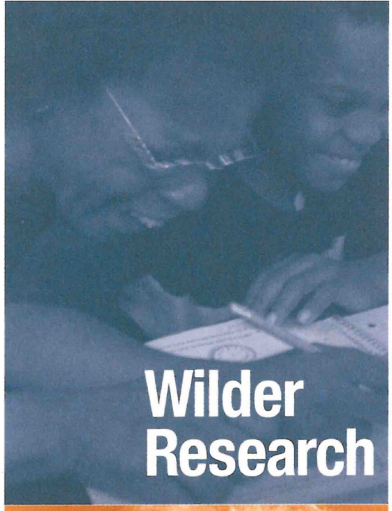

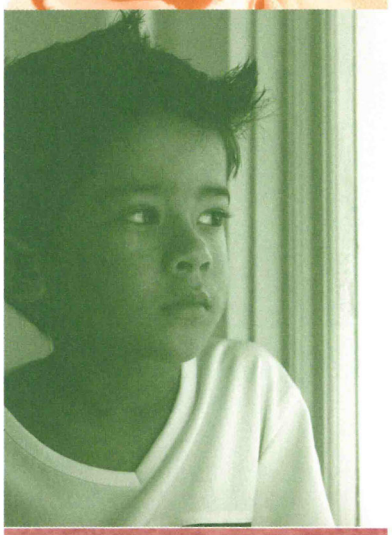

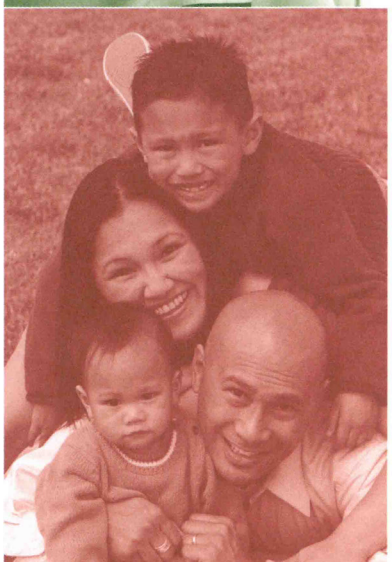

Project Early Kindergarten evaluation

Results of a longitudinal study of a Saint Paul Public Schools initiative, 2005-06 through 2011-12

OCTOBER 2012

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Acknowledgments

We wish to thank Lisa Gruenewald, Project Early Kindergarten (PEK) Program Manager, for her contributions to the ongoing evaluation and this report. We also wish to thank Think Small - Leaders in Early Learning staff, PEK school and child care teachers, principals at PEK schools, directors at PEK child care centers, and PEK children and parents for their time and support of the program and study. Ann Lovrien, former PEK Assistant Director and Kate Bonestroo, former PEK Coordinator, also made important contributions to the evaluation, especially during the first six years of PEK.

We wish to thank the Saint Paul Public Schools' Department of Research, Evaluation and Assessment for their help in providing information and data for the evaluation.

The PEK evaluation is led by Dan Mueller and Edith Gozali-Lee of Wilder Research. The following Wilder Research employees helped in collecting, processing, and analyzing data, and producing this report:

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Executive summary

The Saint Paul Public Schools' Project Early Kindergarten (PEK) program aims to improve the school readiness of Saint Paul children. The program offers a rigorous academic approach and targets children who are English Language Learners, come from low-income families, or need Special Education services. Ultimately, the program intends to help close Saint Paul's achievement gap.

The program began in 10 Saint Paul schools in fall 2005, and expanded to community child care settings a year later. PEK has since become the model for pre-kindergarten programs district-wide and is now titled the Saint Paul Public Schools' Pre-Kindergarten Program. In 2011-12, 27 district elementary schools (30 classrooms), 14 child care centers, and 9 family child care homes offer pre-kindergarten programs following the PEK approach. School sites offer the program to 4-year-olds, and child care sites to 2½- to 4-year-olds.

PEK aligns pre-kindergarten education with the district's K-12 curriculum model. The model emphasizes standards-based education and extensive professional development. With sensitivity to young children's developmental needs, PEK extends this model to early education, bringing children's preschool experience into alignment with the educational experience they will have in later years.

Evaluation

A core component of PEK is the inclusion of an ongoing evaluation that can be used to inform programming. PEK participates in a rigorous, independent evaluation conducted by Wilder Research. Children are tested over time and in developmentally appropriate ways. Evaluators compare children's academic and social skills in kindergarten and early elementary years to comparison groups of peers who did not participate in PEK to estimate program impact. Outcome data are available for three cohorts of PEK school children and for five cohorts of 4-year-olds who participated in the child care component.

School results and implications

Results indicate that participants at PEK school sites had a substantial advantage in academic and social skills over classmates upon kindergarten entry. This advantage tended to narrow later on. On average, students at PEK school sites experienced the following advantages:

- In the year before kindergarten, all three cohorts of children who completed PEK made faster progress than children nationally in vocabulary, reading, and writing skills.
- When they reached kindergarten, PEK children had academic skills that were substantially more advanced than those of similar, same-age children in a comparison group who applied and were accepted for PEK, but who had not yet attended the program.

- All three cohorts of PEK children also showed advantages compared to their kindergarten classmates.
- Advantages for PEK children over their classmates tend to be stronger with each successive cohort. In all four academic areas assessed (vocabulary, reading, writing, and math), Cohorts 2 and 3 scored significantly higher on average than both classmates with and without prior preschool or child care center experience.
- Teachers' ratings of children in kindergarten also suggested that overall, PEK tended to enhance social skills, lessen problem behaviors, and improve academic competence more than other experiences that classmates had prior to kindergarten.
- Principals, teachers, and parents provided very positive feedback about PEK.

PEK students' advantages over their classmates decreased from kindergarten through third grade. However, the reduced advantages were less pronounced in the later cohorts, as might be expected given the program's stronger implementation over time.

- In fall of first grade, PEK students continued to show academic advantages over classmates without preschool or child care center experiences, and in some cases, also maintained advantages over classmates with preschool experience. PEK Cohort 3 students were the most likely to maintain advantages over classmates in both groups. The amount of progress PEK students made between fall of kindergarten and fall of first grade compared to their classmates varied by cohort and academic outcome. In some cases, PEK students made similar progress, and in other cases, they made less progress, narrowing the gap between themselves and the classmate groups.
- In fall of second grade, advantages observed for PEK students were again stronger for Cohort 3 than Cohort 2. Cohort 1 students were not assessed in second grade. PEK Cohort 3 students continued to show an advantage over their classmates without prior preschool experience in vocabulary, reading, writing and math, and over classmates with preschool experience in vocabulary and math. PEK Cohort 2 students continued to have an advantage in reading over classmates with preschool experience, but no longer had advantages in other areas assessed over either classmate group.
- In spring of third grade, PEK students maintained some academic advantages over classmates *without* prior preschool experience in Cohort 2 and 3, but not over classmates *with* preschool experience. Students were assessed in reading and math in third grade using the Minnesota Comprehensive Assessments (MCA) and Measures of Academic Progress (MAP) tests. PEK Cohort 1 students showed no advantage over their classmates on these assessments. PEK Cohort 2 students performed better in reading than their classmates without preschool experience, while PEK Cohort 3 students performed better in both reading and math than classmates without preschool experience.
- PEK students' advantages over their classmates in teacher ratings of social skills, problem behaviors, and academic competence were no longer evident in Cohorts 1 and 2 by the spring of third grade. However, PEK Cohort 3 students continued to show an advantage in academic competence over their third grade classmates without preschool experience. They

also had a better attendance rate than these classmates.

To address the "fade out" of program advantages over time, and to ensure that all children are able to achieve substantial advances in later grades, it seems important that all grade-level instruction be differentiated to varying skill levels, and that lessons taught in PEK are not repeated for those students in kindergarten. Toward this end, PEK leaders have fostered linkages between PEK and kindergarten teachers, and have worked intensively with some schools to equip kindergarten teachers to differentiate their instruction based on children's incoming skill levels. The program can continue to support information sharing among PEK and kindergarten teachers, and to find ways to help kindergarten teachers use the information provided on PEK students.

Child care results and implications

Initially, the child care component of the evaluation focused on program implementation. However, due to increased interest in assessing child care outcomes, this component of the evaluation expanded over time. Baseline student assessments were added in fall of PEK, as were comparison groups of kindergarten classmates for the last two cohorts. Data were not collected on PEK child care children beyond fall of kindergarten.

There was no consistent evidence for an academic advantage in fall of kindergarten for students who had participated in PEK child care during their pre-kindergarten year, based on the five cohorts studied. Results from the early cohorts suggested some academic advantages for PEK participants over kindergarten classmates without preschool or child care center experience, but these results were not replicated in later cohorts. Nevertheless, students in the last two cohorts (Cohorts 4 and 5) made accelerated progress on most of the academic measures in their pre-kindergarten year. Differences in the classmate comparison groups used to estimate PEK impacts in the earlier cohorts versus the last two cohorts may be a factor in these inconsistent results.

Other results for 4-year-olds that participated in PEK child care were as follows:

- Change in academic skills during the pre-kindergarten year was studied in PEK child care Cohorts 3-5. In Cohorts 4 and 5 PEK children made faster progress than children nationally on three of the four academic measures (vocabulary, writing, and math, but not reading). In Cohort 3 accelerated progress was made only in writing.
- In Cohorts 4 and 5, no academic advantage was found for PEK child care participants over their classmates in fall of kindergarten, as indicated above. Nevertheless, these PEK students' academic skills tended to be higher than their kindergarten peers nationally, and higher than in the earlier PEK cohorts.
- It was possible to compare PEK child care children in the Cohorts 1 and 2 with PEK school-based children upon reaching kindergarten. Results indicated a slight advantage for PEK school-based children in reading and math but no difference in vocabulary. Teachers tended to rate PEK school-based children higher in social skills and lower in problem behaviors than PEK child care children.

- In addition, teachers' ratings indicated that PEK child care children did not have any advantages in social skills over their non-PEK kindergarten classmates. These classmates tended to have fewer behavior problems than PEK child care children according to teachers' ratings.
- Overall, child care center directors, center teachers, and family child care home providers gave positive feedback about their experiences with PEK.

PEK has made extensive efforts to tailor the program to the needs and environments of its child care settings. The program should be commended for its efforts to collaborate with community child care partners by offering professional development that is rigorous and adaptable to home and center environments. Program staff listen to the feedback from child care providers. To continue to strengthen language and literacy environments, the program can use site-level data to target supports for individual child care teachers.

Based on earlier evaluation findings that children who participated in PEK child care had some advantages over kindergarten classmates in academic skills but not in social skills, the program offered "Positive Behavioral Interventions and Supports" training to teachers. Results were promising for PEK Cohort 3 children who performed better than the previous two cohorts in social skills in kindergarten. However, PEK children in Cohorts 4 and 5 tended to have more behavior problems in kindergarten than their classmates, suggesting the need for additional attention to behavioral management in PEK child care settings.

The program may also want to consider additional ways to accelerate progress in child care participants' early reading skills during their PEK year.

Future study directions

Advantages of PEK school-based Cohorts 1-3 over their classmate groups at kindergarten entry decreased over time, from kindergarten through third grade. However, the impacts of PEK upon kindergarten entry were stronger for the later cohorts, and advantages of PEK over classmate comparison groups appeared to persist to some extent through the third grade for those later cohorts, especially in Cohort 3. Given school-based PEK's positive impacts, it seems worthwhile for the program to evaluate the progress of PEK children in later grades based on MCA and MAP assessments conducted by the Saint Paul school district and Minnesota Department of Education.

Further, to our knowledge, the PEK evaluation study is the only pre-kindergarten program study in the United States that uses a quasi-experimental method and has a high percentage of ELL students. The PEK program and study contribute to a better understanding of how to prepare ELL children for school readiness, and of the academic and social impacts of pre-kindergarten programs for ELL children. To this end, it would be worthwhile to continue following the academic and social progress of these children into later grades.

Introduction

Program background

Overview

Project Early Kindergarten (PEK) aims to improve the school-readiness of Saint Paul children and help close the achievement gap through offering high-quality educational experiences for preschool children. The program aligns Saint Paul's pre-kindergarten education with the district's K-12 curricular model (formerly known as the Project for Academic Excellence). In this way, the program brings children's preschool experience close to the educational experience they will have in kindergarten and beyond. The program emphasizes standards-based learning, extensive professional development, and parent education and support. Because parents use a variety of care arrangements for their pre-kindergarten children, PEK promotes a community-wide approach involving both schools and child care programs.

The program targets services to children who are English Language Learners, come from low-income families, or need Special Education services. In practice, most participants also represent racial or ethnic minorities. Participating children either attend a half-day, five-day-a-week school-year program at one of the participating Saint Paul schools, or receive similar curricular support at their child care center or family child care home. PEK schools began serving 4-year-olds in fall 2005, and child care programs extended the program to 2½- through 4-year-olds in fall 2006.

PEK sites

Ten Saint Paul schools began offering PEK in fall 2005. These schools included Ames, Como Park, Dayton's Bluff, Four Seasons, Hayden Heights, Maxfield, Prosperity Heights, Wellstone, and World Cultures/American Indian Magnet, two schools which share a building and classroom. Since that time, PEK has become the model for all 4-year-old programs district-wide with the exception of Montessori programs. In the 2011-12 school year, a total of 27 district elementary schools implement the PEK framework.

