

The title for this Special Section is **Bringing Developmental Science into the World**, edited by Roberta Michnick Golinkoff, Kathy Hirsh-Pasek, Rachel Grob, and Mark Schlesinger

Scaling and Sustaining Effective Early Childhood Programs Through School–Family–University Collaboration

Arthur J. Reynolds, Momoko Hayakawa, Suh-Ruu Ou, Christina F. Mondi, Michelle M. Englund, Allyson J. Candee, and Nicole E. Smerillo
University of Minnesota

We describe the development, implementation, and evaluation of a comprehensive preschool to third grade prevention program for the goals of sustaining services at a large scale. The Midwest Child–Parent Center (CPC) Expansion is a multilevel collaborative school reform model designed to improve school achievement and parental involvement from ages 3 to 9. By increasing the dosage, coordination, and comprehensiveness of services, the program is expected to enhance the transition to school and promote more enduring effects on well-being in multiple domains. We review and evaluate evidence from two longitudinal studies (Midwest CPC, 2012 to present; Chicago Longitudinal Study, 1983 to present) and four implementation examples of how the guiding principles of shared ownership, committed resources, and progress monitoring for improvement can promote effectiveness. The implementation system of partners and further expansion using “Pay for Success” financing shows the feasibility of scaling the program while continuing to improve effectiveness.

Preventive interventions early in life can enhance many domains of well-being and reduce later costs of remediation and treatment (Karoly & Auger, 2016; O’Connell, Boat, & Warner, 2009). Despite the accumulated evidence, however, the impacts of early childhood programs vary substantially in magnitude, consistency, and duration. Differences in program quality, teaching practices, timing and duration, and levels of school and family support are contributing factors (Camilli, Vargas, Ryan, & Barnett, 2010; Reynolds & Temple, 2008). Even if large and sustained effects are reliably documented, these programs are rarely scaled to entire populations, further limiting the potential impact in promoting child well-being. Less than 5% of evaluated prevention programs are ever implemented at scale (O’Connell et al., 2009).

To increase the scalability of prevention programs and their potential for sustainability, collaborative models of school, family, and university engagement are needed. In this article, we review the Midwest Child–Parent Center Preschool to Third Grade Program (CPC-P3) as an approach for scaling and sustaining an evidence-based preventive intervention. We describe key elements, short- and longer term impacts, and share lessons for implementation at the neighborhood, district, and higher levels of scale. Pay for Success (PFS) financing in the program is also discussed. CPC-P3 provides comprehensive education and family support services to children and parents (Human Capital Research Collaborative, 2012; Reynolds, Hayakawa, Candee, & Englund, 2016). It is a school reform model to engage school leaders and families as

Preparation of this article was supported in part by the National Institute of Child Health and Human Development (Grant R01 HD034294), Investing in Innovation Fund, U.S. Department of Education (Grant U411B110098), and 20 matching grants to the U.S. Department of Education. The views expressed are those of the authors and not necessarily the funding agencies.

Correspondence concerning this article should be addressed to Arthur J. Reynolds, Institute of Child Development, University of Minnesota, 51 East River Road, Minneapolis, MN 55455. Electronic mail may be sent to ajr@umn.edu.

© 2017 The Authors

Child Development published by Wiley Periodicals, Inc. on behalf of Society for Research in Child Development.

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

All rights reserved. 0009-3920/2017/8805-0006

DOI: 10.1111/cdev.12901

program owners, thereby facilitating scale up. Although previous studies of high-quality preschool programs show strong evidence of cost-effectiveness (Karoly & Auger, 2016; Reynolds, Temple, Ou, Arteaga, & White, 2011), scale up has not occurred.

Core Principles of School–Family–University Collaboration

As a school reform model, CPC-P3 implements a set of core elements in elementary school or center-based sites to enhance student learning. CPC services through third grade can be completely colocated or as a partnership between centers and schools. The framework is based on a school–family–university collaboration model, which emphasizes three major principles: (a) shared ownership, (b) committed resources, and (c) progress monitoring for improvement.

In shared ownership, the major partners have an equal responsibility to plan, implement, manage, and improve the program. Rather than the usual approach in which an externally developed program (e.g., university based) is adopted by an organization without modification, a shared ownership model distributes the responsibility to ensure effective implementation, thereby strengthening the commitment from all partners to work together in achieving common goals. This is consistent with emerging stakeholder models of research (Frank, Basch, & Selby, 2014).

In committed resources, each partner makes key investments that are necessary for effective implementation. Resources include time, financial capital, and physical space. Although resources denote the “stake” that each partner has in an initiative, the increased commitment that goes along with investment can be a springboard to scale up and sustainability. Alternative financing options that are used, such as matching grants, blended funding, and leveraging resources among institutions, increase the capacity and feasibility of further expansion. Given shared ownership, staff collaboration in fulfilling roles and responsibilities is further enhanced, which also increases the efficiency of available resources.

Progress monitoring for improvement addresses how well programs are meeting their short- and intermediate-term goals. This ongoing formative evaluation is essential for continuous improvement. Measuring and reporting the extent of implementation fidelity enables timely adjustment of program strategies and activities to the needs of participants

and partners alike. This is especially important in comprehensive programs in which responses to intervention have large variability. The use of data and evidence, and sharing these among partners, reinforce the importance of meeting milestones and standards. The tools that are routinized also help ensure that the quality of the program can be maintained as expansion increases.

Barriers to Scaling and Sustaining Effective Programs

Although there is increased priority for scaling and sustaining effective early childhood and prevention programs, several barriers have hampered the success of scale-up efforts and led to a very small percentage of programs that have been expanded population wide. One is cost. Many early intervention and preschool programs with strong evidence provide services that are more intensive and comprehensive, and have quality assurance standards that require additional resources (O’Connell et al., 2009). School districts and states are not usually able to cover these costs because feasibility is paramount with the goal of serving the most families at a minimum acceptable level of cost. In the long-term effects of preschool programs, the most evidence-based models range in cost, depending on duration, from \$10,000 to over \$70,000 per child (Reynolds & Temple, 2008). These programs have smaller class sizes and well-compensated staff.

