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Viewpoint: Support Gov. Bullock's Early Edge initiative

MARCH 14, 2015 2:35 PM • BY DOUG ARDIANA, ET. AL.

We are writing today as leaders from across Montana's rural school districts.

Now is the time to support Governor Steve Bullock's Early Edge initiative for public, universally available pre-kindergarten.

While a great number of Montana's students are excelling thanks to our high-quality and innovative public schools, a frightening achievement gap remains. Too many of our students cannot keep up in school through no fault of their families or their schools but simply because they started their education without a strong foundation. Numerous studies show pre-K is tied to higher test scores and graduation rates and decreases in drug abuse and other criminal activity. The more kids who show up at kindergarten ready to learn on day one, the better teachers can prepare them for successful educational and professional careers in the future.

Early Edge gives Montana the opportunity to address this gap sitting right in front of us but only if legislators work together to do right by Montana's earliest learners. Montana is one of only six states without publicly funded early education, and it's time Helena put aside partisan differences to invest in the bright future of every corner of our state, in both rural and urban areas.

Opportunity for our school system

An unreasonable number of students start school unprepared because their families cannot afford preschool without a public option. Children who miss out on early education also miss out on significant benefits, including the ability to adjust to the demands of formal schooling, the ability to socialize with other children, and guidance on how to behave appropriately in a classroom setting. Extensive research by institutions such as Georgetown, Harvard, and the University of Chicago Department of Economics shows that high quality preschool makes a huge difference in children's lives as they progress through the school system and into life, affecting drop out and crime rates.

These benefits would not simply be limited to our urban school districts; students in rural districts will benefit as well. Because Early Edge puts control in the hands of local school districts, we will have the opportunity to decide exactly how to implement this initiative in a way that fits with and expands our already existing programs, and it allows us to develop new and innovative ways to reach out to our kids.

With our current graduation rate at 85 percent, Montana is doing well, but with Early Edge, we can do even better. High-quality early childhood education is critical to making sure 100 percent of Montana youth graduate. No one policy is a cure-all, but Early Edge marks a huge step in the right direction for our youth.

Early Edge funding in addition to SB 175

Concern about Early Edge funding lies in where the money is going when there are other issues at hand, such as hiring more teachers into our school systems. Let us be very clear: the Governor is proposing Early Edge funding in addition to the historic investments that were already made last

legislative session thanks to SB 175. Schools across the state are receiving funding through SB 175, and Early Edge is certainly not an either/or proposition.

If we are serious about investing in the future of our state, Early Edge needs to be a priority now and for the long haul. Montana's students need to be shown they are a priority, and schools need resources if more students are going to be successful from preschool all the way through to when they join Montana's job market.

If you agree with us that Early Edge is a wise investment in Montana's economic and educational future, please visit earlyedgeaction.org and contact your legislators to urge them to support this essential initiative.

Doug Ardiana, Superintendent, Bonner School District

Laurie Barron, Superintendent, Evergreen School District

Dennis Gerke, Superintendent, Hardin School District

Brad Moore, Superintendent, Big Sandy School District

Joby Parker, Superintendent, Rosebud County School District

Jule Walker, Superintendent, Plevna School District

Independent Record

Pre-K plan is good for businesses, communities

MARCH 26, 2015 6:00 AM

As business leaders who collectively support more than 2,000 jobs around the great state of Montana, we are writing in full support of Early Edge, Gov. Steve Bullock's initiative to establish opt-in, universally available preschool for all 4-year-olds. We hope our legislators can come together to do what's right for middle-class, working families struggling to afford high-quality early education, as well as for our state's economy.

Providing quality education to our children is an issue supported across party and economic lines. As CEOs and senior leaders of workforce-driven organizations, we also view this as a workforce investment issue. Montana children must be able to compete nationally and globally, and when our children are disadvantaged by a lack of preschool, both the children and employers suffer in the long-term.

We must stress that early education is a nonpartisan issue. Forty-four states, including Kansas, Oklahoma, Arkansas and Kentucky, have concluded that there is significant value and return on this investment to adopt legislation that funds pre-K education. The U.S. Chamber of Commerce maintains that there is no better economic development investment than investments made in high-quality, early childhood education.

A child's brain is 90 percent developed by the time he or she turns five years old. According to University of Chicago Professor James Heckman, a national expert on early childhood education, public investment in preschool is one of the best ways to prevent a child's family circumstances from dictating his or her future. Longitudinal studies available at www.heckmanequation.org and Harvard's Center on the Developing Child present compelling evidence that pre-K reduces crime rates and teen pregnancies, and increases the likelihood of high school graduation.

We know that the skills learned in these early years are the building blocks for future learning and success, as documented by dozens of studies, including one from Duke University published Feb. 3 in the journal "Educational Evaluation and Policy Analysis."

Educating children in these early years hones their cognitive, behavioral and social skills. These benefits translate into a better-equipped, more competitive workforce. Investing in our children at this early stage of development will be the greatest gift that we can provide both for them and for Montana's economic future.

Children who attend preschool this fall will begin to enter the workforce in 2028, a time when Montana will likely face tremendous domestic and international competition for our goods and services. We are obligated to provide our children with the same or better opportunities to learn and to thrive as our competitors give their children. Investing in early childhood education is good for Montana's children, for our economy and for our communities.

Please join us in supporting Early Edge Montana by visiting www.EarlyEdgeAction.org to ensure that all Montana four-year-olds have an equal opportunity to pursue the American Dream.

Niles Hushka is the CEO of KLJ and resides in Bozeman. Geoff Birnbaum is Executive Director of

Youth Homes. Sherri Davidoff is the CEO of LMG Security in Missoula and a member of the Missoula Chamber of Commerce Board of Directors. Pat Corrick is the Managing Partner at Farran Realty Partners in Missoula. Steve Malicott, President/CEO of Great Falls Area Chamber of Commerce. Brad McCall owns McCall Homes & Development in Billings. Paul Meyer, Executive Director of Western Montana Mental Health.

NIEER
NATIONAL INSTITUTE FOR EARLY EDUCATION RESEARCH

DEBUNKING THE MYTHS: BENEFITS OF PRESCHOOL

MYTH: Only the most disadvantaged children benefit from prekindergarten; middle class children receive no benefits. Studies on mainstream children generally do not show benefits from early education programs.

FACT: Research has found that high quality preschool programs DO make a difference for children from middle-income families as well as for low-income children. The most rigorous study of a universal preschool program to date finds that ALL children benefit regardless of income. This study of Oklahoma's universal prekindergarten program, which examined scores from three tests taken by approximately 4,700 prekindergarten and kindergarten students in Tulsa in September 2003, found that the benefits of early education DID extend to middle-income children.[1]

The Cost, Quality, and Outcomes Study, which followed a sample of children with a wide variety of family backgrounds from their next-to-last year in preschool (prior to entering kindergarten) through their early elementary school years, found higher quality preschool-age child care to be associated with better cognitive and social outcomes for children across the economic spectrum.[2] Several large-scale studies of preschool in the United States and abroad offer further evidence that preschool matters for children from diverse economic backgrounds.[3] The evidence is quite consistent, while children from better-off families may not get exactly the same benefits from preschool as children in poverty, all children benefit.