PEK extends the program to child care settings through a partnership with Think Small – Leaders in Early Learning (formerly Resources for Child Caring), a community agency working to improve the quality of early childhood care and education (Resources for Child Caring, n.d.). The first cohort of partnering child care programs was asked to participate in PEK for two years, spanning the 2006-07 and 2007-08 school years. Six centers and 15 homes were originally selected to participate in the program. A second

cohort of providers began offering PEK in fall 2008. They included 7 child care centers that were new to PEK at that time, 1 continuing center, and 13 new family child care homes. In 2010-11, a third cohort of providers with 13 child care centers and 10 family child care homes offered PEK. A new child care center joined in the fall of 2011 and one family child care home dropped out, making a total of 14 child care centers and 9 family child care homes offering pre-kindergarten programs following the PEK approach in 2011-12.

Evaluation

Wilder Research serves as the independent evaluator of PEK. The evaluation assesses the program at the 10 original school sites and at participating child care centers and family child care homes. For children attending at school sites, researchers use a quasi-experimental research design to assess impacts on children's academic success. The study also follows school-based children into their early elementary years to see if program effects are sustained through early elementary school. Children attending at child care sites are assessed in kindergarten to allow for comparisons at that time to children who attended PEK school sites and to children who did not attend PEK. Since 2008, assessments have also been conducted at child care sites with 4-year-old children. As with school cohorts, the child care participants are assessed in the fall of their PEK year to facilitate measures of change between fall of PEK and fall of kindergarten. Three cohorts of school-based children and five cohorts of child care children were included in the evaluation study. A complete description of research methods is provided in the Evaluation section of the report.

Funding

The program operates primarily through funding from Saint Paul Public Schools' referendum and The McKnight Foundation. In 2004 The McKnight Foundation provided a three-year, $2.8 million grant for program development and implementation, and in 2007 McKnight contributed an additional $3 million for efforts through the 2009-10 school year. PEK extends the program to child care settings through a partnership with Resources for Child Caring. The Minnesota Early Learning Foundation also contributed funds to the child care portion of the program in the 2007-08 and 2008-09 school years. In summer 2010, The McKnight Foundation added $2 million for PEK work through the 2011-12 school year.

In addition, from 2006-07 to 2009-10, PEK-Early Reading First provided funds at two of the PEK schools and two other child care centers under a federal grant. Wilder Research conducted a separate evaluation of the PEK-Early Reading First program. The annual and final evaluation reports are available on Wilder Research's website (see Mohr, Gozali-Lee, & Mueller, 2008a; Gozali-Lee, Broton, & Mueller, 2008; Gozali-Lee & Mueller, 2009; and Gozali-Lee, Mohr, & Mueller, 2010). Following completion of the Early

Reading First grant, those schools and child care centers continued to participate in the PEK program.

District pre-kindergarten consolidation

In fall 2008, the Saint Paul Public Schools consolidated pre-kindergarten programs district-wide and determined that all programs, except the Montessori programs, would use the PEK curricular approach. This consolidation unified five programs that previously operated separately. The consolidated program is titled the Saint Paul Public Schools' Pre-Kindergarten Program. In this evaluation report, however, we continue to use the program's former name, Project Early Kindergarten (PEK). In 2011-12, 27 district elementary schools, with 30 classrooms and over 1,200 children participate in the PEK curricular framework. Following are the elements of consolidation adopted by the district:

- Classes meet five days a week for two and a half hours a day;
- Class times align with school start and end times to enable pre-kindergarten staff to participate in Professional Learning Communities and other school functions;
- Transportation is provided using the elementary school busing system (with separate busing provided for some Early Childhood Special Education children);
- Pre-kindergarten enrollment is processed by the district's Student Placement Center;
- Suggested class size is 20 students;
- Classes are taught by a licensed teacher and an assistant teacher. Additional staff work in classrooms that include children with Special Education needs;
- Program management and staff supervision occur at the local school level under the direction of the principal, encouraging a team approach within the school;
- Early childhood professional development workshops and ongoing job-embedded coaching are standardized across programs;
- Using PEK's Early Childhood Workshop framework, pre-kindergarten curriculum and instruction is aligned with the district's K-12 curricular model, with a specific focus on alignment with kindergarten and first grade;
- Student, classroom, and program accountability measures are standardized;
- An Early Childhood Special Education (ECSE) inclusion model is maintained in 23 of the 27 district schools;

- Parent education, family support, and student behavior support are provided district-wide;
- The Early Childhood Curriculum Resource center is made available district-wide; and
- Referendum funds are used to cover the cost of all pre-kindergarten general education teachers and assistants, parent educators, and transportation. The McKnight Foundation funds and School Readiness state aid are used for program support for all pre-kindergarten program schools. Special Education covers all ECSE teachers, assistants, therapists, and social workers.

To ensure that gains made in pre-kindergarten programs are sustained and built on in future years, the district is also working to connect pre-kindergarten with kindergarten teachers. Efforts are made to align programming during these early years and equip kindergarten teachers to differentiate instruction based on the varying needs of incoming students. For example, in 2008-09 and 2009-10, PEK provided weekly coaching to kindergarten teachers in four schools (Dayton's Bluff, Wellstone, American Indian, and World Cultures) to strengthen their capacity to differentiate instruction. To increase the connections with PEK teachers, the coach worked with both PEK and kindergarten teachers in Professional Learning Communities in these schools. In 2010-11, kindergarten teachers from Wellstone, American Indian, World Cultures, Highwood Hills, Eastern Heights, Hayden Heights, and Prosperity Heights schools, a total of 16 teachers, received the one-on-one coaching from PEK. In 2011-2012, one-to-one coaching from PEK coaches continued in the previous year's sites and expanded to include teachers at John A. Johnson. Additionally, the Saint Paul Public Schools established the Office of Early Learning (OEL) which provides kindergarten-specific professional development district-wide. The PEK Program Manager also convened a Kindergarten Task Force which met six times throughout the school year. The Task Force included district-wide administrators, kindergarten teachers, and content coaches and it examined current research on best practices in kindergarten, the Saint Paul Public Schools current practices, and alignment possibilities between pre-kindergarten and kindergarten. The Kindergarten Task Force articulated recommendations for horizontal alignment of curriculum, instructional strategies, and assessment in all kindergarten classrooms across the district to meet the social, emotional and academic needs of kindergarten students. These recommendations were presented to district leaders in May 2012 to inform practices, programming, and professional development for the 2012-13 school year.

Contents of the report

This report comes at the conclusion of the eighth year of PEK. Following an initial planning year (2004-05), PEK has served children through the school component for seven years (2005-06 to 2011-12) and through the community child care component for five years (2006-07 to 2011-12). This report summarizes the program's implementation and outcomes results to date, through the 2011-12 school year. As shown in Figure 1, at this point outcomes data are available for children attending the first three years of PEK at school sites and the first five years of PEK at child care sites. The area shaded in gray reflects the most recent outcome data from the 2011-12 school year.

The report begins by describing PEK goals and components, followed by a section on evaluation methods. The main body of the report then summarizes evaluation results to date. Results are separated into two sections: one on the school component and one on the community child care component. Both sections summarize student outcomes as well as implementation results. The final section of the report explores the lessons learned thus far in the evaluation. These lessons are intended to provide information that may be instructive to the early childhood education community and policymakers. The report concludes with an Appendix of figures providing supplemental information. It should be noted that throughout this report, "teachers" is used to refer to school teachers, child care center teachers, and family child care home providers.

1. Summary of outcomes data available to date

	Progress from PEK to kindergarten[a]	Fall of K results compared to peers[b]	Progress from kindergarten to 1st grade	Fall of 1st grade results compared to peers[b]	Progress from 1st grade to 2nd grade	Fall of 2nd grade results compared to peers[b]	3rd grade results compared to peers[b]
School-based Cohort 1 (PEK 2005-06)	✓[d]	✓[d,e]	✓[d]	✓[d,e]	N/A[k]	N/A[k]	✓[e,f,h,i]
School-based Cohort 2 (PEK 2006-07)	✓[d]	✓[d,e]	✓[d]	✓[d,e]	✓[d]	✓[d,e]	✓[e,f,h,i]
School-based Cohort 3 (PEK 2007-08)	✓[d]	✓[d,e]	✓[d]	✓[d,e]	✓[d]	✓[d,e]	✓[e,f,h,i]
Community-based Cohort 1[c] (PEK 2006-07)	✓[g]	✓[d,e]	N/A[k]	N/A[k]	N/A[k]	N/A[k]	N/A[k]
Community-based Cohort 2[c] (PEK 2007-08)	✓[g]	✓[d,e]	N/A[k]	N/A[k]	N/A[k]	N/A[k]	N/A[k]
Community-based Cohort 3[c] (PEK 2008-09)	✓[d,g]	N/A[k]	N/A[k]	N/A[k]	N/A[k]	N/A[k]	N/A[k]
Community-based Cohort 4[c] (PEK 2009-10)	✓[d,g]	✓[d,e]	N/A[k]	N/A[k]	N/A[k]	N/A[k]	N/A[k]
Community-based Cohort 5[c] (PEK 2010-11)	✓[d,g]	✓[d,e]	N/A[k]	N/A[k]	N/A[k]	N/A[k]	N/A[k]

Note: *New data from the 2011-12 school year are highlighted in gray.*

[a] *Progress during PEK is presented as change in score from fall of PEK to fall of kindergarten.*

[b] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. In addition to the classmate comparison group, school-based Cohorts 1 and 2 are also compared in fall of kindergarten to their same-age peers who had chosen but not yet received PEK. Community-based Cohort 3 does not have a comparison group.*

[c] *Results reflect 4-year-olds who attended community-based PEK.*

[d] *Peabody Picture Vocabulary Test III (PPVT III) and Woodcock-Johnson III Tests of Achievement (WJ III) results are presented.*

[e] *Results of the teachers' ratings of students on the Social Skills Rating System (SSRS).*

[f] *MCA results from spring of third grade are presented.*

[g] *Results of Individual Growth and Development Indicators (IGDIs) administered to 4-year-olds by PEK staff are presented.*

[h] *School attendance rates are presented.*

[i] *Measures of Academic Progress (MAP) results from spring of third grade are presented.*

[j] *These data are not currently available, but will be collected in next year.*

[k] *Data are not collected.*

Program goals and components

PEK's goals include providing programming aligned with the Saint Paul Public Schools' K-12 curricular model and using a research-based approach to delivering services. Ultimately, the program intends to help close Saint Paul's achievement gap. Key program components include alignment with the district's K-12 curricular model, involving extensive professional development; parent education and support; and participation in a rigorous evaluation. This section and the following section on evaluation describe these program goals and components as well as the program's activities in these areas.

Central goals

PEK's central goals, as stated by the program, follow:

1. *School-based:* To develop optimal, developmentally and academically focused early childhood programming aligned with the district's K-12 standards-based comprehensive reform model for 4-year-old English Language Learner students, Special Education students, and students who qualify for free and/or reduced-price meals.

2. *Community-based:* To use a research-based approach to deliver accurately targeted specialized services and support to early learners (primarily 3- and 4-year-old children), families, child care providers, and the greater local community that aligns with the district's standards-based comprehensive reform model and creates a smooth transition into kindergarten.

Alignment with the Saint Paul Public Schools' K-12 curricular model

With differences based on young children's developmental needs, PEK brings children's preschool experience into alignment with the educational experience they will have in kindergarten and beyond. This educational experience centers on the Saint Paul Public Schools' K-12 curricular model (previously known as the Project for Academic Excellence). The Saint Paul Public School District introduced the curricular model in 2001 as a comprehensive academic reform model. Since that time, the curricular model has expanded from a pilot project in selected elementary schools to a district-wide approach implemented in every grade level. With the replication of PEK's model across 4-year-old programs, instruction aligned with the district's K-12 curricular model now extends to early education district-wide as well.

The Saint Paul Public Schools' K-12 curricular model emphasizes standards-based education and extensive professional development and aligns with state and national standards in reading, writing, math, and science. It also provides ongoing training for teachers and administrators based on national standards for effective training. Professional development includes best practices in standards-based instruction of core academic subjects. The model also emphasizes on-the-job coaching to help teachers develop lessons with clearly defined learning goals. Principals play an important role as instructional leaders who are involved in classrooms and oversee classrooms' implementation of the model (Saint Paul Public Schools, 2005).

In the district's own language, following are the 10 core components of the Saint Paul Public Schools' K-12 curricular model (formerly Project for Academic Excellent) (Saint Paul Public Schools, n.d.):

1. Standards-based curriculum and instruction as the foundation of reform;
2. Extensive continuing professional development for teachers and administrators;
3. Focus on a small number of core academic skills;
4. Demonstration sites to promote replication;
5. A shared sense of instructional leadership across the school and district;
6. Content-based coaching of teachers, principals, and district leaders;
7. Availability of essential materials for learning;
8. Peer support for teachers;
9. Standards-based assessment to monitor progress; and
10. Increasing to scale across the district.

