

Can Maryland Benefit from Universal Preschool? A Review of the Research on the Efficacy of Early Education

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Access to universal preschool has the attention of politicians and policymakers—from President Obama to gubernatorial candidates in Maryland who have advanced various proposals to expand pre-kindergarten. This attention has generated debate about the benefits of early education, in part because expanding access to preschool requires significant funding, but also because the research on early education can appear contradictory. Yet, unlike many educational reforms that capture policymakers' attention, there is a substantial research base supporting the efficacy of early education.

As policymakers in Maryland consider universal preschool programs as a means to capitalize on learning that takes place in the early years, it is important to understand the research on the benefits of early education, the program characteristics critical to successful outcomes, and the costs and benefits of expanding preschool. New knowledge from neuroscience and developmental research has converged with empirical findings from four decades of program evaluation studies on early education programs that can be used to guide policy on early learning.

Summary of Key Findings

- Gaps in both cognitive and non-cognitive abilities emerge early in a child's life, before a child enters school. Schools have limited impact on closing these gaps, even though students who are behind show learning gains throughout their school years.
- Experiences in the early years of life are of critical importance for establishing the brain architecture that will shape future cognitive, social, and emotional development as well as physical and mental well-being.
- There is a substantial body of methodologically sound evaluations of early childhood programs that show positive impacts from participating in early childhood programs. Early childhood programs appear to improve achievement in the short term, and long-term follow studies of some programs show long-lasting, positive effects on a variety of measures of academic performance and later life outcomes.
- Cost-benefit studies demonstrate that the long-term benefits of pre-kindergarten outweigh the initial short-term costs needed to start such a comprehensive program. Studies estimating the rate of return to early childhood investments have ranged from 7-18% annually for every dollar invested. Moreover, early investments are often more cost effective than investments made later in a child's life.

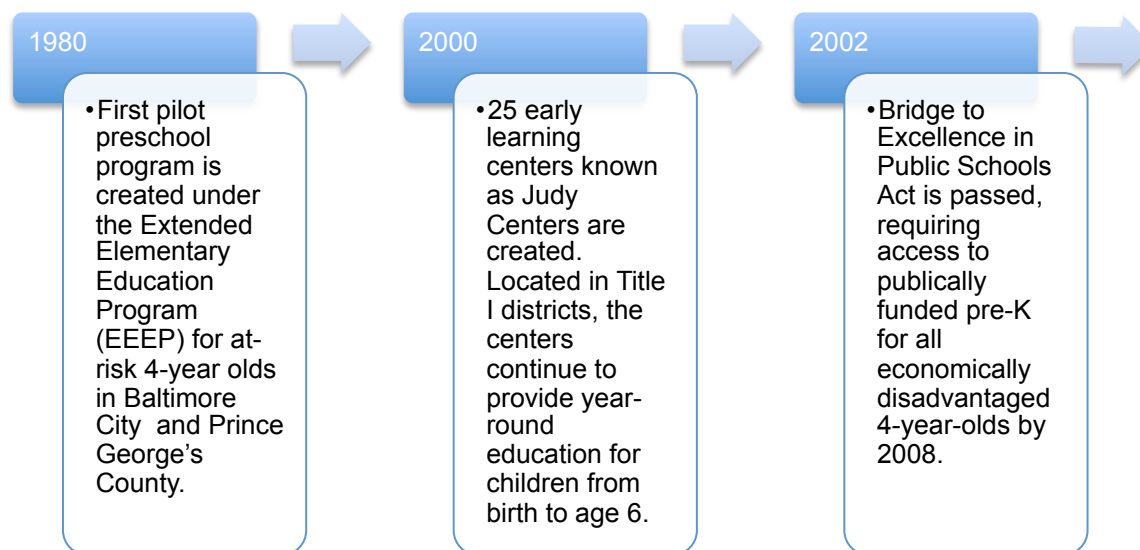


Figure 1: Maryland Preschool Education Timeline

This policy brief surveys recent literature on advances in the science of early child development and brain development and summarizes findings from program evaluations of preschool programs. It examines the arguments for and against universal preschool from a research perspective and sorts out conflicting information on the benefits of early education. The aim is to provide Maryland policymakers with an informed foundation for considering whether to expand access to early education.

Early Education in Maryland

Maryland has taken steps to support preschool programs since 1980 when the Maryland State Board of Education established the Extended Elementary Education Program, a pilot preschool program in Baltimore City and Prince George's County. More recently, the 2002 *Bridge to Excellence in Public Schools Act* included a provision requiring all local boards of education to provide preschool education to economically disadvantaged 4-year-old children by 2008. As a result, enrollment in publicly funded preschool increased about 40% between 2003 and 2011. In 2007, the *Maryland Task Force on Universal Preschool Education* developed a framework and recommendations for expanding access to high quality pre-kindergarten to all 4-year olds in the state (Maryland State Department of Education, 2007). However, this effort stalled following the 2008 recession and resulting budgetary constraints.

