve children's development and school readiness. The major reason these impacts are important is that one of the top goals of the nation's social policy is to close the achievement gap between children from poor and from wealthy families, as well as the gap between minority children and white and Asian children.[1] The gaps in development begin to appear in the first year of life and are substantial by the time children reach the public-school years.[2] Thus, programs designed to boost the development of disadvantaged children during the preschool years are one of the best bets for closing the development and education—and ultimately the economic—gaps. One of the most fundamental questions is how much public money it will take to deliver high-quality programs during the preschool years to children who need it the most. (See Chapter 7 for more on the costs and benefits that come from public investment in pre-k programs.)

In this chapter, I will assume that early childhood programs can actually close these gaps so that the question of how we can pay for the programs that will be necessary can be explored. After reviewing the number of children aged zero to five and their current care arrangements, I review current programs and spending as well as the prospect for additional spending by the federal or state governments. This paper concludes with some ideas for increasing the amount of money available for early childhood education.

Although state pre-k funding is dealt with separately, all major funding streams are included in this analysis because the various funding sources—primarily money for child care, Head Start, and state pre-k—interact at the local level. In addition, a key to making early childhood funds go further is figuring how to use all the sources of funding as wisely as possible.[3]

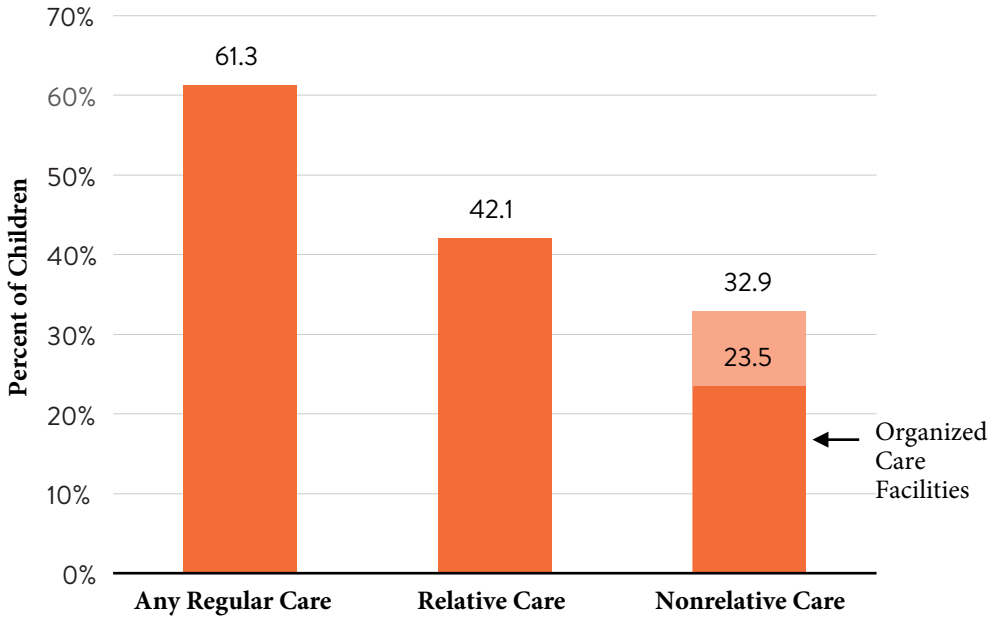
The major conclusion of this paper is that there are not likely to be enough public funds available to substantially increase spending on early childhood programs—including pre-k—in the near future. However, smaller increases in funding, especially at the state level, may well be possible.

Number of Children Aged Zero to Five and Their Current Care Arrangements

The best and most complete source of data on the number of children aged zero to five in the United States and their child care arrangements comes from the Census Bureau. In a 2013 study based on 2011 data, Laughlin reports that there were 20.4 million infants and children under age five in 2011.[4]

Figure 1 shows the child care arrangements of those children. A little over 61 percent of children under age five—or about 12.5 million— were in some form of regular care arrangement on a routine basis, mostly because their parents or single parent worked. Ignoring the fact that some of these children were in multiple care arrangements, around 42 percent received their primary source of care from relatives, and nearly 33 percent were in non-relative care. Within the non-relative care group, over 19 percent (nearly 4 million children) were in child care centers, and 5.6 percent (or about 1.14 million) were in Head Start or pre-k. Another 7.6 percent (or 1.55 million) were in family day care or another arrangement in the provider's home. These data imply that ensuring that children receive high-quality care that could boost their development would probably involve significant movement from informal and privately paid for (or free) arrangements to more formal arrangements paid for with public funds.

Figure 1. Types of Child Care for Children Under Age Five



Note: 20.4 million children under age five in 2011. Many children were in multiple arrangements.
Source: Lynda Laughlin, "Who's Minding the Kids? Child Care Arrangements: Spring 2011."
U. S. Census Bureau (p 70-13), April 2-13.

Current Spending on Early Childhood Programs

Table 1 provides an overview of current federal and state spending on the major early childhood programs. Between the federal government and the states, the nation spends a little over $36.6 billion annually on early childhood programs, all but about $10 billion of that from the federal government. This may seem like a lot of money, but both federal and state spending on early childhood has been somewhat stagnant. This relatively stagnant funding is an impediment to those who hope that the federal and state governments will play a major role in increased spending on early childhood.