Early Childhood Workshop

Local and national experts in early childhood development and education developed a preschool curricular model for PEK aligned with the Saint Paul Public Schools' K-12 curricular model. This "Early Childhood Workshop" integrates the Reader's and Writer's Workshops. Contributors included the district's Reader's and Writer's Workshop professional development trainer and her consultant group, the California-based Foundation for Comprehensive Early Literacy Learning (CELL); the University of Minnesota's Center for Early Education and Development; English Language Learner,

School Readiness, and Special Education staff; the district's curriculum coordinator and PEK staff.

Materials are geared toward the developmental needs of young children and are based on best practices in early childhood education. They emphasize specific standards in personal and social development, language and literacy, mathematical thinking, and physical development and health. The Early Childhood Workshop model is presented in a comprehensive implementation manual for teachers. Manuals also provide information on the district's K-12 curricular model and underlying Principles of Learning, PEK core content and early childhood standards, standards-based instruction, using standards-based assessment to monitor progress, and other topics relevant to program goals. Separate editions of the manual are provided to PEK school and child care teachers (Saint Paul Public Schools, 2007b).

At school sites, licensed teachers use the implementation manual and *Discovering Our World* curriculum to guide their instruction. This standard-driven curriculum was created by district staff and provides a clear scope and sequence that teachers should cover in their instruction. Reflecting their unique needs and operations, child care centers use their manual in conjunction with *Doors to Discovery,* a complete literacy-focused curriculum. Family child care homes use their manual along with a theme-based curricular model developed specifically for them. Beginning in the 2007-08 school year (Cohort 3), school classrooms also implemented *Everyday Mathematics,* a curriculum used in district kindergarten through sixth-grade classes.

Professional development

PEK emphasizes extensive ongoing professional development and on-the-job coaching for participating school and child care teachers. For school teachers, this training builds on the required educational credentials of teaching licenses and preschool certification. As an indication of the program's investment in training, it supports three Think Small – Leaders in Early Learning coaches, a part-time Early Childhood Mental Health Consultant and two school coaches for Pre-Kindergarten and kindergarten classrooms, national literacy consultants, and one community and family specialist who promotes the program's parent education efforts. At the beginning of the second grant period, the program also hired one additional part-time parent educator supported by the Minnesota Early Learning Foundation. The Program also supported an assessment coach for 2008-09 and 2009-10 school years and since the 2009-10 school year, the program supports a behavioral specialist.

PEK teachers attend an intensive training workshop at the beginning of the school year, spanning three days for school teachers and one or two days for child care teachers. During the year, school teachers and child care teachers meet in regular Professional Learning

Communities. Both school and child care teachers also participate in one-on-one weekly or biweekly coaching sessions. Program coaches, in turn, participate in master coaching sessions. School and child care teachers receive training on the following topics, for example: the role of rituals and routines; standards-based instruction; progress monitoring to guide data-driven instruction; reading and writing strategies, including read alouds, shared reading, interactive writing, active learning, and guided oral reading; the Principles of Learning, which underlie the district's K-12 curricular model; Positive Behavioral Interventions and Supports; differentiated instruction; components of the Classroom Assessment Scoring System (CLASS) instrument; and parent education. PEK also arranges for school and child care teachers and school principals to visit other PEK sites.

As part of the district's efforts to further the connections between pre-kindergarten and kindergarten classrooms, since the 2008-09 school year kindergarten teachers have received a two-day workshop in differentiated instruction, and in many schools pre-kindergarten and kindergarten teachers work together in Professional Learning Communities. At PEK schools, more intensive training was also offered to kindergarten teachers at Dayton's Bluff, Wellstone, American Indian, and World Cultures during the 2008-09 and 2009-10 school years. Kindergarten teachers in these schools received one-on-one weekly coaching sessions. The coaches also worked with both kindergarten and PEK teachers in Professional Learning Communities. In 2010-11, coaching and training workshops continued to be offered to kindergarten teachers in Wellstone, American Indian, and World Cultures, as well as to kindergarten teachers in Hayden Heights, Prosperity Heights, Highwood Hills, and Eastern Heights schools. In 2011-2012, the one-to-one coaching from PEK coaches continued in the previous year's sites (Hayden Heights and Prosperity Heights were combined to form The Heights) and expanded to include teachers at John A. Johnson. Additionally, as previously mentioned, the Saint Paul Public Schools established the Office of Early Learning (OEL) which provides kindergarten-specific professional development district-wide. The Kindergarten Task Force gave recommendations to the district leaders for horizontal alignment of curriculum, instructional strategies, and assessment in all kindergarten classrooms across the district to meet the social, emotional and academic needs of kindergarten students.

Professional development is also provided to school principals and child care center directors and assistant directors to equip them to assume the role of the instructional leader at their school or center.

Principals and center directors as instructional leaders

A tenet of the Saint Paul Public Schools' K-12 curricular model is that principals assume the role of the instructional leader at their school. Likewise, principals at PEK schools and directors at participating child care centers assume the role of the instructional leader

of PEK at their site. This role provides site-level accountability for fidelity with the program model. At schools, the role also facilitates PEK's integration into the school as a whole. The program places a strong emphasis on developing linkages between PEK, kindergarten, and early elementary teachers as a way of ensuring smooth transitions for students and curricular alignment across grade levels. In child care centers, child care directors provide initial training about the PEK approach to teachers before the teachers receive intensive training workshops from the PEK coaches.

School principals and center directors receive professional development to prepare them for assuming this role. Program coaches also provide them with memos to guide them in making classroom observations. These memos describe instructional best practices from the latest professional development teachers have received that should be evident in the classroom. As described below, program administrators, principals, and child care center directors also monitor the program's implementation.

Progress monitoring

The Saint Paul Public Schools' K-12 curricular model emphasizes ongoing progress-monitoring. PEK teachers use developmentally appropriate tools to monitor progress in children's skills and their growth toward developmental milestones. Work Sampling System portfolio and Individual Growth and Development Indicators (IGDIs) assessment help teachers understand changes in individual children and alert them when a child may require more intensive interventions. As with their K-12 counterparts, PEK teachers use information gathered through the ongoing assessments to inform their instruction. In addition, since fall 2007, program administrators, principals, and child care center directors have also conducted "Progress Monitoring Walks" to check the fidelity of program implementation.

Parent education and support

PEK also emphasizes parent involvement in children's learning as well as parent-school connections. PEK supports work to increase parents' understanding of the skills children need for school, and parents' engagement with their children in literacy activities at home. They also aim to help parents feel comfortable navigating the school system and participating in school activities. Parent-education efforts are coordinated by the program's community and family specialist as well as a part-time parent educator who works to connect child care families with neighborhood schools.

PEK developed extensive parent-education materials, titled "School and Home – Partners in Learning," which were first implemented in 2007-08. Materials include literacy activities that parents can do with children at home. Math activities were added in the

2008-09 school year. Every week, parents also receive take-home information in different languages that reinforces skills being taught in PEK and explains how to use the literacy and math materials. Parents also receive information about community resources. To facilitate home learning over the summer, teachers also distribute summer activity booklets to PEK school and child care children who are going on to kindergarten.

In addition to developing parent-education materials, PEK offers parenting events and parent-education sessions at the schools, and brings school services to child care centers. For example, the program offers parent orientations at the schools and provides welcome packets with information about transitioning to school. As another example, PEK provides "Understanding School Choice" sessions at participating child care centers during which district student placement staff answer parents' questions and help parents register their children for kindergarten and Early Childhood Screening.

Evaluation

PEK participates in a rigorous evaluation. The program views evaluation as an important sustainability strategy in that ultimately, the evaluation will provide evidence of whether the model warrants continuation and replication. The evaluation includes two components: an implementation evaluation and an outcomes evaluation. Wilder Research holds primary responsibility for the evaluation, with support and assistance from Saint Paul Public Schools' Department of Research, Evaluation and Assessment.

Program implementation

The implementation evaluation addresses the overarching question, Does PEK provide a high-quality preschool program that is aligned with the district's K-12 curricular model and integrated into the school system? The implementation evaluation also assesses the degree to which PEK is serving the target population of high-need students, as well as parent involvement and school-family linkages.

Researchers gather information on the children served and the extent to which schools and child care settings are implementing the program. Information to date is gathered from surveys and focus groups conducted by Wilder Research, records data provided by the district and PEK staff, and observations conducted and reports prepared by the program's evaluator from Saint Paul Public Schools and staff of the University of Minnesota's Center for Early Education and Development. Principal and PEK teacher surveys provide information on principals' perceptions of PEK implementation and teachers' interactions with parents. The kindergarten teacher survey gives information on their connections with PEK and its teachers. Parent surveys provide information on their involvement in their children's learning and school activities, their satisfaction with PEK, and children's prior educational experiences and family background. Focus groups with child care teachers and directors provide feedback on their experiences with the program. To gather information about how the program is implemented in each setting, outside observers use structured questionnaires. Additionally, school and program records provide information about student enrollment, demographics, and attendance at PEK.

Program outcomes

Wilder Research's evaluation focuses on the program's outcomes. It answers the key question, Does a high-quality preschool program aligned with the district's K-12 curricular model improve students' educational outcomes? To answer this, evaluators need to know the following:

- Are children better prepared for kindergarten because they participated in PEK?
- Do they perform better in elementary school (kindergarten through third grade)?
- What are the benefits for children, families, and teachers of having pre-K programs integrated with schools?
- Is it cost-effective?

Wilder Research addresses these questions through a quasi-experimental research design. Children are tested over time and in developmentally appropriate ways to see how they progress academically and socially, and whether program effects are sustained through early grade school. The study compares a treatment group of children who received PEK services with a comparison group who did not. Experimental research, involving random assignment to treatment and control groups, can be difficult to attain in education research. This quasi-experimental approach presents a rigorous alternative. While the study will not be able to prove absolutely that PEK causes specific outcomes, researchers will be able to draw reasonable inferences about the changes that can be attributed to the program.

The study's design and its use of nationally validated assessment instruments also allow researchers to compare PEK results with results from other public school-related preschool programs around the country. The *Peabody Picture Vocabulary Test III* (PPVT III) measures receptive vocabulary, and three subtests of the *Woodcock-Johnson III Tests of Achievement* (WJ III) - Letter-Word Identification, Spelling, and Applied Problems - measure early skills in reading, writing, and math, respectively. Wilder Research staff administer these tests one-on-one with children at the school sites each fall, and beginning in 2008-09 with children at child care sites. Teachers also complete assessments of individual students in the fall. They assess students' social skills, problem behaviors, and academic competence on the Social Skills Rating System (SSRS). A description about standardization studies and scoring interpretations, taken from the assessment manuals, is presented in the Appendix. Figure 2 provides the study's assessment schedule over the seven-year period from 2005-06 to 2011-12. More detailed information about the school and child care portions of the study are provided following the figure.

2. PEK assessment schedule, 2005-06 to 2011-12

SCHOOL COMPONENT

Groups	Fall 2005	Fall 2006	Fall 2007	Fall 2008	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012
Cohort 1:										
PEK students	PEK	K	1st grade	None[d]	None	3rd grade[e]				
Classmates[a]	None	K	1st grade	None[d]	None	3rd grade[e]				
Cohort 2:										
PEK students		PEK	K	1st grade	2nd grade			3rd grade[f]		
Classmates[a]		None	K	1st grade	2nd grade			3rd grade[f]		
Cohort 3:										
PEK students			PEK	K	1st grade		2nd grade			3rd grade[f]
Classmates[a]			None	K	1st grade		2nd grade			3rd grade[f]

COMMUNITY (CHILD CARE) COMPONENT

Groups	Fall 2005	Fall 2006	Fall 2007	Fall 2008	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012
Cohort 1		None[c]	K	None	None	None				
Cohort 2			None[c]	K	None	None				
Cohort 3				PEK[c]	K	None				
Cohort 4					PEK[c]		K			
Classmates[b]							K			
Cohort 5							PEK[c]		K	
Classmates[b]									K	

Note: *Unless otherwise noted, this assessment schedule pertains to the WJ III, PPVT III, and SSRS.*

[a] *"Classmates" refers to the comparison group students who attended kindergarten at the 10 original PEK schools and who did not attend PEK at school or child care sites.*

[b] *"Classmates" refers to the comparison group students who attended kindergarten in any schools in Saint Paul Public Schools and who did not attend PEK at school or child care sites. Children are selected based on their matched schools and demographic characteristics with those of PEK child care cohort children.*

[c] *Individual Growth and Development Indicators (IGDIs) are used in PEK child care. For child care Cohorts 3, 4 and 5, the PPVT III and WJ III are also administered in fall of PEK (fall 2008, fall 2009, and fall 2010) to children who will attend kindergarten the following fall.*

[d] *Cohort 1 school students who participated during the program's initial year of implementation are not assessed in second grade.*

[e] *MCA-II in reading and math and SSRS.*

[f] *MCA-II and MAP in reading and MCA-III in math and SSRS.*

PEK school sites

For children attending the 10 original PEK schools, the study assesses the following program outcomes: 1) the progress they make during PEK, and 2) the impact of PEK on their later academic performance. Progress during PEK is measured by comparing children's baseline (fall of PEK) test scores with their scores one year later, in the fall of kindergarten. To measure PEK's impact, the study compares PEK participants' academic and social skills to those of their peers over time, as described below.