School readiness presents challenges for many children who are not poor. A national study of first-time kindergarten students in 1998 found that children from families with average (median) incomes were as far behind children in families with higher incomes as poor children were behind the average. This middle class readiness gap was found for social and emotional development as well as cognitive development. For example, dividing children into five income groupings, the children in the middle group (the middle quintile) scored 6 points higher in reading, 7.3 points higher in general knowledge, and 6.5 points higher in math than the children in the bottom quintile (the 20 percent of families with the lowest incomes). Yet, the middle group was still 6.7 points lower in reading, 6.5 points lower in general knowledge, and 6 points lower in math than children in the top quintile (the 20 percent of families with the highest incomes).[4]

Many middle-income children are deprived of early education opportunities because they don't qualify for income-tested programs, but their parents cannot afford to pay for prekindergarten out of their own pockets. Among families with incomes between $30,000 and $75,000, just half of children ages three and four not yet in kindergarten, are enrolled in preschool. This compares with three-quarters of children the same age range whose families have incomes $75,000 and above.[5] Studies in California and Boston indicate that the supply of preschool programs in middle-income neighborhoods is often no greater than in low-income neighborhoods and in some cases, preschool is even more scarce.[6] Universal prekindergarten would address these gaps by greatly expanding opportunities for middle-income children to participate in high quality early education experiences.

MYTH: As universal prekindergarten programs become more common, the goal is to require all 4-year-olds to attend preschool.

FACT: Major organizations, experts, and political leaders are calling for VOLUNTARY preschool attendance.[7] In light of the fact that very few states require even *kindergarten* attendance, it is highly unlikely that compulsory preschool attendance is on the horizon anywhere. The commonly expressed goal is to make preschool available to all children whose parents wish them to attend. Data on preschool participation by parental income and education levels shows that preschool education is nearly universal for children of well-educated parents with high incomes. Parents want to send their children to good preschool programs—the problem is that so few can afford good programs without help.

When used in reference to prekindergarten programs, the term "universal" is used in several different ways.[8] Sometimes it is used to mean providing all families with access to free programs. But attendance is optional, not required. Universal has also been defined as providing access to all families at an affordable cost. In some cases programs would be free, and in others costs would be partly subsidized so that families could afford to enroll their children. Finally, universal sometimes refers to granting guaranteed subsidies for parents in the form of vouchers or tax credits that fund preschool attendance but do not regulate the quality of available programs. Voluntary, universally available, programs provide viable options for families who want to enroll children in preschool. There is universal agreement that compulsory attendance would be bad public policy; suggesting that that preschool advocates seek to make preschool compulsory is a dishonest scare tactic.

MYTH: Children are prepared for school without prekindergarten.

FACT: Many children do not arrive at school with the skills they need. Unfortunately, this is the seed that grows to become America's school failure and dropout problem. The National Center for Education Statistics (NCES) study of children who entered kindergarten in 1998 found that cognitive and social skills are strongly correlated with income at school entry. Although children in poverty are the furthest behind, children from middle-income families are as far behind children from higher income families as poor children are behind the middle class.[9] Most American children are not achieving their potential prior to school entry, and those who start behind tend to stay behind. America cannot afford to squander the talents of so many of its children by leaving them behind at the starting gate.

In a 1995 survey of 3,500 kindergarten teachers from across the country, many reported that large proportions of their students lacked important school readiness skills. For example, 46 percent of the kindergarten teachers reported that at least half of the students in their class had difficulty following directions, 36 percent reported that at least half of their class lacked academic skills they needed, and 34 percent reported that at least half of their class had difficulty working independently.[10] In Maryland, only 52 percent of children who entered kindergarten in 2002 were considered "fully ready."[11] In a 2001 statewide survey, Colorado kindergarten and first-grade teachers reported that four out of 10 children were not academically prepared for school and that about one-third of their students were not socially and emotionally prepared.[12]

According to a 2004 poll, a large majority kindergarten teachers believe that their students would be better prepared for school if they participated in prekindergarten.[13] In the poll, 66 percent of kindergarten teachers rated children who attended prekindergarten as "substantially better prepared" to start school ready to succeed compared to 1 percent of teachers who said prekindergarten kids were "less prepared." The vast majority of the teachers, ranging from 78 to 93 percent, said children who had attended quality prekindergarten programs were more likely to get along with others and be sensitive to their feelings, count, have problem-solving skills, know letters of the alphabet and follow directions, and were less likely to disrupt class.

MYTH: Public preschool programs do not give parents choices.

FACT: Many public preschool programs allow parents to choose where to send their children from among a mix of public and private providers, including preschool programs operated by for-profits, non-profits, and faith-based organizations.[14] What is essential is that public funding is sufficient and public standards high enough that the programs offered are all of high quality. Parents don't have effective choice if the programs available to them are of poor quality.

MYTH: Studies of model preschool programs are methodologically weak, and it is difficult to apply the findings from these studies to programs in public settings.

FACT: Misleading attacks on several of the best-known preschool studies appear to be an effort to undermine confidence in the research on preschool education generally. In some cases, the attacks are factually incorrect. In other cases, the facts are accurate but misinterpreted. Moreover, these attacks on the details of a few studies reflect a deep misunderstanding of science. No study stands alone, nor is any study perfect. The conclusion that good preschool education is one cost-effective tool for improving the school readiness and success of children rests on hundreds of studies, including dozens of long-term studies.[15] The patterns of findings in two of the most commonly cited -- the Perry Preschool and Abecedarian studies -- have been replicated in other studies in the United States and abroad.[16] The results from these studies are both statistically significant and generalizable. Methodologically sound research has consistently shown that high-quality prekindergarten programs have the potential to offer children substantial benefits that are apparent much later in life—including improved achievement and high school graduation rates, and reduced special education placements.

The Perry Preschool sample was selected to be at high-risk of school failure, but it turns out the sample is roughly representative of African-American children in the early 1960's. Some claim that no other program or study, for more than 40 years, has shown results as dramatic as those found for Perry. These same accusations often include reviews of the Abecedarian study which reports much larger gains in IQ, achievement, and school success than the Perry study. It is unclear how this claim could be made about Perry having read both studies. In fact, the Perry study has smaller effects on achievement, grade repetition and special education than many other studies. One of the important lessons from economic analysis of the Perry study's results is that even moderate gains in school success can have substantial economic pay-off.

Critics of the Perry Preschool study claim that: there are many aspects of the children's lives and families that were not affected by the program, that the preschool children were more likely to be in remedial classes, that there was no effect on employment at age 19, and that the preschool and control groups differed in maternal employment and this might explain the results. All of these claims are misleading, false, or unsubstantiated hypotheses that have been proven wrong. The Perry Preschool study measured most aspects of child development and family characteristics related to child development. That does not mean that preschool was expected to have an impact on all or even most of them. The pattern of effects that was found is logical, consistent with major theories of how children learn and develop, confirmed by statistical models that look at links across measures, and replicated in other studies.[17]

Children who went to the Perry Preschool program acquired knowledge and skills to a much greater extent than those that did not during the preschool years. The program did not give them higher self-esteem directly or change their parents' attitudes, beliefs, or abilities. When they got to school they did better and so began to feel more motivated, behave better, etc. This helped them keep on learning more in school. The program also helped them stay out of crime and delinquency. The most likely reason is that it taught them to think before they acted, take personal responsibility for their actions, and gave them skills for getting along with others. The

differences on remedial education are very tiny and could not explain larger differences on special education.