Even if costs can be justified, scaling may not occur due to lack of institutional commitment to the program, which is the second major barrier. Many evidence-based programs are viewed by organizational leaders as being less feasible to widely implement (Frank et al., 2014), and as is often the case with externally developed programs, shared ownership is not sufficiently developed. This further reduces commitment given the importance of organizational control in scaling. The third barrier is the inherent fragmentation of services, which is a major challenge to overcome in reforms. Multi-component, multiyear programs like P-3 integrate two disparate systems—preschool and K-12 education—which requires a large degree of coordination and alignment. Establishing strong continuity at larger levels of scale requires commitment to innovation and operational efficiency. Because organizational cultures in education and human services value treatment over prevention (O’Connell et al., 2009), priority on integrated interventions to reduce

future cost burdens is difficult to alter without a new leadership vision.

Midwest CPC Expansion Program

Due to discontinuities in instructional support and philosophy between early childhood and school-age settings, improvements in the integration and alignment of services during this important ecological transition can improve children's levels of readiness for kindergarten that are sustained over the elementary grades (Takanishi & Kauerz, 2008). Each CPC-P3 site provides a dynamic support system over P-3 (see Appendix S1). Comprehensive education and family support services are provided. Under the direction of a leadership team at each site and in collaboration with the principal, CPC-P3 enhances school readiness skills, increases early school achievement, and promotes parent involvement. It is a stand-alone school or center in which all children receive services. Sites implement a set of six core elements following the program guidelines and requirements specified in the manual (Human Capital Research Collaborative, 2012; Reynolds et al., 2016). All teachers, staff, and children for these designated grades participate as well as staff hired to reduce class sizes, and provide program leadership, professional development, and family engagement.

The CPC's head teacher (HT) or director works under the leadership of the elementary school principal. HTs are the administrative leads for the program and manage implementation, provide coaching and supervision to staff, and help establish expectations of performance. The parent resource teacher (PRT) directs the CPC's parent resource room and family services, and outreach activities are organized by the school community representative (SCR). Health services are coordinated between the preschool and elementary grades. Liaisons work with the HT and PRT to provide alignment of curriculum and parent involvement activities. Small class sizes are a hallmark. Site mentors from the Human Capital Research Collaborative (HCRC) also work with leadership and staff to ensure effective implementation. Curricular and performance monitoring are integrated within a professional development system of school facilitators and online supports.

Figure 1 shows the collaborative focus of the CPC expansion, which is designed to enhance shared ownership and school-wide integration of P-3 services. Children's learning is supported by

the family within the context of the school and community.

CPC-P3 School Reform Focus

Given the historic focus on specific elements of reform, including curriculum enhancement and small classes (Reynolds, Magnuson, & Ou, 2010), newer comprehensive approaches for promoting effective school transitions may not only have larger effects on child development but also increase the likelihood that gains will be sustained. This is consistent with ecological, risk/protection, and human capital theories (Bronfenbrenner, 1989; Rutter & Rutter, 1993). To date, key principles of effective school improvement developed in the 1970s have not been successfully utilized in early childhood programs and their follow-on efforts. Among these are principal leadership, school climate and high expectations of performance, and engaged learning communities (Rury, 2016; Takanishi & Kauerz, 2008). These principles have been incorporated in school reform with positive results, most notably the five essentials framework (Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010).

Although developed independently within the context of early childhood programs, the six core elements of CPC are consistent with the five essentials, and they provide a strategy of school improvement that can promote well-being and achievement. As shown in Figure 1 and Table 1, the core CPC-P3 elements are described as follows:

1. *Collaborative leadership team*: A leadership team is run by the HT in collaboration with the principal. The HT ensures that all elements are effectively implemented.
2. *Effective learning experiences*: Ensure mastery in core learning domains (e.g., literacy and language, math, science, socioemotional) through small classes, diverse and engaged instruction, and increased time through full-day preschool and kindergarten classes. For example, preschool and K-3 classes are limited to 17 and 25, respectively, with assistants in each.
3. *Aligned curriculum*: Organize a sequence of evidence-based curricula and instructional practices that address multiple domains of child development within a balanced, activity-based approach. A curriculum alignment plan is developed with the principal and is updated annually.
4. *Parent involvement and engagement*: Comprehensive menu-based services are led by the PRT and SCR including multifaceted activities and opportunities to engage families.