Comparisons to peers

Using the assessments mentioned earlier, children attending PEK schools are compared to two different groups of peers. First, they are compared to similar children who applied and were accepted for PEK, but who have not yet attended the program. In this analysis, children who just finished PEK constitute the "treatment" group, and children who are just beginning PEK constitute the "no-treatment" comparison group. Because children develop rapidly at this age, Wilder Research uses a statistical model that estimates the difference between the two groups right at the program's September 1 birthday cutoff point. Near the cutoff point, children from both groups are essentially the same age but treatment-group children have completed the program and comparison-group children have not. This analysis provides a comparison of children with similar characteristics, and eliminates the selection bias that can occur if families who choose to enroll their children in the program differ in important ways from those who do not. This analysis is referred to as the "birthday cutoff" method, illustrated in Figure A1.

Second, once PEK children reach kindergarten, they are compared to their kindergarten classmates. These classmates may differ in some ways from PEK children. They have had a range of prior preschool and child care experiences, and some have had no formal preschool or child care experiences at all. This comparison reveals how developmental skills of PEK children compare to skills of kindergartners coming from a variety of backgrounds.

Comparisons over time

To see whether program effects last over time, PEK school children and their classmates are assessed in subsequent years as well. The study continues to follow these two groups through third grade. The same assessments of academic and behavioral progress described earlier are used in these early primary grades, with the exception of third grade when the statewide Minnesota Comprehensive Assessments (MCA) are used. During the PEK evaluation years, revisions were made to the MCA. In spring 2010, when PEK Cohort 1

and their classmates were in third-grade, the Minnesota Comprehensive Assessments - Series II (MCA-II) was used to assess reading and math skills. In spring 2011 and 2012, the Minnesota Comprehensive Assessments - Series II (MCA-II) reading and Minnesota Comprehensive Assessments - Series III (MCA-III) math are being used with third-grade students statewide, including the PEK Cohort 2 and Cohort 3 children and their classmates. In this report, evaluators refer to both the MCA-II and MCA-III as the MCA. In addition to the MCA, starting in spring 2011, third-grade students in Saint Paul Public Schools take the Northwest Evaluation Association Measures of Academic Progress (MAP).

It should be noted that the classmate comparison group is defined as children who: a) are kindergarten classmates of former PEK children, and b) attend kindergarten at one of the 10 original PEK school sites. PEK children are followed in kindergarten as long as they remain in any public (including charter) or private school in Saint Paul. After kindergarten, both the former PEK school students and the comparison group students are followed as they move through the primary grades as long as they remain in schools in Saint Paul.

PEK child care sites

In the child care component, the evaluation of program outcomes is similar to but not as extensive as the evaluation of the school-based component. Wilder Research assesses academic progress during the PEK year for children in child care Cohorts 3, 4, and 5, assessing them in both the fall of PEK and the fall of kindergarten. Children in child care Cohorts 1 and 2 were assessed in kindergarten only. The PEK child care component's impact is not assessed beyond the fall of kindergarten.

In kindergarten, evaluators compare PEK child care Cohort 1 and 2 participants' academic and social skills to those of participants in PEK school component Cohorts 2 and 3, respectively, and to the kindergarten classmate comparison groups identified for those PEK school cohorts. Therefore, students in the classmate comparison groups used for PEK school component Cohorts 2 and 3 also serve as the comparison groups for child care Cohorts 1 and 2. Child care Cohort 1 attended PEK at the same time as school Cohort 2, and child care Cohort 2 attended PEK at the same time as school Cohort 3. As previously described, the classmate comparison groups for the PEK school component are defined as kindergarten classmates of former PEK children at the 10 original PEK schools. Comparisons between PEK child care participants and comparison group students are based on the same assessments used in the school component (i.e., the PPVT III, WJ III, and SSRS).

Comparison groups were selected for child care Cohorts 4 and 5 in a different manner. Because the school component of the evaluation follows children in PEK school Cohorts 1-3 only, there were no associated comparison groups for these later child care cohorts.

For child care Cohorts 4 and 5, students selected for the comparison group did not attend a PEK school-based or child care site, they had similar demographic characteristics with the PEK child care cohort, and they attended kindergarten at one of the same schools as children in the PEK child care cohort. A matching procedure was used which identified possible comparison group students based on their matched characteristics with PEK child care students. The procedure was run in hierarchical iterations based on the number of matched characteristics, first identifying comparison group students matching on all specified characteristics, and identifying additional students in subsequent iterations. The pool of students identified for the comparison groups was larger than the number of children in the PEK child care cohorts. Therefore, as with the comparison groups identified for the school component, these matches were not one-to-one. Child care Cohort 3 did not have a comparison group of students.

Other measures

In addition to the child assessments conducted as part of the evaluation, PEK teachers also use formal tools to monitor individual children's progress over the course of the year. These tools include Work Sampling System portfolio and Individual Growth and Development Indicators (IGDIs) assessment. Although not formally a part of the evaluation, the IGDI results are discussed briefly in the context of other student outcomes presented in this report. Finally, Wilder Research's economists conducted a return on investment analysis of the program that is available as a separate report (Diaz, 2012).

Statistical tests

A variety of statistical tests are used in this report, including Analysis of Covariance (ANCOVA) and *t*-tests to measure differences between groups. Evaluators use ANCOVA to examine differences between PEK children and their classmates groups, adjusting for differences in demographic characteristics and test date between the groups. To examine year-to-year change within groups, paired samples *t*-tests are used. In some cases, we use Repeated Measures Analysis of Covariance to examine the interactions between groups in their year-to-year change, adjusting for the differences among groups in their characteristics. The specific statistical test used is indicated in the notes accompanying each figure in the Appendix.

Statistical significance

In some cases, this report refers to differences between groups that are "significant." By significant, we mean that the difference is significant at the 0.05 level based on a statistical test. In other words, there is less than a 1 in 20 probability that the difference occurred by chance.

Progress through 2011-12: School-based PEK

This section provides results available to date for the 10 original PEK schools. The section begins by profiling children who attended PEK schools during the program's first three years, 2005-06 (Cohort 1), 2006-07 (Cohort 2), and 2007-08 (Cohort 3). Their progress during PEK is then discussed, followed by a presentation of their academic and social outcomes in kindergarten through third grades, again with available results varying by cohort as depicted in Figure 1. After discussing student outcomes, this section briefly describes program implementation through 2007-08 when Cohort 3 children completed PEK. The section concludes with a list of issues for consideration that can be used to inform ongoing program planning efforts.

More specifically, results presented in this section are organized as follows:

- Overview of results
- Characteristics of children (Cohorts 1-3)
- Progress while in PEK (Cohorts 1-3)
- Kindergarten readiness compared to similar children (Cohorts 1-3)
- Kindergarten readiness compared to classmates (Cohorts 1-3)
- Differences in first grade compared to classmates (Cohorts 1-3)
- Differences in second grade compared to classmates (Cohorts 1-3)
- Differences in third grade compared to classmates (Cohorts 1-3)
- Implementation efforts during the first three years (Cohorts 1-3)
- Implementation from 2008-09 through 2009-10
- Teacher professional development and school integration in 2010-11
- Issues for consideration

Overview

Results show promising progress for children attending PEK schools in 2005-06 (Cohort 1), 2006-07 (Cohort 2), and 2007-08 (Cohort 3). On average, children in each cohort showed academic and social advantages over peers when they reached kindergarten. Children's academic gains made during the pre-kindergarten year have also increased with each successive cohort. This trend may be associated with the development of PEK. That is, as PEK has become more fully implemented and mature as a program, its impact may have increased correspondingly. However, PEK advantages over their classmates began to lessen as former participants moved through the primary grades. These reduced effects were less evident in the later cohorts, as might be expected given the program's stronger implementation over time. In third grade, PEK Cohort 3 children still maintained significant advantages in multiple areas over their classmates without prior preschool or child care center experience.

On average, children in the school cohorts experienced the following changes:

- In the year before kindergarten, all three PEK cohorts made faster progress than their peers nationally in vocabulary, reading, and writing skills. Cohort 2 also made accelerated progress in math skills, while Cohorts 1 and 3 made expected progress.

- When they reached kindergarten, PEK children had academic skills that were substantially more advanced than those of similar, same-age children in a comparison group who had chosen but not yet received PEK. These comparison children were just beginning their PEK year. A statistical model was used to estimate the difference between the two groups when they were essentially the same age, but one had completed the program and the other had not.

- All three cohorts showed advantages compared to their kindergarten classmates, and the differences tended to be stronger with each successive cohort. In all four academic areas assessed (vocabulary, reading, writing, and math skills), Cohorts 2 and 3 scored significantly higher on average than both classmates with and classmates without prior preschool or child care center experience.

- Teachers' ratings of children in kindergarten also suggested that, overall, PEK tended to enhance social skills, lessen problem behaviors, and improve academic competence more than other experiences that classmates had prior to kindergarten.

- Between fall of kindergarten and fall of first grade, the academic and social advantages that children in Cohorts 1-3 seemed to gain from PEK appeared to lessen somewhat, on average. PEK students made less progress than their classmates

between kindergarten and first grade, narrowing the gap between the groups. Nevertheless, PEK students in Cohorts 1-3 continued to show academic advantages over classmates without preschool or child care center experience. In addition, over their classmates with preschool experience, children in Cohort 2 maintained advantages in reading and writing skills, and children in Cohort 3 maintained advantages in vocabulary, writing, and math skills.

- Between fall of first grade and fall of second grade, PEK Cohort 2 and Cohort 3 made accelerated progress in vocabulary and slower than expected progress in reading and writing, on average. In math, PEK Cohort 2 students made expected progress and Cohort 3 students made accelerated progress during the same time. Their respective classmates made similar progress on all four academic areas except in comparison to Cohort 3 in vocabulary. In this case, Cohort 3 students made larger gains than their classmates, on average.

- In fall of second grade, PEK Cohort 2 children continued to have an advantage over their classmates with prior preschool experiences in reading, but no longer had advantages in other areas assessed (vocabulary, writing, and math skills), and they performed similarly to their classmates without prior preschool experiences. In contrast, PEK Cohort 3 children showed an advantage over their classmates without prior preschool experiences on all areas assessed (vocabulary, reading, writing, and math skills) and over their classmates with prior preschool experiences in vocabulary and math skills.

- Teachers' ratings of children in second grade suggested that PEK Cohort 2 children's advantages over their classmates in social skills, problem behaviors, and academic competence were no longer evident. In contrast, PEK Cohort 3 children showed higher social skills and academic competence than their classmates with and without prior preschool experience and fewer problem behaviors than their classmates without prior preschool experience.

- In third grade, results of the 2010 Minnesota Comprehensive Assessments (MCA) showed that PEK Cohort 1 children performed similarly to their classmates in reading and math, as well as in teacher-rated social skills and attendance.

- PEK Cohort 2 children in third grade performed better than their classmates without prior preschool in reading, as measured by the 2011 MCA and Measures of Academic Progress (MAP). They performed similarly to their classmate comparison groups in math, teacher-rated social skills, and attendance.

- PEK Cohort 3 children performed better than their classmates *without* prior preschool experience on reading and math assessments (both MCA and MAP), attendance, and teacher ratings of academic competence, and similarly on social skills. There were no

significant differences on these measures between PEK Cohort 3 children and their classmates *with* prior preschool experience.

Key evaluation findings to date also include the following:

- Compared to publicly funded pre-kindergarten programs in several other states, the estimated effect of PEK upon kindergarten entry tended to be larger in vocabulary and writing skills. Reading results are comparable to the other studies.
- PEK school principals, teachers, and parents provided very favorable feedback about the program.
- Overall, structured classroom observations found that PEK classrooms have achieved a high level of alignment with the district's K-12 curricular model and are strong in their intentional supports for language and literacy.

Characteristics of children

Ten Saint Paul elementary schools began offering PEK to 4-year-olds in fall 2005. Between morning and afternoon sessions, these schools have the capacity to serve a total of 360 PEK children. Figure 3 shows the number of children in the three cohorts at PEK school sites. It is important to note that these numbers reflect most but not all children who have participated in the program. Wilder Research defines each cohort as those who are assessed in fall of their PEK year, and there have been some participants who were not assessed as part of the study. Some children were not assessed because they started the program later in the year, left the program in the fall, transferred schools, were absent, or did not have parental permission to participate in the assessments.