Yes, there was no difference in unemployment as it is technically defined, but only because people not trying to find a job are not considered unemployed. However, preschool led to a big increase in the percentage with a job at age 19. Finally, although the Perry treatment and control groups were comparable on every other measure, the control group had a higher percentage of mothers with jobs. However, the researchers tested for the effects of this by taking maternal employment into account and looking at the effects of maternal employment. In the Perry study, having a mother with a job was an advantage—it meant that their mothers had more education, skills, and income. So this difference actually reduced the estimated effects of the preschool program.

From an economic perspective, high-quality preschool education programs for children in poverty have the potential to yield benefits that exceed their costs.[18] Although there are large gaps in school success and achievement between children from low-income families and those from upper-income backgrounds, interventions that begin very early in life can help close those gaps. These gaps are so large that even falling short of closing the gap, a preschool program can make a substantial contribution. As a result, early education programs also stand to provide a great benefit to society.

High/Scope researchers involved in the Perry Preschool Study note that findings from this study are generalizable to programs that are implemented on a broader scale, provided that such programs are "reasonably similar" to the Perry program.[19] Reasonably similar programs are those in which teachers have bachelor's degrees and are certified in education; teacher-child ratios are limited to 1:8; preschool education is offered to children for at least 2 years, at ages 3 and 4; classes are offered 5 days per week, for at least 2.5 hours per day; in which the High/Scope curriculum or a similar model is used; and in which home visiting or parent outreach components are offered. Because the Perry Preschool Study focused on children growing up in poverty, its findings are most applicable to children from low-income families

In most states, high-quality, publicly available, preschool programs are already in place to serve children at risk.[20] Although these programs do not currently meet *all* of the criteria that would make them reasonably similar to the Perry Preschool program, some do meet most of those criteria—including many of the criteria that are most expensive to fund. For example, Arkansas offers a prekindergarten initiative that provides BA-level teachers with specialized training in early education, appropriate class sizes, and comprehensive support services for children and their families. This program met all 10 of the benchmarks associated with a high-quality program, as identified by the National Institute for Early Education Research. A rigorous evaluation of Oklahoma's prekindergarten program in Tulsa found impacts on achievement at kindergarten entry that quite comparable to Perry Preschool program effects in the early elementary years.[21]

MYTH: Preschool education programs do not have any lasting effects on children.

FACT: Numerous studies show benefits from preschool education that carry over into the first years of school and even well into the adulthood. These benefits include both (a) increased academic achievement and (b) school success and improvements in social-emotional development behavior and conduct. Dr. James Heckman, a University of Chicago economist and Nobel Laureate has concluded that the preschool years are the most productive years for new educational investments and that the long-term impacts of early education on social and emotional development may be the most important consequences of preschool education. Yet these important social-emotional benefits are often ignored.[22]

Over the years various opponents of compensatory education for disadvantaged children have reported that preschool education programs produce few long-term benefits—that is, that any positive effects of these programs "fade out" and eventually disappear over time. This claim is largely incorrect.

Research studies have generally shown that gains in IQ due to preschool programs are most apparent in the short term, but tend to gradually diminish and even disappear.[23] This is not always the case, but is generally true for one or two year preschool programs. However, other outcomes do not follow the same pattern. Research on the effects of preschool participation on children's achievement test scores is more variable. Some studies see effects decline over time, others find them steady, and yet others suggest that gains could even snowball.[24]

Overall, the methodologically strongest studies indicate that meaningful effects on achievement persist.[25] Results to the contrary most often are due to the use of faulty research designs and methods. Specifically, such studies lack the statistical power necessary to detect an effect due to high attrition, or are biased due to the exclusion of children attending special education classes and those repeating a grade. Studies that are more methodologically sound have found that preschool produces long-term benefits in achievement. This is consistent with uniformly positive evidence that after participating in high-quality preschool programs, children are less likely to repeat a grade or to be placed in special education. They are also more likely to graduate from high school.

In summary, the claim that all of the important effects of preschool education disappear over time is inaccurate. Even when the effects of prekindergarten on children's IQ scores decrease over time, the effects persist in a variety of other areas—delinquency and crime, special education placements, high school graduation rates, and achievement scores among them—so that high-quality preschool education yields important long-term benefits.

MYTH: Leading experts in child development believe that preschool education is ineffective or even harmful.

FACT: Opponents often misrepresent the views of leading experts including Dr. Edward Zigler and Dr. David Elkind in order to give the false impression that they oppose preschool education and support the opponent's views. This is precisely the opposite of the truth.

Selective quotes taken out of context from Dr. Zigler's publications have been used to make it seem as if he believes that all preschool education is ineffective. What Dr. Zigler actually argued was that universal preschool programs that did not provide the full array of services offered by an adequately funded Head Start program, that did not target children in poverty, and that were not followed up with continued support for children's development and learning would not produce the results for reduced school failure, lower drop-out rates and increased test scores *that he had already acknowledged were produced by strong preschool programs for children in poverty*. In fact, Zigler has been and continues to be a strong supporter of public investment in preschool education including Head Start. He also has strongly emphasized that preschool programs should not be expected to fix all of the problems that poverty poses for child development. Thus, he argues for broader and longer lasting public support for child development, not less. In a 2001 article in the *Journal of the American Medical Association*, Dr. Zigler says, "a substantial literature now supports the concept of early childhood intervention." He also states: "earlier school for every child is a welcome idea."[26] Zigler continues to argue that preschool alone is not a cure for the ills of poverty, that children benefit from strong support for their learning and development at every age, and that preschool programs need to address the needs of the whole child in order to be maximally effective.

Opponents also selectively quote Dr. Elkind so as to make it appear (incorrectly) that he opposes preschool education, at least for middle class children. However, what Dr. Elkind opposes is bad preschool education for any child. He has stated that every child ought to have access to good preschool education. In a 2001 article in *Education Next,* Dr. Elkind concludes: "If we want all of our children to be the best that they can be, we must recognize that education is about them, not us. If we do what is best for children, we will give them and their parents the developmentally appropriate, high-quality, affordable, and accessible early-childhood education they both need and deserve."[27]

Some research has found that long hours of child care beginning in the early years of life can produce modest negative effects on children's behavior when they enter school. These effects are small and may be temporary. The same studies that find this one mild negative effect also find positive effects on children's cognitive abilities and positive effects on other aspects of children's social skills and behavior including their sociability and compliance. High quality preschool programs at ages 3 and 4 have not been found to produce this negative effect. Moreover, research has shown that we know how to produce positive effects on social development and behavior and avoid negative effects. This includes large-scale "gold standard" studies of Head Start and Early Head Start that found positive rather than negative effects on behavior. Good practices need to be required and supported so that all early childhood programs produce substantial positive effects and no negative effects.[28]

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Investing in Our Future: The Evidence Base on Preschool Education

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Executive Summary

Large-scale public preschool programs can have substantial impacts on children's early learning. Scientific evidence on the impacts of early childhood education has progressed well beyond exclusive reliance on the Perry Preschool and Abecedarian programs. A recent analysis integrating evaluations of 84 preschool programs concluded that, on average, children gain about a third of a year of additional learning across language, reading, and math skills. At-scale preschool systems in Tulsa and Boston have produced larger gains of between a half and a full year of additional learning in reading and math. Benefits to children's socio-emotional development and health have been documented in programs that focus intensively on these areas.

