Evaluation of Kindergarten Readiness in Five Child-Parent Centers: Report for 2014-15

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Prepared for:
IFF Pay For Success I, LLC
333 S. Wabash Avenue, Suite 2800
Chicago, Illinois 60604
Attention: Matthew J. Roth, Chief Operating Officer
E-mail: mroth@iff.org
Copy to:
DLA Piper LLP (US)
203 N. LaSalle Street, Suite 1900
Chicago, Illinois 60601
Attention: Richard F. Klawiter, Esq.
E-mail: Richard.klawiter@dlapiper.com

Prepared by:

SRI International
Erika Gaylor
Traci Kutaka
Kate Ferguson
Cyndi Williamson
Xin Wei
Donna Spiker

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Background

The Child-Parent Center (CPC) model, one of the longest-running early childhood intervention models in the United States, has produced some of the most robust long-term outcomes for children’s academic and social outcomes (Reynolds, 2000; Reynolds & Temple, 2008). Beginning in January 2012, as part of a U.S. Department of Education Investing in Innovation (i3) grant to the University of Minnesota, the city of Chicago and Chicago Public Schools (CPS) received funding to (1) increase the number of children who could attend existing CPC sites, and (2) increase the number of CPC programs by adding 16 new sites.

The Social Impact Bond (SIB) (also referred to as Pay for Success) is a funding mechanism where private businesses support programs that are expected to have a high return on investment. Beginning in 2014-15, the IFF Pay for Success project funded additional CPC preschool slots at six CPS schools. In 2015-16, two additional sites (identified by CPS and approved by the city of Chicago) were added to the PFS project. SRI International (SRI) has been hired to conduct the evaluation of the child outcomes for this project referred to as the “SIB-CPC project”. The project anticipates serving four cohorts of preschool children across the eight sites over four school years— Cohort 1: 2014-15, Cohort 2: 2015-16, Cohort 3: 2016-17, and Cohort 4: 2017-18.

This first SRI project report describes the kindergarten readiness outcomes of the first cohort of children in the SIB-CPC project. First, we briefly describe the CPC program and its expansion efforts using SIB funding, including evidence about the impacts of the CPC program model on children’s school readiness and school achievement. Second, we describe how the SIB-CPC program is being evaluated. Third, we present the extent to which the SIB-CPC program goals have been achieved for the kindergarten readiness outcomes for Cohort 1.

CPC Program Model

CPC Model Description

CPC programs seek to promote school readiness, parent involvement, and early learning that, in turn, will translate into long-term benefits with regards to academic achievement, higher graduation rates, and career success. The CPC model is unique
in that it is designed to (1) provide full- or part-time high-quality preschool experiences for three- and four-year old children, and (2) combine those educational experiences with family support services and parent engagement activities. The services for children and families offered by CPC sites are intended to be delivered in a coordinated and synergistic way across the preschool to third grade continuum. Indeed, the CPCs emphasize the provision of comprehensive services and parental involvement—program features that are considered to be strongly associated with program quality (Reynolds & Hayakawa, 2011; Reynolds, Magnuson, & Ou, 2010). A typical CPC site includes the components listed in Exhibit 1.

The CPC Program model components are explained more fully at https://humancapitalrc.org/midwest-cpc/cpc-resources (Human Capital Research Collaborative, 2015). For this report, the components listed in Exhibit 1 are taken from the draft evaluation plan in the SIB-CPC expansion agreement (see Chicago Child-Parent Center Social Impact Bond Evaluation Plan, December 2, 2014, in Appendix A, pp. 9-11). Note that the CPC model as conceptualized in the current SIB expansion project primarily focuses on providing high-quality preschool education, engaging parents in their child’s education through a parent resource teacher (PRT) provided at the child’s preschool, and promoting continuity and stability from pre-K through the primary grades. Because the focus for the SIB-CPC project is on providing preschool programming, SRI’s evaluation has been designed to measure the impact of the preschool components on children’s short- and long-term outcomes.
### Exhibit 1. CPC Program Model Components

#### Effective Learning Experiences
- Offer Pre-K classes that are limited to 34 children for half-day classrooms (two sessions of 17 children each) and have a minimum of 2 teaching staff. Full day classrooms, if available, will be limited to 20 children per session.
- Provide highly qualified educational staff that will provide the classroom instruction and parent engagement activities. For example, classroom teachers are certified with a bachelor’s degree (or higher). Overall, program staff must adhere to the requirements set forth by the CPS Talent office, in accordance with collective bargaining unit agreements, and state regulations. Any changes in CPS education and certification requirements will be complied with.
- Use data to drive instruction by effectively documenting the organization and implementation of instructional practices to monitor quality and adherence to the Program, which is completed by all Program staff where appropriate.
- Program staff meet with parents over the course of each school year to review their child’s progress and discuss parent program opportunities with the Parent Resource Teacher (PRT).

#### Aligned Curriculum
- Implement a CPS District curriculum and formative assessment that is aligned to standards, domains of learning, assessments, and learning activities.
- Collaborate with the PRT and classroom teachers to ensure that opportunities to engage families in student learning are available, appropriate, and aligned to the program and parents’ needs.
- CPS and, most specifically, the Office of Early Childhood Education provides meaningful professional development and ongoing coaching and feedback for teachers, aides, and other staff members that facilitates high-quality instructional practices.

#### Parent Involvement and Engagement
- Engage a PRT and School-Community Representative (SCR) to work closely with the Head Teacher and Liaisons to maintain a consistently supportive parent program.
- Encourage parents to sign a CPC school-home agreement at the start of the school year outlining a plan for fostering learning at home and participating in CPC activities.
- Offer and engage families in monthly activities. PRTs create and distribute a monthly parent involvement calendar, and conduct parent/teacher conferences over the year to review progress in the parent program.
- Provide a resource room dedicated to parent and family activities through Kindergarten when possible.
- Provide culturally responsive learning opportunities for families that provide flexibility for families’ needs and schedules.

#### Collaborative Leadership Team
- Engage a Program leadership team that includes the Head Teacher, Parent Resource Teacher, and School-Community Representative.
- Meet regularly, under the direction of the Principal, to discuss operations and best practices within the CPC.
- Meet regularly, under the direction of the OECE Management Team, with staff from across sites to share challenges, experiences, and best practices, and make frequent on-site visits to monitor quality and effectiveness to the Program.
- Establish meaningful partnerships with community providers to strengthen service delivery and enlist local universities in training opportunities.
Continuity and Stability

- CPC Pre-K classrooms are co-located in the same building as Kindergarten classrooms, when possible, to promote familiarity and integration for students as they transition to Kindergarten.
- Provide a structure of communication, planning, and joint activities, under the direction of the principal, Leadership team and OECE Management Team, from Pre-K through the primary grades.
- Provide a part-time Kindergarten aide when funding is available to support the transition into Kindergarten.

Professional Development System

- Offer ongoing professional development opportunities on current trends and needs in early childhood education classrooms, through the Office of Early Childhood Education and the CPC leadership teams, including topics such as quality curriculum and instruction, data-driven instruction, learning environment, social and emotional needs, and parent engagement.
- Meet regularly and create professional learning communities to review ways to support their instruction in the classroom and with other teachers.


Expected Outcomes from the CPC Program Model

IMPACT ON SCHOOL READINESS

Early research on CPC showed significant positive effects on children’s kindergarten readiness, with 47% of children who received CPC preschool considered ready for kindergarten compared with 28% of children who did not receive any preschool (Reynolds, 1995; Reynolds, Temple, Robertson, & Mann, 2002). Examination of a more recent cohort of CPC participants indicated that they had significantly higher scores on a measure of language proficiency at the end of the program compared with children enrolled in other publicly funded preschool programs (Reynolds, 2002).