3. Children attending PEK school sites, 2005-06 to 2007-08

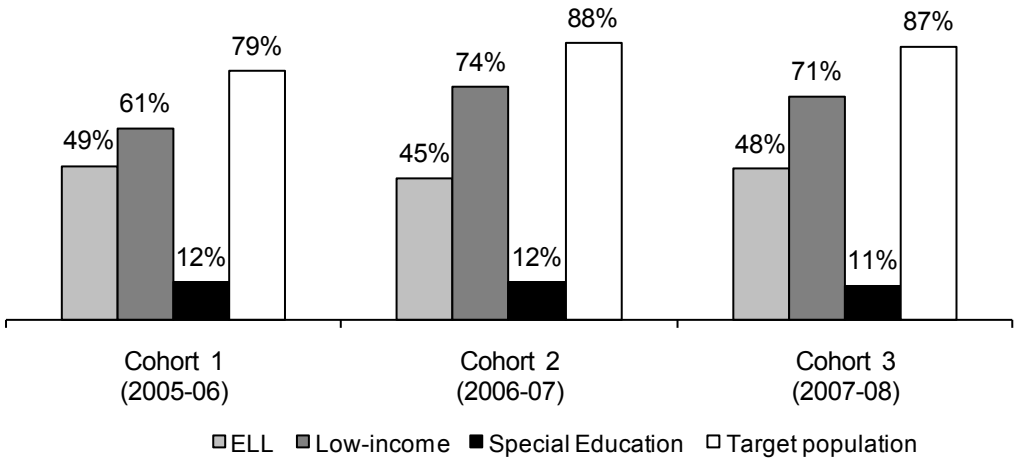
Cohort	Number of children
Cohort 1 (PEK 2005-06)	326
Cohort 2 (PEK 2006-07)	329
Cohort 3 (PEK 2007-08)	312
Total	967

Note: *A total of 360 children can be served by the 10 PEK schools. Wilder Research defines each cohort as children who were assessed as part of the study in fall of their PEK year. As explained in the text, this definition includes most but not all children who have participated in the program. Numbers in this figure may differ slightly from those in other figures in this and other PEK reports depending on the inclusion or exclusion of children tested in Spanish, children whose birth date was outside the range for their cohort based on the program's birthday cutoff date, and children completing only the PPVT III or WJ III but not both. There may also be variations based on missing data for some variables.*

Demographics

Figure A2 in the Appendix provides demographic profiles of students in school-based Cohorts 1, 2, and 3. Some demographic characteristics can change over time, and these profiles reflect demographic data from fall of the PEK year. In each year, a majority of PEK students were low-income (61-74%), defined here as eligible for free- or reduced-price lunch. Just under half were English Language Learners (ELL) (45-49%). Among those with a primary home language other than English, Hmong was the most common home language followed by Spanish. More than 1 in 10 children in each cohort needed Special Education services (11-12%). Looking at these three categories together, 79-88 percent were in the program's target population across the three years, meaning they were either low-income, ELL, or needed Special Education services. Additionally, most students were from racial or ethnic minorities (81-85%). Figure 4 depicts the representation of PEK's target populations in the first three cohorts.

4. PEK school component. Representation of PEK target populations, 2005-06 to 2007-08



Note: *PEK targets children who are English Language Learners (ELL), from low-income families, or need Special Education services. "Target population" reflects the percentage of children who are in any of these three groups.*

Comparison group demographics

Demographic characteristics of the classmate comparison groups are presented in the Appendix. The demographic information reported is based on the information provided by the district in kindergarten. As noted in Figures A3-A5, there were some differences between PEK cohort children and their classmates. For example, there were more children in comparison groups than in Cohort 1 and 3 who were eligible for free or reduced-price

lunch. In cases where former PEK students differed in meaningful ways from the comparison groups, we statistically adjusted for those demographic differences in our analysis. We also adjusted for any differences among the groups based on when in the fall they were tested.

Changes over time

It is important to note that in some cases, children's demographic characteristics can change over time. For example, it may not be known that a child needs Special Education services until after that child has been in the school system. As another example, a child may be eligible for free or reduced-price lunch one year and ineligible another year. Additionally, methods for obtaining PEK children's demographic characteristics changed in 2006 after the district introduced a new application process for 4-year-old programs that collects applicants' demographic information.

Changes due to attrition

Demographics presented here reflect all students in the original PEK cohorts. However, attrition occurs over time in the study. Subsequent years' analyses reflect only those students who were tested in a given year. Children attending PEK at school sites are followed after their PEK year as long as they remain in schools in Saint Paul. Children attending kindergarten or first grade outside of Saint Paul are not reflected in analyses presented in this report for fall of those years. Attrition also occurs in the comparison groups. Comparison groups are defined as kindergarten classmates of PEK children at the 10 original PEK schools. After kindergarten, comparison group students are followed as long as they remain in schools in Saint Paul.

Figure 5 shows the number of PEK children who were assessed at the beginning of their PEK year, meaning fall 2005 for Cohort 1, fall 2006 for Cohort 2, and fall 2007 for Cohort 3. Wilder Research conducted assessments with a total of 967 cohort children. In third grade, a total of 578 children or 60 percent of the total original cohort children were included in the evaluation based on those who took the state's assessments, the MCA-II and MCA-III.

A total of 775 comparison children were included in the evaluation. These children were assessed in the fall of their kindergarten year. In their third grade, a total of 458 children or 59 percent of the original comparison children took the state's assessments.

5. PEK school component. Attrition in study groups

	Number assessed	
	PEK	**3rd grade [d]**
Cohort 1	326	199
Cohort 2	329	196
Cohort 3	312	183
Total	967	578
	Kindergarten	**3rd grade**
Cohort 1 comparison [a]	256	152
Cohort 2 comparison [b]	284	151
Cohort 3 comparison [c]	235	155
Total	775	458

[a] Kindergarten classmates of PEK school -based Cohort 1 children in 2006-07 at the 10 PEK schools.

[b] Kindergarten classmates of PEK school -based Cohort 2 children in 2007-08 at the 10 PEK schools.

[c] Kindergarten classmates of PEK school -based Cohort 3 children in 2008-09 at the 10 PEK schools.

[d] The number of students reported here is based on MCA assessments.

We compared the fall of PEK (baseline) demographics of these children to those of children who remained in the study in third grade to see if they differed in important ways. A higher percentage (72%) of children in Cohort 1 assessed in third grade was eligible for free and reduced-price lunch, compared to the original cohort (61%). Cohort 1 comparison children appeared to resemble its original cohort. As in the original cohort, Cohort 1 comparison had a higher percentage of free and reduced-price lunch (91%) children compared to Cohort 1 (72%) in third grade.

Cohort 2 children in third grade appeared to resemble its original cohort. A higher percentage of Cohort 2 comparison children received free or reduced-price lunch (87%) and special education services (20%) in third grade, compared to the original cohort in kindergarten (61% and 7%, respectively) and to Cohort 2 children in third grade (76% and 15%, respectively).

Similar to Cohort 1, a higher percentage (86%) of children in Cohort 3 assessed in third grade was eligible for free and reduced-price lunch, compared to the original cohort (71%). Their comparison group also had a higher percentage of students who were eligible for free and reduced-price lunch in third grade (91%). As noted before, income levels (i.e., eligibility for free or reduced-price lunch) can change over time. We used

statistical analyses to adjust for these differences in demographic characteristics among the groups of children being compared.

Home life

Most PEK school children participating the first three years lived with both parents (70-73% in Cohorts 1, 2, and 3), and more than 1 in 10 lived with their mother only (15-17%). Quite frequently other adult relatives also lived in the household. A majority of children's parents graduated from high school or attended some college but did not receive a four-year degree (67-69% of mothers and female caretakers, and 63-68% of fathers and male caretakers) in Cohorts 1, 2, and 3.

School experience

Children often enrolled in PEK without any prior preschool or child care experience. About 4 in 10 attended preschool, Head Start, or a child care center before they started PEK (36-40% in Cohorts 1, 2, and 3). Children also were typically not in another preschool or child care program while they attended PEK. When not in their PEK class, children were most commonly cared for by parents (45-47% in Cohorts 1, 2, and 3). Other common arrangements involved – sometimes in combination with parental care – care from relatives, neighbors, or friends.

Progress while in PEK

For each cohort, progress during students' PEK year is measured by comparing their fall of PEK (baseline) test scores with their fall of kindergarten test scores. Comparisons are made based on the Peabody and Woodcock-Johnson academic assessments conducted by Wilder Research. Because children develop rapidly at this age, we look at how their progress compares to how much children of this age would be expected to progress based on national norms.

Academic progress compared to national peers

Figure 6 depicts PEK students' progress during the pre-kindergarten year, shown separately for each of the three cohorts. The analysis is based on test scores that are age-standardized. This means that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to one's peers nationally. PEK school-based students made substantial gains in academic skills during their PEK year. Compared to their peers nationally, students in all three cohorts made accelerated progress in vocabulary, reading, and writing. In other words, on average they made faster progress over the course of the

year in these areas than did their peers nationally. Progress in math skills differed by cohort. Whereas students in Cohorts 1 and 3 made normative progress in math during their PEK year, Cohort 2 students made accelerated progress in this area compared to their peers nationally. Still, progress in math lagged behind progress seen in the other three academic areas (Figure A6; Mueller, 2008). It should be noted that math was not a focus during the program's first two years of implementation. The program implemented the *Everyday Mathematics* curriculum in the fall of Cohort 3's PEK year (2007). Nevertheless, on average Cohort 3 students did not make accelerated progress in math during their PEK year (the average score increased somewhat, but the difference was not statistically significant).

Despite their substantial gains in academic skills, on average former PEK students were somewhat below national norms in vocabulary and math skills in fall of their kindergarten year. This does not seem surprising given the program's large ELL population and that math was not a focus during the program's first two years. On the other hand, PEK students were slightly above national norms in reading and writing skills in the fall of their kindergarten year, on average.

It is also worth noting that the overall average gains made during the PEK year have increased with each successive cohort. In other words, the second cohort of PEK children made stronger gains than the first cohort, and the third cohort of PEK children made stronger gains than both of the previous cohorts. In addition, students' scores in fall of kindergarten have been slightly higher each year, indicating a higher level of kindergarten readiness for each successive cohort. At the same time, it should be noted that the average number of days between the fall of kindergarten and fall of preschool testing periods has varied somewhat by cohort, ranging from 375 days for Cohort 2 to 390 days for Cohort 1 and 435 days for Cohort 3. This should be taken into account when comparing results across the cohorts because children who had a longer gap between testing may have progressed more in part because they had more time to develop.

Academic progress in age-equivalency terms

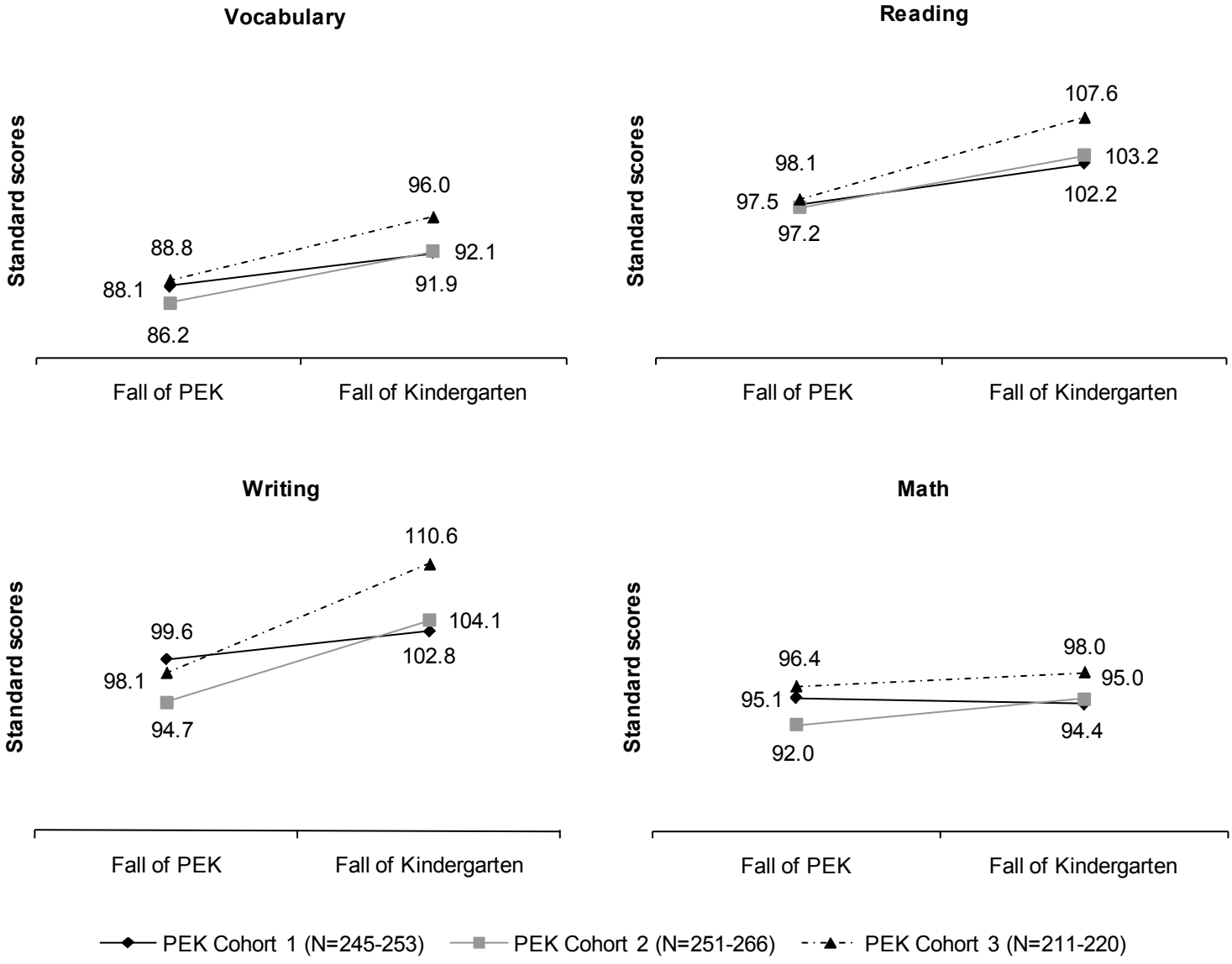
Translating results into age-equivalency scores provides another meaningful way of looking at these changes. In vocabulary, Cohort 3 children were estimated to be at 3 years 6 months in the fall of PEK on average, and at 5 years 6 months in the fall of kindergarten on average, for a 24-month gain. This compares to an average vocabulary gain of 18 months for Cohort 2 children and 15 months for Cohort 1 children. In reading skills, Cohort 3 children were estimated to have experienced a 19-month gain during their pre-kindergarten year on average, compared to a 16-month gain for Cohort 2 and a 14-month gain for Cohort 1. Similarly, children in Cohort 3 made larger average gains in writing (22 months) compared to children in Cohorts 1 and 2 (17 months). It should be noted, though, that

age-equivalency scores are a less exact measure than standard scores, which are used in other analyses presented here. For this reason, in age-equivalency terms it appears that Cohort 2 children made the same size gains as Cohort 1 children in writing (17 months) and math (12 months), even though Cohort 2 children had larger gains in these areas using standard scores. In addition, it appears that children in Cohort 3 made larger gains in math compared to children in Cohort 2 (16 vs. 12 months), when the standard score results show the opposite (Figure A7; Mueller, 2008). Again, it should also be noted that the average number of days between the testing periods has varied somewhat across the cohorts.