In addition to the publicly funded preschool program, Maryland has 25 early learning centers, known as Judy Centers. The Judy Centers are located in or near Title I schools and provide year-round services to children from birth through age 6. These centers collaborate with local partners to provide a wide spectrum of early childhood programs and family support services. Maryland also supports the federal Head Start program with supplemental state funding. Head Start grants supported about 250 program sites and served about 12,000 low-income students in 2010-11.

In the 2012-13 school year, Maryland's publicly funded preschool program enrolled 35% of all 4-year olds in the state and 4% of 3-year olds. Since the program began in 2002, enrollment has increased among 4-year olds, the targeted population, by about 10 percentage points, from 25% to 35%. Since 2008, when publicly funded preschool was implemented across the state, enrollment of 4-year olds has fluctuated between 35% and 37%.

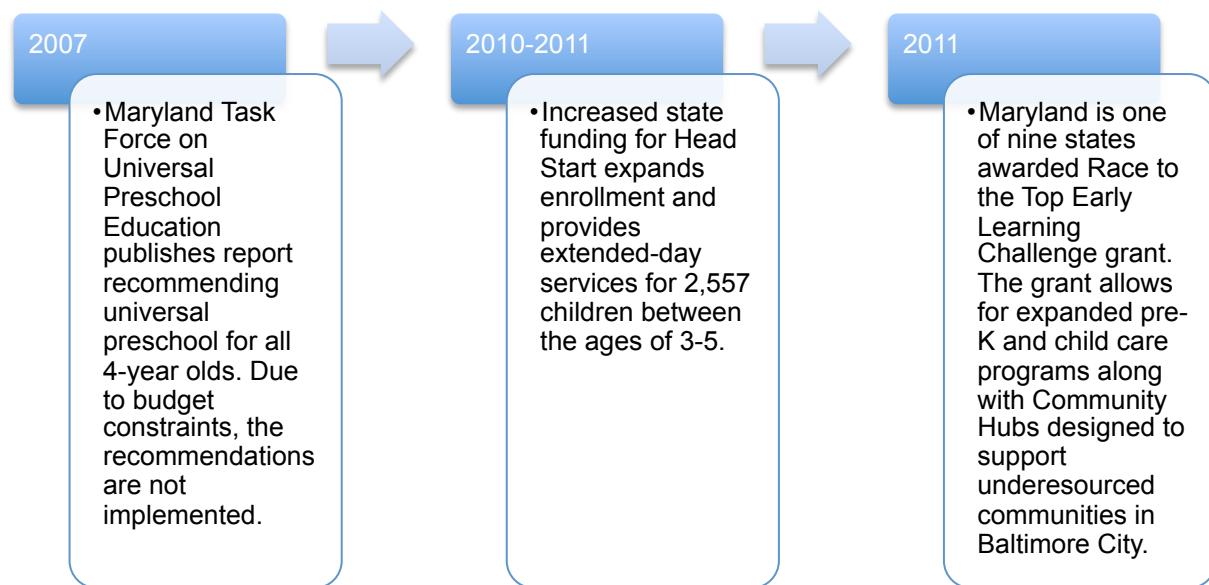
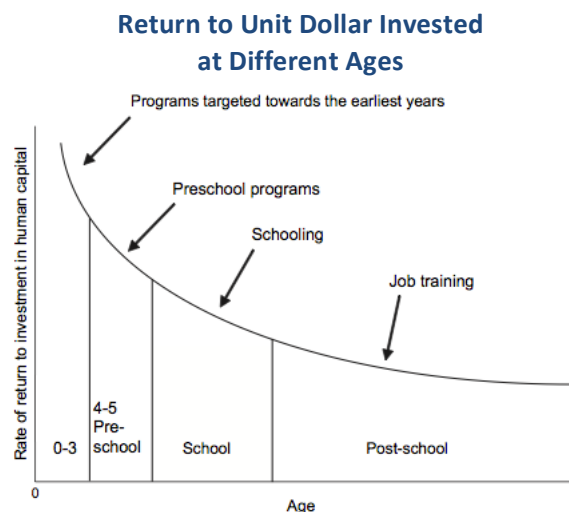


Figure 1 continued: Maryland Preschool Education Timeline

Why Invest in Early Education?

The primary argument for investing in early education is that gaps in both cognitive and non-cognitive abilities emerge early in a child's life, often before children start school, and that many of these early abilities are important determinants of later success in life. A substantial body of education research (Bryk & Raudenbush, 1988; Lee & Burkam, 2002; Linn, 2000; Mosteller & Moynihan, 1972; Raudenbush, 2004) has consistently shown that differences in mean test score levels usually reflect differences in children's cognitive skills and background characteristics *before* they enter school. Schools have little impact on closing these gaps, even though students who begin behind show learning gains throughout their school years (Cunha & Heckman, 2010; Kim & Sunderman, 2005). Similarly, noncognitive or social skills diverge early and then are nearly parallel during school-going years across children with parents of different socioeconomic status (Cunha, Heckman, Lochner, & Masterov, 2006). This divergence has led some states, including Maryland, to invest in expanding access to preschool for disadvantaged children.