Condition of Federal and State Budgets and Deficits

To gain useful perspective on the capacity and inclination of the federal and state governments to spend more on early childhood, we should briefly examine changes in federal and state revenues and budget deficits in recent years. Any attempt to increase government spending on any given area of policy has a better chance of success, other factors being equal, if government revenues are rising and if deficits are under control.

Figure 2 shows Office of Management and Budget (OMB) data on federal revenues, outlays, and deficits between 1980 and 2015.[5] Although revenues fell precipitously during the Great Recession, from 17.9 percent of GDP in 2007 to 14.6 percent of GDP in both 2009 and 2010, by 2015 revenues had recovered to over 18 percent of GDP. But spending has been greater than revenues every year since 2002, yielding substantial deficits and adding greatly to the nation's debt. Moreover, both the Congressional Budget Office (CBO) and OMB, two major sources of reliable budget data in the nation's capital, project deficits as far into the future as estimates have been made by both agencies. CBO presents a stark picture of the long-term debt problem facing the country, concluding that the debt poses "substantial risks for the nation" and making the understated observation that the debt "presents policymakers with significant challenges."[6]

Congress has done little about the budget deficit since reaching a modest compromise deficit reduction plan in 2014, usually referred to as the Murray-Ryan Budget Deal,[7] and that deal did virtually nothing to reduce the long-term deficit. In a word, Congress is ignoring the growing debt. Ditto for both candidates in the 2016 Presidential election.[8] But in earlier years, Congress made substantial cuts in spending and modest increases in taxes, and the caps it imposed on appropriated spending (about one-third of the federal budget) are still tightening and causing reduced spending on many programs.[9]

Table 1. Summary of Spending on Major Early Childhood Programs, 2015

PROGRAM (FEDERAL)	Spending (in billions of dollars)
Head Start and Early Head Start	8.6
Child Care Development Block Grant (CCDBG)	4.9
Temporary Assistance for Needy Families (TANF) Transfers to CCDF	1.4
Child Care Food Program	3.1
Child and Dependent Care Tax Credit (Tax code)	4.5
Dependent Care Assistance Program (Tax code)	0.9
Individuals with Disabilities Act (IDEA) Part C and §619	0.8
Maternal, Infant, and Early Childhood Home Visiting	0.4
Preschool Development Grants	0.25
TANF Block Grant Direct Spending on Child Care	1.2
Education for the Disadvantaged: Title 1, Part A, spending on preschool	0.3
Title XX Grants (Social Services Block Grant), spending on child care	0.06
TANF Transfers to Social Services Block Grant spent on child care	0.2
PROGRAM (STATE)	
State Preschool	6.15
TANF Maintenance of Effort (MOE) on child care	1.7
State CCDBG Matching and Maintenance of Effort (MOE)	2.1
Total	**36.6**

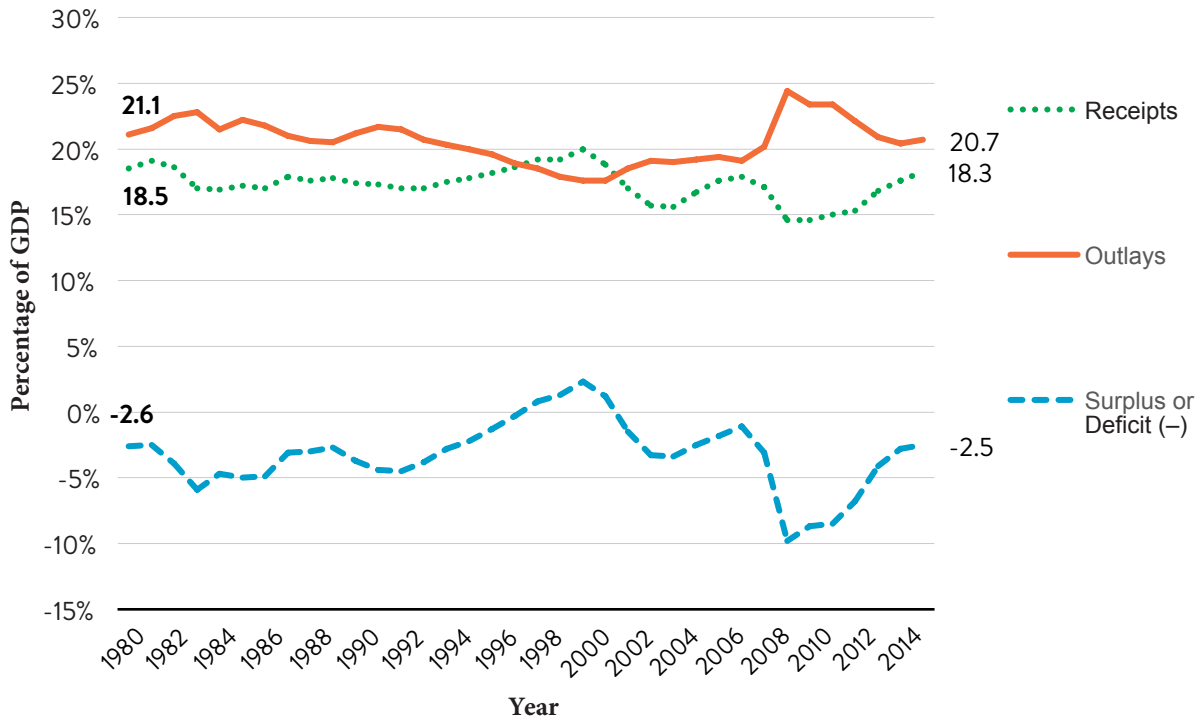
Thus, the federal budget picture is less than favorable for any group that wants to increase spending on early childhood—or any other domestic programs for that matter.