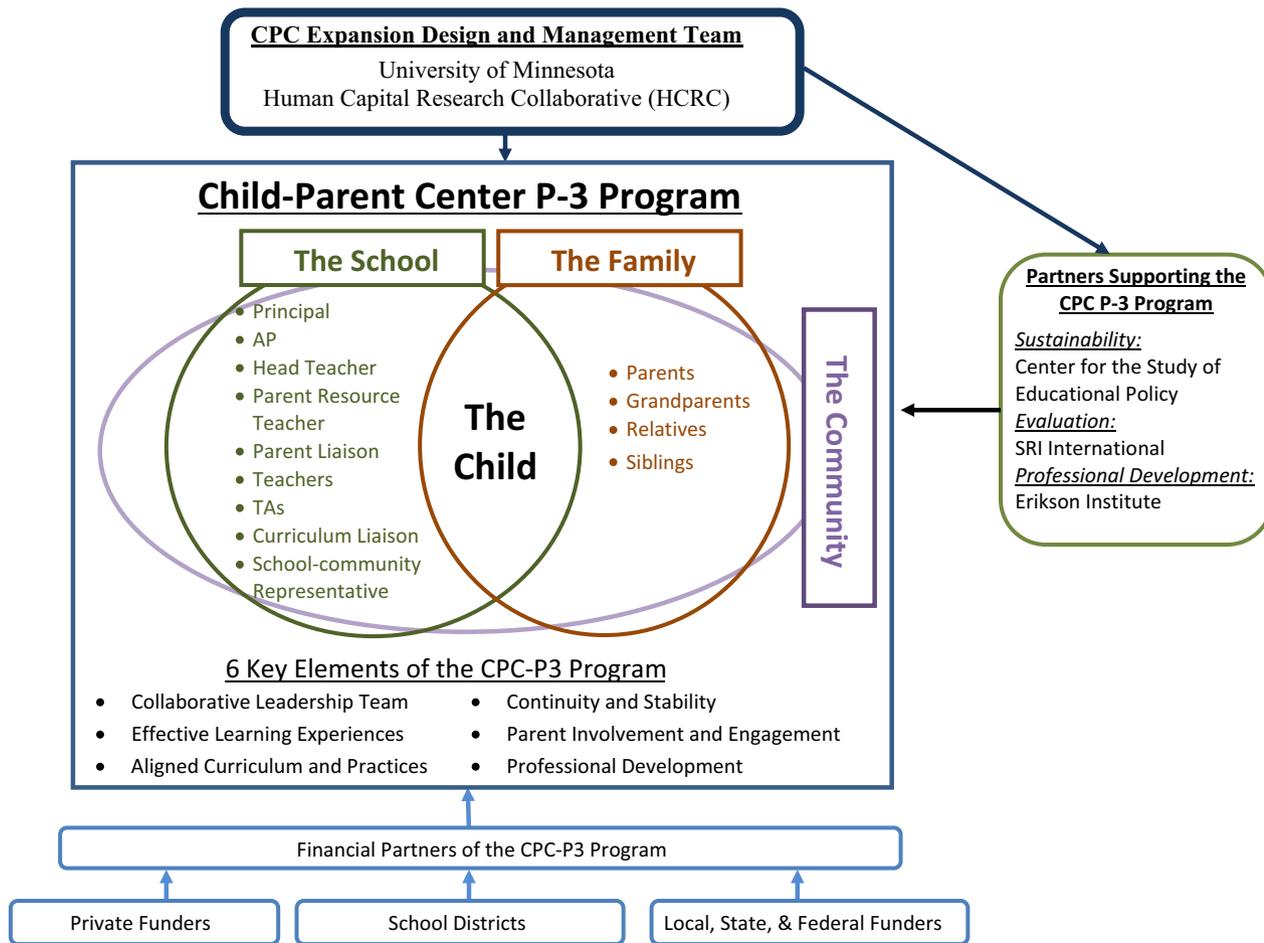


Figure 1. Midwest Child-Parent Center P-3 Program structure with partners. [Color figure can be viewed at wileyonlinelibrary.com]

5. *Professional development system*: Online professional development and onsite follow-up support are integrated for classroom and program applications. Among the topics covered by the modules are oral language, thinking skills, movement, inquiry, and socioemotional learning.
6. *Continuity and stability*: Preschool to third-grade services, through colocated or close-by centers, incorporate comprehensive service delivery and year-to-year consistency for children and families. Instructional and family support services are integrated across grades.

Table 1 provides a description of how each of the program elements contributes to the three core principles of family-school-university collaboration. The collaborative leadership team of the principal and HT help establish the learning environment of shared ownership among the partners, which provides opportunities for CPC staff to serve children

and families in all facets. The principal's increased commitment, including participation in institutes and decisions to increase school resources to P-3, is a significant advance from the original program (see Appendix S2). The barriers faced in implementing each element are also noted in Table 1, including maintaining small classes, across-grade communication among teachers, and student mobility. These and others are addressed in the implementation examples below.

Implementation Examples for Strengthening Impacts and Increasing Sustainability

Although CPC has a distinguished history, expansion beyond Chicago has been a major need. This is addressed by the Midwest expansion. At the time of the expansion in 2012, only the preschool component of the program was being implemented in just 10 of the original sites. Working

Table 1
Midwest Child-Parent Center Expansion Elements, Principles of Collaboration, and Impacts

Program element	Major barrier	Shared ownership	Committed resources	Progress monitoring	Evidence of impact
Collaborative leadership	Principal commitment	Create a positive learning environment with accountability	Hire leadership team for implementation	Ensure that instructional and family services are effective	Increased fidelity of implementation; increased principal support to staff
Effective learning experiences	Maintaining small classes	Establish common principles of small classes and balance of instructional activities	Provide matching funds to open new classrooms	Classroom Activity Report tool; observation of instruction tool; teacher checklist	Full-day preschool increased readiness skills and attendance; increased engage in learning
Aligned curriculum	Across-grade communication	Provide coordinated instruction across grades	Implement new curricula for increased effectiveness	Annual curriculum alignment plan; observation of across-grade coordination	Increased child-initiated instruction linked to greater learning gains
Parent involvement and engagement	Engaging hard-to-reach families	Establish a home-school agreement to partner with the school community	Increase staff time to work with parents and family members	Parent involvement logs; annual parent involvement plan	Program linked to increased parent involvement in school
Professional development	Time to review teaching practices	Create a professional learning community for teacher and staff growth	Hire coaches and mentors to improve implementation and teaching practices	Checklist of fidelity; number of teaching modules and reviews of practice	Increased time in math instruction and in child-initiated activities
Continuity and stability	Student mobility	Ensure consistency and predictability in learning from year to year	Additional classroom supports (e.g., teaching assistants, small classes); family outreach	Calculate the percentage of students who remain in the program over time	Participating families have lower mobility; small classes continue in K-3

with Chicago's leadership and others, the HCRC team developed a comprehensive plan that integrated six core elements that was implemented under a school reform model consistent with the U.S. Department of Education's Office of Innovation.

Program elements were modified and strengthened to address large demographic changes at both the societal level (e.g., increasing numbers of single-parent households and working mothers of young children) and program level (e.g., more diverse populations of children and families, new geographic locations; see Appendices S2 and S3).

We describe four examples of CPC-P3 implementation, including effectiveness, limitations, and challenges, and how the program is working toward sustainability.

Example 1: Collaborative Leadership and Effective Learning

As a school reform model, the program has a collaborative leadership structure in which the principal and staff establish a positive learning environment for students and families. Principals develop a CPC leadership team and support key program elements through matching funding (e.g., open full-day preschool, hire teaching assistants, and outreach staff), and facilitate cross-grade curriculum and parent involvement strategies (see Appendices S2 and S3).