Quality preschool education is a profitable investment. Rigorous efforts to estimate whether the economic benefits of early childhood education outweigh the costs of providing these educational opportunities indicate that they are a wise financial investment. Available benefit-cost estimates based on older, intensive interventions, such as the Perry Preschool Program, as well as contemporary, large-scale public preschool programs, such as the Chicago Child-Parent Centers and Tulsa's preschool program, range from three to seven dollars saved for every dollar spent.

The most important aspects of quality in preschool education are stimulating and supportive interactions between teachers and children and effective use of curricula. Children benefit most when teachers engage in stimulating interactions that support learning *and* are emotionally supportive. Interactions that help children acquire new knowledge and skills provide input to children, elicit verbal responses and reactions from them, and foster engagement in and enjoyment of learning. Recent evaluations tell us that effective use of curricula focused on such specific aspects of learning as language and literacy, math, or socio-emotional development provide a substantial boost to children's learning. Guidelines about the number of children in a classroom, the ratio of teachers and children, and staff qualifications help to increase the likelihood of—but do not assure—supportive and stimulating interactions. Importantly, in existing large-scale studies, only a minority of preschool programs are observed to provide excellent quality and levels of instructional support are especially low.

Supporting teachers in their implementation of instructional approaches through coaching or mentoring can yield important benefits for children. Coaching or mentoring that provides support to the teacher on how to implement content-rich and engaging curricula shows substantial promise in helping to assure that such instruction is being provided. Such coaching or mentoring involves modeling positive instructional approaches and providing feedback on the teacher's implementation in a way that sets goals but is also supportive. This can occur either directly in the classroom or though web-based exchange of video clips.

Quality preschool education can benefit middle-class children as well as disadvantaged children; typically developing children as well as children with special needs; and dual language learners as well as native speakers. Although early research focused only on programs for low-income children, more recent research focusing on universal preschool programs provides the opportunity to ask if preschool can benefit children from middle-income as well as low-income families. The evidence is clear that middle-class children can benefit substantially, and that benefits outweigh costs for children from middle-income as well as those from low-income families. However, children from low-income backgrounds benefit more. Children with special needs who attended Tulsa's preschool program showed comparable improvements in reading and pre-writing skills as typically developing children. Further, at the end of first grade, children with special needs who had attended Head Start as 3-year-olds showed stronger gains in math and social-emotional development than children with special needs who had not attended Head Start. Studies of both Head Start and public preschool programs suggest that dual language learners benefit as much as, and in some cases more than, their native speaker counterparts.

A second year of preschool shows additional benefits. The available studies, which focus on disadvantaged children, show further benefits from a second year of preschool. However, the gains are not always as large as from the first year of preschool. This may be because children who attend two years of preschool are not experiencing a sequential building of instruction from the first to the second year.

Long-term benefits occur despite convergence of test scores. As children from low-income families in preschool evaluation studies are followed into elementary school, differences between those who received preschool and those who did not on tests of academic achievement are reduced. However, evidence from long-term evaluations of both small-scale, intensive interventions and Head Start suggest that there are long-term effects on important societal outcomes such as high-school graduation, years of education completed, earnings, and reduced crime and teen pregnancy, even after test-score effects decline to zero. Research is now underway focusing on why these long-term effects occur even when test scores converge.

There are important benefits of comprehensive services when these added services are carefully chosen and targeted. When early education provides comprehensive services, it is important that these extensions of the program target services and practices that show benefits to children and families. Early education programs that have focused in a targeted way on health outcomes (e.g., connecting children to a regular medical home; integrating comprehensive screening; requiring immunizations) have shown such benefits as an increase in receipt of primary medical care and dental care. In addition, a parenting focus can augment the effects of preschool on children's skill development, but only if it provides parents with modeling of positive interactions or opportunities for practice with feedback. Simply providing information through classes or workshops is not associated with further improvements in children's skills.

Investing in Our Future: The Evidence Base on Preschool Education

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The expansion of publicly-funded preschool education is currently the focus of a prominent debate. At present, 42% of 4-year-olds attend publicly funded preschool (28% attend public prekindergarten programs, 11% Head Start, and 3% special education preschool programs).[1] A vigorous debate about the merits of preschool education is underway, although at times it has not included the most recent available evidence. The goal of this brief is to provide a non-partisan, thorough, and up-to-date review of the current science and evidence base on early childhood education (ECE). Our interdisciplinary group of early childhood experts reviewed rigorous evidence on why early skills matter, the short- and long-term effects of preschool programs on children's school readiness and life outcomes, the importance of program quality, which children benefit from preschool (including evidence on children from different family income backgrounds), and the costs versus benefits of preschool education. We focus on preschool (early childhood education) for four-year-olds, with some review of the evidence for three-year-olds when relevant. We do not discuss evidence regarding programs for 0 – 3 year olds.

Early skills matter, and preschool can help children build these skills.

The foundations of brain architecture, and subsequent lifelong developmental potential, are laid down in a child's early years through a process that is exquisitely sensitive to external influence. Early experiences in the home, in other care settings, and in communities interact with genes to shape the developing nature and quality of the brain's architecture. The growth and then environmentally based pruning of neuronal systems in the first years support a range of early skills, including cognitive (early language, literacy, math), social (theory of mind, empathy, prosocial), persistence, attention, and self-regulation and

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executive function skills (the voluntary control of attention and behavior).[2] Later skills—in schooling and employment—build cumulatively upon these early skills. Therefore investment in early learning and development is more efficient and can generate more benefits than costs relative to investment later in the life cycle.[3] The evidence reviewed below addresses the role of preschool in helping children build these skills.

Rigorous evidence suggests positive short-term impacts of preschool programs on children's academic school readiness and mixed impacts on children's socio-emotional readiness.

