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THE CHALLENGE OF SUSTAINING PRESCHOOL IMPACTS

Introducing ExCEL P-3, a Study from the Expanding Children's Early Learning Network

This is the first in a series of issue briefs on the ExCEL Network.

Early childhood interventions can be highly cost effective when positive impacts are sustained into adulthood. Yet while many recent preschool interventions have been found to have short-term effects on young children's language, literacy, mathematics, executive function, and social-emotional development, studies show that impacts on cognitive and academic skills tend to diminish in early elementary school — a phenomenon commonly known as fade-out or convergence. There are a number of plausible hypotheses, but little hard evidence, on how to sustain the benefits of early childhood education.

This brief introduces the ExCEL P-3 project, a study being done in partnership with the Boston Public Schools, the University of Michigan, and the Harvard Graduate School of Education, which aims to explore several leading approaches for sustaining children's early preschool gains. Two related ExCEL projects — focusing on instructional quality (ExCEL Quality) and summer enrichment programs (ExCEL Summer) — will be covered in later briefs in this series.

Young children from low-income families, particularly those who are nonwhite or whose home language is not English, continue to lag behind their higher-income peers in school readiness and later academic achievement. One promising avenue for reducing early skill gaps is to provide these children with high-quality early childhood education. Spurred by ample evidence that some preschool programs can bolster children's kindergarten readiness, states and localities throughout the United States have responded by expanding preschool programs.¹

In doing so, policymakers facing tight budgets are seeking cost-effective approaches that can produce lasting impacts for children. Yet the research to date does not provide concrete guidance on how investments in early childhood education can reach their full potential. This brief describes one project of the Expanding Children's Early Learning (ExCEL) Network that examines that question.

The ExCEL Network aims to harness the commitment to expand early childhood education by building a systematic body of rigorous evidence to guide the design and delivery of preschool programs on a large scale. A collaboration led by MDRC, a nonprofit, nonpartisan education and social policy research organization, ExCEL is engaging local officials, preschool providers, and researchers as active partners in innovation and evidence building, while also benefiting from the contributions of other experts in the policy-making, practitioner, and advocacy communities. Anchor funding is being provided by the Laura and John Arnold Foundation, with outreach to other national, regional, and local funding partners.

ExCEL seeks to demonstrate effective approaches that can play a key role in the successful expansion of preschool programs. Three questions are fundamental to this initiative:

- How do we *sustain positive outcomes for children* from preschool programs into the elementary grades and beyond?
- What is the right combination of *curricula and teacher professional development to improve preschool instructional quality* and maximize child outcomes?
- Would *increasing the amount of instruction, through a summer enrichment program* right before kindergarten entry, lead to stronger child outcomes? What are the effects of the program for children who did or did not attend formal preschool?

Each of these questions will be examined rigorously to produce an integrated body of work on the effectiveness of interventions for low-income pre-kindergartners. Data will be collected on common measures across the three projects, and an active learning network of participating localities and researchers will identify and share practical lessons as the program operation unfolds and the research findings emerge. In addition to providing ongoing opportunities for the participating localities, the ExCEL Network will be a resource for other districts, cities, and states throughout the country seeking evidence-based practices.

This issue brief focuses on the first of the three policy questions above and describes the ExCEL P-3 study. ExCEL P-3 makes use of a special opportunity in the Boston Public Schools to

¹ Schweinhart et al. (2005); Campbell et al. (2012); Barnett (1995); Ludwig and Phillips (2008); Puma et al. (2012).

confirm whether a preschool program that combines evidence-based curricula with coaching and professional development for teachers, reinforced by system-wide alignment of instruction into elementary school, will produce sustained improvements in a range of student outcomes. The other two ExCEL projects — focusing on instructional quality (ExCEL Quality) and summer enrichment programs (ExCEL Summer) — are described at the end of this document and will be covered in later briefs in this series.