Effectiveness

During the planning stages, the HCRC team worked with each principal to develop an implementation plan for a smooth roll out in each school. One of the main recommendations by principals and head teachers was to open full-day preschool classrooms in the 1st year (fall 2012). This was based in large part on feedback from parents that they wanted their children in full-day preschool due to the incompatibility between their work schedules (or other obligations) and the school's existing part-day program. The added challenge of coordinating care and education for the other part of the day was a major concern. Some parents indicated that they would not enroll their child in the center unless there was a full-day option. In addition to parents' demands, principals also believed full-day preschool would improve school readiness skills and the successful transition to the kindergarten and the elementary grades.

The evidence reveals positive impacts on learning and continuity.

Limitations and Challenges

Full-day preschool, however, was not part of the CPC expansion design and consequently required significant changes to the program. To address this issue, HCRC and the principals established a solution by which if the school contributed at least 25% of the added cost for opening a full-day classroom, HCRC would match the remainder. Eleven of the 16 schools agreed to do this with the contributions ranging from 25% to 100%. HCRC reallocated funding to cover these costs. Twenty-three full-day classrooms were opened in fall 2012. This was the first time in these schools that principals directly funded preschool classrooms out of their own budgets. This process also supported key elements of shared ownership and committed resources (see Table 1).

Unfortunately, the process of opening full-day classrooms caused significant delays in classrooms being fully enrolled and operational. It was not until January 2013 that all full-day classrooms were fully staffed and enrolled, which reduced the amount of instructional time. Although these types of delays associated with start-up initiatives are to be expected, the consequence is that the 1st year impact of the program was likely conservative. More positively, this problem was not repeated in future years as full-day programs continued to grow.

A further limitation concerns the differential commitment by the principals in leading the program. Some principals made strong commitments to an active role. Others did not and also did not commit additional resources to the implementation. Two strategies were implemented to strengthen the principal role in the P-3 system of services. First, twice per year principal institutes were established to discuss the importance of the leadership climate of the program in sustaining learning gains. Second, each site was assigned a site mentor who worked with each school to ensure not only faithful implementation but to share ongoing progress with principals.

Overall, our partnership with schools in opening full-day preschool and establishing a leadership culture led to the district financially sustaining and expanding them the following year. Moreover, CPC leadership positions in each school were sustained with district funding. Further sustainability and

expansion planning are underway with these and other districts.

Example 2: Menu-Based System of Parent Involvement and Engagement

Although the importance of parent involvement in children's success has been well documented (Hayakawa, Englund, Warner-Richter, & Reynolds, 2013; Jeynes, 2007), daily schedules and demands, school climate, and the lack of necessary school resources often prevent parents from fully engaging in supportive activities. Through collaborations with leaders and stakeholders, we developed a menu-based system that overcomes these barriers by offering a comprehensive program tailored to educational and career needs. Parents choose among a range of activities in which to participate and agree to be involved at least 2.5 hr per week (Appendices S3 and S4). Completion of a needs assessment and significant outreach to families helps ensure involvement is optimized.

The goals of family engagement are to (a) implement a menu-based program that addresses family needs while strengthening the school-family partnership, (b) sustain parent involvement in children's education, and (c) enhance support for educational attainment, career opportunities, and personal development. Each site has a parent resource room to host events and activities. The PRT works collaboratively with the HT and the school principal to engage families (see Table 1). The SCR conducts home visits and mobilizes resources for families.

Effectiveness

A needs assessment is conducted at the beginning of each year to avoid planning events that do not match the identified needs of families. The available resources in the community are assessed through asset mapping, which enables opportunities for further collaboration. The leadership team, including parent involvement liaisons (K–third grade), develops activities at each center. The yearly parent involvement plan provides an overall strategy. Parent involvement logs (an electronic documentation system) are maintained for progress monitoring. In Year 1, parent involvement logs showed that CPC families in Year 1 participated in an average of 12.4 school events compared to 2.7 for the comparison group. This difference was maintained the following year. Teacher ratings of parent involvement in school were also higher in the program (Reynolds et al., 2014; Reynolds et al.,

2017). Given parents' work schedules and other responsibilities, home visits were increasingly used to promote parent engagement.

Limitations and Challenges

Given the importance of family–school partnerships, the menu-based system approach to involvement was developed to address the different needs of families within and across sites. The desired levels of school and home involvement varied considerably. Despite careful planning and the use of results from the needs assessment to establish effective plans, a relatively large percentage of parents did not regularly participate in the program or had significant barriers to doing so. It was also observed that child attendance was a major problem with rates of chronic absenteeism approaching 50% in some schools.

Two major strategies were implemented in the first 2 years to counteract these issues, notwithstanding the fact that levels of school involvement in the CPC program consistently exceeded those in other sites. First, the work effort of the SCR was increased to a full-time position. Being only part-time in the 1st year, this individual was not able to fully engage with families, encourage participation in parent events and workshops, and sufficiently address student attendance problems. The increased number of home visits to families in need or to those who were reluctant to participate in school events made a big difference. It was an opportunity to foster positive relations and reduce obstacles impacting a family's ability to participate in the school and children's education. Establishing this type of school climate is key to the program.

The second strategy to enhance participation was more strategic. The entire leadership team—principal, HT, PRT, SCR, and others—regularly communicated to and shared with parents the importance of school–family partnerships. This included outreach newsletters to families about the opportunities in the school and the benefits of the program, the development of a parent involvement plan that set goals and developed strategies to involve parents as leaders, and documenting and monitoring the types and frequency of parent involvement.

Benefits of parent involvement accrue to the extent that participation enhances parenting skills, attitudes and expectations, and involvement in children's education (Hayakawa et al., 2013; Reynolds et al., 2016). Parent involvement in school and parent expectations for achievement have been found to improve well-being by increasing children's learning time, enhancing motivation and school

commitment, and increasing expectations for success (Hayakawa et al., 2013). They also improve social support and parenting skills, which reduce social isolation and the risk of child maltreatment (Jeynes, 2007; Sweet & Appelbaum, 2004). The menu system of involvement in the Midwest expansion enables the program to engage more parents (see also Appendix S4), but greater and more creative efforts are needed to bolster and sustain involvement for the most in need and identify those activities that are most impactful.