Effects on language, literacy, and mathematics. Robust evidence suggests that a year or two of center-based ECE for three- and four-year-olds, provided in a developmentally appropriate program, will improve children's early language, literacy, and mathematics skills when measured at the end of the program or soon after.[4] These findings have been replicated across dozens of rigorous studies of early education programs, including small demonstration programs and evaluations of large public programs such as Head Start and some state Pre-K programs. Combining across cognitive (e.g., IQ), language (e.g., expressive and receptive vocabulary) and achievement (e.g., early reading and mathematics skills) outcomes, a recent meta-analysis including evaluations of 84 diverse early education programs for young children evaluated between 1965 and 2007 estimated the average post-program impact to be about .35 standard deviations.[5] This represents about a third of a year of additional learning, above and beyond what would have occurred without access to preschool. These data include both the well-known small demonstration programs such as Perry Preschool, which produced quite large effects, as well as evaluations of large preschool programs like Head Start, which are characterized both by lower cost but also more modest effects. Two recent evaluations of at-scale urban prekindergarten programs, in Tulsa and Boston, showed large effects (between a half of a year to a full year of additional learning) on language, literacy and math.[6]

Effects on socio-emotional development. The effects of preschool on socio-emotional development[7] are not as clear-cut as those on cognitive and achievement outcomes. Far fewer evaluation studies of general preschool (that is, preschool without a specific behavior-focused component) have included measures of these outcomes. And relative to measures of achievement, language and cognition, socio-emotional measures are also more varied in the content they cover and quality of measurement.

A few programs have demonstrated positive effects on children's socio-emotional development. Perry Preschool was found to have reduced children's externalizing behavior problems (such as acting out or aggression) in elementary school.[8] More recently, the National Head Start Impact Study found no effects in the socio-emotional area for four-year-old children, although problem behavior, specifically hyperactivity, was reduced after one year

of Head Start among three-year-olds.[9] An evaluation of the Tulsa prekindergarten program found that prekindergarten attendees had lower levels of timidity and higher levels of attentiveness, suggesting greater engagement in the classroom, than was the case for other students who neither attended prekindergarten nor Head Start. However, there were no differences among prekindergarten and other children in their aggressive or hyperactive behavior.[10] A recent explanation for the divergence of findings is suggested by meta-analytic work on aggression, which found that modest improvements in children's aggressive behavior occurred among programs that made improving children's behavior an explicit goal.[11]

Effects on health. The effects of preschool on children's health have been rigorously investigated only within the Head Start program; Head Start directly targets children's health outcomes, while many preschool programs do not. Head Start has been shown to increase child immunization rates. In addition, there is evidence that Head Start in its early years of implementation reduced child mortality, and in particular mortality from causes that could be attributed plausibly to aspects of Head Start's health services, particularly immunization and health screening (e.g. measles, diabetes, whooping cough, respiratory problems).[12] More recently, the National Head Start Impact Study found somewhat mixed impacts on children's health outcomes between the end of the program and the end of first grade.[13] Head Start had small positive impacts on some health indicators, such as receipt of dental care, whether the child had health insurance, and parents' reports of whether their child had good health, at some post-program time points but not at others. Head Start had no impact at the end of first grade on whether the child had received care for an injury within the last month or whether the child needed ongoing care. The positive impacts of Head Start on immunization, dental care and some other indicators may be due to features of its health component—the program includes preventive dental care, comprehensive screening of children, tracking of well-child visits and required immunizations, and assistance if needed with accessing a regular medical home. In contrast to the literature on Head Start and health outcomes, there are almost no studies of the effects of public prekindergarten on children's health.

A second year of preschool shows additional benefits.

Few studies have examined the relative impact of one vs. two years of preschool education, and none that randomly assigned this condition. All of the relevant studies focus on disadvantaged children. The existing evidence suggests that more years of preschool seem to be related to larger gains, but the added impact of an additional year is often smaller than the gains typically experienced by a four-year-old from one year of participation.[14] Why the additional year generally results in smaller gains is unclear. It may be that children who attend multiple years experience the same curriculum across the two years rather than experiencing sequenced two-year curricula, as programs may mix three-year-old and four-year-olds in the same classroom.

Children show larger gains in higher-quality preschool programs.

Higher-quality preschool programs have larger impacts on children's development while children are enrolled in the program and are more likely to create gains that are sustained after the child leaves preschool. Process quality features—children's immediate experience of positive and stimulating interactions—are the most important contributors to children's gains in language, literacy, mathematics and social skills. Structural features of quality (those features of quality that can be changed by structuring the setting differently or putting different requirements for staff in place, like group size, ratio, and teacher qualifications) help to create the conditions for positive process quality, but do not ensure that it will occur.

For example, smaller group sizes and better ratios of staff to children provide the right kind of setting for children to experience more positive interactions. But these conditions by themselves are not enough. Teacher qualifications such as higher educational attainment and background, certification in early childhood, or higher than average compensation for the field are features of many early education programs that have had strong effects. Yet here too, research indicates that qualifications alone do not ensure greater gains for children during the course of the preschool years.[15] To promote stronger outcomes, preschool programs should be characterized by both structural features of quality and ongoing supports to teachers to assure that the immediate experiences of children, those provided through activities and interactions, are rich in content and stimulation, while also being emotionally supportive.

The aspects of process quality that appear to be most important to children's gains during the preschool years address two inter-related dimensions of teacher-child interaction. First, interactions explicitly aimed at supporting learning, that foster both higher-order thinking skills in general and learning of content in such specific areas as early math and language, are related to gains, as discussed further later in this brief. Second, learning across multiple domains is enhanced in the context of warm, responsive teacher-child relationships and interactions that are characterized by back and forth—serve and return—conversations to discuss and elaborate on a given topic.[16,17] Both the warm and responsive interaction style and learning-focused interactions also predict the persistence of gains into the school years.[18] Some evidence suggests that children who have more opportunities to engage in age-appropriate activities with a range of varied materials such as books, blocks, and sand show larger gains during the preschool years (and those gains are maintained into the school years).[19]

Quality in preschool classrooms is in need of improvement, with instructional support levels particularly low.

Both longstanding and more recent research reveal that the average overall quality of preschool programs is squarely in the middle range of established measures. In large-scale studies of public prekindergarten, for example, only a minority of programs are observed to provide excellent quality; a comparable minority of programs are observed to provide poor quality.[20] It is therefore not surprising that impacts of most of the rigorously evaluated

public prekindergarten programs fall shy of those in Tulsa and Boston (showing gains in the small to moderate range for reading and math, that is, a few months of added learning, rather than the half-year to full-year of additional learning that was found in Tulsa and Boston).[21] Head Start programs also show considerable variation in quality. While few programs are rated as having "poor" quality, research suggests that as in studies of many public prekindergarten programs, Head Start programs on average show instructional quality levels well below the midpoint of established measures.[22] In sum, there is variation in quality in both Head Start and prekindergarten nationally, with no clear pattern of one being stronger in quality than the other in the existing research. It is important to note here that funding streams are increasingly mixed on the ground, with prekindergarten programs using Head Start performance standards or programs having fully blended funds; thus, these two systems are no longer mutually exclusive in many locales.

High-quality programs implemented at scale are possible, according to recent research. Evaluation evidence on the Tulsa and Boston prekindergarten programs shows that high-quality public Pre-K programs can be implemented across entire diverse cities and produce substantial positive effects on multiple domains of children's development. Assuring high quality in these public programs implemented at scale has entailed a combination of program standards, attention to teacher qualifications and compensation, additional ongoing on-site quality supports such as the ones described previously, and quality monitoring.

A promising route to quality: Developmentally focused, intensive curricula with integrated, in-classroom professional development.