APPROACHES FOR SUSTAINING PRESCHOOL IMPACTS

Intensive early childhood interventions can be highly cost effective when positive impacts are sustained into adulthood. The strongest evidence of positive, lasting impacts comes from older studies of small-scale programs, notably the Perry Preschool and Abecedarian projects.²

While many more recent preschool interventions have been found to have short-term positive effects on young children’s language, literacy, mathematics, executive functioning, and social-emotional development, studies do not yet allow for long-term follow-up, and little is currently known about whether the lasting benefits of preschool programming found in the Perry and Abecedarian projects

are consistent in contemporary work. The studies conducted over the past ten years, which typically follow children through elementary school, generally show that impacts on cognitive and academic skills tend to diminish in early elementary school — a phenomenon commonly known as fade-out or convergence.³ An evaluation of the Tennessee Voluntary Prekindergarten program is a recent example showing that preschool effects on cognitive outcomes may not extend into elementary school.⁴ This more recent pattern of findings has drawn attention in the field about how to design programming to achieve reliable, sustained impacts into elementary school on a system-wide scale. There are a number of plausible hypotheses, but little hard evidence, on how to increase the prospects for sustaining early impacts into elementary school. The ExCEL P-3 study is well positioned to explore several leading approaches:

- **ADDRESSING THE FULL RANGE OF RELEVANT SKILLS.** It may be that certain skills that contribute to longer-term success are not being taught or measured. For example, although the Perry Preschool project’s early impacts on important cognitive skills mostly disappeared, there were lasting and consistently positive impacts on other skills, such as improved classroom and personal behavior and fewer referrals to special education. Moreover, evaluations to date have focused mostly on “constrained” skills

2 Schweinhart et al. (2005); Campbell et al. (2012). The High/Scope Perry Preschool project was implemented in Michigan from 1962 to 1967 as a high-quality preschool intervention for three- and four-year-old children at high risk of failing in school. Conducted from 1972 to 1985, the Abecedarian project was a high-quality child care intervention for at-risk children from early infancy through age five in North Carolina. Both studies found large program impacts on children’s cognitive skills in early elementary school (Campbell et al. 2002; Schweinhart, Barnes, and Weikart 1993). Follow-up studies for both projects have continued to show long-lasting impacts on school attainment, economic development, and decreased criminal behavior into adulthood (Campbell et al. 2012; Schweinhart et al. 2005).

3 Barnett (1995); Ludwig and Phillips (2008); Puma et al. (2012).

4 Lipsey, Farran, and Hoffer (2015).

(basic math skills and identification of letters or words) that all children are expected to develop in the early grades. Therefore, children in the control group in program evaluations, or those who did not attend preschool, soon catch up to the children who benefited from preschool.⁵ The ExCEL P-3 study will examine whether more lasting impacts might be found for “unconstrained,” higher-order skills (such as receptive and expressive vocabulary, critical thinking, or effective problem solving), which are more open to ongoing development and improvement.

- **IMPROVING INSTRUCTIONAL ALIGNMENT.** Preschool and early elementary school curricula are often not coordinated to support students’ continued skill development. A recent study using a nationally representative data set found that kindergarten teachers reported spending a significant amount of time teaching skills that children who attended preschool already knew,⁶ rather than building effectively on what was taught in preschool. In addition, the small-group, play-based instructional approach commonly used in preschool classrooms differs significantly from the whole-group instruction that prevails in elementary school. Evidence is emerging that curricular strategies to align the preschool and elementary school instructional content and format can contribute to sustaining preschool impacts.⁷ The ExCEL P-3 study will examine whether a curriculum that aligns

instruction from preschool to early elementary school supports lasting preschool impacts.

- **BOOSTING THE MAGNITUDE OF EARLY IMPACTS.**

The initial impacts of certain preschool programs might be too small to be sustained over time. Notably, longer-term effects on various life outcomes such as those found in the Perry Preschool and Abecedarian projects may be due in part to the sizable effects achieved during the preschool period.⁸ This underscores the importance of boosting early impacts, which will be the focus of the ExCEL Quality project. That study seeks to improve instructional quality through curricular reform and strengthened professional development.

- **PROMOTING QUALITY IN THE YEARS AFTER PRESCHOOL.**

Children’s kindergarten and early elementary school experiences may not be of sufficient quality to sustain their preschool gains. Descriptive studies suggest that the effects for children who attended preschool are more likely to be sustained when children receive high-quality elementary education.⁹ A related concern is that, in early elementary school classrooms with many children who did not attend preschool, teachers may focus their attention on helping these children catch up, leaving less time to focus on continued progress for the children who did attend preschool.¹⁰ The ExCEL P-3 study will examine whether classroom qual-

5 Paris (2005); Bailey, Duncan, Odgers, and Yu (2017).

6 Engel, Claessens, and Finch (2013).

7 For example, a randomized experiment of a program that aligned the content and instructional approach of a math-based curriculum across preschool and elementary school found that preschool impacts were sustained through the end of first grade, relative to a business-as-usual control group. In contrast, children who received only the preschool math enhancement did not show sustained impacts through first grade (Jenkins et al. 2015).

