

RESEARCH

State Pre-Kindergarten Effects on Early Learning at Kindergarten Entry

An Analysis of Eight State Programs

by Dr. Kwanghee Jung

State-funded pre-kindergarten programs are now established in 43 states and the District of Columbia. Nearly one-third of four-year-olds in the U.S. participate in these programs in the year before they enter kindergarten (Friedman-Krauss et al., 2018). A primary goal of these programs is to support the learning and development of young children to better prepare them for school success. Rigorous studies have found that high-quality pre-K education programs can improve children's learning and development in both the short- and long-term.

Over the past 15 years, enrollment in state-funded pre-K programs has more than doubled, reaching over 1.5 million children by 2017. State programs vary greatly with regard

to funding per child, eligibility criteria, and virtually every other feature subject to regulation. Consequently, quality also varies with regard to structure (e.g., teacher qualification and teacher-child ratio) and process (e.g., instruction, interaction, and classroom environment) as do hours of operation, age of entry, and the strength with which each program is connected to the public school system (Friedman-Krauss et al., 2018). State pre-K programs all share an expressed intent to provide education typically linked to early learning standards, but the diversity among programs presents a challenge in assessing how well they work.

The objective of this study was to estimate impacts of the state-funded preschool program at kindergarten entry and to inform federal and state policy decisions about providing preschool. This study was conducted in eight states, Arkansas, California, Michigan, New Jersey, New Mexico, Oklahoma, South Carolina, and West Virginia. Pre-K programs in these states range from low to high in per-child funding and vary in standard relating to quality.

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Study Design

Our study compared the test scores of similarly aged children, on either side of a strict age cutoff for kindergarten entry, to estimate the impacts of state-funded preschool programs using measures of children's early learning relating to language, literacy, and mathematics.

Typically, pre-K program effects are estimated by comparing the test scores of children who attended a program with the scores of similarly aged children who did not attend. Where programs are universal, it is understandably difficult to find a "comparable" group of children who did not attend the program. However, even where programs are not universal, children who attend state pre-K can differ substantially from those who do not attend in ways that make it difficult to measure the program's effects. For example, household income can affect achievement in ways that mask the effects of pre-K in states with income-based eligibility criteria. Additionally, when parents choose whether or not to enroll their children, other, unmeasured factors, which may have influenced that choice, may also affect child achievement.

The approach we used makes it possible to measure the effects of state-funded pre-K even when it is offered universally. The approach compares one group of children, made up of the previous year's pre-K graduates at kindergarten entry, to another group, made up of children just entering pre-K. The two groups are demographically similar in every way, other than that the group entering kindergarten was just old enough to have met the age requirement to do so, whereas the slightly younger group must wait to attend kindergarten until the next year. This is thought to be the best way to measure the effects of pre-K without interference from other, unrelated factors.

We collected data in the eight states between 2004 and 2015. Programs in some states were offered to all children while others targeted only the highest poverty districts. All programs served four-year-olds and most served some three-year-olds. Most used mixed-delivery systems including both public and private providers. However, our California sample includes only public-school classrooms, and the vast majority of classrooms studied in Oklahoma and South Carolina were also in public schools. All programs employed a teacher and an assistant in each classroom. Maximum class size was 20 students for most programs. Most teachers in these programs had earned a bachelor's degree with specialized training in early childhood, except in California where just under half had earned a bachelor's and most others had associate's degrees. All programs offered at least a half-day of instruction five days per week during the school year, but Arkansas and New Jersey offered all children a full school day and three other states permitted full school days at local discretion. Six of the eight states had comprehensive early learning standards in place.