Curricula can play a crucial role in ensuring that children have the opportunity to acquire school readiness skills during the preschool years. Preschool curricula vary widely. Some, typically labeled "global" curricula, tend to have a wide scope, providing activities that are thought to promote socio-emotional, language, literacy, and mathematics skills and knowledge about science, arts, and social studies. Other curricula, which we label "developmentally focused," aim to provide intensive exposure to a given content area based on the assumption that skills can be better fostered with a more focused scope.[23]

Few global curricula have been evaluated rigorously. However, existing evidence from independent evaluators suggests no or small gains associated with their use, when compared with other commercially available curricula, researcher-developed curricula or curricula developed by individual teachers.[24] A revised version of a widely used global curriculum is currently being evaluated via a randomized trial.[25]

As for developmentally focused curricula, several recent experimental evaluations have demonstrated moderate to large gains in the targeted domains of children's development, for math curricula,[26] language and literacy curricula,[27] and curricula directed at improving socio-emotional skills and self-regulation, compared with usual practice in preschool

classrooms,[28] which typically involve more global curricula. In these studies, for the group receiving the developmentally focused curriculum, it is generally added to a global curriculum that is already in place.

Most of the successful curricula in these recent evaluations are characterized by intensive professional development that often involves coaching at least twice a month, in which an expert teacher provides feedback and support for in-classroom practice, either in person or in some cases through observation of videos of classroom teaching. Some curricula also incorporate assessments of child progress that are used to inform and individualize instruction, carried out at multiple points during the preschool year. These assessments allow the teacher to monitor the progress of each child in the classroom and modify her content and approach accordingly.

This recent set of studies suggests that intensive, developmentally focused curricula with integrated professional development and monitoring of children's progress offer the strongest hope for improving classroom quality as well as child outcomes during the preschool years. However, more evidence is needed about the effectiveness of such curricula, particularly studies of curricula implemented without extensive support of the developer, or beyond initial demonstrations of efficacy.[29] That is, the majority of rigorously conducted trials of developmentally focused curricula have included extensive involvement of the developer(s) and involve relatively small numbers of children. There have been only a few trials of curricula in "real world" conditions—meaning without extensive developer(s') involvement and across a large program. Some notable recent results in "real world" conditions show promise that substantial effects can be achieved,[30] but more such studies are needed given the widely noted difficulties in taking interventions to scale.[31]

A recent development in early childhood curricula is the implementation of integrated curricula across child developmental domains (for example, socio-emotional and language; math and language), which retain the feature of defined scope for each area. In two recent successful instances, efforts were made to ensure feasible, integrated implementation; importantly, supporting coaches and mentor teachers were trained across the targeted domains and curricula.[32]

In addition to in-classroom professional development supports, the pre-service training and education of teachers is of critical concern in the field of preschool education. However, here evaluation research is still scant. Recent innovations include increasing integration of practica and in-classroom experiences in higher education teacher preparation courses; hybrid web-based and in-person training approaches; and attention to overlooked areas of early childhood teacher preparation such as work with children with disabilities, work with

children learning two languages, or teaching of early math skills. However, these innovations have yet to be fully evaluated for their impact on teacher capacities or preschool program quality.[33]

Over the course of elementary school, scores for children who have and have not attended preschool typically converge. Despite this convergence, there is some evidence of effects on outcomes in early adulthood.

As children in preschool evaluation studies are followed into elementary school, the differences between those who received preschool and those who did not are typically reduced, based on the available primary-school outcomes of evaluations (chiefly test scores of reading and math achievement). This phenomenon of reduced effect sizes on test scores over time is often labeled "fadeout."[34] We use the term convergence, as this term more accurately captures how outcomes like test scores of children who participated versus did not participate in preschool converge over time as the non-attenders catch-up. There is not yet a strong evidence base on reasons for the convergence of test scores in follow-up evaluations of children after early childhood. A number of factors may be involved—for example, low quality of primary schooling, particularly for students in disadvantaged areas, may fail to build on the gains created by early childhood education.[35] Having students who attended and benefited from preschool may also permit elementary-school teachers to focus more on the non-attenders, and this extra attention may explain the convergence or catch-up pattern.

Persistence of effects in landmark, small demonstration programs. A handful of small-scale demonstration programs show that while the language, literacy, and mathematics test scores of children participating versus not participating in preschool programs tend to converge as children progress through their K-12 schooling careers, the programs nonetheless appear to produce effects on a wide range of behavioral, health, and educational outcomes that persist into adulthood. The existing evidence pertains to low-income populations. The two most well-known randomized experimental tests of preschool interventions with long-term outcome data—Perry Preschool and Abecedarian—provided striking evidence of this. Both programs produced large initial impacts on achievement test scores. Though some effects remained, the size of these impacts fell in magnitude as children aged. Nonetheless, there were very large program effects on schooling attainment and earnings during adulthood.[36] The programs also produced striking results for criminal behavior; fully 60-70% of the dollar-value of the benefits to society generated by Perry Preschool come from impacts in reducing criminal behavior.[37] In Abecedarian, the

treatment group's rate of felony convictions or incarceration by age 21 is fully one-third below that of the control group.[38] Other effects included reductions in teen pregnancy in both studies for treatment group members and reductions in tobacco use for treatment group members in Abecedarian.

Persistence of effects in programs at scale. Patterns of converging test scores but emerging impacts in adulthood are present in some other noteworthy preschool programs as well. These also focus on disadvantaged populations. For example, in studies of Head Start, there appear to be long-term gains in educational, behavioral and health outcomes even after test score impacts decline to zero. Specifically, a number of quasi-experimental studies of Head Start children who participated in the program in the 1960's, 1970's and 1980's find test score effects that are no longer statistically significant within a few years after the children leave the program. But even though Head Start participants have test scores that look similar to other children by early to mid elementary school, these studies show that Head Start children wind up completing more years of schooling, earning more, being healthier, and (in at least some studies) may be less likely to engage in criminal behavior.[39] Two studies have examined the medium-term persistence of gains of publicly funded state prekindergarten programs. One of these has followed children through third grade and found persistent mathematics gains, but not reading gains, through third grade for boys.[40] The second study has followed children through first grade and has found convergence of participating and non-participating children's cognitive skills and mixed impacts on children's behavioral outcomes.[41]

Future Directions in Sustaining Short-Term Gains from Preschool. Despite several promising studies of long-term gains, we caution that the vast majority of preschool program evaluations have not assessed outcomes substantially beyond the end of the program. Strategies for sustaining short-term gains for children require more exploration and evaluation. One path to sustaining short-term gains may be to maximize the short-term impact by ensuring that quality of preschool is high, according to the approaches described previously. Another is to work towards greater continuity in learning goals and approaches across the preschool and early elementary years and ensuring instructional quality and support for health and socio-emotional learning in kindergarten and the early elementary grades. And finally, efforts to bolster three major influences that parents have on children's development—their psychological well-being; their parenting behaviors; and their economic security—have been a focus in Head Start but not in other preschool programs. Intensifying and further specifying these components may increase the impact of preschool. Recent advances in successful parenting interventions, which provide great specificity and intensive focus on the dimension of parenting behavior targeted (e.g., specific behavior management approaches or contingent responsiveness), have yet to be integrated with preschool systems.[42] A recent meta-analytic study suggests that a parenting-focused component can be an important complement to preschool and produce added gains in children's cognitive skills. The key is that the component on parenting be delivered via modeling of positive interactions or opportunities for practice with feedback. Didactic workshops or classes in

which parents merely receive information about parenting strategies or practices appeared to produce no additive benefits beyond those from the early education component of preschool alone.[43] Efforts to integrate recent advances in adult education and workforce development programs (a new set of two- or dual-generation programs), similarly, are just now being evaluated.[44]

Preschool's effects for different subgroups.

