

Preschool Education as an Educational Reform: Issues of Effectiveness and Access

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Overall Impacts of Preschool Education

A substantial body of research finds that high-quality preschool education can substantively improve the learning and development of young children. Multiple meta-analyses conducted over the past 25 years have found preschool education to produce an immediate effect of about half a standard deviation (0.50 sd) on cognitive development on average (Camilli, Vargas, Ryan, & Barnett, 2010; Gorey, 2001; McKey et al., 1985; Nelson, Westhues, & McLeod, 2003; White & Casto, 1985). This is the equivalent of a move from the 30th to the 50th percentile for achievement test scores. For the social and emotional domains, average estimated effects have been smaller, but meaningful, and it should be taken into account that many programs did not target this domain (Camilli et al., 2010; McKey et al., 1985; White & Casto, 1985). Most studies focused on economically disadvantaged children and provide evidence regarding how much preschool programs can contribute to closing the achievement gap for disadvantaged children.

The research also provides a clear answer to the question of whether effects persist or quickly fade out (Aos, Lieb, Mayfield, Miller, & Pennucci, 2004; Karoly, Kilburn, & Cannon, 2005). On average effects decline, but remain substantial. Long-term outcomes include lasting effects on cognitive abilities, school progress (grade repetition, special education placement, and high school graduation), and social behavior (Camilli et al., 2010). Estimated effects decline as students move from the immediate experience of preschool education into elementary school. However, effects level off and persist through the school years at about half size of the initial effects.

One way to address the question of “consensus” in research is through meta-analysis as it provides an objective summary of all the evidence. The most recent meta-analysis of the preschool literature is by Camilli and colleagues (2010). They find that estimates of preschool’s effects on cognitive abilities vary with study rigor and features of the programs studied. The most rigorous studies, including randomized trials, produce larger estimated impacts. In higher quality studies, cognitive effects average about 0.70 sd initially and decline to about 0.30 sd in the long-run. Direct instruction and individualized teaching (small group and one-to-one) were associated with larger cognitive effects. Provision of added services (e.g., social services) was associated with smaller impacts. Simulations by Camilli and colleagues suggest that long-term cognitive effect sizes could be increased to about 0.50 sd long-term by modest improvements in program design.

Note that the entire decline in effects over time in preschool research is *not* properly considered “fade out.” When schools help children who do not attend effective preschools catch up with children who attended preschool, this is not a fade-out of effectiveness. These efforts are expensive, and benefit-cost analyses based on randomized trials have found that far less was spent on grade repetition and special education for children who attended preschool than controls who did not attend the preschool program. Universal preschool programs or even programs that succeed in serving all children from low-income families would produce a different dynamic,

reducing the need for compensatory efforts in the early grades and changing who receives compensatory services.

Differences in Impacts by Type of Preschool Program

Preschool programs in the United States are provided by a complicated system of local, state, and federal programs. However, programs serving low-income children can be sorted into three general categories: child care, Head Start, and public education. Private child care ranges from informal and unpaid family, friend and neighbor care to paid home-based and center-based programs. States operate child care subsidy systems with considerable federal funding. Head Start is a federal to local program that by-passes state and local government. Public education is often provided through the public schools, but in the preschool years often is contracted with private providers. These three sectors differ considerably in their effectiveness.

Child care has the smallest effects on children's learning and development. Family day care homes may produce no positive cognitive effects, while child care centers yield at best small (0.10 to 0.15 sd) short-term effects (Bernal & Keane, 2006; NICHD Early Child Care Research Network, 2002). There is controversy about whether such programs negatively affect other aspects of development. Some studies find modest negative effects of child care on social-emotional development (Baker, Gruber, & Milligan, 2005; Magnuson, Ruhm, & Waldfogel, 2007; NICHD Early Child Care Research Network, 2003). Higher quality care may lessen this negative influence (Love et al., 2003; NICHD Early Child Care Research Network, 2003). Results also vary with methodology (Crosby, Dowsett, Gennetian, & Huston, 2010). Any long-term effects of typical child care are very small (Belsky et al., 2007).