On the other hand, Congress has shown in recent years that it is not above using budget tricks to avoid limits on new spending if it decides new spending is in order. Moreover, President Trump, who has proposed extensive cuts in social programs, clearly intends to propose expansions of day care programs, and his campaign proposals have been extremely expensive (although most of the benefits would go to families with income over $100,000 per year). At an estimated $115 billion over 10 years, his various proposals to increase support for child care are, well, shocking.[10] It is difficult to believe that the Republican Congress will support spending more than $10 billion a year on new child care programs.

Focusing now on spending on children, a group of budget analysts at the Urban Institute has been keeping track of federal spending on children using rigorous and creative methods. They find that between 1960 and 2010 federal spending on children as a share of all federal spending increased in most years and over the period increased from 3.2 percent to 10.7 percent of federal spending. This additional spending on children is especially impressive when we realize that, over this period, total federal spending increased from less than $0.6 trillion to about $3.7 trillion in inflation-adjusted 2015 dollars. In other words, children got more than three times as big a fraction of federal spending that was six times greater at the end than the beginning of the period.[11] This positive trend for children, however, ended after 2010. Since that year, spending on children has fallen from 10.7 percent to 7.7 percent, or by nearly 30 percent of total federal spending. Unless there are changes in the underlying laws that determine spending on children, which the brief review of actions on the federal budget above suggest are unlikely, the Urban Institute group shows that the declines in children's spending will continue and even accelerate in the years ahead. The decline in spending on children is baked into the cake. Meanwhile, spending on Social Security, Medicare, and Medicaid for the elderly will grow substantially, a clear sign that the elderly take precedence over children in the allocation of federal dollars.[12]

An important point is that federal budget rules permit revenue neutral new spending. Let's say, for example, that Congress wanted to increase early childhood funding by $1 billion per year. If the bill to increase the funding included cuts in other programs, increased revenues (not necessarily tax increases), or a combination of the two that equal $1 billion per year, the bill would not violate budget rules. The point is that Congress might be able to increase spending on early childhood programs if its members were willing either to increase revenues or to cut other programs. But the reason the federal government is in such terrible financial shape is that Congress is reluctant to cut spending and even more reluctant to increase revenues, especially if increasing revenues means increasing taxes.

Figure 2. Federal Receipts, Outlays, and Surpluses or Deficits as Percentages of GDP, 1980-2015



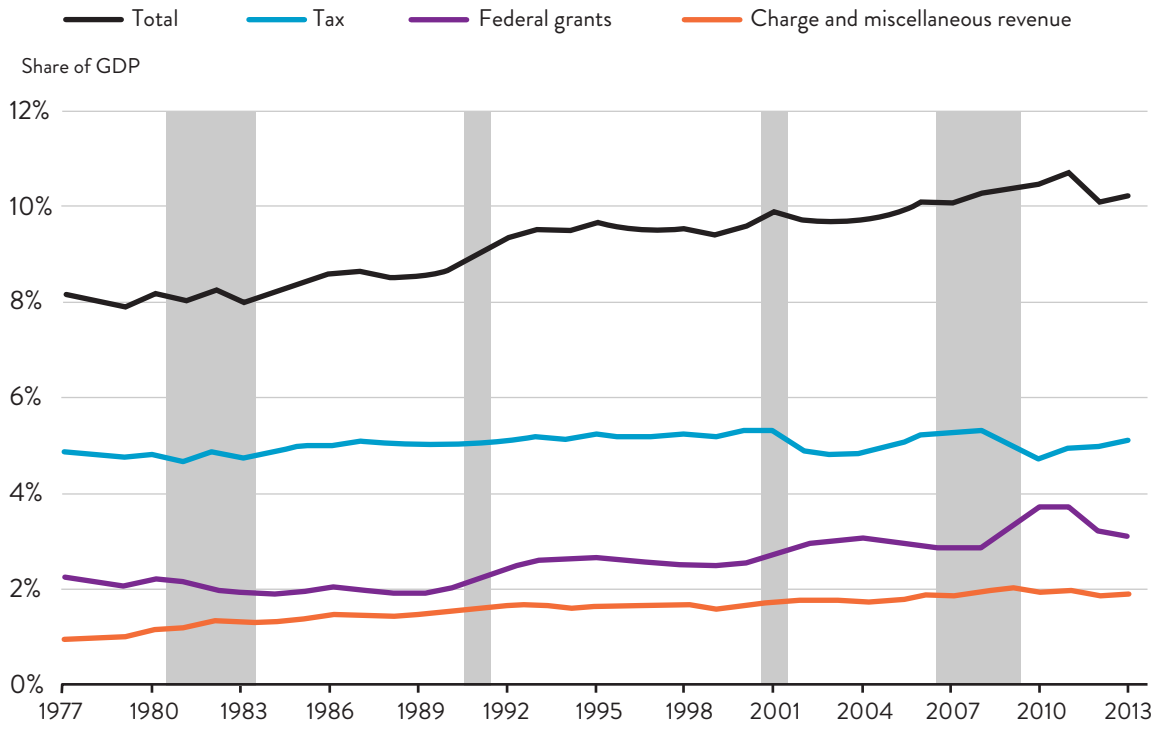
Source: Office of Management and Budget, Historical Tables, Table 1.2: Summary of Receipts, Outlays, and Surpluses or Deficits (-) as Percentages of GDP: 1930-2021