Early childhood interventions are often more effective and less costly in promoting success in school, reducing crime, and fostering workforce participation and productivity than interventions later in a child's life. James Heckman, economist and Nobel laureate, and Flavio Cunha distinguish between early and late childhood investments, and show that early investments result in greater returns than later investments in initiatives such as reduced student-teacher ratios, job training and convict rehabilitation programs, adult literacy programs, or college tuition subsidies (Cunha & Heckman, 2010; Heckman, 2008). Investments though are complementary—it is essential to invest early to get satisfactory adult outcomes, but it is also essential to invest late to harvest the fruits of the early investments (Cunha & Heckman, 2010). Early investments in learning lay the foundation for later learning, and when missing, can explain why returns to investments later in the adolescent years are low. In many poor families, the underinvestment begins at early ages and continues throughout the life of the child.



Source: Heckman, 2008.

What are the Neurological Foundations of Early Learning?

Neuroscientists have contributed to our understanding of how early childhood experiences affect cognitive development—learning and the ability to learn—and why children who are behind rarely catch up during their school years. There is compelling evidence that there are sensitive periods in the development of a child (N. A. Fox & Rutter, 2010). Early experiences determine whether a child’s developing brain provides a strong or weak foundation for future learning. In these early years, the interaction of genes and experience shape the architecture of the developing brain, with genes determining when particular skills are developed and experiences shaping how they are formed (S. E. Fox, Levitt, & Nelson III, 2010; National Scientific Council on the Developing Child, 2007, 2010).

We also know that brains develop in a predictable sequence and that some skills and abilities are more readily acquired at certain stages of childhood than others. For example, language development, the ability to regulate emotions, and motor development takes place between birth and three years. Between three and five years of age, increasingly complex

social behaviors, emotional capacities, problem-solving abilities, and pre-literacy skills build on earlier developmental achievements and provide the foundation for later learning.

This understanding of how the brain develops underscores the importance of early childhood experience. The brain develops through a “building blocks” approach in which new experiences wire circuits of knowledge that are necessary for later learning and the acquisition of skills (Center on the Developing Child at Harvard University, 2007). For example, phonemic awareness, acquired by six months of age, is considered one of the first building blocks to learning how to read.

The time for brain development is also short; in fact, by the age of six, 95% of a child’s brain architecture is already established (Blair & Diamond, 2008). As the brain reaches the end of establishing new circuits, it undergoes a “pruning period” in which circuit endings that are not connected through exposure to new experiences disappear (Center on the Developing Child at Harvard University, 2007; S. E. Fox et al., 2010). When this happens, it becomes more difficult for children to adapt to new or different experiences—they lack the building blocks that would provide the foundation for more complex learning (Center on the Developing Child at Harvard University, 2007).

In this way, early learning environments are “key windows of opportunity” through which children can successfully acquire the foundation necessary for later academic and life success (Center on the Developing Child at Harvard University, 2007). By the time a child is three, her brain is ready to learn to effectively problem-solve, socialize, and read. Yet, the mastery of those academic skills relies on the development of behavioral skills—specifically the development of executive function. Executive function is a person’s ability to

control or regulate their thoughts and actions. For example, the ability to stay focused on a task (attention control) contributes to the development of emergent literacy and numeracy skills (Welsh, Nix, Blair, Bierman, & Nelson, 2010), and using short-term memory (working memory) helps with problem solving and reasoning.

In recent years, research on early childhood development has emphasized executive function because of its indirect effects on educational attainment and its association with self-regulation and socialization. A child who exhibits strong executive function is more likely to graduate from high school and enroll in college (Diamond & Lee, 2011). In fact, children with poor executive function tend to have negative perceptions of their identities as students resulting in less effort in school, higher dropout rates, and greater proclivity to crime (Blair & Diamond, 2008). The importance of targeting the development of executive function relies on the idea that building a self-regulatory foundation early will foster greater academic gains as the child moves into formal education.

One of the main contributions of early childhood education to developing executive function is its ability to provide an environment where children can successfully learn how to self-reflect, pace, and motivate themselves in order to excel academically. By learning positive classroom behavior, students showed greater gains in emergent literacy and early math skills at the end of kindergarten (McClelland, Connor, Jewkes, Farris, & Morrison, 2007). While some research finds that the academic gains from early childhood education may diminish over time, early behavioral gains have proven to be predictive of later academic success (McClelland, Morrison, & Holmes, 2000). These issues are taken up in the next section.