Example 3: Progress Monitoring for Improving Instruction

Monitoring is key to ensuring that learning is on track. Program fidelity is a major component of assessing progress. Based on site visits, interviews, and a review data collected for each element, we assessed each school's fidelity of implementation in meeting requirements. The scale for each element and overall ranged from 1 (*few requirements met*) to 5 (*almost all*). The average rating of implementation fidelity for Year 1 across the six program elements was 3.9 or moderately high. The highest was continuity and stability (4.2) and the lowest was aligned curriculum (3.3). Parent involvement was in the moderate range (3.9). Across the six elements, 75% of sites met the moderate-to-high fidelity standard defined as a rating of 3.5 or higher. In Year 2, the overall fidelity rating was four with collaborative leadership, parent involvement, and professional development rated highest. Eighty percent of sites met the fidelity standard.

CPC classrooms are required to utilize a variety of instructional strategies to maintain a balance of teacher-directed and child-initiated activities at a ratio no higher than 65/35. The classroom activity report (CAR) was developed by HCRC to monitor classroom progress in meeting this requirement. This tool documents the implementation of the content and frequency of instructional activities. Classroom teachers complete the CAR on a regular basis.

Effectiveness

CAR is used as a progress monitoring tool for improving learning outcomes. Although the distribution of instructional time was similar in full-day and part-day classes, the number of hours of total instructional time was nearly 2.5 times greater in full-day classes (984 vs. 417; see Appendix S5). This increase was proportionate across instructional domains and activities. For example, the number of hours in child-

initiated literacy activities increased to 225 in full-day from 101 in part-day. Roughly half the instruction time was spent on language and literacy, and 20% on math. These data were used by schools and the district to determine if and how the additional hours were productively spent. They also helped plan for better instructional alignment between preschool and the early grades. We have found that learning gains in preschool and kindergarten increase as the level of child-initiated activities increase.

The CAR, along with an observational assessment called the classroom learning activities checklist (see Appendix S6), provides valuable information for improving the quality of experiences in the classroom. Independent observations of program and comparison sites on this assessment indicated that 76% of CPC preschool classrooms were rated moderately high to high in task orientation and engagement, a key program focus. Forty-three percent of comparison classrooms had this rating.

Limitations and Challenges

Although the purpose of the monitoring tools is to inform and improve instruction and program fidelity, many schools initially perceived that the documentation of instruction was for accountability rather than program improvement. The frequency with which some of the tools were completed and the limited feedback provided only reinforced this view. For example, the CAR was completed by classroom teachers twice per month initially but is currently done three times per year with no loss of information. A review and discussion with classroom teachers about how child- and teacher-directed instruction are operationalized were also a necessary step in enhancing understanding about a key program foci. The use of these data is also important for professional development, but full integration has yet to be achieved. Program mentors and facilitators regularly participate in grade-level meetings, review teaching modules, and provide feedback. Greater availability of time to sufficiently cover these topics will help teachers identify gaps and design new instructional strategies tailored to the needs of children rather than being judged as the right or wrong strategy. The curriculum alignment plan also can help reinforce tailoring instruction across the P-3 continuum.

Example 4: Scaling and Financing Through PFS

Given the low rate of success in scaling evidence-based programs, new approaches to financing have

been developed. One of the most prominent is called social impact bonds or Pay for Success (PFS). In PFS, mission investors consisting of private partners and/or philanthropic organizations loan funds to public sector jurisdictions (e.g., school districts, counties) to expand programs (Government Accountability Office, 2015; Temple & Reynolds, 2015). To the extent that these services are found to generate cost savings to the public sector, a state or local government is obligated to make payments to the investors based on the estimated cost savings. Economic evaluation is crucial in both determining the suitability of programs to be financed and in determining the magnitude of the “success” payments.

PFS illustrates the role of shared ownership and committed resources in program expansion (Table 1). Through a PFS initiative with the City of Chicago, the Midwest CPC has begun further expansion in the Chicago Public Schools. In this financing structure, Goldman Sachs, Northern Trust, and the Pritzker Family Foundation provide \$17 million in loans for the operational costs of new classrooms, which will serve an additional 2,600 children over the next 4 years (Human Capital Research Collaborative, 2014). The city will repay the loans only if the program improves outcomes as determined by an independent evaluation.

Midwest Expansion and PFS Planning

In the planning phase, the city engaged our team to help develop the initiative. The CPC program under the Midwest expansion was selected because it was showing strong initial findings and the district was committed. The program also had a long track record of effectiveness in promoting student success and cost savings. Two cost–benefit analyses documented that at an average cost per child of \$9,500 (2015) for preschool, benefits exceed costs by a factor of 7–10 (Reynolds, Temple, Robertson, & Mann, 2002; Reynolds, Temple, White, et al., 2011). A large percentage of the economic return was savings in special education, juvenile court, and child welfare. For example, the annual cost per child of special education is over \$15,000 above and beyond regular instruction. The majority of this cost is covered by the district. Given the direct relationship between the city and the district, the focus of the PFS was special education savings.

Success Payment Structure

The annual success payments made by the district and city are \$2,900 for each child who is

school ready for kindergarten, \$750 for each child who is literacy proficient in Grade 3, and \$9,100 for each year a CPC participant avoids special education as compared to a matched control group. Rates of special education placement will be tracked through high school. The payment structure is based on evidence that CPC improves school achievement and reduces the need for special education by up to 41% (Reynolds et al., 2002).

Effectiveness

PFS began implementation in February 2015 for an initial cohort of nearly 400 children in six sites. Five of them are existing schools in the CPC expansion. The 1st year evaluation findings were reported in spring 2016 for 328 of 449 four-year-olds who met the eligibility criteria. Results indicated that 59% of 4-year-olds met the defined school readiness benchmark (Gaylor et al., 2016). Among full-day preschool participants, 67% met the benchmark. The success metric was defined as a child performing at or above the national average at the end of the year on five of six subscales of the Teaching Strategies Gold Assessment System (Lambert, Kim, & Burts, 2013). Given the low-income and ethnic minority status of the families served, this is a relatively high percentage of children meeting the benchmark. It was set at a high standard of performance to ensure that children identified as school ready were clearly so. The resulting success payment by the city to the private funders for the 1st year was \$556,800. A lower benchmark would have increased the size of the payment.