Turning to the fiscal situation of states, it's clear that one of the most remarkable characteristics of state budgets is their dependence on federal grants. Figure 3 shows the major sources of state revenue between 1977 and 2013, the latest year data are available. The top line in Figure 3 shows that total state revenues grew from around 8 percent to 11 percent of GDP between 1977 and 2011 before falling to around 10 percent in 2012 and 2013. This decline represents the largest decline in state revenues in the past 35 years. Federal grants to states rose from around 2 percent of GDP in the 1980s to around 3 percent in the 1990s and the 2000s. Then, federal grants jumped to nearly 4 percent of GDP as the federal government tried to make up for the fall in state tax revenues that struck nearly every state during the Great Recession. But federal grants fell back to their pre-recession level by 2013. States now get about 30 percent of their revenue from federal grants, a figure that, given the condition of the federal debt, seems unlikely to increase very much.[13]

The overall budget situation of states is not as bad as that of the federal government, in large part because most states have constitutions that prohibit deficit spending (although this limitation on state spending is sometimes observed in the breach). However, there is general agreement that most states, especially Illinois, Pennsylvania, New Jersey, and Kentucky, have even more serious budget problems than might at first appear because of the long-term obligations of their state pensions. One study estimates that the amount of money states and localities contribute to their pension systems over the next 30 years will have to increase by 2.5 times, or by about 14 percent of the total revenue projected to be generated over this period by state and local governments. This level of funding would require a tax increase of $1,385 per household per year.[14]

Despite the very tight condition of state budgets, over the last decade and more, some states have initiated pre-k programs, and many states have managed to increase their spending on their pre-k program in at least some years. State total spending on pre-k increased at a healthy pace until 2010 when it leveled off and then declined, primarily as a result of historic declines in state revenues during the Great Recession and then the

Figure 3. State General Revenue Trends



Sources: Census Survey of State Government Finances; Bureau of Economic Analysis.
Note: Shaded areas indicate recessions.

falloff in federal grant dollars starting in 2012. During the seven years between 2003 and 2010, state funds for pre-k rose from about $3.3 billion to $5.9 billion in 2015 dollars. Funding then fell for two years before increasing to $6.2 billion in 2015.[15] It might be hoped that some or even many states, despite their budget issues, can keep increasing their spending on pre-k programs. In any case, it makes sense to conclude that the prospects for additional spending on early childhood programs seem better at the state than the federal level.

What Would a Universal Early Childhood Program Cost?

There have been numerous proposals to create an early childhood system that is comprehensive in the sense that it includes programs for both infants and older preschoolers as well as proposals that would integrate preschool and the early elementary grades.[16] Without focusing on the substance of these proposals, let us assume that a comprehensive program of some type could be created with the current spending average applied to nearly all children. I use the term "early childhood" to refer to the entire zero to five period. Infant care has always cost more than care for older preschool children, primarily because under state regulations there must be more teachers per child when serving infants, typically around two to three teachers for every 10 infants compared with just one per 10 children in the case of four-year-olds.[17] In any case, Child Care Aware of America estimates that the cost of care (including both in-home and center-based services) ranges from $13,000 in Arkansas to $21,000 in Massachusetts. The overall average for center-based care for children ages zero through four is estimated at $9,589 by New America.[18]

We can get a rough idea of how much new money would be needed to create universal care for all 19.9 million children ages zero through four[19] by comparing what is spent now on federal and state early childhood programs to the cost of programs for nearly every child ages zero through four. The cost of such a universal program if it applied to all children would be around $191 billion (19.9 million children multiplied by $9,589 per child). It is reasonable to adjust this figure in two ways. First, the federal and state governments currently spend about $37 billion on early childhood programs. If we subtract that amount, the net cost of the comprehensive new program falls to $154 billion. A second reasonable adjustment would be to reduce the number of children on which the calculation is based because not every parent will want their child in a government-supported program, especially during the child's first year or two. I know of no good way to estimate how many parents would not take advantage of subsidized care, let alone how the estimate would vary across ages from infancy through age four. Let's assume that 70 percent of families would take advantage of the offer, which would reduce total costs by 30 percent to around $108 billion. Admittedly, there is a lot of guesswork involved in this rough estimate, and many researchers would argue that the average cost figure I'm using is too low because most care facilities now used by parents need to be improved.[20] But my only purpose in making the estimate is to provide some idea of the magnitude of the amount of money advocates would be looking for if they tried to build a high-quality early childhood program covering the years between birth through age four.

A more limited goal would be to support pre-kindergaten programs in the single year prior to kindergarten. We can make a somewhat more accurate estimate of how much would be needed to support pre-k programs for every four-year-old child. According to the National Institute for Early Education Research (NIEER), 42 states and the District of Columbia now have pre-k programs that enrolled 1.39 million children at a cost of $6.2 billion in 2015.[21] The average spending per child was $4,489 (many of the programs are half-day). According to the NIEER report, 29 percent of four-year-olds were enrolled in the 42 state programs. It is straightforward to estimate that if the aim were to provide a universal program, and we assume as before that 70 percent of parents would put their children in the program in the average state, that would mean that 70 percent of 4.78[22] million, or 3.35 million children, would be enrolled. Adding an additional 1.96 million children to the 1.39 million now being served at $4,489 per child would cost an additional $8.78 billion per year. Of the several caveats that apply to this estimate, perhaps the most important is that many would argue that high quality pre-k programs would cost more per program than is currently being spent.