IMPACT ON THIRD-GRADE READING AND LITERACY

The Chicago Longitudinal Study (CLS) followed children over time using administrative records to examine attendance, achievement, and graduation rates in CPC participants compared with children who did not attend CPC preschool. One study found a significant positive impact on third-grade reading achievement for pre-K to third-grade participants (.53 standard deviation) compared with participants who attended CPC only for pre-K and kindergarten (Reynolds, 1994). Smaller studies of high-quality preschool interventions have found similar impacts on later school achievement compared with a no-preschool control group (e.g., Abecedarian study:...
IMPACT ON SPECIAL EDUCATION USE

The same long-term CLS study (described in the previous section) showed that extended CPC participation (defined as 4 to 6 years) resulted in reductions in the use of special education. For children 6 to 18 years, CPC participants had an average rate of special education placement of 14.4% compared with 24.6% for children in the comparison group (who did not receive CPC preschool intervention), indicating that CPC participants had a 41% lower rate of special education placement (Reynolds, Temple, & Ou, 2003). This finding is consistent with another analysis using the CLS sample that compared the average rates of special education placement over time for children who had attended a CPC preschool to those of children who attended a full-day non-CPC kindergarten classroom (special education placement rates of 12.5% versus 18.4%, respectively) (Conyers, Reynolds, & Ou, 2003). A more recent study of North Carolina’s current state-funded preschool program used statewide population-level data over time (1995 to 2010) to show that third-grade special education rates were reduced by as much as 39% for children who participated in the preschool program, even after taking into account a variety of child and family risk factors, types of special education categories, and funding levels that varied by year (Muschkin, Ladd, & Dodge, 2015). Other reviews of a variety of preschool program models also report reductions in special education placement as one of the many cost savings results from participation in high-quality preschool programs like the CPC model (Karoly et al., 1998; Lynch, 2007).

In summary, positive impacts on kindergarten readiness, third-grade reading achievement, and special education placements have been cited extensively to demonstrate the short- and long-term benefits for the individual child and savings for society that come from investing in early childhood education. These studies were used as the basis for identifying the selected outcomes in the current study and for calculating the repayments that will be made in the Chicago SIB-CPC project.

Chicago PFS Project (SIB-CPC Project)

During 2014-15, the SIB expansion of the CPC model involved funding for part-day or full-day CPC preschool at five sites. A sixth site was converted to a CPC model.
beginning in January 2015. Because it did not operate for a full year, this site is not part of the evaluation for 2014-15. The five sites that participated in the evaluation for 2014-15 were already implementing the CPC program prior to the SIB-CPC expansion.\footnote{Note that three sites had been providing CPC services since 2012 at the start of the i3 federal grant and two had been providing CPC services since 2013 when the original sites from the 1970s were merged with the current site.} The SIB funding expanded the capacity of these five sites to provide preschool to an additional 156 three- and four-year olds.\footnote{The sixth site opened up 6 new CPC classrooms for expansion of the CPC model to an additional 218 three- and four-year olds. Again, this site is not included in the 2014-15 evaluation as the site was not open for long enough to provide adequate dosage of CPC preschool.} The funding paid for the hiring of an additional teacher and teacher assistant at each site as well as enhanced resources and instructional materials to implement the CPC model. The CPC program typically serves both three- and four-year olds; sometimes in mixed-age classrooms. Thus, the funding provided by investors was used to provide CPC preschool and enhanced services to both three- and four-year olds.

In the second year (2015-16) of the SIB-CPC project, two additional sites, identified by CPS and approved by the city of Chicago, were added to the six 2014-15 SIB-CPC sites. The project anticipates that four cohorts of children will be served across the eight sites, identified by the school year in which children begin preschool (cohort 1: 2014-15, cohort 2: 2015-16, cohort 3: 2016-17, cohort 4: 2017-18) (see Appendix B for grade levels of children in the four cohorts across years.)

### Evaluation Design

SIB and PFS initiatives typically involve an independent evaluator to help determine whether the outcomes have been achieved. Because government only pays when outcomes are achieved rather than for activities, the focus of the evaluation is on measuring the outcomes of the individuals participating in the initiative.

SRI is conducting the independent evaluation of the outcomes of the SIB-CPC expansion project for three primary child outcomes. SRI developed the evaluation methodology building on a draft design written by a team that included the Harvard Social Impact Bonds Technical Assistance Lab. The project also will include an oversight committee comprised of early education and research experts. The evaluation team has been charged with independently documenting the outcomes-based performance measures of the initiative. This kind of evaluation is not intended
to test the impact of the CPC model against other preschool models; rather it is tracking the outcomes of the participating children against specific performance standards. Three performance questions are being addressed in the evaluation.

(1) What is the rate of kindergarten readiness in children participating in the SIB-CPC sites as defined by performance on the Teaching Strategies (TS) Gold instrument (completed by teachers in the spring of preschool before a child enters kindergarten)?

(2) What is the rate of third-grade literacy as defined by performance in meeting or exceeding grade-level performance on the state or district-administered third-grade assessment in reading?

(3) What is the rate at which students are identified with special education needs and placed in special education services (starting in kindergarten) compared with a matched-comparison group of children?

Kindergarten readiness is being measured in the spring of preschool for CPC participants (as described below), and third-grade literacy will be measured in the spring of third grade following the administration of required state achievement tests. SRI will begin measuring special education placement in kindergarten and continue each year until spring 2020 (note that in spring 2020, cohort 1 will reach the fourth grade; cohort 2 will reach the third grade; cohort 3 will reach the second grade; and cohort 4 will reach the first grade).3

The evaluation of the SIB-CPC project is using two different designs to track the primary outcomes, a descriptive study for the kindergarten readiness and third-grade literacy outcomes and a quasi-experimental design for the special education outcomes (first to fourth grades). Specifically, for the kindergarten readiness and third-grade literacy outcomes, there will be no comparison group for evaluating the outcomes and calculating the subsequent repayment. For these two primary outcomes, the outcomes will be based on the intervention group only and payments will be calculated using outcomes relative to national standards. For the kindergarten readiness and literacy outcomes, a decision was made in the planning phase that these outcomes had normative information so that children’s performance on the measure could be used to identify whether they were performing at or above

3 SRI’s involvement in the evaluation is currently scheduled to end in Fall 2020.
normative trends. It was decided to use this kind of standard rather than compare performance with a comparison group of children. In addition, the kindergarten outcome measure is not available for children with no preschool experience, given that the kindergarten readiness measure is collected during the spring of Pre-K in Chicago Public Schools.

For *special education outcomes* (first to fourth grades), children are identified as receiving the intervention (defined here as attendance in a CPC preschool classroom) in the year they are in preschool and then are matched to children with similar demographic characteristics but who did not attend any type of preschool in CPS. This “no Pre-K” comparison group will be identified when the children are in kindergarten for each of the four Cohorts. Specifically, the evaluators will create a no Pre-K comparison group for each cohort of intervention children using propensity score matching processes.

**Analysis Approach**

**SAMPLE INCLUDED IN THE COHORT 1 ANALYSIS**

Children were included in the intervention cohort if they attended one of the five SIB-CPC sites, were enrolled in either a full- or half-day pre-K classroom, were not identified as having a severe disability, were income-eligible (i.e., eligible to receive free or reduced-price lunch), and were at least four years old in September 2014. Additionally, a child needed to have attended a CPC pre-K classroom for at least 66% of the days (not consecutively) in a given school year—a percentage considered a sufficient amount or “dose” of the intervention to affect child outcomes.

Children with a severe disability were excluded because the project is based on the hypothesis that high-quality early childhood education will prevent children *at risk* for developing delays or mild disabilities from needing special education services at later ages. Early childhood education and intervention also may reduce the need for children with mild delays or speech and language impairments in preschool from needing additional special education services in kindergarten and beyond. The project does not expect to prevent children with severe disabilities or needs from receiving special education services. Children were categorized as having no disability, a mild disability, or severe disability based on a priori decisions in the planning and evaluation design phase. A severe disability could include autism,
specific learning disability, deaf-blindness, deafness, hearing impairment, orthopedic impairment, other health impairment, traumatic brain injury, visual impairment, and multiple disabilities. A mild disability could include developmental delay, speech and language impairment, specific learning disability, and accommodations or modifications for children with no other disability (mild or severe). Additionally, children were excluded from the intervention cohort if they were in a separate classroom for special education students.

The cohort used to determine kindergarten readiness included children from the five sites that were already providing the CPC model to three- and four-year olds. Inclusion of all eligible four year olds in this group increases the sample size for the study to provide a more reliable and valid assessment of kindergarten readiness at these five sites. At the end of the year, administrative enrollment data showed that 653 three- and four-year old children were attending preschool at these five sites (267 three-year olds; 386 four-year olds). SIB expansion funding covered the costs of providing CPC preschool for 156 of these 653 children. Of note, all of the children across all classrooms received the full CPC model. That is, the experience of all four year olds enrolled in these CPCs is similar with a common curriculum, professional development, and parent engagement aligned through monthly Collaborative Leadership Training by all CPCs, including high-quality preschool and family support services and parent engagement activities. Thus, the evaluation does not distinguish between SIB funding and other CPC funding sources.

SRI’s evaluation is focused on kindergarten readiness as the first outcome and therefore focuses on examining the outcomes of children in each cohort who are at least four years old in September of their preschool year and then tracking outcomes beginning at the end of preschool, before children start kindergarten the following year.