Limitations and Challenges

Although the PFS enabled expansion of the program that would not have otherwise occurred, three major limitations are evident about the initiative. First, given the time constraints of the planning process, a number of elements in the original plan had to be scaled back or eliminated. Originally, CPC kindergarten and school-age services were to be part of the funded services. The added costs of these services could not be accounted for by the funders and were thus dropped. Each site will be responsible for funding the K-3 services, which may lead to uneven impacts. One of the funders of the initiative also dropped out during the planning process, which reduced the budget of the initiative. Finally, the State of Illinois declined to partner in the initiative, which prevented the state portion of special education costs to be included. Nevertheless, the 18-month process

from start to completion is one of the fastest in the PFS field. Further delays may have adversely affected the rest of the initiative.

Second, although the use of three success metrics is unique in PFS, the focus on special education savings as the major success metric is only partially consistent with CPC evidence. CPC has shown sizable preventive effects in child maltreatment, juvenile arrest, and adult arrest that are not included in the success metrics of the contract. This was due to the challenges of multijurisdiction agreements. Child welfare and justice systems are run through counties and the state rather than the city. Cook County was unwilling to participate, especially for the time frame involved. Thus, it is quite likely that the savings of the program will be underestimated. As the initiative proceeds, it is possible that supplemental contracts could be developed to capture some of these savings. Intermediate or implementation metrics such as health and parenting outcomes, attendance, and school dropout could be added. They were not included because they had too long of a time horizon (school dropout) or less clear linkages to special education savings (attendance, parent involvement).

Finally, the scope of evaluation in the PFS is limited to assessing whether the contract metrics are met. No assessment of implementation fidelity is part of the planned research and questions such as who benefits most, and school by school differences are not being investigated. This limits understanding about impacts and generalizability. If the success metrics are not met or are exceeded by a wide margin, the reasons why, the role of implementation quality, and causal understanding will be difficult to explain. Supplemental studies and analyses will surely be needed. As service contracts, the priority on research and implementation fidelity in PFS is relatively low (Government Accountability Office, 2015; Temple & Reynolds, 2015).

Despite these significant limitations, PFS helped scale CPC and can facilitate similar efforts in other districts. It provides a new avenue for leveraging resources in evidence-based programs. Private investment contributed to an initiative can also be combined with public resources to create a public-private approach to scaling.

CPC Impacts Over Time

Prior Chicago Longitudinal Study Evidence

The positive effects of the CPC program have been documented in many studies. Findings from the Chicago Longitudinal Study (CLS; Reynolds,

2000/2012), which has tracked a CPC and comparison cohort born in 1979–1980, has provided the most extensive evidence and it is the basis of the Midwest CPC expansion. In a quasi-experimental design, 989 three- and four-year-olds from low-income families who participated in 20 CPCs in the mid-1980s were compared to 550 children of the same age who enrolled in the usual early childhood programs in five randomly selected schools. A broad range of measures of well-being have been collected over 3 decades with over 90% sample recovery. These include school readiness and achievement, remedial education, educational attainment, involvement in the criminal justice system, and economic well-being. Program participation was from P-3 and followed the CPC model elements (see Appendix S3). Study characteristics and findings are described in Table 2.

Effectiveness

Based on a variety of regression analysis, CPC preschool participation was found to be associated with higher school readiness, higher reading and math achievement, reduced grade retention, and reduced special education placement (Reynolds, Temple, Ou, et al., 2011; Reynolds, Temple, White, Ou, & Robertson, 2011). Gains on the Iowa Test of Basic Skills were found from kindergarten through age 15. By age 22, the CPC preschool program is found to be associated with a higher rate of high school completion and a lower rate of juvenile arrest (Ou & Reynolds, 2006; Reynolds, Temple, Robertson, & Mann, 2001). Children participating in the P-3 program were found to have higher academic achievement when compared with children receiving only the preschool or follow-on programs. CPC P-3 participation (4 or more years of services) was associated with lower rates of school remedial services and delinquency (Reynolds, Temple, White, et al., 2011; Reynolds et al., 2001).

Limitations and Challenges

Despite this positive evidence of long-term effects, the generalizability of findings to current practice is limited primarily because the context of implementation was inner-city Chicago in the mid-1980s. Not only does this limit external validity, but the instructional practices and program structure at the time are now different. Moreover, there is a need to assess current validity for use in other settings. Also, because the CLS began in the kindergarten year, limited information on implementation

Table 2
CPC Estimates for School Readiness Skills and Parent Involvement in Two Studies

Study characteristics	Midwest expansion project			CLS
	Chicago	Saint Paul	Total	
Preschool years	2012–2013	2012–2013	2012–2013	1983–1985
Research design	Quasi-experimental, propensity scores			Quasi-experimental, matched groups
Program, control participants	1724, 906	215, 87	1993, 993	989, 550
Control group enrolled in PreK (%)	100	100	100	15
African American/Hispanic/Asian (%)	64/34/0	30/14/31	60/32/3	93/7/0
Assessment	TS-Gold	PALS	TS-Gold/PALS	ITBS composite
Time of assessment	End of PreK	End of PreK	End of PreK	Beginning of K
Average class size/level of fidelity	17/high	17/high	17/high	17/high
CPC effect size in standard deviations	.48	.38	.47	.63
Higher dosage (full-day/2 years)	.65	n/a	.40	.71
Lower dosage (part-day/1 year)	.32	.38	.33	.36
Parent involvement effect size	.39	.20	.37	.46
Time of assessment	End of PreK	End of PreK	End of PreK	First grade

Note. Midwest CPC Chicago sample size is enrolled 3- and 4-year-olds. Saint Paul sample size is enrolled 4-year-olds for whom the school district provided data. Chicago longitudinal study (CLS) sample size is an age cohort of children who enrolled at ages 3 and/or 4. The quasi-experimental designs are propensity score matching at the school level (i.e., achievement, family income, race/ethnicity) and matched groups based on demographic similarity and participation in district intervention. For dosage, Midwest CPC is full-day/part-day; CLS is 2 years versus 1 year for part-day. TS-Gold = Teaching Strategies Gold Assessment, total score; PALS = Phonological Awareness Literacy Screening (Upper-Case Alphabet Recognition); ITBS = Iowa Tests of Basic Skills cognitive composite; CPC = Child-Parent Center.

fidelity is available as well as the extent to which different elements were implemented.