What does Research say about the Short-term Benefits Associated with Preschool Education?

Much of the debate around the benefits of early education center on whether access to preschool improves children's cognitive abilities and, if so, whether the benefits persist in later school years. This debate is often around the magnitude of *test score gains* and the persistence of those gains over time. The key to understanding these studies is that most analysts rely on short-term outcomes—primarily standardized achievement test scores—to measure gains in cognitive ability. When cognitive ability is confined to achievement as measured by test scores, the general finding is that test scores improve but often these gains diminish over time.

Critics of early education often cite a study of Head Start that examined the impact of Head Start for 3- and 4-year old children in four program domains—cognitive development¹, social-emotional development, health status and services, and parenting practices—through early elementary school (third grade) (Puma et al., 2012). It showed initial positive impacts on children's outcomes across the four developmental domains *while they were in the program*, but these effects dissipated as children entered elementary school. However, other sustained findings from the Head Start study, frequently ignored by the critics, were for children from high-risk households. For this subgroup, children enrolled in the program as 3-year olds maintained sustained cognitive impacts from pre-kindergarten through 3rd grade (Puma et al., 2012). Other subgroups in both age cohorts also experienced sustained benefits in one or more of the four domains from participating in Head Start.

¹ Cognitive development was measured by direct assessments of language and literacy skills, pre-writing skills, and math skills; teacher reports of children's school performance; and parent reports of child literacy skills and grade promotion.

There are a number of explanations for why early gains from participating in Head Start dissipate over time. It may be related to the lack of later investment and follow-up during the elementary years. Many Head Start participants attend poor quality schools with low levels of investment. Indeed, there is evidence of sustained achievement effects when children are placed in above-average elementary schools following preschool (Currie & Thomas, 2000; Nisbett et al., 2012; Zhai, Raver, & Jones, 2012). Moreover, the findings do not rule out other, longer-term effects that may occur from participating in Head Start. As already noted, neuroscience suggests that benefits gained in the social and emotional development of children in their early years have positive outcomes later in life.

Another explanation for the limited effects of Head Start is that the experiences of the children in the treatment and control groups were much more similar than in most randomized studies. Although the Head Start study used a random assignment design, it was not a comparison of Head Start to a “no services” condition. Instead, the study evaluated the Head Start program against a mixture of alternative care settings, with many children in the control group participating in some form of preschool. About half of 4-year olds and 40% of 3-year olds in the control group were enrolled in other early education programs (Lowenstein, 2011). In addition, some children in the control group enrolled in Head Start after the initial program year. According to the authors, “to achieve measureable impacts, Head Start had to outperform services that children in the control group received” (Puma et al., 2012, p. 153).

There is other evidence that early education improves student’s academic achievement and that these improvements persist into elementary school. A meta-analysis of 123 comparative studies of early childhood

interventions, carried out over five decades and including both quasi-experimental and randomized studies, found significant positive effects for children who attended a preschool program before entering kindergarten (Camilli, Vargas, Ryan, & Barnett, 2010). Effects diminish, but do not disappear, after children leave preschool and enter primary school. The largest effects were found for cognitive outcomes, but positive effects were also found for children’s social skills and school progress (i.e., school grades, academic track, special education placement, high school completion, and college attendance). Other, long-term effects such as grade retention and high school graduation rates were not measured in these studies.

As more states implement preschool programs, more rigorous long-term follow-up studies have been conducted. For example, the Abbott Preschool Program Longitudinal Effects Study (APPLES) assessed the impact of New Jersey’s Abbott Preschool program on children’s learning and development (Barnett, Kwanghee, Youn, & Frede, 2013). APPLES followed the 2004-05 cohort of 3- and 4-year old children enrolled in the Abbott preschool program through grade 5. The 5th grade (2011-12) follow-up study found that Abbott preschool increased achievement in Language Arts and literacy, math, and science. The largest achievement gains were for students who attended preschool for two years, but attending preschool for one year also led to achievement gains. The study also found reductions in grade retention and special education placement rates for students attending the program.

One of the longest studies of state supported preschool is a study of the Michigan’s Great Start School Readiness program, which began in 1985. This study found effects on academic achievement through grade 4, lower grade retention rates for students between grades 2 and 12, and higher on-time graduation rates for children who participated in the program,

among other benefits (Andrews, Jargowsky, & Kuhne, 2012; Schweinhart, Xiang, Daniel-Echols, Browning, & Wakabayshi, 2012). Other states with evidence of effective publicly funded preschool programs include Georgia, Oklahoma, North Carolina, South Carolina, and Texas (Cascio & Schanzenbach, 2013; Fitzpatrick, 2008b; Gormley Jr. & Phillips, 2005; Ladd, Muschkin, & Dodge, 2014; Wong, Cook, Barnett, & Jung, 2008). These studies found positive effects regardless of the socioeconomic background of the children served, although effects tend to be somewhat larger for children from low-income families.