8 Campbell et al. (2002); Schweinhart, Barnes, and Weikart (1993).

9 Johnson (2012); Swain, Springer, and Hofer (2015).

10 Barnett (2011); Zigler and Styfco (2004).

ity and composition in early elementary school help explain variation in preschool impacts.

THE BOSTON PROGRAM

The Boston Public Schools (BPS) starts with a well-developed preschool program and builds on it with Focus, a system-wide language, literacy, and STEM (science, technology, engineering, mathematics) curriculum that aligns content and instruction from kindergarten through second grade.¹¹ All preschool classrooms use two evidence-based curricula: Opening the World of Learning,¹² a language and literacy curriculum that includes a social-emotional skills component in each unit, and Building Blocks,¹³ an early mathematics curriculum that also promotes language development by requiring children to explain their mathematical reasoning verbally. Play-based classroom instruction focuses on extending children’s learning and deepening their understanding of language, literacy, and mathematical concepts through problem solving and peer interaction. The preschool teachers receive curriculum-specific training and in-class support from experienced early childhood coaches.

BPS began rolling out Focus in 2012 to address its concern that the district’s strong preschool program was largely disconnected from children’s instruction in kindergarten and early elementary school. Focus is designed to ensure that kindergarten teachers build effectively on what children are taught in preschool, first grade builds on

kindergarten, and second grade builds on first grade. To take a simplified example, the preschool curriculum ends the year with a unit on “things that grow,” incorporating vocabulary instruction on animal and plant names and related verbs into the daily activities of the classroom. Preschool children are exposed to such words as *tadpole*, *cub*, *flock*, *hatch*, and *burrow*. Then, early in kindergarten, children participate in an “animals and habitats” unit, which introduces more complex vocabulary (*hibernate*, *life cycle*, *habitat*, *discover*, *transform*) and knowledge (such as how animal habitats change across the season) that explicitly build on the introduction to the theme children learned in preschool.

Table 1 summarizes how Focus departs from previous practice in BPS — and in the field at large — in four key ways that could help sustain the impacts of preschool: the content of instruction, the format of instruction, opportunities to tailor instruction to children’s skill levels, and professional development support.

HOW WILL ExCEL P-3 BUILD ON THE BOSTON EXPERIENCE?

A set of impact analyses completed in 2009 found that the BPS preschool program had moderate to large early effects — half a year of learning on average — on children’s academic, social-emotional, and executive function skills.¹⁴ In 2016, MDRC launched an effort with BPS, the University

11 This brief uses “Focus” to describe the cross-grade, aligned curriculum that BPS developed and is implementing from preschool to second grade. Within this aligned curriculum, each grade has its own specific curriculum: Focus on K1 is used in preschool, Focus on K2 in kindergarten, Focus on First in first grade, and Focus on Second in second grade.