SRI requested a data export of all students ever enrolled as grade PK (the CPS designation for four-year-olds in preschool) in the five sites at any time in the 2014-15 school year. Overall, 449 PK students were ever enrolled at one of the five sites.

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4 In an earlier version of this report, the "mild" disability category was incorrectly described as including SPL, DD, and ED. This description has been corrected; the results of analyses have not changed.

5 PK is the designation CPS assigns to students enrolled in 4-year-old preschool. Students in three-year-old preschool are designated PE, and are not included in the evaluation.
during 2014-15. Across the total sample of 449 PK children attending one of the 5 sites in 2014-15, 328 or 73% met all of the eligibility criteria. The consort diagram in Exhibit 2 illustrates the exclusions from the original sample of 449 PK children ever enrolled in one of the 5 sites that resulted in the final sample of 328 children included in the analytic sample for this Cohort 1 (2014-15).

Exhibit 2. Participating Sample of Cohort I Children Attending CPC Sites, by Exclusion Criteria

The remaining 328 children became the SIB-CPC Cohort 1 (2014-15). As seen in Exhibit 2, meeting the attendance criteria was the biggest challenge, with approximately 80% of the 449 PK children ever enrolled in the five sites attending for 66% of the days. The SIB-CPC cohort is defined as meeting the eligibility criteria above and will become the cohort to be tracked for outcomes in kindergarten and in later grades. This cohort also will be used to identify a matched-comparison group of

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6 The number of children ever enrolled is different than enrollment estimates at any given point in the year. As children left a site, new children were enrolled. The 449 includes all children ever enrolled during the 2014-15 year. Based on enrollment in May/June 2015, CPS reported that 386 four year old children were enrolled at the five sites at the end of the year.
children in kindergarten for comparing special education outcomes in kindergarten and in later grades.

The 328 students in Cohort 1 had the following characteristics:

- Half of the children were male (51%).
- Two-thirds of the children (68%) were identified as Hispanic and one-third (29%) were identified as African-American. Fewer than 2% of the children were identified as Caucasian and the remaining 2% were identified as Asian or multiracial.
- About one-tenth (11%) of the children attending the five sites had an identified mild developmental delay or disability or an identified 504 plan that described modifications and accommodations (e.g., an extra set of textbooks, home instruction, a tape recorder or keyboard for taking notes) that they needed to perform at the same level as their peers.
- About one-third (35%) were enrolled in full-day with the remainder enrolled in half-day Pre-K classrooms.

This final cohort included for the Year 1 analysis \( n = 328 \) was similar to the total sample of PK children \( n = 449 \) in regard to the following characteristics: gender, and disability. However, when we compared the 121 who did not meet the eligibility criteria to the 328 that did, we found that the children who were included \( n = 328 \) were significantly more likely to be Hispanic and significantly more likely to speak Spanish compared with the children who were excluded \( n = 121 \) \( p < .001 \).

**MEASURING KINDERGARTEN READINESS**

Kindergarten readiness was examined using Teaching Strategies (TS) \textit{GOLD} \textsuperscript{TM} scores from the spring before the child entered kindergarten.\textsuperscript{7} TS \textit{GOLD} \textsuperscript{TM} is a teacher-reported measure of young children’s skills across six developmental domains, including: literacy, language, mathematics, cognitive development, socio-emotional well-being, and physical health. This measure is being used because it was the only available child assessment data that CPS routinely collects and was therefore selected as the measure of kindergarten readiness by the SIB planning

\textsuperscript{7} Teaching Strategies \textit{GOLD} \textsuperscript{TM} assessment was developed to be used as a formative assessment tool to monitor children’s skills while attending a child care or preschool program so teachers can adjust their instructional strategies depending on how children are progressing on a variety of skills and behaviors. TS \textit{GOLD} \textsuperscript{TM} was not developed as a measure of kindergarten readiness.
team. It is used routinely in the CPS preschool programs and there is no CPS-wide measure of kindergarten readiness that is completed about children as they are entering kindergarten in the fall of the school year. The metric for kindergarten readiness is the percentage of children who are performing “at” or “above” national trends across at least five of these six domains. Put another way, a child is determined to be ready for kindergarten if he or she is rated by the teacher as demonstrating levels of skill or knowledge that are expected for a child at a particular age—the reference point for such expectations come from the observed abilities of other children from a representative sample of same-aged peers in the United States. We categorized children as kindergarten ready on each domain by the criterion of meeting or exceeding the 50% percentile on the standard score for that domain using scores from the most recently published technical manual (Lambert, Kim, & Burts, 2014a). Then, we calculated the percentage of children who met this criterion on five of six domains.

CALCULATING IMPACT ON KINDERGARTEN READINESS

Every child who scored “at” or “above” the national norm on at least five of the six domains in the spring of their preschool year was categorized as “kindergarten ready.”

Results

This section discusses the results for the first cohort of SIB-CPC children (Cohort 1). The TS GOLD™ Spring 2015 data were missing for three of the 328 children, resulting in a final analytic sample for this outcome of 325 children (99% of the 328 children), which we used to calculate kindergarten readiness.

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8 The methodology involved in SIB projects relies on use of available administrative data rather than additional data collection to evaluate outcomes.

9 There are no available data on which domains of the TS GOLD™ assessment to use to reliably and validly determine kindergarten readiness. The decision to define kindergarten readiness as performing at or above national trends on five of six domains (and not four of six) aligns with the National Research Council’s definition of school readiness which includes age-level skills across multiple domains (National Research Council, 2008). The threshold of 5 of 6 domains also takes into account that a child may not meet a standard for all 6 domains, especially in the spring of preschool, as these skills are emerging during this time period.

10 Teacher-reported assessments have some unknown sources of variability and the GOLD assessment is no different. Research on the GOLD assessment indicates that between 17% and 25% of the variance in scale scores is accounted for by unmeasured differences between classroom and teachers, including rater effects (Lambert, Kim, and Burts, 2014b).

11 These children were missing data either because they were no longer enrolled in the spring (n = 2) or their GOLD assessment was incomplete (n = 1).
Of those 325 children, 59% (58.77%) were considered to be ready for kindergarten, where “readiness” was defined as scoring at or above the 50th percentile on at least five of the following six domains: literacy, language, mathematics, cognitive development, socio-emotional well-being, and physical health. One-tenth (11%) of the 325 children did not score at or above the 50th percentile for any domain, with 3% meeting the criteria for only one domain, 7% for two domains, 11% for three domains, and 9% for four domains (see Exhibits 3 and 4). Additionally, children who attended full-day CPC preschool had higher rates of kindergarten readiness (67%) compared to children who attended half-day CPC preschool (55%).

**Exhibit 3. Percent of Cohort I Children Meeting Kindergarten Readiness Across Domains**

<table>
<thead>
<tr>
<th>Number of domains meeting or exceeding the 50th percentile</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>11%</td>
</tr>
<tr>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>2</td>
<td>7%</td>
</tr>
<tr>
<td>3</td>
<td>11%</td>
</tr>
<tr>
<td>4</td>
<td>9%</td>
</tr>
<tr>
<td>5</td>
<td>10%</td>
</tr>
<tr>
<td>6</td>
<td>49%</td>
</tr>
</tbody>
</table>

**Exhibit 4. Percent of Cohort I Children Meeting Kindergarten Readiness, by Domain**

<table>
<thead>
<tr>
<th>Domain</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>80%</td>
</tr>
<tr>
<td>Language</td>
<td>64%</td>
</tr>
<tr>
<td>Literacy</td>
<td>72%</td>
</tr>
<tr>
<td>Math</td>
<td>78%</td>
</tr>
<tr>
<td>Physical</td>
<td>58%</td>
</tr>
<tr>
<td>Social-emotional</td>
<td>77%</td>
</tr>
</tbody>
</table>
Discussion

Socio-demographic risk factors—the most extensively studied of which is poverty—are associated with variability in skill development, as well as differential growth in later academic achievement. Early childhood programs potentially mitigate the risks endemic to children from disadvantaged backgrounds, with studies showing that the strongest positive short- and long-term outcomes result from intensive and comprehensive programs targeting low-income children (Burger, 2010; Institute for Research on Poverty, 1997; Reynolds et al., 2010). Prior studies highlight early childhood as a critical and sensitive period for the development of brain architecture and neurochemistry (e.g., Knudsen, Heckman, Cameron, & Shonkoff, 2006) and subsequent academic and socio-emotional well-being (Shonkoff & Phillips, 2000). Indeed, possessing cognitive and socio-emotional skills at kindergarten entry has been linked to enhanced learning and performance down the academic pipeline (e.g., Duncan et al., 2007).