Family income. **Recent evidence suggests that high-quality preschool positively contributes to the language, literacy, and mathematics skills growth of both low- and middle-income children, but has the greatest impact on children living in or near poverty.** Until recently, it has been difficult to compare the effectiveness of high-quality preschool across income groups, because almost all of the earlier studies focused on programs that targeted children from poor families. For example, the median percentage of families in poverty in rigorous early childhood education evaluations identified in a recent meta-analysis was 91%.[45] One study from the 1980's of the positive impacts of preschool education on children from well-to-do families suggested substantial positive impacts on boys.[46] More recently, the advent of universal prekindergarten in a small number of states and communities has permitted comparisons based on income. In two studies of public prekindergarten programs, positive and substantial impacts on language, literacy, and mathematics skills were found for both low- and middle-income children. In both of these studies, the impacts were larger for children living in or near poverty (as indicated by free- or reduced-lunch status), but still substantial for their less disadvantaged peers.[47]

Race/ethnicity. **Overall, the current research evidence suggests that children of different racial/ethnic groups benefit from preschool.** Many of the most prominent evaluations from the 1960's, 1970's and 1980's (e.g., Perry, Abecedarian, and the Chicago Child-Parent Centers) focused on African American students, with no comparisons of effects possible across different racial/ethnic groups. Several more recent studies have compared effects for students from different racial/ethnic backgrounds. The Head Start Impact Study reached somewhat different conclusions for three-year-olds and four-year-olds: for three-year-olds, positive post-program impacts were strongest for African Americans and Hispanics, relative to White, non-Hispanic children; for four-year-olds, positive impacts were smaller for Hispanics, again relative to White, non-Hispanic children.[48] The Tulsa study found substantial improvements in school readiness for prekindergarten participants from all racial and ethnic groups. Effect sizes were moderate to large for all racial and ethnic groups studied (White, Black, Hispanic, Native American) but especially large for Hispanics.[49] The Boston study found substantial benefits in language, literacy, mathematics, and executive functioning domains for children from all racial and ethnic groups. Effect sizes were especially large for Hispanics and for Asian Americans, though the sample size for Asian Americans was relatively small.[50]

Dual language learners and children of immigrants. **Positive impacts of preschool can be as strong or stronger for dual language learners and children of immigrants, compared with their English-speaking or native-born counterparts.** Given the specific challenges and opportunities faced in school by dual language learner (DLL) students[51] and the growing number of such students in the U.S., it is important to know how high-quality preschool programs impact them in particular, as well as the features of quality that are important to their development. National non-experimental evidence suggests that positive effects of preschool on early reading and math achievement are as strong for children of immigrants as for children of the native-born.[52] In the Tulsa prekindergarten program, effects for Hispanic students who came from homes where Spanish was the primary spoken language (DLL students) were larger than effects for Hispanic students who came from homes where English was the primary spoken language.[53] And the National Head Start Impact Study found significantly stronger positive impacts of Head Start on language and school performance at the end of kindergarten for DLL students, relative to their native speaking counterparts.

Generally, the same features of quality that are important to the academic outcomes of monolingual English speaking children appear to be important to the development of DLL children. However, a feature of early childhood settings that may be important specifically to the development of DLL children is language of instruction. There is emerging research that preschool programs that systematically integrate both the children's home language and English language development promote achievement in the home language as well as English language development.[54] While there are no large meta-analytic studies of bilingual education in preschool, meta-analyses of bilingual education in elementary school and several experimental preschool studies have reached this conclusion.[55] Home language development does not appear to come at the cost of developing English language skills, but rather strengthens them. Thus, programs that intentionally use both languages can promote emergent bilingualism, a characteristic that may be valuable in later development.[56]

Children with special needs. **More research is needed replicating and extending initial findings of positive effects for children with special needs.** The Head Start Impact Study found that children with special needs randomly assigned to Head Start as 3-year-olds made significant gains in math and social-emotional development at the end of first grade compared with peers assigned to the control group.[57] Research on the Tulsa prekindergarten program found that children with mild to moderate special needs who participated in prekindergarten experienced significant improvements—comparable to those for typically developing children—in their reading skills and writing skills, though not necessarily in math. There is a need to test these patterns in other studies.

The benefits of quality preschool outweigh the costs.

High-quality preschool programs are one of many possible ways to support children's development, and it is important to ask whether the benefits from such programs can offset their considerable costs. Cost-benefit frameworks enable researchers to assess the value of social investments.[58] Key to this technique is a systematic accounting of the costs and benefits of an intervention, based on a careful comparison of outcomes for those individuals who participated in the program and otherwise similar individuals who did not. Early childhood education costs refer to all expenditures necessary to provide the program, including staff time and capital investments. Benefits typically take one of two forms. First, benefits may come from cost savings, such as reduced spending for special education and grade retention, as well as lower involvement in the child protection, welfare, and criminal justice systems. Second, benefits may flow from greater economic productivity, especially higher earnings as adults. It is also important to note that benefits can accrue not only to the individuals who directly participated in preschool programs, but also to society (e.g., the value of not being a crime victim). When both costs and benefits are quantified, researchers can produce an estimate of a program's benefits relative to its costs.

Rigorous efforts to estimate benefit-cost ratios of preschool have yielded very positive results, suggesting that early childhood education can be a wise financial investment. Using data on the long-term life outcomes of program participants and non-participants, assessments of the Perry Preschool program[59] and the Chicago Child-Parent Centers[60] both yielded estimates of about 7 to 1 or higher. Estimates of the longer and thus more costly Abecedarian Project (program length of 5 years) have produced a lower estimate of approximately 2.5 to 1.[61] Other scholars, lacking hard evidence on long-term impacts for program participants and non-participants who have not yet become adults, have made projections by blending evidence on short-term results from the program with evidence on the relationship between short-term results and adult outcomes from other sources. Such efforts have yielded estimates for universal prekindergarten programs (available to children from all income groups) that range from 3 to 1 to 5 to 1.[62] The divergence of estimates across programs suggests that it may be hard to predict the exact rate of return for programs. However, the best current evidence suggests that the impact of quality preschool per dollar spent on cognitive and achievement outcomes is larger than the average impact of other well-known educational interventions per dollar spent, such as class-size reductions in elementary schools.[63]

The consistent finding of benefits that substantially exceed preschool program costs indicates that high-quality early childhood education programs are among the most cost-effective educational interventions and are likely to be profitable investments for society as a whole.

Conclusion

The goal of this research brief has been to summarize the most recent rigorous research for inclusion in the important public discussion that is now occurring about preschool education. When taken together with earlier foundational studies, the growing body of research on preschool both confirms but also extends the previous evidence in important directions.