Variations in academic progress among demographic groups

PEK students' progress during the pre-kindergarten year was examined within the specific demographic groups targeted by the program (Mueller & Gozali-Lee, 2007; Mueller, 2008). The results show that, on average, ELL students made significantly larger gains than non-ELL students in some areas, including vocabulary for Cohorts 1 and 3, math for Cohorts 1 and 2, and reading for Cohort 1 only. Students in Special Education made significantly less progress than other students in reading for Cohorts 1 and 3 and in writing for Cohort 1 only. In contrast, students in Special Education made significantly larger gains than other students in math for Cohort 2. Results for Cohort 1 indicate that students who were eligible for free or reduced-price lunch made significantly larger gains than students who were ineligible in the areas of vocabulary and reading. However, results for Cohorts 2 and 3 showed no significant differences on this income measure in any of the four areas. Lastly, the results suggest some significant differences based on race/ethnicity, although the findings are not very consistent across the cohorts and measures. The most consistent finding is that Asian students made significantly larger gains than some other racial/ethnic groups, most frequently White students. This result was found for Cohorts 1 and 3 in the areas of vocabulary and math, and for Cohort 1 only in the area of reading (Figures A8-A11 for Cohort 3 and Mueller, 2008 for Cohorts 1 and 2).

6. PEK school component. Changes in academic test standard scores from pre-kindergarten to kindergarten: PEK Cohort 1 (fall 2005 to fall 2006), Cohort 2 (fall 2006 to fall 2007), and Cohort 3 (fall 2007 to fall 2008)



Note: *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are also age-standardized. This means that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to one's peers nationally. One-year changes in standard scores were statistically significant for each group in each subject, with the exception of Cohort 1 and Cohort 3 children in math (see Figure A6).*

Kindergarten readiness compared to similar children

Kindergarten readiness is assessed in two ways: 1) by comparing PEK children to similar children who applied and were selected for PEK but who have not yet participated, and 2) by comparing PEK children to their kindergarten classmates. This section discusses kindergarten readiness compared to similar children selected for PEK. The comparison is based on the Peabody and Woodcock-Johnson academic assessments conducted by Wilder Research.

Using the "birthday cutoff" method (see Figure A1), children who just finished PEK are compared to children who are just beginning the program. An advantage of this analysis is that it minimizes the selection bias that could occur if there were differences between families who chose PEK for their children and families who did not. Children who just finished PEK constitute the "treatment" group, and children who are just beginning PEK constitute the "no-treatment" comparison group. Again, because children in the two groups are different ages, a statistical model is used to estimate the difference in scores between the two groups right at the program's September 1 birthday cutoff date for enrollment. At this point, the two groups are essentially the same age, but one has participated in PEK and the other has not. The birthday cutoff analysis has been conducted twice in this study: once when Cohort 1 was beginning kindergarten (treatment group) and Cohort 2 was just beginning PEK (no-treatment group), and once when Cohort 2 was beginning kindergarten (treatment group) and Cohort 3 was beginning PEK (no-treatment group).

In the analyses, adjustments are made to account for any differences between the two cohorts being compared in their demographic characteristics and testing dates, as well as for the differences in baseline scores between the cohorts being compared. It is important to note that these adjustments may not completely correct for these differences.

Cohort 1 entering kindergarten compared to Cohort 2 entering PEK

Based on the birthday cutoff analysis, when PEK school-based Cohort 1 children started kindergarten they were considerably ahead of same-age children who had chosen but not yet received PEK. Again, this is based on statistical estimates of differences between Cohort 1 and Cohort 2 at the program's September 1 birthday cutoff date, where they were essentially the same age. Cohort 1 had completed PEK, and Cohort 2 was just beginning the program. There were statistically significant differences in vocabulary and reading, writing, and math test scores at the birthday cutoff date in favor of children who had attended PEK. The size of the PEK impact on scores is estimated to be between medium and large for vocabulary and reading, and large for writing and math (Figure A12). However, the size of the program's impact on writing and math might be

overestimated due to significant differences between Cohorts 1 and 2 in their pretest (fall of PEK) writing and math scores that raise concerns about the equivalency of cohorts at the cutoff. Baseline scores for Cohort 1 children were higher than Cohort 2 in both writing and math, on average. We also made an adjustment for these baseline score differences, which estimated that the impact of PEK might be medium to large rather than large (Maxfield, Gozali-Lee, & Mueller, 2010)

In age-equivalency terms, this analysis found a difference of 12 months between the two groups in their vocabulary scores. This means that children who attended PEK were estimated to be 12 months ahead of where they would have been without attending the program. Children who attended PEK were estimated to be 8 months ahead in reading, 12 months ahead in writing, and 10 months ahead in math compared to where they would have been without participating in PEK (Figure A13; Mueller & Gozali-Lee, 2007). However, differences between the cohorts at baseline suggest that the writing and math results may be overestimated. Rough estimates adjusting for the differences at baseline suggests that the children who attended PEK were ahead by nine months in writing and by six months in math. As has been seen in some other analyses of PEK results, a look at the impact within individual demographic groups suggests that Cohort 1 White students benefited less from the program than other students (Mueller & Gozali-Lee, 2007).

Cohort 2 entering kindergarten compared to Cohort 3 entering PEK

A year later, we conducted the birthday cutoff analysis when Cohort 2 was entering kindergarten and Cohort 3 was entering PEK. In this case, Cohort 2 served as the "treatment" group and Cohort 3 as the "no-treatment" comparison group. Again, we used a statistical model to estimate differences between the two groups at the program's birthday cutoff point, where the groups were essentially the same age.

As with the initial analyses based on Cohorts 1 and 2, results again indicated that children who had participated in PEK had substantially more advanced skills in vocabulary, reading, and writing compared to same-age children who had chosen but not received the program, as evidenced by statistically significant differences in test scores at the birthday cutoff date. The size of the PEK impact was estimated to be between medium and large in these areas. On the other hand, the math advantage observed for Cohort 1-2 birthday cutoff analysis was not observed for Cohort 2-3 analysis, as there was not a statistically significant difference in math test score at the birthday cutoff date (Figure A12). However, the writing and math results are likely to be underestimated due to significant differences between Cohorts 2 and 3 in their pretest (fall of PEK) writing and math scores. In this case, Cohort 3 children had higher baseline scores than Cohort 2 children in both writing and math. We made an adjustment for these baseline score differences, which estimated

that the impact of PEK might be large (rather than medium to large) for writing, and small (rather than insignificant) for math (Maxfield, Gozali-Lee, & Mueller, 2010).

In age-equivalency terms, PEK children were estimated to have a 10-month advantage in vocabulary, a 6-month advantage in reading skills, a 9-month advantage in writing skills, and a 3-month advantage in math skills (Figure A14; Mueller, 2008). Differences between the cohorts in baseline scores suggest that the writing and math results may be underestimated. A crude adjustment for these differences suggests that PEK children may have experienced a 12-month advantage in writing and a 4-month advantage in math.

Because the incoming PEK cohorts differed in their baseline scores, in general comparing results of the two birthday cutoff analyses (Cohort 1-2 analysis vs. Cohort 2-3 analysis) may be misleading. Still, even when looking at only the two subject areas (reading and vocabulary) in which baseline scores were more comparable for both groups being compared, the size of the PEK impact seems to be consistent across the two analyses. In this case, the size of the PEK impact is estimated at between medium and large for vocabulary (effect size of 0.69 for Cohort 1-2 analysis and 0.58 for Cohort 2-3 analysis) and large for reading (effect size of 0.75 for Cohort 1-2 analysis and 0.71 for Cohort 2-3 analysis) (Figure A12).

Comparisons to other programs

The birthday cutoff method has been used in several studies of state-funded preschool programs around the country to determine program effects on children's test scores when they reached kindergarten. Using these studies, we are able to compare PEK's results with those of state-funded preschool programs in eight other states. Overall, the estimated effect tended to be larger for PEK on the Peabody Picture Vocabulary Test. The estimated effect in Letter-Word Identification (reading) for PEK is similar to one study that also used the same Woodcock-Johnson assessments, but there was no consistent trend on the Woodcock-Johnson writing and math, based on the two birthday cutoff analyses conducted (Figures A12 & A15; Mueller & Gozali-Lee, 2007). However, there are limitations to these comparisons that should be kept in mind. As previously mentioned, we made adjustments where there were differences in baseline test scores of PEK cohorts being compared, and it is possible that our adjustments did not entirely correct for the impact on results. Other studies' limitations in this area are unknown because baseline assessments were not available for both cohorts. Additionally, the proportion of English Language Learners in our study may account for some of the difference in results. There could also be other meaningful differences between the programs.

Kindergarten readiness compared to classmates

When they reach kindergarten, former PEK students are also compared to their kindergarten classmates. Former PEK school students are followed as long as they attend kindergarten in Saint Paul, even if they attend kindergarten at a school other than the 10 original PEK schools. The classmate comparison group is defined as kindergarten classmates of former PEK children at the 10 original PEK schools. Some classmates have had prior preschool or child care center experience, and some have not. We compare former PEK students to each of these two classmate comparison groups: those with prior preschool or child care center experience and those without. Comparisons are made based on the Peabody and Woodcock-Johnson assessments and the Social Skills Rating System.

Analyses presented here incorporate adjustments for differences among the groups in their demographic characteristics and when in the fall children were tested. It is important to note that former PEK children may also differ from their kindergarten classmates in other important ways. For example, families who apply for PEK may differ in motivation, knowledge, or other important factors from those who do not. In that sense, the birthday cutoff analysis described in the preceding section offers advantages. Still, we feel that comparing former PEK students to their kindergarten classmates provides insights into how PEK compares to other experiences children may have before kindergarten.

Academic assessments

In fall of their kindergarten year, in general children who had participated in PEK Cohorts 1-3 scored higher on average in each of the four academic areas than kindergarten classmates who had other preschool or child care center experience. Classmates without prior preschool or child care center experience scored lowest of the three groups on average in each area. The academic advantage for PEK children compared to their kindergarten classmates with prior preschool or child care center experience was significant in vocabulary only for Cohort 1 children, while children in Cohorts 2 and 3 experienced a significant advantage in all four academic areas. Compared to classmates without prior preschool experience, PEK children in all three cohorts experienced significant advantages on average in all four academic areas, including vocabulary, reading, writing, and math (Figures A16-A18).

Comparing PEK children to classmates who had preschool experience, the effect sizes tend to be in or near the small to medium range. The size of PEK's effects are generally larger when PEK children are compared to classmates who did not attend preschool or a child care center, tending to be in or near the medium to large range (Figure A19). These results suggest that PEK provides benefits beyond those received by most kindergarten children in their pre-kindergarten experiences. In addition, the results suggest that the size of PEK's effect has grown with each successive cohort.

Despite the significant advantages for children who attended PEK, their test scores in fall of kindergarten were nonetheless below the national average for vocabulary and math, as might be expected given PEK students' demographic characteristics. On the other hand, their scores in reading and writing were above the national average.

Academic results in age-equivalency terms

Translating scores into age-equivalency terms provides another meaningful way to examine these results, although it should be noted again that age-equivalency scores are a less exact measure than standard scores.

PEK children were estimated to have an advantage over classmates with other preschool or child care experiences in vocabulary, ranging from a three-month advantage for Cohort 1, to a six-month advantage for Cohort 2 and an eight-month advantage for Cohort 3. Compared to classmates without prior preschool experience, the PEK advantage in vocabulary was estimated to be 5 months for Cohort 1, 9 months for Cohort 2, and 11 months for Cohort 3.