In reporting the extent to which the CPC program has been successful at preparing children for kindergarten, comparisons may be instructive with respect to the degree our research findings agree with what we would expect from one year of preschool. We structure our discussion by reflecting on three guiding questions. First, do any data from TS GOLD™ (our outcome measure) indicate whether the proportion of children who are kindergarten-ready in this project, is typical for the population we are studying? Second, to what extent are our findings similar to those of other CPC and CLS data? Third, to what extent are our findings similar to the ECLS-B12 or ECLS-K data for the general population and for children from low-income families?

For the first contrast, does evidence exist that will allow us to verify the extent to which the TS GOLD™ accurately measures the kindergarten readiness domains? Kim, Lambert, and Burts (2013) recently published data that provide empirical evidence supporting the validity for the TS GOLD™ domains and learning objectives for typically developing children, as well as English-language learners and for those children identified with special needs or disabilities. In other words, this observation-based teacher rating evaluation measures the construct domains in the same way.

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12 ECLS-B and ECLS-K are two contemporary longitudinal datasets that draw from a nationally representative sample; both collected direct assessments of children’s skills at kindergarten entry (cf. Hair, Halle, Terry-Humen, Lavelle, & Calkins, 2006; Lee, Zhai, Brooks-Gunn, Han, & Waldfogel, 2014).
across various subgroups of children 3 to 5 years old. Next, Lambert, Kim, and Burts (2014b) established the external validity of the instrument by examining whether teacher ratings of child development and learning were associated with child demographic characteristics in expected directions. For example, children with identified disabilities started behind their typically developing peers and developed at a slower rate.

More recently, Reynolds and colleagues (2014) published data in a peer-reviewed journal showing that 80.9% of children attending full-day CPC classrooms \((n = 409)\) and 58.7% of children attending part-day CPC classrooms \((n = 573)\) were considered kindergarten-ready when kindergarten-readiness was defined as meeting the national norm on four of the six TS GOLD™ subdomains. Additionally, full-day participants demonstrated higher average levels of skill mastery in the subdomains of language, mathematics, socio-emotional development, and physical health (but not for literacy and cognitive development). Reynolds and colleagues (2014) report a higher proportion of children who are kindergarten ready, but use a less stringent standard for “readiness,” i.e., a threshold of four compared with five; five was the standard for the current evaluation. If we had used that standard of 4 of 6 domains, an additional 9% would meet that kindergarten readiness criteria, for a total of 68% (Exhibit 3). The independent evaluator decided prior to the analysis to use the more stringent standard of 5 of 6 domains to represent kindergarten readiness.

The CPC model, integrated into the CPS system since its inception in 1967, has been systematically evaluated for its impact on child and family outcomes. A notable by-product of the CPC program’s efforts is the CLS, which has supported researchers’ efforts to develop a deeper understanding of the “active” ingredients of early dual-generation interventions and early childhood interventions more generally. Using data from the CLS, Reynolds (1995) suggests that children who attended any form of preschool (e.g., full- versus half-day; a 1-year versus a 2-year program) outperformed those children who did not attend preschool in regard to measures of cognitive readiness at kindergarten entry. Specifically, analysis of the one of the original CPC cohorts (i.e., children attending kindergarten in the 1985-86 school year) showed that 44% of children who attended a CPC for 1 year were considered ready for kindergarten, compared with 28% for children who had no preschool (Arthur Reynolds, personal communication, February 25, 2015). These differences in
achievement remained significant until third grade, reappeared in fourth grade, increasing in magnitude until children exited the study in the sixth grade. Additionally, preschool participants also had consistently lower cumulative rates of grade retention and special education placement up through the sixth grade. Indeed, ongoing evaluation efforts of the CPC program by Reynolds and colleagues have continued to document the positive effect of preschool participation on the cognitive aspects of kindergarten-readiness and early grade achievement (relative to children who did not attend preschool) over the years (e.g., Reynolds & Temple, 1998; Reynolds et al., 2003).

Finally, data from the contemporary, nationally representative sample of ECLS-K children and using calculations that are similar to those of this report, indicate rates of school or kindergarten readiness that are typically less than 50% for children from economically disadvantaged households (Isaacs, 2012). In comparison, the same report showed that 75% of children from more economically advantaged households (i.e., moderate to high income households) were considered ready for kindergarten.

Together these findings suggest a large number of children who attended a SIB-CPC for preschool were assessed by their teachers as ready for kindergarten based on the assessment tool used. Given that this is not an experimental design, we cannot make causal attributions.

The year 2 report will include kindergarten readiness outcomes for children participating in Cohort 2. It will also include data examining special education placement rates in kindergarten for Cohort 1 compared with rates of special education placement in a matched-comparison sample of children who did not attend any preschool in CPS.
References


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December 2, 2014

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VII. APPENDICES
INTRODUCTION AND STUDY OBJECTIVES

The purpose of this document is to describe the methodology to be used to evaluate the impact of the Child Parent Center (CPC) Social Impact Bond (SIB) expansion on three primary impact outcomes: Special Education Utilization, Kindergarten Readiness, and Third Grade Literacy. This document also describes additional research questions that the Evaluator will seek to explore in collaboration with CPS to help the CPCs improve their performance. This methodology will be developed in conjunction with CPS and other experts in the early education field.

Participants in the CPC program (the Treatment Group) will be compared to groups of matched comparison students who did not have a CPC experience through the use of a propensity score matching algorithm. One comparison group will consist of children who did not attend any form of CPS Pre-K (No Pre-K comparison group). Another group will consist of children who attended some other type of CPS pre-K program, such as Head Start or Pre-School for All (Other Pre-K comparison group).

Payments based on Special Education utilization for the SIB project will be calculated using the difference in outcomes between the Treatment group and the No Pre-K comparison group.

Payments based on Kindergarten Readiness and Third Grade literacy will be calculated using outcomes of the treatment group relative to national standards.

The Other CPS Pre-K comparison group will be used for sensitivity analyses and for addressing other research questions not related to payment triggers.

For the purposes of calculating payments owed as part of the SIB transaction, impacts will estimated using the total population of eligible students at SIB CPC sites, and then scaled to reflect the actual number of seats funded by the Lenders. We will adjust the scaling factors annually to reflect observed mobility trends.

The primary impact outcome questions are as follows:

1. What is the impact of the CPC program on the rate at which students need an IEP?
2. What is the impact of the CPC program on Kindergarten Readiness as defined by performance on the TS Gold instrument (completed by teachers at the end of preschool)?
3. What is the impact of the CPC program on Third Grade literacy as defined by performance on the CPS 3rd grade assessment?
In addition to these impact outcome questions, this evaluation will also seek to answer qualitative research questions that will help improve the performance of the program going forward unrelated to the Pay for Success calculations. These research questions will be developed more fully in conjunction with CPS and other experts in the early education field, and will only be pursued subject to additional external funding. The questions may include:

1. How do the primary impact outcomes vary by key subgroups, including gender, race, prior pre-school attendance, English language learner status, and potentially other subgroups?
2. How is the CPC program impacting attendance in Pre-K? How does attendance vary by site? How does attendance vary compare to other CPS Pre-K programs? Are there policies in place at specific sites that could be driving improved attendance?
3. How does the CPC program support a transition to Kindergarten? What sites are better at retaining children from Pre-K to K, both within their host school and within the entire district? Where do children who transfer within CPS go and why? Are there different impact outcomes for students who have less mobility?
4. How successful is the CPC program at improving social-emotional learning outcomes (defined by the social-emotional components of the TS Gold instrument) compared to children enrolled in other CPS pre-K programs?
5. How successful is the CPC model at engaging parents? What strategies are the most effective at encouraging parental engagement? What strategies appear to have the greatest impact on children’s outcomes?

This document will serve as a template for how the evaluation will be conducted. The Evaluator will draft a final Evaluation Plan to be approved by CPS, the City, the Project Coordinator with Approval of the Lender Committee (such term being defined herein as such term is defined in the Loan Documents of the Lenders) using this document as a framework. No changes to payment terms or payment terminology will be made.

STUDY POPULATION

Eligible Population – Treatment Group
The Treatment Group in this study will consist of four-year-olds\(^1\) who are attending Pre-K at any of the CPC SIB sites, in full day or half day programs, who at any point during the school year are eligible for the National School Lunch Program (NSLP).