How Skills Were Measured

- Receptive vocabulary was measured by the Peabody Picture Vocabulary Test, 3rd Edition (PPVT-III; Dunn & Dunn, 1997), in which children point to one of four pictures shown when the assessor gives a word orally to identify. This test directly measures vocabulary size, and is also used as a quick indicator of general cognitive ability. Additionally, it correlates reasonably well with other measures of linguistic and cognitive development related to school success.
- Early mathematical skills were measured with the Woodcock-Johnson Tests of Achievement, 3rd Edition (Woodcock, McGrew, & Mather, 2001) Subtest 10, "Applied Problems." Woodcock-Johnson achievement subtests have good reliability and have been widely and successfully used in studies of the effects of preschool programs including Head Start.
- Early literacy abilities were measured in six states using the Print Awareness subtest of the Preschool Comprehensive Test of Phonological & Print Processing (Pre-CTOPPP; Lonigan, Wagner, Torgeson & Rashotte, 2002), which tests recognition of individual letters and letter-sound correspondences, and whether children can differentiate words in print from pictures and other symbols. In West Virginia, we used the TOPEL (Lonigan, Wagner, Torgeson & Rashotte, 2007), and in Michigan we used the Letter-Word Identification subtest of the Woodcock-Johnson Tests of Achievement, 3rd Edition (Woodcock et al., 2001) as the measure of early literacy. Spanish-language equivalents are available for all three types of measures, and were used as appropriate for Spanish-speaking children.

Data collection procedures varied slightly from state to state, but generally involved a random selection of pre-K classrooms throughout each state, followed by a random selection of approximately four children per classroom. We followed the same procedure for kindergarten classrooms in order to obtain the sample of children who had already attended pre-K.

Measures of Learning

Our study focused on cognitive development using relatively low-cost, easily administered, direct assessment measures. We did not want to rely on teacher assessments, as the potential differences between the pre-K and kindergarten teachers administering the assessments could potentially have an effect on child outcomes. Cost constraints and the lack of inexpensive direct measures of social emotional development limited the range of outcomes we measured, though we recognize its importance.

Table 1. Description of State Pre-kindergarten Programs in our Sample

State	Year Established	Spending per Child (2015 Dollars)	Number of four-year-olds Enrolled	Percent of four-year-olds	Staff/Child Ratio	Max Class Size	Duration	Teacher Education	Comprehensive Learning Standards	Means Tested
Arkansas 2005	1991	\$ 6,064#	4,462	12%	1:10	20	7 hours	Mostly BA degree ECE training	Yes	Yes
California 2006	1965	\$ 3,928#	52,849	10%	1:8	No Limit	3 hours or 6.5 hours	CDA	No	Yes
Michigan 2008	1985	\$ 4,691#	23,134	18%	1:8	18	Half-day or Full-day	BA degree ECE training	Yes	Yes
New Jersey Abbott* 2005	1998 - upgraded in 2002	\$11,293	21,410	79% of Abbott Children	2:15	15	Full-day	Mostly BA degree ECE training	Yes	Not in district
New Mexico 2008	2005	\$ 2,857#	3,570	13%	1:10	20	Varied	Mostly BA degree in ECE	Yes	Yes
Oklahoma 2004	1990 – universal in 1998	\$ 3,474#	30,180	64%	1:10	20	Varied	BA degree ECE training	Yes	No
South Carolina 2004	1984	\$ 1,905	17,821	33%	1:10	20	Mostly Half-day	BA degree ECE training	No	Yes
West Virginia 2015	1993 - universal by 2010	\$9,898	13,779	68%	1:10	20	Varied	BA degree with ECE training	Yes	No

Note. * New Jersey's Abbott districts include about ¼ of the state's children. # Represents an incomplete amount of spending per child as it does not include federal and local spending shares.

Source: Data from the annual survey of state pre-K programs conducted by NIEER and reported in the State of Preschool Yearbooks (Friedman-Krauss et al., 2018). Ratios and class sizes are maximums allowed. Duration often is determined locally.

Table 2. **State Preschool Access by State (2016-2017)** — To see a comprehensive list of the number of children enrolled in state pre-kindergarten for each state, visit ChildCareExchange.com/issue

Results and Recommendations

Overall, our study adds to growing evidence that high-quality public pre-K can improve learning and development for children across demographic groups. Although these results cannot be extrapolated to all state pre-K programs, the range of state pre-K programs we assessed was diverse.