12 Schickedanz and Dickinson (2004).

13 Clements and Sarama (2007).

14 Weiland and Yoshikawa (2013).

TABLE 1
KEY FEATURES OF THE FOCUS CURRICULUM AT BOSTON PUBLIC SCHOOLS
COMPARED WITH PREVIOUS PRACTICE

CURRICULAR FEATURE	PREVIOUS PRACTICE	FOCUS CURRICULUM
Content of instruction	<ul style="list-style-type: none"> ■ Substantial repetition of preschool content in elementary school ■ Lessons are focused on basic skill development, not integrated into thematic lessons directed at content knowledge ■ Subjects (literacy, language, math, science, social studies) taught separately ■ Shallow content instruction, spread across many content areas (e.g., 16 topics for language/literacy in kindergarten) 	<ul style="list-style-type: none"> ■ Content builds from preschool to second grade with little repetition ■ Lessons are theme-based and focus on building critical thinking and content knowledge ■ Connections are made across subject areas ■ Deep content instruction (e.g., 4 themes for language/literacy in kindergarten, 6 in first grade)
Format of instruction	<ul style="list-style-type: none"> ■ Kindergarten/elementary school structures and formats not aligned with preschool ■ Primarily whole-group ■ Teacher-directed, with mostly passive listening and individual seatwork 	<ul style="list-style-type: none"> ■ Structures and formats mirror preschool ■ Primarily small-group ■ Student-directed, with teacher support ■ Promotes active engagement with materials and tasks that relate to broader themes ■ Project-based, including collaborative work with peers
Opportunities to tailor instruction	<ul style="list-style-type: none"> ■ Tailored instruction difficult to implement with whole-group instruction ■ Level of difficulty aimed at lower to middle performers 	<ul style="list-style-type: none"> ■ Small-group instruction centers and multiple learning approaches allow for differentiated instruction ■ Tailored instruction designed to bring less skilled students (who are less likely to have attended preschool) up to speed without holding back more skilled students
Professional development	<ul style="list-style-type: none"> ■ Preschool teachers receive intensive training and ongoing coaching ■ Kindergarten through second-grade teachers receive mostly one-shot curriculum training 	<ul style="list-style-type: none"> ■ All preschool through second-grade teachers receive curriculum training and coaching ■ Monthly curriculum-focused seminars, led by a coach, encourage kindergarten through second-grade teachers to share problems, successes, and resources

of Michigan, and the Harvard Graduate School of Education to conduct a new longitudinal study examining the malleable factors in BPS children's learning environments that influence their academic, social-emotional, and behavioral outcomes from preschool to third grade. This descriptive research, which is funded by the Institute of Education Sciences as part of its Early Learning Network, aims to inform early education and elementary school systems on how to support children's positive development across the critical transition to formal schooling. Although this study will provide some insight into the key factors that are most important for predicting students' positive development, the research design will not allow the team to make any causal conclusions.

The ExCEL P-3 study presents an opportunity to build on this completed and ongoing work in Boston in several respects. First, the original impact study of BPS followed children only through the beginning of kindergarten and was conducted before the introduction of the aligned instruction that characterizes Focus.¹⁵ The ExCEL P-3 study will extend at least through third grade for children who receive this aligned instruction. This follow-up is important, since third grade is widely recognized to be a critical point for predicting children's longer-term achievement and academic

success. Second, the original impact study used a quasi-experimental, regression discontinuity design;¹⁶ the ExCEL P-3 study is a natural experiment that leverages a lottery that BPS conducts to allocate preschool slots in the face of excess demand. Third, in the original impact study tests were administered only in English, whereas in the ExCEL P-3 study Spanish-speaking students will be tested in Spanish.

The ExCEL P-3 study will explore two primary questions by comparing outcomes for children who were assigned to preschool in the 2016-2017 school year by lottery and a control group of children who were not assigned to preschool because of limited openings.

- 1 What are the impacts of BPS preschool on children's constrained and unconstrained skills at the beginning and end of kindergarten and third grade?
- 2 What factors might help explain whether gains in children's skills are sustained through third grade?

Data sources for the ExCEL P-3 study will include BPS administrative records, child assessments, and measures of preschool and early elementary school

15 A follow-up study is under way, using retrospective administrative data to estimate the effects of Boston preschool on cognitive outcomes through third grade for children enrolled before Focus was put in place. The study will not include findings on such factors as teacher practice, classroom quality, or instructional content, which are hypothesized to influence the sustainability of preschool impacts, and it will have limited ability to differentiate between constrained and unconstrained skills.

16 Regression discontinuity analysis is a quasi-experimental approach that can be used to estimate program impacts in situations where candidates are selected for treatment based on a score or rating falling above or below a certain threshold, by comparing individuals whose scores are similar but on opposite sides of the cut point. The Weiland and Yoshikawa study compared outcomes in the fall of 2009 for children who turned four years old immediately before or immediately after September 1, 2008. The impact estimates are difficult to generalize to the larger student population, since the findings particularly relate to children with birthdays on or close to the cut point. Lipsey et al. (2015) note that while age-based regression discontinuity designs are a popular approach for examining the impacts of preschool programs on child outcomes, such designs have a set of limitations relative to experimental research designs.

quality and fidelity to the aligned Focus curriculum. The potential impacts on unconstrained skills will be measured using direct assessments of children’s vocabulary and receptive language ability, as well as the strategies children use when completing an assessment of math skills. The outcomes will be examined for key subgroups, including children from different racial and ethnic groups, those who are eligible for free or reduced-price lunch, and dual language learners.