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\(^1\)The intention is to identify children in the “age cycle four” year – the year prior to when they are planning to attend Kindergarten. At the time of the drafting of this document, this was defined by CPS as attaining age four on or before September 1st. This age identification protocol may be adapted as necessary to capture these children.
In the first year of the program, the following sites will be considered CPC SIB sites:
  • De Diego
  • Melody
  • Peck
  • Thomas
  • Fiske
  • Hanson Park

In the second year of the program, two additional sites, identified by CPS and approved by the City, will be added to the list of CPC SIB sites in addition to the sites listed above. If SIB funding in future years is used to add classrooms at additional schools as part of this project, those schools can be considered CPC SIB sites as well. If SIB funding is removed from one of the above sites, that site will no longer be considered a CPC SIB site.

A child may enter the program based on CPS age eligibility criteria. For the 2014/15 school year, this entailed being age 4 as of September 1st.

All four-year-olds at CPC SIB sites, including children attending full-day classes, will be included in the treatment group, subject to the exclusions listed below.

In the first year of the program, we anticipate that 374 new slots for four-year-olds will be created through the SIB program. In the second year of the program, we anticipate that we will create an additional 408 new slots for four-year-olds in addition to maintaining funding for the original 374. In the third year of the program, we anticipate that we will maintain the 782 new slots that were created in years one and two. In the fourth year of the project, we expect to provide funding for at least 680 slots. Overall at CPC SIB sites, we anticipate that approximately 840 four-year-olds will be served per year once the program is operating at scale, with 782 of those positions funded by the SIB. The new slot amounts will be finalized prior to the launch of each new cohort.

**Year 1 contingency for CPC Treatment Group**
Due to the timing of the contracting, some of the new classrooms to be added in the 2014/15 school year will not be ready to serve children until the school year has already begun. Five of the Year 1 CPC SIB Sites where we will be adding additional classrooms (De Diego, Melody, Peck, Thomas, and Fiske) have been operating as a CPC for a year or more. As a result, they have an established leadership team, trained and experienced teachers, and fully outfitted classrooms.
To ensure that the children being tracked are receiving a sufficient dosage of the CPC program, for Year 1 only we will restrict the Treatment group eligibility to children who are enrolled in one of these five established CPC SIB sites, in a classroom that was already established as of September 2\textsuperscript{nd} 2014 (the start of the 2014/15 school year). CPS will proceed with opening the new classrooms once all contractual issues have been resolved, but the children who are enrolled in those classrooms (including children at Hanson Park, the new CPC for Year 1) will not be included in the outcome calculations for the purposes of determining payments. This will allow CPS leeway to identify and train high quality teachers, and mitigate the risk that the outcomes (or underlying characteristics) of children who enroll in a CPC Pre-K after the start of the year are different from those of their peers who enrolled at the start of the year. The outcomes of these late-enrollees can be used as a unique sub-group, but will not factor into any calculations that determine payment amounts.

It is anticipated that the sample size of eligible four-year-olds in existing classrooms at existing CPC SIB sites will be at least 300 students. As with future analyses, when calculating payments this number will be scaled to reflect the actual number of slots funded by the Lenders as part of this initiative.

**Eligible Population – No Pre-K Comparison Group**

The No Pre-K Comparison Group in this study will be identified via a propensity score matching algorithm that pulls from a pool of eligible No Pre-K children districtwide. The pool of eligible No Pre-K children will include all children who meet the following criteria:

- Are enrolled in a CPS Kindergarten program, excluding:
  - Charter schools
  - Schools currently operating a CPC, as part of the SIB program or otherwise
  - Magnet and Selective Enrollment Schools
  - Schools that serve exclusively a special education population
- Are five years of age as of September 1\textsuperscript{st}
- Did not attend a CPS Pre-K program in the school year prior to beginning Kindergarten
- Did not attend a Head Start program funded through the City of Chicago
- Are eligible for NSLP at any point during the school year

A child will be considered to have attended a Pre-K program if that child attended 10 days or more of a city funded pre-school program, or any days at any CPC site over the course of the school year. Days need not have been attended consecutively.

The No Pre-K Comparison group will be identified the year that their matched Treatment cohort begins Kindergarten to ensure that children within both groups are on the same age cycle.

**Eligible Population – Other CPS Pre-K Comparison Group**
The Other CPS Pre-K Comparison Group in this study will be identified via a propensity score matching algorithm that pulls from a pool of eligible children who attended other forms of CPS pre-K within the district. The pool of eligible Other CPS Pre-K children will include children who meet the following criteria:

- Are enrolled in a CPS Pre-K program, excluding:
  - Charter schools
  - Schools currently operating a CPC, as part of the SIB program or otherwise
  - Magnet and Selective Enrollment Schools
  - Schools that serve exclusively a special education population
- Are four years of age as of September 1st.
- Are eligible for NSLP at any point during the school year

The Other CPS Pre-K Comparison group will be identified the same year that their matched Treatment cohort begins pre-school to ensure that children within both groups are on the same age cycle. This group will only be identified subject to available external funding.

Exclusions for payment calculations
The hypothesis is that the CPC program will have the biggest impact on children who are deemed at risk for poor school performance and achievement, but who lack a severe or significant disability. Without additional support, many of these children may end up being diagnosed with a mild learning disability, emotional disturbance, or developmental delay (including speech/language impairment). For these children, additional support in the classroom and at home can help ensure that they stay on track developmentally with their peers, avoiding the need for years of special education services.

The same impact is not expected for children with severe disabilities (identified in preschool or at a later date), and it is also not expected that a preschool intervention would meet the needs of the child without the benefit special education services, nor would that be appropriate or within the parameters of a child’s right to a free and appropriate education. To ensure that children have access to the supports they need based on a clinical evaluation, if a child at any point during the course of the study is diagnosed with a severe disability, he or she will be removed from the study group during the year that the disability is added to the child’s IEP onward. The preliminary list of severe disabilities, with input from the Independent Evaluator, may be as follows:

- autism
- deaf-blindness
- deafness
- hearing impairment
- orthopedic impairment
- other health impairment
- traumatic brain injury
- visual impairment
- multiply disabled\(^2\)
- intellectual disability
- students placed into self-contained classrooms for children with special needs

This list may be adapted at the discretion of the Evaluator with approval from CPS, the City, the Project Coordinator, and the Approval of the Lender Committee.

### RECRUITMENT PROCEDURES

Children are identified for enrollment under the *Chicago: Ready to Learn!* application process. A timeline of application, placement, registration, and enrollment of children for the 2014/15 school year is provided below; this will also serve as an illustrative plan for how the process will occur in future years:

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>April and June 2014</td>
<td><em>Chicago: Ready to Learn!</em> Application Rounds 1 &amp; 2</td>
</tr>
<tr>
<td>May and July/August 2014</td>
<td>Placement</td>
</tr>
</tbody>
</table>

\(^2\) Intended to represent students with multiple severe disabilities

\(^3\) For a complete list of application centers, see http://cps.edu/Schools/EarlyChildhood/Documents/ApplicationSites_SY14_15.pdf or http://cps.edu/readytorelearn. Every CPC also is capable of accepting applications directly.
| June through September 2014 | Registration | Parents accept or decline placement. Schools notify parents of registration dates and times. Schools indicate parents' acceptance or decline of placement in Program Management and move registered children into the classroom Homerooms for IMPACT. Teachers complete the registration packet with families for all new students. Clerks enter identifying additional information into the IMPACT system. |
| September 2014 | Enrollment | Children are enrolled upon attendance on the first day of school. |
| September 2014 onward | Rolling enrollment | Schools continue to enroll students throughout the school year as slots open up due to attrition, new funding, etc. Staff conduct additional outreach in communities with lower than expected enrollment to help fill all the slots. This includes additional ad spots, flyers, and community events. These children will only be included for evaluation purposes if they meet the dosage and eligibility requirements outlined in this document. |

**INTERVENTION AND OUTCOMES**

**Defining the Intervention**
The CPC SIB intervention will provide one year of half-day CPC Pre-K to four-year-olds at CPC SIB sites. The key components of the CPC model are as follows:

**Effective Learning Experiences**
• Offer Pre-K classes that are limited to 34 children for half-day classrooms (two sessions of 17 children each) and have a minimum of 2 teaching staff. Full day classrooms, if available, will be limited to 20 children per session.
• Provide highly qualified educational staff that will provide the classroom instruction and parent engagement activities. For example, classroom teachers are certified with a bachelor’s degree (or higher). Overall, program staff must adhere to the requirements set forth by the CPS Talent office, in accordance with collective bargaining unit agreements, and state regulations. Any changes in CPS education and certification requirements will be complied with.
• Use data to drive instruction by effectively documenting the organization and implementation of instructional practices to monitor quality and adherence to the Program, which is completed by all Program staff where appropriate.
• Program staff meet with parents over the course of each school year to review their child’s progress and discuss parent program opportunities with the Parent Resource Teacher (PRT).