Although Head Start varies somewhat from one agency to another, this is a federal program with a single set of standards. The strongest study of Head Start is the National Impact Study (NIS), a large-scale randomized trial (Puma et al., 2005). The estimated initial effects of one year of Head Start are 0.15 to 0.35 sd across cognitive and social outcomes. Effects tended to be smaller for broad cognitive and social measures and larger for simple literacy skills. By the time children are kindergarten and first grade even these small effects are no longer apparent. Follow-up data suggest that elementary schools produced large gains in kindergarten compared to Head Start and may have enabled children who did not attend Head Start to catch up with those who did attend (U.S. Department of Health and Human Services, Administration for Children and Families, 2010).

Forty states funded regular preschool education through 52 state programs in 2010. About a third of the children in these programs are served by private providers through diverse arrangements. Public schools provide preschool as part of these programs and separately using local and, for example, federal Title I funds. State and local standards for preschool programs vary greatly from one place to another making it difficult to generalize about the design of these programs much less their impact. Nevertheless, research has found the strongest impacts of programs among these public education programs.

High-quality (discussed below) preschool education provided by the public schools has been found to produce relatively large gains in learning and development (Consortium for

Longitudinal Studies, 1983; Deutsch, Deutsch, Jordan, & Grallow, 1983; Deutsch, Taleporos, & Victor, 1974; Frede, 1998; Jordan, Grallo, Deutsch, & Deutsch, 1985; Schweinhart et al., 2005). Randomized trials have found long-term cognitive gains from some programs equal to about half the achievement gap for children in poverty.

Recent studies provide rigorous estimates of the effects of some large scale, state-funded pre-K for both programs targeting children from low-income families and universal pre-K. Some provide credible estimates of short-term effects on both low-income and higher-income groups. These studies find much larger initial effects on cognitive abilities than were found for Head Start (Barnett, Howes, & Jung, 2008; Gormley, Gayer, Phillips, & Dawson, 2005; Gormley, Phillips & Gayer, 2008; Hustedt, Barnett, Jung, & Figueras, 2008; Hustedt, Barnett, Jung, & Thomas, 2007; Lipsey, Farran, Hofer, Bilbrey & Dong, 2011; Wong, Cook, Barnett & Jung, 2008). Positive effects are found for boys and girls, for all major ethnic groups, and regardless of income. Effects tend to be larger for children from lower-income families and for English language learners. Effect sizes are as high as 1.0 sd for simple literacy measures and 0.25 sd to 0.35 sd for broader domains.

Rigorous long-term follow-up studies of these state pre-K programs are still rare. However, several find effects persist at least through the early grades (Frede, Jung, Barnett & Figueras, 2009; Malofeeva, Daniel-Echol & Xiang, 2007; Peisner-Feinberg & Schaaf, 2010). A study of New Jersey's Abbott pre-K program found effects of about 0.20 for one year of pre-K and 0.40 for two years of pre-K through second grade which is the most recent follow-up (Frede, et al., 2009). These effects are quite similar in size to early results from the Child Parent Centers discussed below. The Abbott pre-K program also was found to reduce grade retention, with the effect of two-years again twice as large as the effect of one year of pre-K. It should be kept in mind that the Abbott pre-K program has small classes, certificated teachers, operates for a full school day, and has the highest reported annual cost of any state pre-K program at over \$12,000 per year (Barnett et al., 2010).

One of the more rigorous long-term, large-scale studies of public school pre-K examined the Child Parent Centers (CPC) operated by the Chicago public schools (Temple & Reynolds, 2007). Just over half of CPC students studied attended two-years at age 3 and the others attended for one year at age 4. The CPC program had a certified teacher and an assistant in each classroom of 18 children, and a relatively strong parent outreach and support component. Thus, it was similar in design to other "high-quality" public education discussed above. Estimated CPC effects on test scores at kindergarten entry were 0.35 to 0.77 sd for all children and 0.20 to 0.65 sd for those who had only one year (Reynolds, 2000). Effects on cognitive abilities declined but remained about 0.20 sd in eighth grade. Effects on other outcomes include a 15 percentage point reduction in grade retention, a 10 percentage point reduction in special education placements, and an 11 percentage point increase in high school graduation.

Specific Features of Effective Preschool Education Programs

Generally, research finds that the programs with the largest and longest lasting effects are more educationally intensive and expensive. The most effective programs have been part of public education and have had more highly educated, better paid teachers than Head Start and child care

(Barnett, 2011). They have had reasonably small class sizes and low child:teacher ratios (Head Start has relatively low ratios as well). Strong evidence of substantial long-term effects is limited to public school programs with degreed teachers paid at public school levels and low ratios of children to teachers. This is not because only these programs have been rigorously studied, but because other programs have failed to produce substantial long-term effects in randomized trials.