Prospects for Additional Funding for Early Childhood Programs

Given the tight fiscal situation in which both federal and state governments find themselves, the prospects for the

comprehensive program at nearly $110 billion annually, or even the universal pre-k program at nearly $8.8 billion, are not high. Not only is the fiscal situation of the federal government and, to a somewhat lesser degree, state governments, a barrier, but the fact that President Obama sponsored a universal pre-k plan starting in 2013 that got nowhere is a sign of the odds against passing major early childhood legislation at the federal level.[23] The wisest plan for those who want to expand early childhood programs, at least for the foreseeable future, would be to focus their efforts on a federal plan that costs about $1 billion a year, and to intensify the work of building coalitions of interest groups and members of Congress that will support the legislation over the period of years that will be required to pass even modest federal legislation.

Meanwhile, efforts at the state level to continue the pattern of modest increases in most years for state pre-k programs is probably another decent chance for achieving additional funds for programs that focus on the year before public school entry. The difficulty of raising government funds, even in modest amounts, suggests that all the new money should be invested in children from poor and low-income families. ■

[1] Sean F. Reardon, "The Widening Academic Achievement Gap Between the Rich and the Poor: New Evidence and Possible Explanations," in *Whither Opportunity?: Rising Inequality, Schools, and Children's Life Chances*, ed. Greg J. Duncan and Richard J. Murnane (New York: Russell Sage, 2011), 91-115.

[2] Christopher Jencks and Meredith Phillips, *The Black-White Test Score Gap* (Washington: Brookings Institution Press, 1998).

[3] In two extended discussions with Steven Dow who runs ten early childhood facilities in Tulsa, I got a lesson in how it is possible to use state and federal dollars from state pre-k, Head Start, Early Head Start, the Maternal, Infant, and Early Childhood Home Visiting program, and the Kaiser foundation to pay for high quality care for about 2,200 slots for two-, three-, and four-year-olds across the ten centers. Thus, in addition to the concern about having more funding to expand early childhood and state pre-k programs, it seems appropriate to devote some attention to how it would be possible for state and local authorities to more easily use all funding streams in a more efficient manner.

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[12] Ron Haskins, 2017.

[13] Norton Francis and Frank Sammartino, "Governing with Tight Budgets: Long-Term Trends in State Finances" (Washington: Urban Institute, September 2015).

[14] Robert Novy-Marx and Joshua D. Rauh, "The Revenue Demands of Public Employee Pension Promises" (Working Paper No. 18489, National Bureau of Economic Research, 2012).

[15] W. Steven Barnett et al., *The State of Preschool: 2015* (New Brunswick, NJ: National Institute for Early Education Research, Rutgers University, 2016).

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11. Reframing Early Childhood Education: A Means to Public Understanding and Support

CRAIG T. RAMEY AND SHARON LANDESMAN RAMEY

In this chapter, we argue that we need to re-frame knowledge about early childhood development to produce a fresh, relevant, and constructive agenda for public action. Such a re-framing acknowledges the complexity of the scientific findings and encompasses information about our nation's rapidly changing demographics and the pressing needs of families with young children. Recasting the issues necessitates thinking in new ways about multiple logistical, economic, and political realities that collectively have hindered the broad-scale successful implementation of scientific insights at the local, state, and national levels. This chapter calls for a scientific inventory of early care and education programs and facilities and provides a conceptual model to guide such inquiry.

Early Care and Education

Our nation's choices about investments in high quality early child care and education are likely to exert a large impact in two quite distinct, albeit intertwined, areas. The first involves whether and how well we eliminate the huge school readiness differences between children born into poverty versus wealth. The second involves whether our communities will have the capacity to ensure that young children from all walks of life, including those from socioeconomically advantaged families and neighborhoods, receive sufficient and continuous amounts and types of positive early experiences needed for their optimal growth and development.

Demographic trends show increasingly that mothers from all socioeconomic strata enter and stay in the workforce throughout their childbearing years. Their families accordingly want and need high quality early care and education for their children. Even among families in which parents are able to provide stable, high quality care for their own children at home, many still seek group socialization experiences and academic readiness programs for their children prior to entering kindergarten.

To the extent that scientists, policymakers, and the public can agree that non-parental care is a shared high-priority need for families, they could have a strong basis for moving beyond tired old debates over matters such as whether parental care is inherently the "best" (or not) for children, whether public pre-k is needed just for children deemed at-risk for poor school readiness, or whether home visiting programs are better (or worse) than high-quality child care centers. We deem these well-worn debates to be simplistic and outdated. Even more relevant are scientific findings about early childhood development and education indicating that there are many different effective methods for providing children with the experiences and opportunities they need.[1]

A new framework, built on both science and social trends and centering its advocacy on identifying what all children need to experience at different stages of development, needs to be affirmed in non-technical, family-friendly, straightforward language. Such a framework can help to create a unified approach to how families and their local communities can build the capacity for supporting optimal child development. We think of this re-framing as a way to emphasize the functional essentials that all children need, rather than relying on certain structural features of programs or settings to ensure positive child developmental progress. We should be seeking to identify how children can obtain equitable and high-quality care and education whether they receive it in their own family or relatives' homes or in public and/or private settings.