In reading, PEK children in Cohort 1 had similar scores on average compared to their classmates with prior preschool experience, while PEK children in Cohorts 2 and 3 were estimated to have an advantage. This advantage amounted to five months for Cohort 2 and two months for Cohort 3. When compared to classmates without prior preschool experience, all three PEK cohorts had an advantage in reading. This advantage was estimated to be four months for Cohort 1, six months for Cohort 2, and five months for Cohort 3.

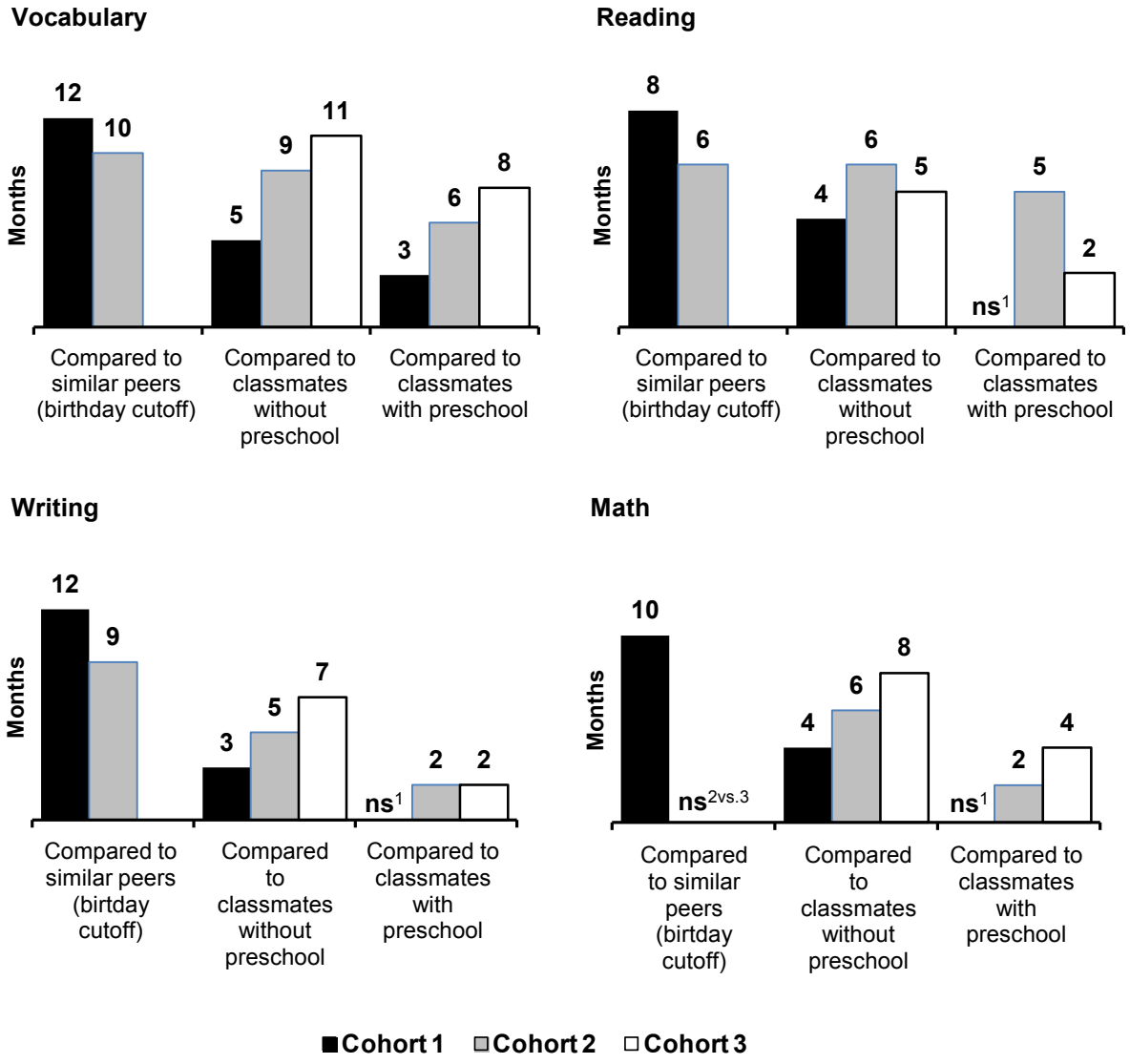
While PEK children in Cohort 1 appeared to have similar writing skills compared to their classmates with prior preschool experience, PEK children in Cohorts 2 and 3 were estimated to have a two-month advantage over these peers on average. Compared to classmates without prior preschool experience, PEK children were estimated to have an advantage in writing ranging from three to five to seven months for children in Cohorts 1, 2, and 3, respectively.

In math, PEK children in Cohort 1 had similar skills compared to their classmates with prior preschool experience, while Cohort 2 had a two-month advantage and Cohort 3 had a four-month advantage, on average. The PEK advantage in math over classmates without prior preschool experience ranged from four months for Cohort 1 to six months for Cohort 2 and eight months for Cohort 3 (Figure A20).

Figure 7 illustrates the advantages of PEK in kindergarten in age-equivalency terms. PEK students are compared to the three comparison groups that have been presented: 1) the birthday cutoff comparison group discussed in the previous section, 2) kindergarten

classmates without prior preschool or child care center experience, and 3) kindergarten classmates with prior preschool or child care center experience. As shown in the figure, there tends to be a pattern of stronger advantages over kindergarten classmates for Cohort 2 compared to Cohort 1, and stronger advantages for Cohort 3 than for both of the previous cohorts. Again, this trend may be associated with the development of PEK over time. While results of the birthday cutoff analysis appear stronger for Cohort 1 vs. 2 than Cohort 2 vs. 3 in general, again that may reflect the impact of differences in baseline test scores in writing and math that may overestimate the results for Cohort 1-2 analysis and underestimate the results for Cohort 2-3 analysis.

7. PEK school component. Difference in age-equivalency scores in kindergarten: PEK students compared to peer groups



Note: *This figure presents the differences in months between the average age-equivalency scores of PEK Cohorts 1, 2, and 3 and their peer groups upon kindergarten entry, shown only for differences that were statistically significant based on the standard score results. The birthday cutoff analysis (first set of columns) was done for Cohort 1 vs. 2 and Cohort 2 vs. 3. Positive numbers indicate that the PEK age-equivalency score was higher by that number of months than the peer group age-equivalency score. In other words, children who attended PEK were estimated to be that many months ahead of children in the peer group upon kindergarten entry on average. All scores are adjusted for demographic and test date differences between the groups being compared. ns = No significant difference between the PEK cohort and the comparison group. The superscript numeral signifies the cohort.*

Teacher ratings

Using the Social Skills Rating System, teachers rated former PEK children and their kindergarten classmates on their social skills, problem behaviors, and academic competence in fall of their kindergarten year. The analyses presented here incorporate adjustments for differences among the PEK and classmate comparison groups in their demographic characteristics.

Findings show that Cohort 1 children had an advantage over their classmates without prior preschool experience in social skills and academic competence, but not in problem behaviors. They scored similarly with classmates who had prior preschool experience. Results were stronger for former PEK children in Cohorts 2 and 3. These children had more positive teacher ratings on average in each of the three areas than both of the classmate groups, those with and those without prior preschool experience. In all three areas, differences between PEK children in Cohorts 2 and 3 and the two classmate groups were statistically significant (Figures 8 and A21-A23).

Compared to national norms, PEK children in all three cohorts exhibited stronger social skills and fewer problem behaviors on average. On the other hand, teachers' ratings of their academic competence were below national norms on average, which might be expected given the students' demographic characteristics (large percentage of ELL).

8. PEK school component. Teachers' ratings in kindergarten: PEK students vs. kindergarten classmates

Assessment	PEK Cohort 1 compared to kindergarten classmates[a]	
Social Skills Rating System	With preschool/ child care center	Without preschool/ child care center
Total Social Skills[b]	No difference	Advantage for PEK
Problem Behaviors[b]	No difference	No difference
Academic Competence[b]	No difference	Advantage for PEK
	PEK Cohort 2 compared to kindergarten classmates[a]	
	With preschool/ child care center	Without preschool/ child care center
Total Social Skills[b]	Advantage for PEK	Advantage for PEK
Problem Behaviors[b]	Advantage for PEK	Advantage for PEK
Academic Competence[b]	Advantage for PEK	Advantage for PEK
	PEK Cohort 3 compared to kindergarten classmates[a]	
	With preschool/ child care center	Without preschool/ child care center
Total Social Skills[b]	Advantage for PEK	Advantage for PEK
Problem Behaviors[b]	Advantage for PEK	Advantage for PEK
Academic Competence[b]	Advantage for PEK	Advantage for PEK

Note: *Includes only students who were rated on both social and academic skills. The analysis adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[a] *Kindergarten classmates were divided into two groups: those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[b] *"Advantage" means higher social skills, fewer problem behaviors, or higher academic competence social skills.*

Differences in first grade compared to classmates

Former PEK participants in Cohorts 1-3 and their classmate comparison groups were assessed again in fall of first grade using the same tools used in earlier years, the Peabody and Woodcock-Johnson academic assessments and the Social Skills Rating System. At this time, PEK and comparison group students were compared on the progress made during their kindergarten year as well as their academic and social skills results in fall of first grade. As previously described, the classmate comparison group consists of PEK children's kindergarten classmates in the 10 PEK schools. After kindergarten, students in both the former PEK group and the classmate comparison group are followed as long as they remain in schools in Saint Paul.

Academic assessments

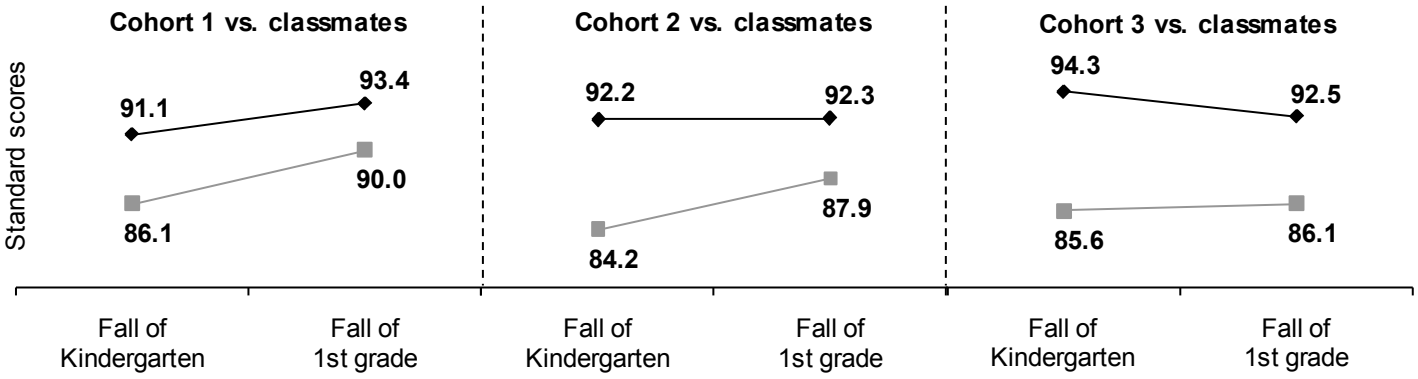
Progress between kindergarten and first grade

Between fall of kindergarten and fall of first grade, former PEK students in Cohort 1 made faster progress than their peers nationally on all four academic assessments, measuring vocabulary, reading, writing, and math skills. Students in PEK Cohort 2 made significant gains in reading and math only, and not in vocabulary and writing. Students in Cohort 3, however, made slower than expected progress in vocabulary, reading, and writing skills and made accelerated progress in math skills.

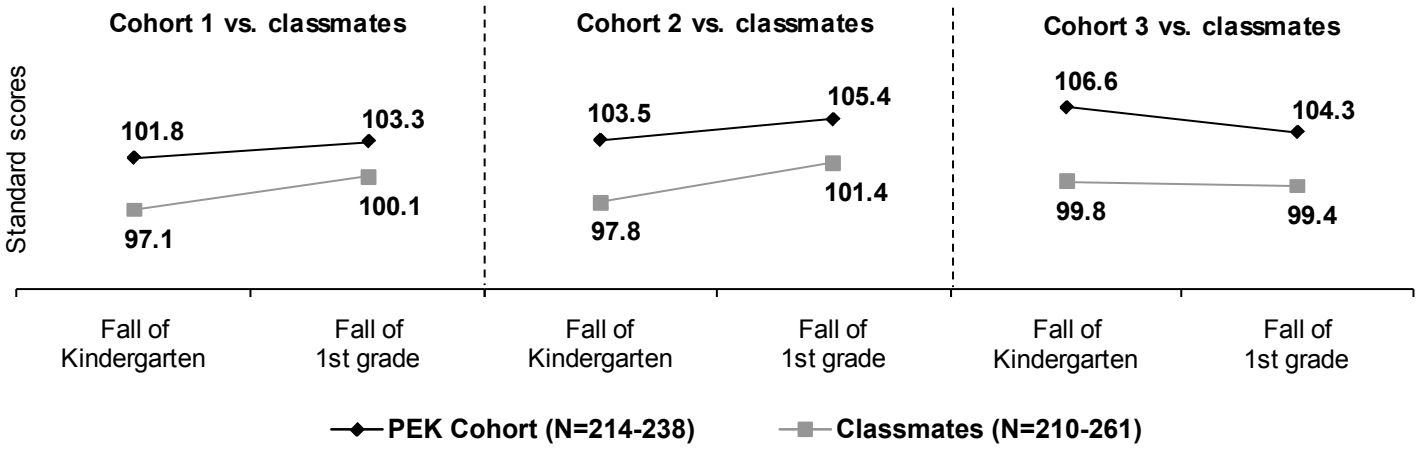
Although former PEK students in Cohort 1 made accelerated progress compared to their peers nationally, their classmate comparison group made even more accelerated progress on each of the four academic measures during the kindergarten year, on average. Similarly, the Cohort 2 classmate comparison group made larger and significant gains on all of the four academic assessments. Cohort 3 comparison classmates made accelerated progress in math, normative progress in vocabulary and reading, and slower than expected progress in writing skills during the kindergarten year, on average. As shown in Figure 9, classmates' larger gains narrowed the gaps that were seen between former PEK students and their classmates in fall of kindergarten. Still, former PEK students continued to score higher on average than their classmates in all four academic areas in fall of first grade (Figures A24-A29). It should be noted that former PEK students' progress was compared to the total classmate comparison group, including both those with and those without prior preschool or child care center experience.