Given the evidence, the lack of consensus among academics regarding teacher qualifications and other program features is somewhat surprising. Yet, many have concluded that teacher education is necessary, but not sufficient, and that a credential per se is no guarantee. Preschool program effectiveness does not depend on any single ingredient. The quality of the education represented by the degree matters, and other factors including compensation, working conditions, supervision, and on-going professional development interact with pre-service education to influence teacher effectiveness (Burchinal, Hyson, & Zaslow, 2011; Kagan & Gomez, 2011; Pianta, Barnett, Burchinal, & Thornburg, 2009; Whitebook & Ryan, 2011). Suffice it to say that no one would argue that well-educated, well-paid teachers are enough to guarantee success. However, some academics advocate that teachers need neither BA degrees (nor professional pay) to be highly effective on a large scale (Fuller, 2011). The problem with this view is that there are no examples of programs with such staffing patterns producing large educational gains in rigorous studies.

The evidence cited to support views that teacher qualifications do not matter consists of correlational studies that fail to find relationships between any level of teacher education and children's learning gains over the course of a preschool year (e.g., Early et al., 2007; Mashburn et al., 2008). These studies find no relationship between any program feature and children's learning gains, though they find some weak associations between classroom practices and outcomes. My view is that this is likely due to limitations of the technique (National Research Council & National Academy of Education, 2010). A charitable view of the findings of these studies is that they are consistent with the view that well-educated teachers are necessary, but not sufficient, and the teacher's highest level education is not an adequate measure of teacher education (e.g., it does not indicate the quality and content of the education received).

Monitoring and evaluation, close supervision, coaching, support by specialists (for example regarding children with special needs or serious behavior problems) also are regarded as key contributors to preschool program effectiveness (Espinosa, 2002; Frede, 1998). The public schools may have been more likely to succeed in producing substantial preschool effects because they have had the resources to provide these. Careful attention must be paid to the how teachers actually teach and what children experience and learn in the classroom (Clements & Sarama, 2011; Diamond & Lee, 2011; Dickinson, 2011). A system that articulates goals for learning and teaching and supports teachers in attaining these goals is likely one of the keys to producing consistently good teaching (Frede, 1998; Mashburn et al, 2008; Pianta et al., 2009).

Curriculum research provides added evidence that intentional teaching focused on specific learning goals leads to greater learning gains (Preschool Curriculum Evaluation Research Consortium, 2008). This requires attention to children's learning across multiple domains including cognitive, social, emotional, and physical, though this does not mean that a preschool

program should be responsible for all of a child's needs (Bishop-Josef & Zigler, 2011; van Goozen, Farichild, & Harold, 2008). Direct instruction, or more broadly, intentional teaching is a key element. Yet, children also need opportunities for learning through discovery, games, rich dramatic play, and other social interactions. Executive functions are particularly likely to be adversely affected by poverty and are as essential to future educational success as language, literacy, and math (Barnett, Jung et al., 2008; Diamond & Lee, 2011; Duncan, 2011; Welsh, et al., 2010). Once the complexity of the teaching required is set out in detail together with the importance of one-on-one and small group interactions in this teaching it becomes clear why teachers must be well educated and continuously supported to teach preschool effectively (Stipek, 2011).

Among the most important areas of development for three- and four-year-olds is the acquisition of oral language and early literacy skills, and preschool education focuses much of its attention on these domains. English Language Learners (ELL), a growing population and a high percentage of disadvantaged students, have even greater needs in these domains than most children. Oral language proficiency in English at kindergarten entry is strongly linked to later achievement for language minority children (Galindo, 2010). Research has found preschool education to have relatively large effects on learning for children from Hispanic backgrounds, especially those for whom English is not the primary home language (Gormley, 2008; Barnett, Howes, & Jung, 2008).

ELL children benefit from many of the same activities as other young children, such as active engagement with teachers in conversation individually and in small groups (Collins, 2010). However, they also benefit from strategic use of their primary language in the classroom, more explanations from the teacher, more opportunities to practice English, and a focus on similarities and differences between English and their home language (Espinosa, 2010). The knowledge required to optimize teaching for children with a home language again illustrates the importance of strong preparation and professional development for teachers. Teachers with a four-year college degree have been found to have characteristics that would make them more successful teachers of young ELL children (Collins, 2010; Freedson, 2010).