What are the Long-term Effects of Participating in Early Education Programs?

Test scores do not measure all that is important for success in school or later in life. In fact, short-term improvements in test scores may not be the best measure for gauging the long-term effectiveness of early educational programs. Most scholars agree that a multiplicity of skills explains success in a variety of life outcomes, with a combination of cognitive and social-emotional skills playing a fundamental role in later life success.

Whether preschool programs have sustained effects on test scores, studies have found substantial effects on other measures of academic performance and later life outcomes. These studies randomly assigned children at high risk of school failure to a preschool program or to a control group that received no preschool services and followed them over time. The most widely-cited studies in this category—the High/Scope Perry Preschool Program in Ypsilanti, Michigan (Schweinhart, 2005; Schweinhart et al., 2005), the Carolina Abecedarian Program (Campbell et al., 2012), and the Chicago Child-Parent Center (CPC) program (Reynolds, Temple, Ou, Arteaga, & White, 2001)—suggest that enriched early preschool environments promote greater

learning in school and reduce problem behaviors in school and later in life (Blau & Currie, 2006; Cunha & Heckman, 2010; Cunha et al., 2006).²

Individuals who participated in these high-quality programs were about half as likely to repeat a grade in school or be assigned to special education classes and were far more likely to complete high school and attend college. They had better paying jobs, were less likely to receive welfare, and had significantly less involvement with law enforcement. The discrepancy between test score effects and other long-term schooling successes were great enough to suggest that attention, self-control, and perseverance, more so than by intellectual ability by itself, contributed to these outcomes (Heckman, 2011; Knudsen, Heckman, Cameron, & Shonkoff, 2006; Nisbett et al., 2012).

² The High/Scope Perry Preschool program operated from 1962 through 1967; studies of the program have followed participants through age 40 with only a 6% missing data rate across all measures. The Carolina Abecedarian project randomly assigned 122 children born between 1972 and 1977 to a treatment or control condition with follow-up studies through age 30. The Chicago Child-Parent Center program started in 1967 and continues to operate. The Chicago Longitudinal Study of program effectiveness began in 1986 and has tracked participants through age 28.

Perry Preschool Project (1962-1967) Ypsilanti, Michigan

- Two-year program targeting low-income, African American 3- and 4-year old children.
- Curriculum emphasized cognitive, social, and physical development.
- Tracked 123 children randomly assigned to a treatment group (preschool) or a control group (no preschool) through age 40.
- At Age 40:
 - 77% of the treatment group compared to 60% of the control group graduated high school;
 - 76% of program participants compared to 62% of the control group were employed;
 - 60% of those in the treatment group compared to 40% of the control group earned \$20,000 or more a year;
 - Program participants had significantly fewer lifetime arrests across various types of crime than control group.

Findings from these studies are important because they suggest that high-quality early education programs can have long-lasting, positive effects on low-income children's cognitive, academic, and socio-emotional development. Nonetheless, critics often dismiss these studies, arguing that the programs operated too long ago to be relevant today, that the findings cannot be generalized to state run programs operating today, and that the quality of these programs cannot be replicated. The next section discusses the merits of these arguments.

Are these Long-term Studies Relevant Today?

Some argue that demographic and technological changes make the Perry, Abecedarian and the CPC studies less relevant today. While it is true that much has changed since the 1960s and 1970s when these programs first operated, the strength of these studies lies in the application of the scientific approach to the design and study of the programs. All three studies employed a randomized, longitudinal design with little

attrition over time. Moreover, there is also no reason to assume that the basic principles of human development have changed in 50 years. As noted, neuroscience has greatly increased our knowledge and understanding of brain development, thus confirming the importance of early learning on later cognitive and social development.

Carolina Abecedarian (ABC) Project (1972-1977)

- A full-time, high-quality care program for low-income children from birth through age 5.
- Curriculum targeted cognitive, socioemotional, and physical development with a special focus on language development.
- Program also provided parental education and healthcare for children.
- Four cohorts of children were assigned to the treatment or control group and tracked until age 30.
- At Age 30:
 - 23% of the treatment group compared to 6% of the control group had earned a Bachelor's degree or higher;
 - 75% of the treatment group was employed full-time compared to 53% of the control group.

Second, the generalizability of the benefits derived from the Perry, Abecedarian and the CPC programs are often criticized because they were based on small samples consisting almost entirely of low-income, African American children (Lips, 2010).³ The relatively small sample size actually speaks to the strength of the findings since dramatic differences between treatment and control group outcomes are usually not found in studies with small sample sizes. When sample sizes are small, group differences must be larger in order to achieve standard levels of statistical significance.⁴ With

³ The High/Scope Perry Preschool Program followed 123 children with very little attrition; the Chicago Longitudinal Study tracked the progress of 1539 students; and the Carolina Abecedarian Program included 111 infants and started from infancy and continued for five years.