**Aligned Curriculum**
• Implement a CPS District curriculum and formative assessment that is aligned to standards, domains of learning, assessments, and learning activities.
• Collaborate with the PRT and classroom teachers to ensure that opportunities to engage families in student learning are available, appropriate and aligned to the program and parents’ needs.
• CPS and, most specifically, the Office of Early Childhood Education provides meaningful professional development and ongoing coaching and feedback for teachers, aides, and other staff members that facilitates high-quality instructional practices.

**Parent Involvement and Engagement**
• Engage a PRT and School-Community Representative (SCR) to work closely with the Head Teacher and Liaisons to maintain a consistently supportive parent program.
• Encourage parents to sign a CPC school-home agreement at the start of the school year outlining a plan for fostering learning at home and participating in CPC activities.
• Offer and engage families in monthly activities. PRTs create and distribute a monthly parent involvement calendar, and conduct parent/teacher conferences over the year to review progress in the parent program.
• Provide a resource room dedicated to parent and family activities through Kindergarten when possible.
• Provide culturally responsive learning opportunities for families that provide flexibility for families’ needs and schedules.

**Collaborative Leadership Team**
• Engage a Program leadership team that includes the Head Teacher, Parent Resource Teacher, and School-Community Representative.
• Meet regularly, under the direction of the Principal to discuss operations and best practices within the CPC.
• Meet regularly, under the direction of the OECE Management Team, with staff from across sites to share challenges, experiences, and best practices and makes frequent on-site visits to monitor quality and effectiveness to the Program.
• Establish meaningful partnerships with community providers to strengthen service delivery and enlist local universities in training opportunities.

**Continuity and Stability**

- CPC Pre-K classrooms are co-located in the same building as Kindergarten classrooms, when possible, to promote familiarity and integration for students as they transition to Kindergarten.
- Provide a structure of communication, planning, and joint activities, under the direction of the principal, Leadership team and OECE Management Team, from Pre-K through the primary grades.
  Provide a part-time Kindergarten aide when funding is available to support the transition into Kindergarten.

**Professional Development System**

- Offer ongoing professional development opportunities on current trends and needs in early childhood education classrooms, through the Office of Early Childhood Education and the CPC leadership teams, including topics such as quality curriculum and instruction, data driven instruction, learning environment, social and emotional needs, and parent engagement.
- Meet regularly and create professional learning communities to review ways to support their instruction in the classroom and with other teachers.

**Defining Sufficient Dosage**

Enrollment and attendance fluctuate throughout the year, with substantial changes during the early weeks of the school year. As a result, some of the children who start the year in a given classroom may not be the same children who end the year in that classroom. This may be due to for a variety of reasons such as mobility, a change in parents’ schedules/ability to bring their children to school, or admission to a closer/more desirable program off of a waitlist later in the school year.

To ensure that CPC SIB children and families are receiving a minimum sufficient dosage of the CPC program, we will restrict analyses to children who attend a certain minimum cutoff of days. The Evaluator will examine historical data from CPS and other districts to determine trends in
attendance and identify a cutoff that sufficiently indicates that a child has received enough of the program for us to expect to see an impact. We are temporarily placing this cutoff at 66% of school days in a given school year; children who attended fewer than 66% of days during their Pre-K year will be omitted from the primary analyses.

The Evaluator may add additional criteria based on an analysis of enrollment and attendance data with the approval of CPS, the City, and the Project Coordinator and Approval of the Lender Committee.

Similarly, for the No Pre-K Comparison group, we will limit the primary analysis sample to eligible No Pre-K children who attend at least 66% of school days in a given school year. If a child at any point during the Kindergarten year attends a school operating a CPC program, that child will be omitted from primary analyses.

Defining Primary Impact Outcomes

Special Education Utilization
The primary Special Education utilization outcome will be defined as a binary indicator of whether or not a student has a CPS-issued Individualized Education Plan (IEP) in a given year. This will be a data point provided as part of the regular data collection points by CPS. As described above, if a student has a diagnosis on his or her IEP of a severe disability, that student will be removed from the study pool for the primary analyses. This indicator will be collected annually every year Kindergarten through 6th grade.

Kindergarten Readiness
CPS uses the Teaching Strategies Gold (TS Gold) instrument in all their Pre-K classrooms to track the development of children. Based on teacher observations, TS Gold measures the progress of children in domains such as socio-emotional, physical, language, literacy, and cognitive development.

The TS Gold instrument is utilized nationally in Head Start programs and some publicly-funded preschool programs. The primary outcome metric for Kindergarten Readiness will be the share of children which are performing at or above the national trends across at least five out of the following six domains: Literacy, Language, Math, Cognitive Development, Socio-Emotional, Physical health.

Third Grade Literacy
Currently, CPS is planning to adopt the PARCC standardized exam. Treatment group children will be measured relative to national percentile rankings on this test or the accepted District assessment administered for 3rd grade. In following with Lesnick et al (2010)\(^4\), every child

\(^4\) See http://www.chapinhall.org/sites/default/files/Reading_on_Grade_Level_111710.pdf
reading at or above the 25th percentile on the English Language Arts/Literacy portion of the spring sitting of the PARCC test will be deemed to be reading at grade level. Any child reading at or above the 75th percentile nationally will be deemed to be reading above grade level. Any child reading below the 25th percentile will be deemed to be reading below grade level.

At the time of drafting this analysis, the PARCC test has yet to be officially implemented in CPS schools. Given the uncertainty of performance on this test and how its outcomes will compare to past tests taken by CPS students, the evaluator may suggest amendments to the definition of reading “on grade level” that could include utilizing a different test or metric. Any modifications must be made prior to the first cohort starting Third Grade, and must be approved by CPS, the City, the Project Coordinator, and Approved by the Lender Committee.

Defining Performance Improvement Questions
The details of these questions will be developed in conjunction with CPS and other partners over the 2014/15 school year. These analyses will be specified in full prior to the start of any data collection or analyses. These analyses will not affect the methodology or results of the primary impact outcomes, and will only be pursued subject to additional philanthropic or other funding.

DATA COLLECTION

Student data
Student data will be provided to the Evaluator by CPS. Pursuant to the data sharing agreement, CPS will strip sensitive individual identifiers and replace them with an anonymous student ID. The key variables CPS will provide are:

- Student ID
- CPS School ID of school currently enrolled in
- Date of Birth (or birth month & year)
- Days attended to date
- IEP status
- IEP diagnoses
- Reported race
- Reported ethnicity
- Free/reduced price lunch eligibility
- ZIP code of residence
- Fall and Spring TS Gold scores (if applicable)
- Any available variables on parental education
- Other variables deemed appropriate by the Evaluator and CPS for the purposes of creating a better propensity score match

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5 This data sharing agreement will be included as an appendix to this plan pending negotiation and drafting between CPS and the Evaluator.
Data will be collected on an annual basis on the last school day in June which is reported for accuracy in the beginning of July. This may be adjusted based on discussions between the Evaluator and CPS to reflect the earliest date that all the necessary data would be available.

Neighborhood data
The Evaluator will pull neighborhood data from publicly available census data, such as the American Community Survey 5-year averages, which break out characteristics by zip code. Neighborhood data include:

- Neighborhood % of population in poverty
- Neighborhood % of population that are single mothers
- Neighborhood % of population that is Black
- Neighborhood % of population that is Hispanic
- Neighborhood % of population employed
- Neighborhood crime statistics
- Neighborhood health indicators

The Evaluator will update the neighborhood data file when creating a new cohort of matched groups.

School data
Data on school level characteristics will be provided by CPS, including:

- CPS School ID
- Total student body population
- % Free/RP lunch
- % Black
- % Hispanic
- School-wide attendance rate from the 2013/14 school year
- School Rating (Levels 1, 2, or 3) from the 2013/14 school year

These data, except for attendance and the school rating, will be updated annually. Attendance and rating data from SY2013/14 (or the closest assessment prior to SY2013/14) will remain fixed to reflect the fact that the presence of a CPC may improve attendance and the school rating over time, which could affect the matching algorithm for later cohorts. The Evaluator may adjust this protocol if extraneous events such as school closures, new leadership, or expansive new programs are added at individual schools or system wide that could contribute to imbalanced matches.

Data Security

6 Crime stats and health indicators subject to availability of data. It may be possible to pull data from a Chapin Hall neighborhood analysis. These covariates may be omitted if it proves too difficult or costly to obtain them.

7 All these data are publicly available online at http://www.cps.edu/schools/find_a_school/pages/findaschool.aspx. School rating is based on the CPS Performance Policy which is used to rate CPS schools. A Level 1 rating is “excellent”, a Level 2 rating is “good” and a Level 3 rating is “low”.
A data sharing agreement between CPS and the Independent Evaluator will define the parameters for sharing data required under this agreement.