This re-framing of the functional essentials related to early childhood education affirms what the scientific evidence supports: that there are many different ways to provide children with what they need to thrive and, further, that no setting or program inherently guarantees a child the stable, healthy, and stimulating social experiences that are essential for normal, healthy development. Such an alternative

functional framework strategically could help to open up new possibilities that increase the choices of both families and their communities in how they combine existing resources and, as needed, expand or enhance the natural settings where children live, play, and learn.

If the public agrees that all families and our nation benefit when children are protected from harm, are well nurtured, and learn at healthy rates so they enter school well-prepared for future academic and social progress, then sharing scientific knowledge about how to provide these positive experiences should further unify our culture and nation. What effective parents and grandparents do for children is truly the same as what effective child care providers and early childhood educators do. Strategies exist to increase adults' knowledge about how infants and toddlers learn; how best to instruct children in language, early literacy, and math; and how to engage children in learning to become social partners who understand kindness, reciprocity, problem solving, and yes, competition and conflict resolution.

Supporting healthy growth and development requires a set of complex adult skills, insightful dedication, and enormous energy. For many parents and the public, there remains a tension between the past (how their own parents and teachers treated them) and the present (how they themselves are seeking to continue the positive practices but not repeat the errors of prior generations). This evolution does not condemn the past; neither does it keep the harmful and limiting ways of childrearing as a permanent feature of an evolving society committed to the best possible outcomes for all young children and their families.

Evolution of Education in the United States

Education is an evolving endeavor, supported largely though institutions that have accepted a crucially instrumental role in preparing individuals to become productive and contributing citizens. The "outcomes" of early care and education are far from unchanging or unidimensional. Rather, the perceptions of adults and leaders in our nation change with the times with regard to the precise types of skills and attitudes and competencies that children need to become successful and to adjust to the changing world. In historical evolution from agrarian to industrial to the information/technology age, localities and states have endorsed major changes in educational expectations, approaches to the type and amount of education needed, measurement of educational quality and student progress, and mechanisms of finance.

The emergence of early childhood care and education as a special branch of formal education warrants a historical perspective. Public education paid for largely through tax dollars began in the United States in the early 1800s and was provided mainly for children whose families were economically impoverished. Large groups of children, notably African-Americans and those with disabilities but even many of the poor, were excluded entirely.

Our country did have some remarkable exceptions in this era. In Boston and New York City, for example, a far more inclusive educational philosophy supported the inclusion of a broader spectrum of the childhood population. Yet in general, wealthy families almost everywhere arranged and paid for their children's education privately, a practice that offered exceptional opportunities to tailor their children's education to individual differences, interests, values, and family situations. Virtually no agency monitored or measured education, public or private, other than in the local form of selecting teachers and school leaders, supporting the building of schools, paying for school supplies and services, and discussing how to improve education. Education often blended secular, religious, ethical, and personal priorities, and, it is safe to add, there was considerable segregation of children in education settings related to social class, race, and gender. In these early years of public education, the collective social good was recognized, from local to national, yet education was not embraced as either the most important or the primary social institution responsible for the future of our nation.

Regional differences in availability, access, and quality in both public and private education were stark. Throughout most of the South, for example, laws prohibited teaching black slaves to read, and poor whites in inferior schools fared little better. Generally, first grade began at age seven, and the main goal was to develop basic reading skills. Writing and arithmetic followed reading skills in importance. Many children attended school for only a few years. Gradually, what was labelled grammar school extended up to the sixth or eighth grade, and

this is what comprised most of free (or almost free) public education until World War I.

The Industrial Revolution, with large-scale migration into cities, created an unprecedented need for more highly skilled labor, thus supporting the extension of public schooling into high school. In many areas of the country even public high school was financed by tuition paid, at least in part, by families. Similarly, the need for and value of higher education or post-secondary education (encompassing vocational and academic pursuits) after grade 12 began to increase, particularly after World War II. Vast public and private investments occurred in higher education and continue into the present. Higher education followed the patterns of initially being available to the elite, high resource families, for men mostly, then being expanded to include greater demographic and socioeconomic diversity. We now have become a nation that aspires to have almost all of our citizens receive some advanced education beyond high school to strengthen our competitive position in the world and to contribute to the collective personal strengths of individuals and localities.

Starting roughly in the 1840s and continuing well into the 20th century, large waves of mainly poor European immigrants challenged the emerging public education systems. Education became a cornerstone that could and did support the melting pot analogy of linguistic and cultural assimilation and equality of opportunity in an expanding participatory democracy. This vision remains so strong that today almost everyone accepts that educating children well is a social, moral, and economic imperative. Vigorous and constructive debates abound concerning topics such as how broad the reaches of education should be: linguistically, culturally, and ethnically.

Early childhood education—specifically, education from birth to school entry in kindergarten or first grade—is the newest age-domain for education. Throughout the nation, public schools increasingly provide some pre-k classrooms for four-year-olds, and sometimes three-year-olds, although these programs vary tremendously in their availability, quality, hours of operation, and comprehensiveness.

We currently provide educational services for some children beginning at birth, notably children with disabilities and children in Early Head Start. For more than five decades we have funded the federal program known as Head Start as a programmatic effort to better prepare three- and four-year olds from economically impoverished families for elementary school. Remarkably, the public and even legislators are not particularly well-informed about how different Head Start programs actually are in what they provide for families and in their quality, their cost, and their effectiveness. As with child care, schools, and health care, Head Start programs range from poor to high quality.