The amount of preschool education matters, and not just its quality, though the two interact. Programs vary greatly on the number of hours provided during a half- or full-day, number of days per week and weeks per year, and age at start (e.g., age 3 or 4). Few rigorous studies address this issue. One small randomized trial has found that an extended day and extended year produced greater learning gains (Robin, Frede, & Barnett, 2006). Other studies have produced mixed findings, but uncontrolled variations in program activities and who chooses to attend which program limit their value. There are many ways to increase the quantity of effective education. One on one for a few hours a week is likely to be more powerful than 50 hours of mediocre child care. As noted earlier state pre-K studies have found evidence of larger effects from two years starting at age 3, and least one study has similar findings for Head Start (Wen, Leow, Has-Vaughn, Korfmacher, & Marcus, in press). Other research providing insights into the value of more time in preschool includes studies showing the magnitude of the differences in language exposure for children from different socio-economic backgrounds and how far behind children in poverty are by the age of three (e.g., Hart & Risley, 1995). Finally, length of day also

can affect access to quality, if lower-income working families opt out of part-day preschool for full-day child care.

The scale and inclusiveness of preschool education also influences how much children benefit. Peer learning opportunities in preschool, and as children progress through elementary and secondary school, will increase achievement beyond what is observed in small scale studies (Henry & Rickman, 2006; Mashburn, Justice, Downer & Pianta, 2009; Neidell & Waldfogel, 2010). If preschool is available to all children, disadvantaged children learn from interactions with their more advantaged peers. In primary school children benefit from having more proficient and better behaved peers when all or most have benefited from preschool (Lavy, Silva, & Weinhardt, 2009). One way to think about the contributions of decreases in behavior problems is that they improve the learning of all children in a classroom even if there is little direct connection between behavior and achievement for an individual child.

Variations in Effects with Child Characteristics

As noted earlier, many studies have found that children from low-income families gain more cognitively from preschool than do their more advantaged peers, though gains for children from middle-income backgrounds can still be substantial (Burger, 2010; Gormley et al. 2005; Melhuish et al., 2008). Some studies have reported that some ethnic groups benefited more than others, but these findings lack consistency across studies. Some of findings of variations by ethnicity may be due to differences in who participates by ethnicity and to confounding with variations in the amount and quality of preschool education received (Bassok, 2010). Often, studies have estimated the effects of “preschool” or “Head Start” as reported by parents with no verification of the program actually attended and no measure of whether it is a half-day or full-day program. Studies investigating variations in effects within carefully defined a measured “treatments” fail to find consistent variations with ethnic background. The Head Start national impact randomized trial found no consistent variations in results across outcomes by ethnicity or language.

Some studies report variations in outcomes by gender, specifically that effects are found for girls but not boys (Anderson, 2008). Other studies report the opposite finding (e.g., Larsen & Robinson, 1989; Reynolds, 2000). Most of these findings have been in small sample studies. Some such findings may represent little more than random variation, though some differences in later outcomes should be expected based on differences in roles and opportunities by gender (teen pregnancy is the most obvious). No gender differences were found when data were pooled across six small preschool studies that included of the studies cited as revealing gender differences (Consortium for Longitudinal Studies, 1983). No gender differences in initial effects or results through first grade are reported in large national studies such as the Head Start national randomized trial, the Infant Health and Development Study, large studies of state pre-K programs, or the Effective Preschool and Primary Education project in England (Puma et al., 2005; McCormick et al., 2006; Melhuish et al., 2008).

Access to Preschool Education

Government statistics regarding access to preschool education are extremely limited. Major data collection efforts (Current Population Survey (CPS), American Community Survey (ACS), Early Childhood Longitudinal Studies (ECLS), National Household Education Survey (NHES)) provide very different estimates of access and little information about the quality of the education accessed. By combining data collected from the states in 2010 with NHES data collected in 2005 and CPS data from 2005 to 2010, I arrived at the estimates of enrollment in all center-based programs by income shown in Table 1. These figures may underestimate enrollment at age 4. State pre-K expanded to serve about 9% more of 4-year-olds from 2005 to 2010 (but did not increase enrollment at age 3). Yet, the CPS indicates no increase in overall enrollment despite increases in state pre-K enrollment over these years. Therefore, Table 1 assumes that all of increase in state pre-K was at the expense of center-based private sector enrollment. This seems unlikely, but it may not be far off, and it doesn't much effect estimates of how many children attend educationally effective preschool programs.