Despite some variation in results between states, we found that pre-K participation was associated with positive effects on basic literacy skills at kindergarten entry, and with some growth in math, but with smaller gains in vocabulary skills. While these effects are consistent with past findings, they raise some concerns. First, average effects for literacy and math, but not language, are similar to those found for large-scale programs thought to be of higher quality (Gormley et al., 2008; Weiland & Yoshikawa, 2013). Further, we measured the largest effects for the most easily mastered domain, simple literacy skills, while the smallest effects were measured on the most open-ended domain, language. Effects on math were intermediate.

Gains in open-ended skills and knowledge are more likely to predict sustained long-term growth, compared to gains in limited skills that most children will master readily after kindergarten entry (Bailey et al., 2017). Gains in the open-ended domain of language are particularly predictive of literacy success beyond grade three (Snow & Matthews, 2016). Our finding of large effects on such discreet skills such as phonological awareness and letter recognition without even moderate impacts on open-ended broad domains therefore raises the concern that programs might focus on easier-to-achieve outcomes while neglecting domains associated with longer-lasting impact.

Our results suggest that state pre-K programs might improve long-term impact by increasingly focusing on unconstrained or broad domains, such as vocabulary and comprehension, as well as others not measured here (e.g., social and emotional development). One step towards this goal would be to implement a content-rich curriculum in pre-K classrooms (Neuman & Wright, 2013). This type of curriculum nurtures the growth of skills and knowledge most predictive of later success by contextualizing learning in which “children have opportunities for sustained and in-depth learning including play; different levels of guidance to meet the needs of individual children; a masterful orchestration of activity that supports content learning and social-emotional development; and time, materials, and resources that actively build verbal reasoning skills and conceptual knowledge” (International Literacy Association, 2018). Another strategy could be to weight constrained, short-term measures such as letter recognition less highly in systems of accountability incentives. We make this recommendation specifically to encourage educator’s work with young children to not

What Qualifies as a State Pre-Kindergarten Program?

NIEER describes state-funded preschool education programs meeting the following criteria.

- The program is funded, controlled, and directed by the state.
- The program serves children of preschool age, usually three- and/or four-years-old. Although programs in some states serve broader age ranges, programs that serve only infants and toddlers are excluded. The program must reach at least one percent of the three- or four-year-old population in the state to be included.
- Early childhood education is the primary focus of the program. This does not exclude programs that offer parent education but does exclude programs that mainly focus on parent education. Programs that focus on parent work status or programs where child eligibility is tied to work status are also excluded.
- The program offers a group learning experience to children at least two days per week.
- State-funded preschool education programs must be distinct from the state’s system for subsidized child care. However, preschool programs may be coordinated and integrated with the subsidy system for child care.
- The program is not primarily designed to serve children with disabilities, but services may be offered to children with disabilities.
- State supplements to the federal Head Start program are considered to constitute de facto state preschool programs if they substantially expand the number of children served, and if the state assumes some administrative responsibility for the program. State supplements to fund quality improvements, extended days, or other program enhancements or to fund expanded enrollment only minimally are not considered equivalent to a state preschool program.

Friedman-Krauss, A.H., Barnett, W.S., Weisenfeld, G.G., Kasmin, R., DiCrecchio, N., & Horowitz, M. (2018). *The state of preschool 2017: State preschool yearbook*. New Brunswick, NJ: National Institute for Early Education Research.

lose the “forest” of enjoyment of early reading for the “trees” of sounding out letters.

Extensive evaluation of such efforts, as well as further research on which pre-K program impacts best predict later gains in learning, development, and school success, would be well

warranted. Our hope is that results from rigorous studies such as this one can help inform legislative decisions at the state and federal levels about effective pre-K models and further funding and growth of public pre-K in the United States. One goal of this research is to emphasize the importance of more of these types of long-term, meticulously designed studies in order to add credence and weight to arguments about the value of pre-K programs for children's future academic success.

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