Demographic Trends

During World War II, women in the U.S. flooded into the paid workforce to take positions formerly held by men who were unavailable due to military service. After the war, some women chose to stay in the workforce for reasons of independence, self-fulfillment, and family income. Since then, accelerating technological and demographic changes have increased the emphasis on advanced education for women so they can enter increasingly skilled occupations that are knowledge-based and frequently changing due to both technical innovation and social change.

Recently two demographic megatrends have converged. First, college-educated women increasingly are continuously in the workforce, including high-skill and high-pressure positions that require up-to-date knowledge and skills. Second, federal welfare reform (Temporary Assistance to Needy Families) has provided cash income and some in-kind benefits only to poor mothers who are engaged in increasing their own education or are in the work-force. Thus, women who work in all types of occupations, whether married or single, need available and affordable childcare if they are to be continuously employed. From our vantage point, both women and men need high-quality child care and early education for their children in order to have security and assurance that their children will thrive.

Going Forward

A substantial proof-of-concept scientific literature with multiple replications and variations exists to support the thesis that systematic early childhood education—in conjunction with health care, good nutrition, physical exercise, and positive family involvement—can be both a short- and long-

term positive influence on young children and their families.[2] A major policy challenge is how to infuse multiple service delivery systems (including natural support systems) with sufficient motivation, knowledge, skills, and stability to allow science and effective communication with the public to guide the operation of the full array of early care and early childhood education supports, including public, private, and public/private efforts. Lest this be regarded as an intrusive and heavy-handed endeavor, we note that our nation already operates in this fashion with respect to many publicly offered services and education itself from kindergarten through higher education. We embrace and enforce public safety standards in multiple domains, including seatbelt laws, car and road safety, restaurants, beauty salons, hotels, buildings, and other features of everyday life in our complex society. Do young children and their experiences not deserve similar consideration?

We think the time is right to make a local, state, and national commitment that is bold, and that includes many sectors historically left out of the planning process. It is time to design and implement an equitable, efficient, affordable, and effective support system for all families with young children, birth to school entry. We know how truly complex and arduous such an undertaking will be. But to continue to hope that modest improvements and more structural standards, local coalitions, new scientific reviews, and more public information campaigns will suffice to change the early childhood landscape would be naïve. Many of the cumbersome and sometimes conflicting guidelines and regulations have not sufficiently produced the intended positive impacts. Neither has simply allowing the free marketplace to operate produced sufficient positive results, including the many programs that have been exempt from regulations.

What we have seen firsthand that can work well are city, county, and state level programs that have very strong (scientifically well-informed) local leadership in partnership with parents, early childhood education experts, developmental scientists, and local political leaders. Invariably, the successful programs we know and have worked with have made an initial commitment to repeatedly measuring and monitoring all programs and all children—openly and frequently—for the explicit purposes of understanding how well they are delivering the intended quality and quantity of supports and the extent to which children and families are participating at high and consistent levels.

The expectations of "gains" and "benefits' must be adjusted to the populations served. Children from families that already provide high-quality home environments do not need to "gain" per se but rather need to be sustained in their healthy growth and development. Children at-risk or already showing delays do need to demonstrate good progress, and may likely need supplemental and individualized supports at different stages in their early years of life. This early childhood emphasis should not be construed to be in competition with educational services for older children; neither should the public expect that high quality care and early education alone will inoculate children for the rest of their lives. A lifespan continuum of supports is truly what children need, and so does our country. In the absence of sufficient amounts of the early learning and health essentials in the first five years of life, the later ages and adult outcomes of far too many children will be unnecessarily compromised.