POTENTIAL LESSONS ON HOW TO SUSTAIN IMPACTS

The ExCEL P-3 study has significant policy implications, whether or not impacts are sustained through third grade. Sustained impacts would provide rigorous evidence of the longer-term effectiveness of a high-quality preschool program that is integrated with district-wide policies to align preschool and elementary school instruction. In contrast, if the preschool impacts fail to hold up, it would underscore the continued challenge of sustaining impacts, even in what is considered to be a high-quality, well-aligned program.

The study will also provide important, albeit more exploratory, evidence on the abovementioned hypotheses concerning specific approaches to sustaining preschool impacts:

- **THE SKILLS BEING TAUGHT AND MEASURED.** If, for example, preschool effects on unconstrained skills persist while effects on constrained skills fade out, it would highlight the importance of focusing instruction on unconstrained skills and measuring them at the end of preschool and through elementary school.
- **ALIGNMENT.** If lasting impacts are largest for children in elementary school classrooms whose teachers implemented the aligned curriculum

with high fidelity, it supports the view that alignment contributes to sustaining the positive early results of preschool programs. If, on the other hand, there are sustained impacts for children in both high- and low-fidelity classrooms, or there is fade-out even for children in classrooms with high fidelity, it is less likely that instructional alignment is a principal factor in explaining longer-term results.

- **THE MAGNITUDE OF PRESCHOOL EFFECTS.** As noted above, the BPS preschool program was found in an earlier study to produce moderate to large impacts on academic, social-emotional, and executive function skills. If sizable preschool effects are found again, but they are not sustained, it suggests that there are other reasons for fade-out besides preschool effects not being large enough.
- **THE QUALITY OF SUSTAINING ENVIRONMENTS.** If preschool effects persist primarily for children who were in higher-quality classrooms during early elementary school, it would underscore the importance of extending quality beyond preschool into early elementary school.
- **CLASSROOM COMPOSITION.** If impacts are sustained more in classrooms with a high concentration of children who attended preschool, it suggests that kindergarten teachers may be better able to build on students’ existing skills when most of them were preschool attenders. This finding would provide another reason to expand access to preschool programs.

NEXT STEPS FOR THE ExCEL NETWORK

The ExCEL P-3 study, now under way, will extend for six years. Information on preschool children’s skills, as well as preschool classroom quality and

curriculum fidelity, will be collected. Similar data on children and classrooms will be collected in subsequent years as the students enter kindergarten and first, second, and third grades. Issue briefs and reports will examine the initial impacts of the BPS preschool program and the extent to which the impacts are sustained over time.

The other two ExCEL projects were in the planning stages at the time this brief was written. ExCEL Quality will focus on ways to combine curricula and teacher training and coaching to strengthen preschool instruction and child outcomes. Curricula under consideration include either a comprehensive program (such as Creative Curriculum or High/Scope) or a standard preschool curriculum to be enhanced with up to two evidence-based, domain-specific curricula. In either case, intensive professional development will involve ongoing teacher training reinforced by regular in-class coaching. The evaluation will answer key implementation, impact, and cost-effectiveness questions with data collected on child outcomes in preschool, with the possibility of further follow-up.

ExCEL Summer will begin with a learning network in which representatives of several interested localities and summer programs consider such issues as participant recruitment, program timing and duration, curriculum, staffing, and parent engagement. A program model will then be piloted to explore these issues in more depth. Full-scale program implementation will follow, with a rigorous evaluation in two localities. Reports will cover program results at least through the end of the children's kindergarten year.