⁴ Although small samples can be susceptible to sampling error, there is no indication of differences between the treatment and control groups in these studies.

very large samples, effects can achieve statistical significance, but be small enough that they are not educationally consequential.

Chicago Child-Parent Center (CPC) Program (1967-Present)

- Two year publicly funded preschool program for low-income children ages 3-5 living in Chicago.
- Curriculum required parent participation, community outreach, and nutrition services; also focused on self-awareness and cognitive and language development.
- Tracked 1,400 participants through age 28.
- At Age 28:
 - 81.5% of the treatment group, compared to 75.1% of the control group graduated high school;
 - The average income for the treatment group was \$11,582 compared to \$10,796 for the control group;
 - Treatment group had lower crime rates and less involvement with the justice system.

A third criticism—that the quality of the Perry, Abecedarian and the CPC programs is not often replicated—is based on the assumption that these programs represent the exception rather than the rule (Lowenstein, 2011). Regardless of whether this assumption is true, studies of these three programs do suggest what is possible for preschool programs to achieve and demonstrate the potential of early education programs to have lasting effects on life outcomes. In fact some programs, such as the Abbott preschool program in New Jersey that is modeled on the Perry program, have found achievement effects. These criticisms have led researchers to look more critically at specific program elements most likely to lead to learning gains and other outcomes.

What Program Factors Contribute to Positive Outcomes?

Identifying program features that contribute to positive outcomes is difficult because of the

wide variation in the type of services provided by early education programs. However, the primary factors that have consistently produced positive outcomes include: (1) warm, responsive interactions between staff and children; (2) high and consistent levels of child participation; (3) small class sizes and high adult-to-child ratios; (4) highly skilled teachers; (5) a language-rich environment; and (6) age-appropriate curricula and stimulating material (Center on the Developing Child at Harvard University, 2007). Most successful programs include these factors. However the available data do not answer whether any of these program features are more important than others, or whether they all are necessary for achieving the strongest impacts.

One key predictor of children's learning is the quality of interactions that take place between teachers and students. Such interactions are the primary mechanisms through which children learn (La Paro, Pianta, & Stuhlman, 2004; Mashburn et al., 2008). Simply put, students learn more and are more likely to participate when teachers interact with them in stimulating and emotionally supportive ways (La Paro et al., 2004). Other program factors, such as small classes and low student-teacher ratios, can create the conditions that allow teachers to provide individualized attention to learning needs and engage in more frequent interactions with children (Barnett, Schulman, & Shore, 2004). For example, research shows that students in preschool classrooms with 20 or fewer children display greater school readiness, better language comprehension, and improved behavioral regulation (Barnett et al., 2004).

Highly skilled teachers are important because of their knowledge of learning and developmental benchmarks, use of effective practices, and ability to engage in high-quality interactions with students. While the evidence is mixed on the importance of teacher characteristics related to teacher training, such as level of

education and credential attainment (Early et al., 2006; Early et al., 2007; Mashburn et al., 2008), there is evidence to suggest that well-educated teachers provide higher-quality instruction and enhance math achievement in particular (Early et al., 2006). Evidence suggests that behavioral based professional development (i.e., coaching) coupled with credential attainment leads to more enriching classroom interactions between teachers and children (Pianta et al., 2014). In addition, requiring a degree and credentials, and compensating teachers accordingly, professionalizes the early childhood workforce.

There is substantial research supporting the effectiveness of providing a language rich environment and age appropriate curricula (Neuman & Rosko, 2005). Standards and developmental guidelines can ensure that the curriculum is age-appropriate and promote both cognitive and social development and program quality. Supportive services, such as the provision of meals, services for parents, and hearing/vision screenings, are particularly important for children who come from homes that may not provide them consistently.

Maryland incorporates many of these recommended characteristics into its publicly funded preschool education program requirements. Maryland requires these preschool programs to adopt a comprehensive preschool curriculum, hire teachers with at least a Bachelor's degree, maintain an average teacher to child ratio of 1:10 and a maximum class size average of 20 students, and employ teachers with pre-kindergarten specialized training and 15 or more hours of in-service teacher training. Maryland also requires school systems to assess incoming preschoolers on six different academic and social dimensions of school readiness (COMAR 13A.08.01.02 – 3) and provide information on meeting pre-kindergarten program goals, teacher certification requirements, maintenance of

teacher to child ratios within the classroom, and alignment of curriculum to the Maryland Common Core State Curriculum (COMAR 13A.06.02).

Why Invest in Universal Preschool versus Targeted Preschool Programs?