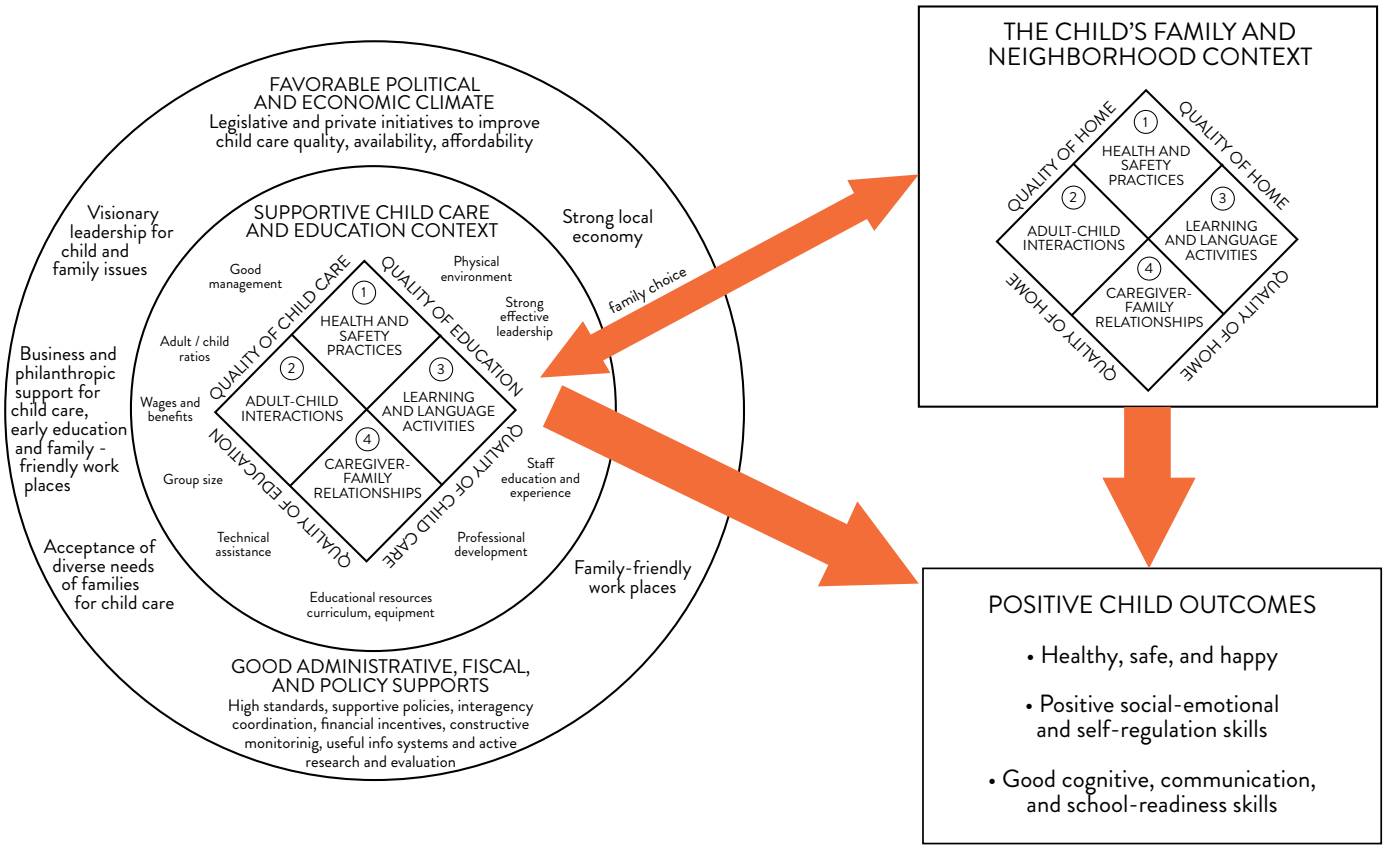
Need for a Full Inventory

At times, there have been efforts to create an inventory of public early childhood education and care efforts and their costs. This has proven very difficult, although invariably the conclusion is that there is an exceptionally high number of publically supported programs or initiatives—at the federal, state, and local level—that appear to have similar or overlapping purposes and often target enrolling the same children and families. At the very least, this array of so many competing programs is likely to be cost-inefficient and confusing. The time is ripe for an inventory to be done to scientific standards and to be truly comprehensive in terms of both cost and quality.

The Four Diamond Model Emphasizing Functional Essentials

Figure 1 illustrates a conceptual framework known as the Four Diamond Model of Quality for Early Education and Care Programs[3,4] In the center is a diamond with four major components, each representing a set of functional activities that research has shown to be reliably associated with more or less positive outcomes. The four sets of activities are health and safety practices; adult-child interactions aimed primarily

Figure 1. The Four Diamond Model for Improving the Quality of Early Education and Child Care



at supporting positive social and emotional development; language and learning activities that occur mostly in school; and caregiver/teacher-family relationships. The latter are vital to facilitating individualized care and education for a child and to encouraging families to provide additional learning supports outside the school or child care settings.

The Four Diamond Model places these four central components within concentric circles that indicate both the proximal (near) and distal (far) supports that influence the quality of education and care. This framework differs from quality rating systems or accreditation criteria that contain multiple structural, administrative, and staffing features as well as observed interactions regarded as actual indicators of a program's quality. In the Four Diamond Model, we view features such as the educational and training background of teachers and other staff, recordkeeping systems, and physical plant dimensions as valuable supports that can facilitate positive interactions in the four diamond areas. However, we do not give programs credit for simply achieving these features. Instead, the emphasis is on the actual and observable transactions in the four diamonds.

The functional activities represented by the Four Diamonds need to be understood within the context of broader factors such as the political and economic climate. In conjunction with the child's family dynamics and with neighborhood characteristics, these broad factors jointly have a direct impact

on children's outcomes, including health, cognition, and social competence. In order to improve the quality, availability, and continuous implementation of high-quality child care and education, many people need to be at the table.

There have been many widely announced efforts to improve early child care and education since the early 1990s, and many taskforces and new trans-agency consortia established. Despite sincere and dedicated work, these efforts have not proven adequate to result in the magnitude of improvements needed to benefit either our nation's most needy children and families or the general public that still struggles with finding the supports they need. So we are not in favor of "more of the same." Our framework acknowledges the real-world realities of funding, value systems, and the centrality of the family unit. It specifies who needs to be active in the planning process and how control must be shared, over time and across settings, among providers.

For several decades, efforts have been made at the national level to better coordinate federally funded programs across major agencies, and demonstrate measurable short-term benefits within an evaluation framework. We think that the highest quality of support can be provided for children and families if we move to a "continuous improvement" model with an emphasis on frequent observational assessment and direct feedback from children, parents, practitioners, developmental scientists, and administrators. This objective, we believe, can be accomplished by emphasizing the functional essentials of early development that are embedded in social interactions. We believe that clearly stated functional standards across multiple settings are possible and within our reach in the near future. ■

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