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REFERENCES

- Bailey, Drew H., Greg J. Duncan, Candice L. Odgers, and Winnie Yu. 2017. "Persistence and Fadeout in the Impacts of Child and Adolescent Interventions." *Journal of Research on Educational Effectiveness* 10, 1: 7-39.
- Barnett, Steven W. 1995. "Long-Term Effects of Early Childhood Programs on Cognitive and School Outcomes." *The Future of Children* 5, 3: 25-50.
- Barnett, Steven W. 2011. "Effectiveness of Early Educational Intervention." *Science* 333, 6045: 975-978.
- Campbell, Frances A., Elizabeth P. Pungello, Kirsten Kainz, Margaret Burchinal, Yi Pan, Barbara H. Wasik, Oscar Barbarin, Joseph J. Sparling, and Craig T. Ramey. 2012. "Adult Outcomes as a Function of an Early Childhood Educational Program: An Abecedarian Project Follow-Up." *Developmental Psychology* 48, 4: 1033-1043.
- Campbell, Frances A., Craig T. Ramey, Elizabeth Pungello, Joseph Sparling, and Shari Miller-Johnson. 2002. "Early Childhood Education: Young Adult Outcomes from the Abecedarian Project." *Applied Developmental Science* 6, 1: 42-57.
- Clements, Douglas H., and Julie Sarama. 2007. "Effects of a Preschool Mathematics Curriculum: Summative Research on the Building Blocks Project." *Journal for Research in Mathematics Education* 38, 2: 136-163.
- Engel, Mimi, Amy Claessens, and Maida A. Finch. 2013. "Teaching Students What They Already Know? The (Mis) Alignment Between Mathematics Instructional Content and Student Knowledge in Kindergarten." *Educational Evaluation and Policy Analysis* 35, 2: 157-178.
- Jenkins, Jade M., Tyler W. Watts, Katherine Magnuson, Douglas Clements, Julie Sarama, Christopher B. Wolfe, and Mary Elaine Spitzer. 2015. "Preventing Preschool Fadeout Through Instructional Intervention in Kindergarten and First Grade." Working paper. Graduate School of Education, University of California, Irvine. Website: inid.gse.uci.edu/files/2011/03/Jenkinsetal_Fadeout_SREE.pdf.

- Johnson, Rucker. 2012. "School Quality and the Long-Run Effects of Head Start." Goldman School of Public Policy Working Paper, University of California, Berkeley.
- Lipsey, Mark W., Dale C. Farran, and Kerry G. Hofer. 2015. *A Randomized Control Trial of a Statewide Voluntary Prekindergarten Program on Children's Skills and Behaviors through Third Grade*. Nashville, TN: Vanderbilt University, Peabody Research Institute.
- Lipsey, Mark W., Christina Weiland, Hirokazu Yoshikawa, Sandra Jo Wilson, and Kerry G. Hofer. 2015. "The Prekindergarten Age-Cutoff Regression-Discontinuity Design: Methodological Issues and Implications for Application." *Educational Evaluation and Policy Analysis* 37, 3: 296-313.
- Ludwig, Jens A., and Deborah A. Phillips. 2008. "Long-Term Effects of Head Start on Low-Income Children." *Annals of the New York Academy of Sciences* 1136, 6: 257-268.
- Paris, Scott G. 2005. "Reinterpreting the Development of Reading Skills." *Reading Research Quarterly* 40, 2: 184-202.
- Puma, Michael, Stephen Bell, Ronna Cook, Camilla Heid, Pam Broene, Frank Jenkins, Andrew Mashburn, and Jason Downer. 2012. *Third-Grade Follow-Up to the Head Start Impact Study: Final Report*. OPRE Report 2012-45b. Washington, DC: Administration for Children and Families, U.S. Department of Health and Human Services.
- Schickedanz, Judith A., and David Dickinson. 2004. *Opening the World of Learning: A Comprehensive Early Literacy Program*. Iowa City: Pearson Early Learning.
- Schweinhart, Lawrence J., Helen V. Barnes, and David P. Weikart. 1993. *Significant Benefits: The High/Scope Perry Preschool Study through Age 27*. Monographs of the High/Scope Educational Research Foundation 10. Ypsilanti, MI: High/Scope Educational Research Foundation.
- Schweinhart, Lawrence J., Jeanne Montie, Zongping Xiang, William S. Barnett, Clive R. Belfield, and Milagros Nores. 2005. *Lifetime Effects: The High/Scope Perry Preschool Study Through Age 40*. Monographs of the High/Scope Educational Research Foundation 14. Ypsilanti, MI: High/Scope Press.
- Swain, Walker A., Matthew G. Springer, and Kerry G. Hofer. 2015. "The Persistence of Pre-K Effects and Early Grade Teacher Quality: Evidence from the Tennessee-Voluntary Pre-K Experiment." *AERA Open* 1, 4: 1-17.
- Weiland, Christina, and Hirokazu Yoshikawa. 2013. "Impacts of a Prekindergarten Program on Children's Mathematics, Language, Literacy, Executive Function, and Emotional Skills." *Child Development* 84, 6: 2112-2130.
- Zigler, Edward, and Sally J. Styfco. 2004. *The Head Start Debates*. Baltimore, MD: Brookes Publishing Company.

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