One important consideration for policymakers is whether to invest in targeted preschool programs as Maryland does now, or universal preschool that is available to all families wishing to enroll their children. Arguments for targeted programs rest primarily on the premise that at-risk children derive the most benefits from preschool. Proponents of targeting also argue that public funding for preschool should support families who cannot afford to pay for preschool. Critics point out that public funding for universal preschool creates a subsidy for middle- and upper-income families who may have the means to pay for preschool or childcare. But even if disadvantaged children benefit the most, preschool programs still provide substantial benefits for children regardless of their socioeconomic background (Barnett, 2008; Burger, 2010). There are several reasons that universal preschool may be preferable to targeted programs:

- Universal preschool garners broader public support than targeted programs serving selected populations of students.
- Access to quality preschool is important to middle income families who may have difficulty affording private preschool or day care.
- The availability of universal preschool can increase access and enrollment in preschool for children living in urban fringe and rural areas where there may be few preschool options (Fitzpatrick, 2008a).
- Universal preschool enhances opportunities for all children to interact in integrated settings by bringing together children of all races and social economic status.

- Low-income children learn more when they attend preschool programs that serve children from diverse backgrounds and include middle-income children (Barnett, 2008; Schechter & Bye, 2007).
- Universal programs may reach more disadvantaged children since poverty is only one characteristic of disadvantaged environments (Duncan & Magnuson, 2005). Other risk factors not necessarily linked to family income include limited parent education, social deprivation or neglect, exposure to abuse, and parental mental health problems. In addition, targeting based on income is difficult since family income can change and there are costs associated with identifying eligible children.
- While increasing numbers of children receive some form of non-parent childcare or education, these programs do not necessarily include educational programming that enhance children's learning and development. High quality program standards are more easily achieved through publicly funded and regulated preschool programs.

What are the Costs and Benefits of Investing in Universal Preschool?

Universal preschool appears to be a costly investment when initial, short-term costs of implementing the program are considered. Indeed, the costs of expanding pre-kindergarten can be high, especially in light of state budgetary constraints. The Maryland State Department of Education (MSDE) has estimated that the expansion of public preschool to all 4-year olds would cost \$121 million (Maryland State Department of Education, 2009). However, from an economic perspective, a program is considered a worthy investment if the long-term societal benefits it generates exceed its program costs.

Cost-benefit studies demonstrate the positive returns from public investments in preschool,

showing that the long-term benefits of pre-kindergarten outweigh the initial short-term costs needed to kick-start such a comprehensive program. Both targeted and universal programs show positive returns to individuals, although cost-benefit ratios are larger for targeted programs (Daniels et al., 2007). Even so, the benefits generated by universal programs would be larger since they reach more children. Likewise, research has found substantial societal benefits that come from greater access to early education. These societal benefits range from increased income tax revenues, reduced juvenile and adult crime, and reductions in child welfare costs, among others. Finally, returns to investments in early education are greater than returns to later investments. For example, James Heckman has shown that an intervention staged to raise high school graduation rates would cost 35-60% more for a society if that intervention was staged after a child turns six (Heckman, 2008).

2009 Cost Benefit Study Maryland

A program open to all 4-year olds:

--Costing \$2,990 per child in 2009,
--Has projected long-term benefit per child of \$14,506 in 2050.

--Maryland will receive \$4.85 in net benefits for every dollar invested in a one-year pre-K program.

A program open to all 3- and 4-year olds:

--Costing \$4,022 per child in 2009,
--Has projected long-term benefit per child of \$16,247 in 2050.

--Maryland will receive \$2.08 in net benefits for every dollar invested in a one year pre-K program.

•Source: Daniels, et al.; 2007

Cost-benefit studies consistently find high returns to investments in early education. Studies estimating the rate of returns to early childhood investments have ranged from 7-18%

annually for every dollar invested. The Abecedarian preschool program was educationally intense and probably best represents the upper bound in terms of societal contributions to pre-kindergarten. The estimated net program costs for five years was \$67,000 but the societal benefits in reduced costs for K-12 schooling, crime, and welfare (among others) were estimated to be \$158,278 for a 7% rate of return (Barnett & Masse, 2007). The Perry Preschool Project also provided similar societal benefits. The social rate of return from the project ranged from 7%-10% for every dollar invested (Heckman, Moon, Pinto, Savelyev, & Yavitz, 2010). The Perry Preschool project led to savings of \$3,475 in welfare costs, \$15,240 in justice system costs, and \$68,584 in crimes never committed based on court settlements for such crimes (Heckman et al., 2010). A cost-benefit study of the Michigan Great Start Readiness Program estimated the cost savings and revenues generated from investments in the program over 25 years at \$1.15 billion (Chase, Anton, Diaz, MartinRogers, & Rausch, 2009). The Chicago preschool program had a total return to society of \$10.38 per dollar invested for an 18% annual return (Reynolds, Temple, White, Ou, & Robertson, 2011).