**STUDY DESIGN & OVERVIEW OF ANALYSES**

**Propensity score Matching Protocol**
Comparison group students will be selected using a propensity score matching technique. Individuals from the treatment group will be matched to up to two individuals from the No Pre-K Comparison group and up to two individuals from the Other CPS Pre-K Comparison group. Matching will be conducted with replacement to allow comparison individuals to be matched more than once.

To create the Treatment Group in school year \( t \), the Evaluator will receive the data collected on the last day of June of school year \( t \) from CPS of all four-year-olds who attended a SIB CPC in school year \( t \) up to the date of the data collection. The data collected and shared will contain all the student data elements listed above. After screening for eligibility as described above and removing ineligible students from the sample, the Evaluator will use students’ ZIP codes to merge on neighborhood data, and students’ school IDs to merge on school characteristics. Neighborhood data will be collected from a reliable source such as Chapin Hall. This will create a de-identified student-level file that contains student-level characteristics, characteristics of that student’s neighborhood of residence, and characteristics of that student’s school.

To create the No CPS Pre-K pool to be used for matching to the Treatment cohort in school year \( t \), the Evaluator will receive a data dump on the last day of June of school year \( t+1 \) from CPS of all five or six-year-olds who attended a CPS Kindergarten in school year \( t+1 \) up to the date of the data dump. The data dump will contain all the student data elements listed above. After screening for eligibility as described above and removing ineligible students from the sample, the Evaluator will use ZIP code data to merge on neighborhood data, and school ID data to merge on school characteristics.

To create the Other CPS Pre-K pool to be used for matching to the Treatment cohort in school year \( t \), the Evaluator will receive a data dump on the last day of June of school year \( t \) from CPS of all four-year olds who attended a CPS Pre-K program other than CPC in school year \( t \) up to the date of the data dump. The data dump will contain all the student data elements listed above. After screening for eligibility as described above and removing ineligible students from the sample, the Evaluator will use ZIP code data to merge on neighborhood data, and school ID data to merge on school characteristics.

To create the matched No Pre-K Comparison group, the Evaluator will append the Treatment Group dataset and the No Pre-K Comparison pool dataset, creating an indicator to identify which children are members of the Treatment group. The Evaluator will then run a probit model using the treatment indicator as the dependent variable and the following variables as independent variables:

- Race binary indicators
- Ethnicity binary indicators
• Gender ("Male" binary indicator)
• Parental education (subject to availability)
• Language spoken at home binaries
• Neighborhood % poverty
• Neighborhood % single mothers
• Neighborhood % by race
• Neighborhood % by ethnicity
• Neighborhood % employed
• Neighborhood crime rates (subject to availability)
• Neighborhood health indicators (subject to availability)
• Total student population of school currently attending
• % Free/RP lunch at school currently attending
• Racial composition of school currently attending
• Ethnicity composition of school currently attending
• School-wide attendance rate from the 2013/14 school year
• School Rating binaries from the 2013/14 school year

Using the results of this model, the Evaluator will predict a propensity score based on a student’s observed characteristics. This score effectively represents the likelihood that a child, given his individual, neighborhood, and school level characteristics, would be in the Treatment group.

The Evaluator will use a nearest-neighbor matching algorithm\textsuperscript{8} to identify the two closest matches based on propensity score for each Treatment group observation, with replacement.

Individuals from either the Treatment group or Comparison pool who are not matched will be dropped.

The remaining students from the Comparison pool who were matched will become the No Pre-K Comparison group for the remainder of the study. Comparison group students will receive a frequency weight equal to the number of times they were matched. Note that as a result, the Comparison group should contain approximately two times as many unique individuals as the Treatment group.

The same protocol will be used to identify the Other CPS Pre-K Comparison group, replacing the No CPS Pre-K Comparison pool with the Other CPS Pre-K Comparison pool.

A unique set of comparison groups will be created for each Treatment cohort (see Appendix for a cohort timing chart).

Checking for covariate balance between groups
Once the comparison groups have been identified, the Evaluator will check for balance between the groups across matching demographics. The Evaluator will choose appropriate methods to check for balance, including but not limited to normalized differences and t-tests of mean values of covariates between groups. If the Evaluator determines that there is imbalance in covariates

\textsuperscript{8} By way of example, see "nnmatch" stata command
between groups, the Evaluator may choose to pursue a Matching Methodology Remedy as described below. The decision to pursue a remedy will be at the discretion of the Evaluator, taking into account the fact that with many matching variables and a p-value cutoff of .05, approximately 1 in 20 variables could have a statistically significant difference by random chance alone. The evaluator will consider the magnitude of the difference and the relative importance of the unbalanced variable(s) in question, placing particular attention to the individual-level race and gender indicators, the home language indicators, the neighborhood poverty indicators, and the school rating indicators.

**Matching Methodology Remedies**

In the event that the Evaluator deems that the propensity score matching algorithm has produced an inadequate match, the Evaluator may make modifications to the matching methodology. This could include introducing a caliper to ensure that certain variables are matched to within a narrow range (or matched exactly), adding or subtracting additional covariates, increasing or decreasing the number of matches, or other techniques deemed rigorous and appropriate by the Evaluator.

The Evaluator may also explore utilizing a set of comparison schools to limit the comparison pool. In this methodology, the Evaluator would identify a set of comparison schools that match the SIB CPC sites, identifying one to three schools for each site. The Evaluator would use a similar propensity score matching protocol, using school level characteristics, to identify these schools. From those comparison schools, the Evaluator would then perform a student-level propensity score match using a comparable methodology to the one described above. The Evaluator will then check for covariate balance to see if this produces better match results.

Once the Evaluator identifies a suitable comparison group that they deem to be well-matched on covariates, the Evaluator will present the match results, describing any changes that were made to the matching algorithm, which must be approved by CPS, the City, the Project Coordinator and Approved by the Lender Committee. The Evaluator should endeavor to use a similar matching protocol from year to year.

**Calculating mobility factor**

The theory behind the financing component of the SIB project is that providing the upfront intervention of high quality Pre-K can produce savings to CPS downstream through reduced Special Education utilization among the students served. For CPS to realize these savings, however, those students must remain in the CPS school district. If a student leaves the district, CPS would realize no savings from the fact that the intervention may have helped that student catch up to his peers and prevented him from acquiring an IEP.

As a result, the Evaluator will calculate a Mobility Factor for each cohort that will represent the share of the original cohort that is still enrolled in a CPS school in a given year. This will be used to adjust the payment amounts to better reflect savings realized by CPS.

To calculate mobility, every year Kindergarten through 6th grade the Evaluator will determine what share of the original children in a given group from the first year of observation are still
enrolled in any CPS school. To do this, every year the Evaluator will send CPS a list of all the student IDs of the original group. CPS will match these IDs to their current enrollment database to determine which students were enrolled in a CPS school at any point in that school year. CPS will then return a dataset to the Evaluator indicating which student IDs are enrolled in a CPS school that year. The Mobility Factor will be defined as:

\[
1 - \frac{\text{# of original students currently enrolled in any CPS school}}{\text{# of students originally enrolled in the group}}
\]

By way of example, assume 500 Treatment group students were identified for the 2014/15 cohort. In SY2015/16, the Evaluator sends a list of these student IDs to CPS, who informs the evaluator that 460 of them are still enrolled at a CPS school. The cumulative mobility for that year would be \(1 - \frac{460}{500} = .08\). In SY2016/17, the Evaluator sends the original list of student IDs to CPS again, who informs the evaluator that 440 of them are still enrolled at a CPS school. The cumulative mobility for SY2016/17 would be \(1 - \frac{440}{500} = .12\).

For grades 7th through 12th, the Evaluator will impute a marginal mobility rate by averaging the incremental annual increase in the Mobility Factor over the last three years. Every year, the Evaluator will impute a new Mobility Factor based on the average imputed marginal mobility rate. See Appendix B for a full example using hypothetical data.

Calculating effect size for Special Education utilization

To calculate the impact on Special Education utilization, the Evaluator will calculate the Average Effect Size per Person, which will then be scaled to reflect the number of seats funded by the Lenders for the purposes of calculating payments. This will allow the Evaluator to utilize all the data available, increasing sample sizes and precision of estimates.