Midwest CPC Evidence

The Midwest CPC expansion assesses the impact and generalizability of the program model. Initial findings are similar to those in the CLS and indicate the benefits of the six core elements and services (see also Table 1). In the expansion project, the CPC cohort included 2,364 CPC participants in 26 sites and 1,212 comparison participants from propensity score-matched schools in four districts of various sizes who enrolled in the usual preschool with no coordinated school-age programs (Reynolds et al., 2014, 2017). The groups are being followed to third grade with school achievement and parent involvement as the primary outcomes. The sample is more geographically and ethnically diverse compared to the CLS, which was in inner-city Chicago with over 90% of children African American. In the Midwest CPC, 53% are African American with 32% Hispanic, 7% White, and 5% Asian.

Effectiveness

Controlling for baseline performance and child and family background characteristics, the mean

effect size for school readiness skills at the end of preschool for Midwest CPC participants in Chicago (based on Teaching Strategies Gold Assessment [TS-Gold] total scores) and Saint Paul (based on Phonological Awareness Literacy Screening alphabet recognition) was .47 *SD* (Table 2). The effect size for school readiness in the CLS was .63 *SD*. Most of the control group in the CLS, however, was not enrolled in preschool, whereas in the Midwest CPC they were enrolled in State PreK or Head Start. Effects for parent involvement in school (teacher ratings) in the Midwest CPC was .33 *SD* compared to .46 in the earlier study. These impacts indicate the continued feasibility and effectiveness of the program across contexts.

Finally, because full-day preschool was introduced in the CPC expansion to increase learning time, we found that this participation (compared to part-day) was associated with significantly higher school readiness skills in language, math, and socioemotional development ($ES = .33$); higher average daily attendance ($ES = .30$); and lower rates of chronic absences ($ES = -.45$; Reynolds et al., 2014). Nevertheless, both part-day and full-day CPC were associated with significantly higher school readiness skills than comparison participants in the usual part-day preschool ($ESs = .32-.71$; Table 2). The impact of dosage in the CLS was similar to the expansion as the 2-year group in part-

day classes had greater school readiness skills than the 1-year group, but both significantly outperformed the matched comparison (Reynolds, Temple, White, et al., 2011; Reynolds et al., 2017). Overall, the findings from both studies show the benefits of the CPC program and the advantages of the principles of shared ownership, committed resources, and progress monitoring.

Limitations and Challenges

Given that the implementation of the program is ongoing, it is too early to assess the full impact through third grade. As a comprehensive program, the contribution of each of the six elements should be assessed as well as their combined effects. This will address key questions such as are all six elements necessary to achieve sizable benefits? Which elements are most associated with child outcomes? Which are not related to outcomes? The capacity to assess the value added of each element will be determined by examining the natural variation across schools and comparing implementation fidelity on each element. This may introduce various types of selection bias that will need to be carefully accounted for in model building. Although the year to year overall rates of fidelity were relatively high, significant variation occurred within each element and over time.

There also are differences in outcome measurement between the studies that complicate comparisons. In the CLS, the measure of school readiness was the cognitive composite of the Iowa Tests of Basic Skills (ITBS) in the beginning of kindergarten. In the Midwest CPC, it was TS-Gold performance assessments rated by teachers at the end of pre-school. Although both are valid indicators of readiness skills, they measure different types of skills. TS-Gold, for example, assessed a broader domain (e.g., socioemotional), whereas ITBS was a standardized test of math, literacy, and listening skills. Further predictive validity studies are needed.

Conclusion

Our efforts to implement and scale the Midwest CPC have relied on conceptualization as a school reform model within a collaborative structure of partners. Through shared ownership, committed resources, and progress monitoring for improvement, the program is more likely to be scaled effectively and sustained in ways that produce benefits to children and families. Successful implementation of CPC has yielded positive benefits so far in

increasing school readiness skills, improving attendance, and in strengthening parental involvement in children's education. Many barriers to effective implementation were addressed early on that resulted in changes to the program. These positive benefits have led to further scale up through an innovative PFS initiative. Cost savings in special education and remediation are expected to be consistent with prior studies. Whether positive impacts are sustained will depend heavily on effective implementation and monitoring, which lead to modifications that improve the fit of the program with the local context. This approach helps to ensure that progress toward scaling preventive interventions continues to occur and has clear social benefits.

References

- Bronfenbrenner, U. (1989). Ecological systems theory. *Annals of Child Development*, 6, 187–249.
- Bryk, A. S., Sebring, P. B., Allensworth, E., Luppescu, S., & Easton, J. Q. (2010). *Organizing schools for improvement: Lessons from Chicago*. Chicago, IL: University of Chicago Press.
- Camilli, G., Vargas, S., Ryan, S., & Barnett, W. S. (2010). Meta-analysis of the effects of early education interventions on cognitive and social development. *Teachers College Record*, 112, 579–620.
- Frank, L., Basch, E., & Selby, J. V. (2014). The PCORI perspective on patient-centered outcomes research. *Journal of the American Medical Association*, 312, 1513–1514. <https://doi.org/10.1001/jama.2014.11100>
- Gaylor, E., Kutaka, T., Ferguson, K., Williamson, C., Wei, X., & Spiker, D., (2016, April). *Evaluation of kindergarten readiness in five child-parent centers*. Report for 2014–2015. Chicago, IL: Illinois Facilities Fund.
- Government Accountability Office. (2015). *Pay for Success: Collaboration among federal agencies would be helpful as governments explore new financing mechanisms* (GAO-15-646). Washington, DC: Author.
- Hayakawa, M., Englund, M. M., Warner-Richter, M. N., & Reynolds, A. J. (2013). The longitudinal process of early parent involvement on student achievement: A path analysis. *National Head Start Association Dialog*, 16, 103–126.
- Human Capital Research Collaborative. (2012). *Program requirement and guidelines, midwest expansion of the Child-Parent Center Program, preschool to third grade*. Minneapolis, MN: Author. Retrieved from <http://humancapitalrc.org/midwestcpc>
- Human Capital Research Collaborative. (2014). *Chicago's social impact bonds for Child-Parent Centers expands a proven school reform model*. Minneapolis, MN: University of Minnesota.
- Jeynes, W. H. (2007). The relationship between parental involvement and urban secondary school student