In Maryland, a feasibility study of the costs and benefits of implementing a high-quality, voluntary universal preschool program estimated significant returns on investment to Maryland (Daniels et al., 2007). This study estimated that for every dollar invested in a one-year preschool program open to 4-year olds, Maryland would receive \$4.85 in net benefits and for every dollar invested in a one-year preschool program open to all 3- and 4-year olds, Maryland would receive \$2.08 in net benefits.⁵ The study estimated that the benefits would exceed costs in 10 years, and by 2052 would result in a 10.5 to 1 benefit-cost ratio for

U.S. society as a whole and an 8.3 to 1 benefit-cost ratio for Maryland society as a whole (p. 17). This analysis shows that public investment in universal preschool is paid off in the future, providing benefits to program participants, the state of Maryland and the federal government.

⁵ These net benefits are based on the per-child costs in 2009, with long-term benefits projected to 2050.

Implications for Early Education Policy in Maryland: Recommendations

The combined knowledge generated from neuroscience, developmental research, and empirical findings from program evaluation studies of early education programs present a compelling argument for the benefits of publicly funded preschool education. Cost-benefit analyses show that benefits accrue to both individuals who participate in early education and to society as a whole and that the benefits far exceed their costs. There is also evidence that early interventions are more cost effective than interventions undertaken in later school years. Taken together, these various streams of research present a compelling argument for investing in early education programs. Based on this review of the literature, we offer the following recommendations.

- Policymakers in Maryland should expand access to preschool for all 4-year old children. Given the current tight fiscal environment, Maryland may not be able to fully fund the program immediately. However, the program could be phased-in over the next three to five years to accommodate current budget constraints. The state could also take advantage of funding provided by the proposed federal PreSchool for All Program, estimated to provide \$42,400,000 in the first year (The White House Office of the Press Secretary, 2013).⁶
 - If targeting is continued, ensure that there is stability in preschool enrollment within a school year and across school years for those who start preschool at age three.
 - Expand targeted programs to include more 3-year old children.
 - Consider combining place-based (geographic) targeting with person-based (income) targeting to expand access to preschool.
- To institutionalize the expansion of publicly funded preschool, a dedicated funding source is needed. This will insure that districts have the resources to sustain universal preschool over time and are willing to commit local resources to the program.
- Because program quality matters, policymakers should maintain and strengthen current program requirements. Preschool programming should include elements that address cognitive, social, emotional, and physical development.
 - Preschool programs should have reasonably small class sizes; teachers who are certified in early childhood education; and provide ongoing professional development, mentoring, coaching, and adequate pay.
- Policymakers should encourage districts to implement programs that serve diverse students in order to maximize the benefits of early education. To lessen income segregation, districts preschool programs that enroll more than 40 percent low-income students should be discouraged.⁷ Five decades of research have shown that students learn more in racial and economically integrated schools. For example, a 2010 study of public housing students in Montgomery County found that students randomly assigned to schools in integrated

⁶ See Daniel, et al. 2007 for a discussion of funding options.

⁷ The 40-percent criterion represents a “tipping point” where increases in the concentration of poverty contribute negatively to student outcomes.

neighborhoods showed greater academic gains than students in high poverty schools that spent more per pupil (Schwartz, 2010).

- Since education deficiencies stem from many sources outside the school system, consideration needs to be given to providing an integrated and comprehensive system of services that addresses the needs of young children and their families. This includes policies that improve access to health care, ensure access to stable, integrated housing, provide adequate income supports, as well as those that support high quality preschool. The Judy Centers provide a model for these kinds of services.
- Legislation expanding access to preschool offers the opportunity to design an evaluation that would provide information on a wide range of variables, include long-term follow-up, and show the benefits and costs of designing, implementing, and running preschool education programs in the state of Maryland. A well-designed evaluation would inform local decision-making and state policymaking and include the following components:
 - It would capture multiple benefits that may accrue from participation in preschool education, and would include at a minimum the impact of preschool education on children's social-emotional, cognitive, and physical development.
 - It would identify both short-term and long-term benefits associated with participating in preschool programs.
 - It would include data that allows investigators to follow program participants over time, as well as examine possible benefits outside of schooling and in later adult life.
 - It would capture which program features, such as curriculum and instructional practices are most effective, and show how various program designs enhance the preschool experience.

Universal preschool is a promising intervention that capitalizes on the learning that takes place in the early years of a child's life, however it should not be taken as a silver bullet. Early interventions must be followed by investments in the later school years. And since educational disadvantage stems from many social and economic factors external to schools, additional policies and resources are needed that address these larger social and economic factors that impact school success and life outcomes.

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The Maryland Equity Project seeks to improve education through research that supports an informed public policy debate on the quality and distribution of educational opportunities. It conducts, synthesizes, and distributes research on key educational issues in Maryland and facilitates collaboration between researchers and policymakers. The Maryland Equity Project is a program in the Department of Teaching and Learning, Policy and Leadership in the College of Education at The University of Maryland.

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