Recent meta-analyses drawing together the evidence across decades of evaluation research now permit us to say with confidence that preschool programs can have a substantial impact on early learning and development. Positive effects on children's development are found for language, literacy and early math skills; for social and emotional outcomes; and in children's health. Whereas earlier evidence was limited to small, tightly controlled demonstration projects, the more recent evidence supports this conclusion for rigorously evaluated high quality preschool programs implemented at scale. While earlier studies were limited to a focus on children from low-income families, some more recent studies of preschool implemented at scale encompass families from a wider socioeconomic range, and for the first time, make it possible to say that preschool education benefits children from middle-income as well as low-income families (although children from low-income children benefit more). The most recent research also makes clear that there are positive effects for dual language learner children as well as for those whose home language is English, and for children with special needs as well as for typically developing children.

While there is clear evidence that preschool education boosts early learning for children from a range of backgrounds, we also see a convergence of test scores during the elementary school grades so that there are diminishing differences over time on tests of academic achievement between children who did and did not attend preschool. Yet the most recent research is showing an accumulation of evidence that even when the difference in test scores declines to zero, children who have attended preschool go on to show positive effects on important adolescent and young adult outcomes, such as high school graduation, reduced teen pregnancy, years of education completed, earnings, and reduced crime. Why there are long term effects even with a convergence of test scores is an important focus of current research.

The evidence continues to grow that the foundation for positive effects on children are interactions with teachers that combine stimulation and support. Such interactions build children's higher-order thinking skills as well as knowledge of specific content (such as early math and language skills), and at the same time are warm, responsive and elicit reciprocal interactions. Features of quality that focus on structural elements, such as group size, ratio, and teacher qualifications are important in that they help to increase the likelihood of such interactions, but they do not ensure that simulating and supportive interactions will occur.

Multiple recent studies suggest a highly promising route to quality in preschool education: providing support for teachers to implement specific evidence-based curricula and instruction through coaching and mentoring. These studies have shown positive effects in strengthening both teacher-child interactions and children's learning in targeted domains. This evidence is particularly important given that large-scale studies of both state-funded preschool and Head Start show that there is a need to improve quality, and especially the quality of instruction.

Beyond coaching and mentoring in support of instruction and curricula, what other factors strengthen the boost provided to children from preschool education? There is evidence that a second year of preschool shows additional benefits to children. However, more work is needed to consider how a second year could intentionally build on children's growth in a first year of preschool. In addition, while comprehensive services can strengthen outcomes, the most recent research indicates that it is important to target such services so that they focus on evidence-based practices. For example, a recently conducted meta-analysis indicates that the positive effects of preschool education can be augmented when a parenting education component is added, but only when this component focuses on providing parents the opportunity to see modeling of positive interactions or to practice such interactions. Such effects do not occur when programs simply provide parents with information.

Finally, while it has been clear for some time that high-quality preschool education yields more in benefits to society than its initial costs, the most recent work indicates that there is a positive return on investment for a range of differing preschool programs, from those that are more intensive and costly to those that require less initial investment. In sum, quality preschool education is an investment in our future.

Appendix:

Which evaluation designs are strong enough to produce trustworthy evidence?

> *We draw in this section from a fuller discussion in: National Forum on Early Childhood Policies and Programs (2007).* ***Early Childhood Program Evaluations: A Decision-Maker's Guide****. Cambridge, MA: Harvard Center on the Developing Child, National Forum on Early Childhood Programs and Policies.* ***http://developingchild.harvard.edu/index.php/download_file/-/view/68/***

We have focused as much as possible in this brief on studies that use the most rigorous study designs and on meta-analyses that reveal patterns in effects across many studies. We define as "rigorous" studies that use designs that compare children or parents who receive program services with a "virtually identical" comparison group of children or parents who do not receive those services.

The ideal method for assessing program effects is an experimental study referred to as a randomized controlled trial or RCT. In an RCT, children who are eligible to participate in a program are entered into a "lottery" where they either win the chance to receive services or are assigned to a comparison (control) group. Parents or program administrators have no say in who wins and loses this lottery. If sufficient numbers of children end up in the program and control groups, and the implementation of random assignment is successful (i.e., there are no significant differences between the two groups in their demographics or in the outcomes of interest prior to the intervention), then any post-program differences in achievement, behavior, or other outcomes of interest between the two groups can be attributed to the program with a high degree of confidence.

Although random assignment of children or parents to program and comparison groups is the "gold standard" for program evaluation, sometimes this is not possible.

In some circumstances, a randomized controlled trial is not feasible. One of the most frequently used alternative methods available to program evaluators is called a Regression-Discontinuity Design (RDD). In this case, assignment to either the control or the intervention group is defined by a cut-off point along some continuum (such as age). For example, a number of public prekindergarten evaluations have taken advantage of strict birthday cut-off dates for program eligibility. In some states, children who are four years old as of September 1 are eligible for enrollment in Pre-K, while those who turn four after September 1 must wait a year to attend. The key comparison in an RDD is between children with birthdays that just make or just miss the cutoff, since they presumably differ only in the fact that the older children attend Pre-K in the given year while the younger

ones do not. Comparing kindergarten entry achievement scores for children who have completed a year in Pre-K with the scores measured at the same time for children who just missed the birthday cutoff and are about to enter Pre-K can be a strong indicator of program impacts, provided that there is evidence that the cutoff policy was not manipulated by participants and adjustments are made for differential selection into "treatment" and "control" research groups.[64] Other methods used in recent nonexperimental preschool studies include propensity score weighting, individual, sibling or state fixed-effects, and instrumental-variables analysis.[65]

Why some evaluation designs are problematic.

Evaluations that select comparison groups in other ways should be approached with healthy skepticism. The key concern is how well children enrolled in the program are matched to children in the comparison group, as countless studies have shown how difficult it is to select comparison groups that are unbiased. Especially important indicators of the quality of the match are assessments of outcomes of interest for both program and comparison-group children taken just prior to the point of program entry, as well as indicators of parental "motivation" if possible. The closer the match on multiple characteristics, the more one can trust the findings. Evaluations that do not detail pre-service characteristics of program and comparison-group children should be viewed suspiciously.

For example, simple comparisons of state standardized test scores before and after the implementation of large-scale ECE do not take into account how the population of children may differ across time. As one possibility, increased immigration into a state might bring children who speak English as a second language and tend to score lower on tests, compared with children who speak English as a first language. If so, any effect of ECE programs in raising the average level of achievement will be obscured when examining trends in state test scores. Economic conditions may change too across time—these can have important effects on children's achievement when assessed at different timepoints.[66]

Generalizing study results to other populations.

An additional important consideration when interpreting the results from any study is the population from which study participants were sampled. This is the population to whom study results apply. For example, results from studies that include only preschool children from low-income families apply only to children from that demographic. Results do not generalize to preschool children from higher-income families. How preschools were selected is equally important. A sample of preschools that volunteered to implement a new curriculum, for example, has more limited implications than a broader sample of preschools that were mandated to implement a new curriculum.

Endnotes

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