- academic achievement. *Urban Education*, 41, 82–110. <https://doi.org/10.1177/0042085906293818>
- Karoly, L. A., & Auger, A. (2016). *Informing investments in preschool quality and access in Cincinnati: Evidence of impacts and economic returns from national, state, and local preschool programs*. Santa Monica, CA: RAND. <https://doi.org/10.7249/RR1461>
- Lambert, R., Kim, D., & Burts, D. (2013). *Technical manual for the Teaching Strategies Gold Assessment System* (2nd ed.). CEME Tech. Rep. Center for Educational Measurement & Evaluation. Charlotte, NC: University of North Carolina.
- O'Connell, M. E., Boat, T., & Warner, K. E. (Eds.). (2009). *Preventing mental, emotional, and behavioral disorders among young people: Progress and possibilities*. National Research Council. Washington, DC: National Academy Press.
- Ou, S., & Reynolds, A. J. (2006). School-age services: Programs that extend the benefits of early care and education services. In C. J. Groark, K. E. Mehaffie, R. B. McCall, & M. T. Greenberg (Eds.), *Evidence-based practices and programs for early childhood care and education* (pp. 114–134). Thousand Oaks, CA: Corwin Press.
- Reynolds, A. J. (2012). *Success in early intervention: The Chicago Child-Parent Centers*. Lincoln, NE: University of Nebraska Press. (Original work published 2000)
- Reynolds, A. J., Hayakawa, M., Candee, A. J., & Englund, M. M. (2016). *CPC P-3 program manual: Child-Parent Center Preschool-3rd Grade Program*. Minneapolis, MN: University of Minnesota, Human Capital Research Collaborative.
- Reynolds, A. J., Magnuson, K., & Ou, S. (2010). PK-3 programs and practices: A review of research. *Children and Youth Services Review*, 32, 1121–1131. <https://doi.org/10.1016/j.childyouth.2009.10.017>
- Reynolds, A. J., Richardson, B. A., Hayakawa, M., et al. (2014). Association of a full-day versus part-day preschool intervention with school readiness, attendance, and parent involvement. *JAMA*, 312, 2126–2134. <https://doi.org/10.1001/jama.2014.15376>
- Reynolds, A. J., Richardson, B. A., Hayakawa, M., Englund, M. M., & Ou, S. (2016). Multi-site expansion of an early childhood intervention and school readiness. *Pediatrics*, 137, e20154587. <https://doi.org/10.1542/peds.2015-4587>. Epub 2016 Jun 10
- Reynolds, A. J., & Temple, J. A. (2008). Cost-effective early childhood development programs from preschool through third grade. *Annual Review of Clinical Psychology*, 4, 109–139. <https://doi.org/10.1146/annurev.clinpsy.3.022806.091411>
- Reynolds, A. J., Temple, J. A., Ou, S., Arteaga, I. A., & White, B. A. B. (2011). School-based early childhood education and age-28 well-being: Effects by timing, dosage, and subgroups. *Science*, 333, 360–364. <https://doi.org/10.1126/science.1203618>
- Reynolds, A. J., Temple, J. A., Robertson, D. L., & Mann, E. A. (2001). Long-term effects of an early childhood intervention on educational achievement and juvenile arrest: A 15-year follow-up of low-income children in public schools. *JAMA*, 285, 2339–2346.
- Reynolds, A. J., Temple, J. A., Robertson, D. L., & Mann, E. A. (2002). Age 21 cost-benefit analysis of the title I Chicago Child Parent Centers. *Education Evaluation and Policy Analysis*, 24, 267–303. <http://www.jstor.org/stable/3594119>
- Reynolds, A. J., Temple, J. A., White, B. A., Ou, S., & Robertson, D. L. (2011). Age-26 cost-benefit analysis of the Child-Parent Center education program. *Child Development*, 82, 782–804. <https://doi.org/10.1111/j.1467-8624.2010.01563.x>
- Reynolds, A. J., Ou, S., Mondy, C. F., & Hayakawa, M. (2017). Processes of early childhood interventions to adult well-being. *Child Development*, 88, 378–387. <https://doi.org/10.1111/cdev.12733>
- Rury, J. L. (2016). *Education and social change: Contours in the history of American schooling* (5th ed.). New York, NY: Routledge.
- Rutter, M., & Rutter, M. (1993). *Developing minds: Challenge and continuity across the life span*. New York, NY: Basic Books.
- Sweet, M. A., & Appelbaum, M. I. (2004). Is home visiting an effective strategy: A meta-analytic review of home visiting programs for families with young children. *Child Development*, 75, 1435–1456. <https://doi.org/10.1111/j.1467-8624.2004.00750.x>
- Takanishi, R., & Kauerz, K. (2008). PK inclusion: Getting serious about a P-16 education system. *Phi Delta Kappan*, 89, 480–487. <https://doi.org/10.1177/003172170808900706>
- Temple, J. A., & Reynolds, A. J. (2015). Using benefit-cost analysis to scale up early childhood programs through Pay for Success financing. *Journal of Benefit-Cost Analysis*, 6, 628–653. <https://doi.org/10.1017/bca.2015.54>

Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Appendix S1. Child-Parent Center Preschool to Third Grade Program

Appendix S2. Comparison of Child-Parent Center Program Before and After Midwest Expansion Implementation

Appendix S3. Child-Parent Center PreK to Third Grade Program: Background and Requirements

Appendix S4. Child-Parent Center Parent Involvement Process

Appendix S5. Percentage of Time in Instructional Activities During the Year by Chicago Full-Day and Part-Day Classes

Appendix S6. Midwest Child-Parent Center Expansion: Classroom Learning and Activities Checklist