To calculate this, the Evaluator will use the following equation:

\[ AESP_{i,t} = SPED_{C,i,t} - SPED_{T,i,t} \]

where \( AESP_{i,t} \) is the Average Effect Size per Person for cohort \( i \) in year \( t \), \( SPED_{C,i,t} \) is equal to the average of a binary indicator of Special Education utilization among the No CPS Pre-K Comparison group for cohort \( i \) in year \( t \) and \( SPED_{T,i,t} \) is the average of a binary indicator of Special Education utilization among the Treatment group for cohort \( i \) in year \( t \). At the discretion of the Evaluator and with approval from CPS, the City, the Project Coordinator, and the Approval of the Lender Committee, the Evaluator may regression-adjust this estimate to help account for any differences in covariates between the Treatment group and the Comparison group.

9 The Evaluator may revise the methodology for averaging the mobility rate if they determine that the current methodology includes a grade breakpoint year that could result in abnormally high mobility out of the district. This methodology must be finalized before the first cohort reaches 6th grade.
Special Education outcomes will be calculated annually every year Kindergarten through 6th grade. Outcomes will be calculated separately for each cohort. Based on conversations with special education experts and reviewing existing CPS data, we believe that the vast majority of children who have a disability will be identified by the end of 6th grade. As a result, after the 6th grade effect size has been calculated, we will average the effect size over the last three years (4th, 5th and 6th grades) and lock in that average rate for the purposes of calculating payments in grades 7th through 12th. This lock-in rate will be calculated separately for each Treatment cohort. The Evaluator may propose changes to this lock-in methodology in the event that the Evaluator determines that this methodology produces skewed results. Any modifications must be approved by CPS, the City, the Project Coordinator, and Approved by the Lender Committee.

Calculating payments for Special Education utilization

To determine the size of Special Education payments owed in a given year for a given treatment group cohort, the Evaluator will multiply the Special Education Average Effect Size per Person for such cohort by the base cohort size multiplied by the 1 minus the cumulative mobility rate for that year. This will determine the Total Number of Special Education Slots Avoided for a given cohort in a given year:

\[ \text{Total Number of Special Education Slots Avoided} = \text{AESP}_{i,t} \times \text{BCS}_i \times (1 - \text{MF}_{i,t}) \]

where \( \text{AESP}_{i,t} \) is the Average Effect Size per Person for cohort \( i \) in year \( t \), \( \text{BCS}_i \) is the base cohort size for cohort \( i \), and \( \text{MF}_{i,t} \) is the cumulative mobility rate for cohort \( i \) in year \( t \).

The base cohort sizes are based on the number of seats actually funded by investors. It is anticipated that the base cohort sizes will be as follows\(^{10}\):

<table>
<thead>
<tr>
<th>Cohort Year</th>
<th>Base Cohort Size</th>
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<tr>
<td>2014/15</td>
<td>374</td>
</tr>
<tr>
<td>2015/16</td>
<td>782</td>
</tr>
<tr>
<td>2016/17</td>
<td>782</td>
</tr>
<tr>
<td>2017/18</td>
<td>680</td>
</tr>
</tbody>
</table>

The Total Number of Special Education Slots Avoided will then be multiplied by the Annual Savings Rate to determine the Special Education Payments owed for a given cohort in a given year. Negative payments will be rounded to zero. The Annual Savings Rate starts at a base of $9,100 in 2015 and grows 1% annually. The table below provides the rates through 2030:

<table>
<thead>
<tr>
<th>Year</th>
<th>Savings Rate</th>
</tr>
</thead>
</table>

\(^{10}\) Note that actual sample sizes used for calculating effect sizes may be larger or smaller than the number of seats funded.

19
If applicable, the Special Education Payments from each cohort will be summed to produce the Total Special Education Payment owed by CPS for that year. These calculations will be reported to the Project Coordinator for the purposes of triggering payments to the Project Coordinator to be used to repay the lenders.

Payments for Special Education will be made every year K – 12th for each Treatment cohort.

**Calculating effect size for Kindergarten Readiness**

As part of the annual data pull, the Evaluator will receive spring TS Gold scores for Treatment group students. TS Gold regularly publishes a set of averages that reflect how children have scored nationally on TS Gold assessment sub-categories, broken out by the time of the test and the age in months of the child. Students will be classified as “meeting the national norms” for a sub-category if they score at or above the national mean spring score for that category for children in their age band. The Evaluator will use the most up to date tables available.

Every child who scores at or above the national norm on at least five of the six subcategories in spring of their four-year-old pre-school year will be deemed “Kindergarten Ready.” To calculate the Kindergarten Readiness payment, the Evaluator will calculate the share of the Treatment group students deemed Kindergarten Ready. The Evaluator will then multiply this number by the base cohort size, multiplied by cumulative mobility from the Kindergarten year of a given cohort. This will determine the Total Number of Kindergarten Ready Children for a given cohort. The Evaluator will then multiply this number by the payment rate of $2,900 to determine the total Kindergarten Readiness payments owed by the City for that cohort.

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Calculating effect size for Third Grade Literacy

CPS is currently transitioning to the PARCC exam. As a result, the exact methodology for calculating Third Grade Literacy may have to be adapted pending observation of how the test is being administered, scored, etc. In particular, in the event that data suggests that fewer than 50% of students are scoring above the 25th percentile, the Evaluator will propose a new protocol or test for determining Third Grade Literacy that better captures the performance of students. The Evaluator will propose a final protocol for approval by CPS, the City, and the Project Coordinator with Approval of the Lender Committee prior to the start of the 2018/19 school year – the year the first cohort begins 3rd grade. A draft protocol is below:

As part of the annual data pull, the Evaluator will receive 3rd grade spring PARCC scores for Treatment group students. The PARCC test is administered nationally, and as a result the outcomes of Treatment students can be compared to national averages. Students will be classified as “reading at or above grade level” if they score at or above the 25th percentile on the English Language Arts/Literacy portions of the PARCC exam.

To calculate the Third Grade Literacy payment, the Evaluator will calculate the share of the Treatment group students deemed to be reading “at or above grade level”. The Evaluator will then multiply this number by the base cohort size, multiplied by cumulative mobility from the Third Grade year of a given cohort. This will determine the Total Number of Third Grade Children Reading at Grade Level for a given cohort. The Evaluator will then multiply this number by the payment rate of $750 to determine the total Third Grade Literacy payments owed by the City for that cohort.

Investigating Highly Unexpected Outcomes

The results of this evaluation will govern the flow of millions of dollars of payments. While it is the full intention of all parties to accept the results of the evaluation, in the event that a highly irregular outcome is achieved, a mechanism must be in place to validate the findings and confirm that they are due to the impact of the program, and not a flaw in the analysis or evaluation design. The Evaluator will have complete discretion to decide if and when a validation of the findings may be necessary, but the following events will serve as guiding principles that could suggest that a validation may be warranted:

- The difference in Special Education Utilization rates between the Treatment group and No Pre-K comparison group is negative or not statistically different from zero (p-value <.05) for any cohort in any year after Kindergarten
- The No Pre-K comparison group Special Education Utilization rate is more than 2.5 times the Treatment group Special Education Utilization rate for any cohort in any year after Kindergarten
- An irregular pattern from one year to the next in Special Education utilization for a given group, defined as utilization shrinking by more than two percentage points for a given group, or increasing by more than seven percentage points
- A larger impact observed when comparing a Treatment group cohort to its corresponding Other CPS Pre-K Comparison group any year after 1st grade.
The Evaluator will determine the appropriate techniques and mechanisms to employ to confirm the cause of the irregularity, which could include handchecking code, checking for continued balance in the treatment and comparison groups, and looking for policy changes within specific schools or system-wide that could have affected outcomes.

If the Evaluator finds a mechanical error, the results will be recalculated using the correction. If the Evaluator finds a methodological flaw, the Evaluator may propose a remedy to the evaluation plan to mitigate the inconsistency in future years. However, the results will not be recalculated for that year or any other past year. Changes to the plan must be approved by CPS, the City, and the Project Coordinator, and Approved by the Lender Committee.
## APPENDIX A: TIMING OF COHORTS

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## Appendix B: Sample Mobility Calculations Using Simulated Data

### Sample Mobility Calculations Using Hypothetical Data

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<tr>
<th>School Year</th>
<th>Grade</th>
<th>Original Enrollment</th>
<th>Students still enrolled at a CPS school</th>
<th>Cumulative Mobility</th>
<th>Marginal Mobility</th>
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**Imputed average marginal mobility for future calculations:** .025

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<tr>
<th>School Year</th>
<th>Grade</th>
<th>Original Enrollment</th>
<th>Imputed Students still enrolled at a CPS school</th>
<th>Imputed Cumulative Mobility</th>
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## Appendix B: Timing of Cohorts

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* SRI evaluation ends on Dec 1, 2020.