Accordingly, I estimate that at age four about two-thirds of children in the lowest income quintile (poverty) and second lowest income quintile (low-income) attend a center-based program. At age three, less half those in poverty and just over a third of low-income children attend a preschool program. These rates do not differ much from those of children from families at the median income thanks to public programs and child care subsidies, but at higher income levels children are much more likely to attend programs. In addition to varying by income, participation rates also vary by region (highest in the northeast, lowest in the west) and ethnicity. Low rates of participation by Hispanics seem to reflect lack of access rather than lack of interest or awareness (Pérez & Zarate, 2006). Of course, as discussed earlier it matters which programs children access as are not equal, which leads to the next question.

How many children have access to an educationally effective program? Only the most general answer can be obtained from Table 1's participation rates for private child care, Head Start and public education. A somewhat better answer can be obtained by adding information from a Rand study of preschool quality in California (Karoly et al., 2008). It covers a large population and is relatively recent. This study provides estimates of the percentage of each type of program that would be classified "good" or better on the Early Childhood Environmental Rating Scale, which is a fairly generous way of estimating educational effectiveness. Applying these figures to the data in Table 1, I estimate that about 10% of children who are poor or low income attend effective preschool programs at age 3 and 20% at age four. Children in higher income families fare much better at age 3, but only a little better at age 4, though more sensitive adjustments for differences within the private sector would favor children from higher-income families. In any case, even in the top half of the income distribution most children are not attending highly effective preschool programs.

Table 1 provides national estimates, but access to quality preschool education also differs dramatically from state to state. Oklahoma offers a relatively high quality program, similar to those found to be effective in research to virtually all four-year olds. A few other states have created programs that seek to be universal at age four, though not all are designed to be educationally effective (e.g., Florida's program is really just child care). Some other states have fairly large, quality programs some of which target economically disadvantaged children. A few

states serve a substantial percentage of disadvantaged children in such programs at age three, as well.

What would it cost to provide educationally effective programs to all disadvantaged children or to all children? The simple answer is that it costs somewhat less per child than providing K-12, though not dramatically less. Preschool requires smaller classes, but most young children with special needs are already being served so what is required is closer to the cost of regular K-12 education without the added cost of special education. A ballpark estimate for the nation might be \$5,000 per child for a half-day and \$10,000 for a full day. The actual cost of an effective program would vary from state to state because of differences in salaries and other prices.

There are roughly 4 million children at each age, so serving 40% of four-year-olds in a full-day quality program would cost \$16 billion and \$32 billion to serve 40% of children for two years starting at age three. The cost of a universal program for all children would be about double those figures. The cost of a half-day program would be roughly half those figures. Of course, many children already attend some kind of public program (40% at age four, though not all are from lower-income families), and their added cost is the cost of enhancing the quality of the program they are already attending. So the added cost to the nation is much less than the total cost. Determining this cost is complicated. For example, does Head Start need additional resources to increase teacher compensation or could Head Start reallocate resources from less productive uses for this purpose? I think that Head Start could get most (not all) of the needed resources to improve its quality from reallocation, but the federal government would have to change regulations to permit that to happen. For subsidized child care, state reimbursement rates for the programs are too low to support much beyond custodial care. Much more would be needed to raise their quality. State pre-K programs vary in per child spending, but most would need to increase spending.

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Table 1.

Estimated Age 3 and 4 Center-Based Preschool Program Participation 2010

Type of Center	% All children	Enrollment by family income quintile (%)				
		1st (<\$20,000)	2nd	3rd	4th	5th (>\$100,000)
<u>3-year-old cohort</u>						
Head Start	8	20	9	7	0	0
Special education	4	1	3	3	3	10
Private – fee paid	32	15	18	27	50	66
Private – no fee	4	7	4	3	2	2
State Preschool	3	3	3	4	3	3
<i>Total</i>	<i>51%</i>	<i>46%</i>	<i>37%</i>	<i>44%</i>	<i>58%</i>	<i>81%</i>
<u>4-year-old cohort</u>						
Head Start	13	30	23	4	5	0
Special education	6	2	5	10	7	4
Private – fee paid	30	6	11	36	43	65
Private – no fee	6	10	6	8	5	3
State Preschool	20	17	20	17	25	18
<i>Total</i>	<i>75%</i>	<i>65%</i>	<i>65%</i>	<i>70%</i>	<i>85%</i>	<i>90%</i>