9. PEK school component. Changes in academic test standard scores from kindergarten to first grade: PEK Cohort 1 vs. classmates* (fall 2006 to fall 2007), PEK Cohort 2 vs. classmates* (fall 2007 to fall 2008), and PEK Cohort 3 vs. classmates* (fall 2008 to fall 2009)

Vocabulary

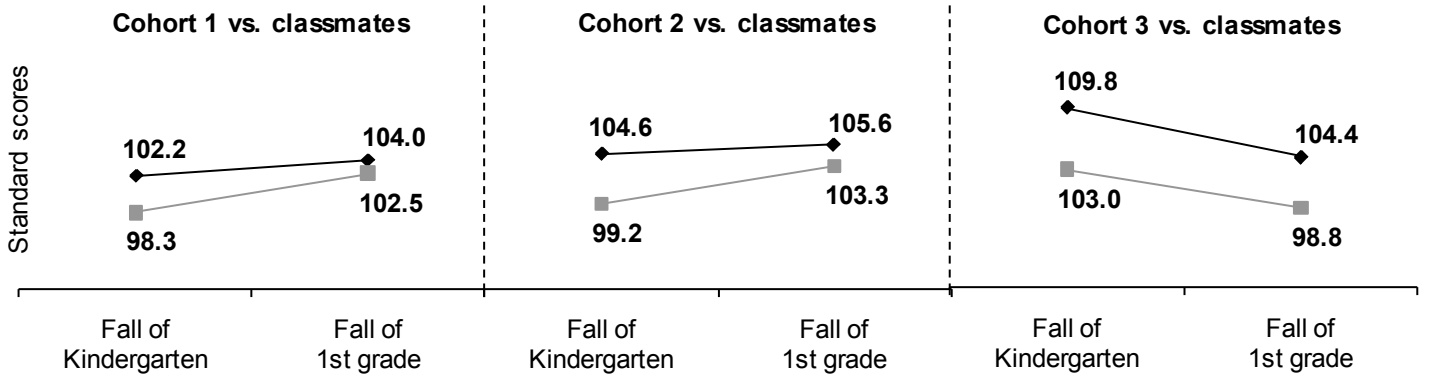


Reading

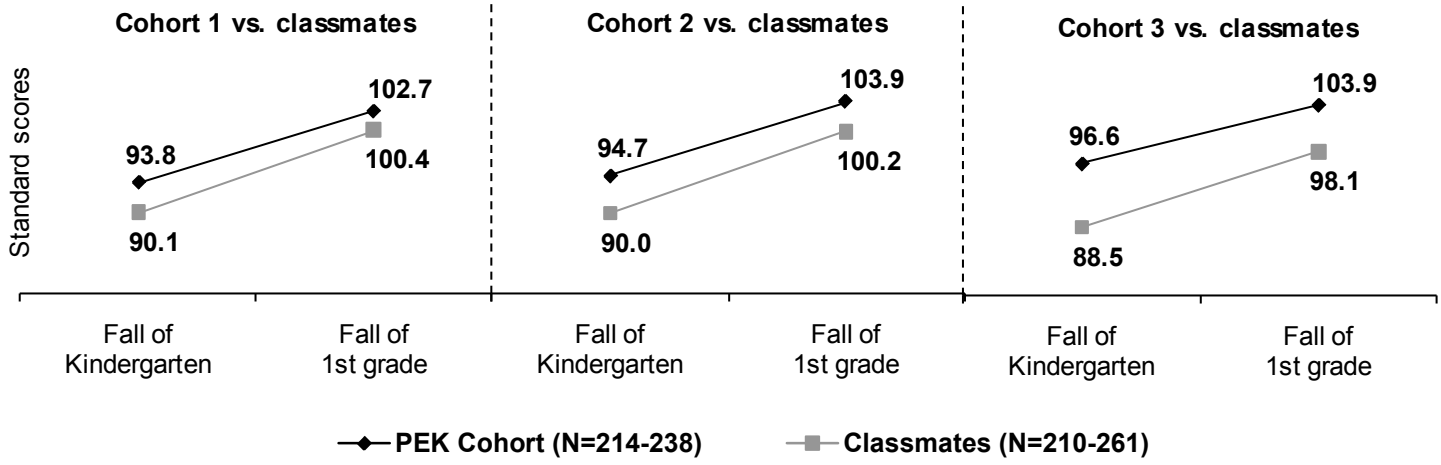


9. PEK school component. Changes in academic test standard scores from kindergarten to first grade: PEK Cohort 1 vs. classmates* (fall 2006 to fall 2007), PEK Cohort 2 vs. classmates* (fall 2007 to fall 2008), and PEK Cohort 3 vs. classmates* (fall 2008 to fall 2009) (continued)

Writing



Math



Notes: *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are also age-standardized. This means that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

** The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. For purposes of this analysis, the kindergarten classmate group includes both classmates with and classmates without prior preschool or child care experience.*

The difference in progress between the two groups can also be viewed in terms of age-equivalency scores. In the fall of kindergarten, the average age-equivalency vocabulary score for PEK Cohort 1 children was 4 years 11 months. It increased to 6 years 1 month in the fall of first grade, for a gain of 14 months. The comparable age-equivalency scores for PEK Cohort 2 children were 5 years 0 months and 6 years 2 months, again representing a 14-month gain in vocabulary during the kindergarten year. For PEK Cohort 3 children, the age-equivalency vocabulary score increased 10 months, from 5 years 4 months to 6 years 2 months during the same period. Nonetheless, the number of months gained on all four academic measures is higher for the classmate comparison groups than for the PEK students (Figures A30-A32).

PEK's impact in first grade

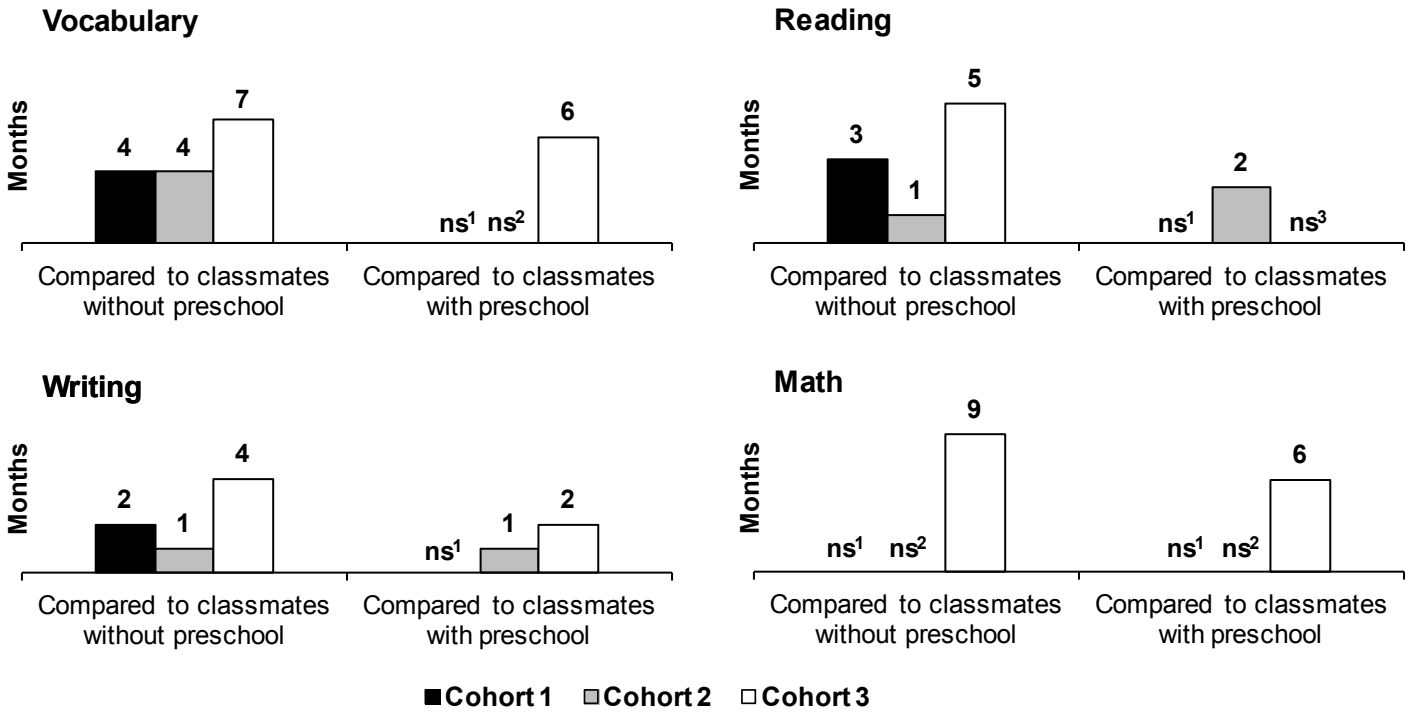
Evaluators compared PEK students' fall of first-grade test results with those of their classmate comparison group. As was done in kindergarten, the classmate group was divided into those with other preschool or child care center experience prior to kindergarten and those without. Analyses presented here incorporate adjustments for demographic differences among PEK and classmate comparison groups as well as when in the fall each child was tested. As would be expected given the preceding discussion of children's progress from kindergarten to first grade, results suggest that the academic advantages that PEK students gained from attending PEK had lessened somewhat by fall of first grade.

In fall of first grade, PEK children continued to show advantages over classmates who did not have other preschool or child care center experience prior to kindergarten. Former PEK participants in all three cohorts scored higher on average than their classmate comparison groups without preschool on all four measures, with the exception of math skills for students in Cohorts 1 and 2 (Figures A33-A36). Effect sizes tended to be small for Cohorts 1 and 2, and medium for Cohort 3 (Figure A37). As shown in Figure 10, former PEK cohorts were ahead of their respective classmate comparison groups without preschool in vocabulary by an estimated four months for Cohorts 1 and 2 and seven months for Cohort 3. In reading, the advantage amounted to an average of three months for Cohort 1, one month for Cohort 2, and five months for Cohort 3. In addition, former PEK students were estimated to have an advantage in writing of two months for Cohort 1, one month for Cohort 2, and four months for Cohort 3. Cohorts 1 and 2 scored similarly to their classmates without preschool experience in math, whereas former PEK students in Cohort 3 demonstrated a nine-month advantage (Figures 10 and A33-A36).

Compared to classmates with prior preschool experience before kindergarten, PEK Cohort 1 students did not score significantly differently on any of the measures in fall of first grade. Results were stronger, but mixed, for students in Cohorts 2 and 3. Both

Cohorts 2 and 3 maintained significant advantages over classmates with prior preschool experience in writing, amounting to one and two months, over their respective classmate comparison groups. In addition, Cohort 3 students were ahead of their classmates with preschool experience by an average of six months in both vocabulary and math, but were not significantly different from classmates in reading skills. Cohort 2 no longer had significant advantages in vocabulary and math, but did maintain a significant two-month advantage in reading over classmates with preschool experience (Figures 10 and A33-A36). As shown in Figure A37, where differences were found compared to classmates with prior preschool, effect sizes tended to be in the small to medium range.

10. PEK school component. Difference in age-equivalency scores in first grade: PEK Cohorts 1-3 compared to their classmates*



Note: *This figure presents the differences in months between the age-equivalency scores of PEK Cohorts 1-3 and their respective classmate comparison groups in fall of first grade, shown only for differences that were statistically significant based on the standard score results. Positive numbers indicate that the PEK age-equivalency score was higher by that number of months than the classmate group age-equivalency score. In other words, children who attended PEK were estimated to be that many months ahead of children in the classmate group when they entered first grade. All scores are adjusted for demographic and test date differences between the groups being compared.*

ns = No significant difference between the PEK cohort and the comparison group. The superscript numeral signifies the cohort.

* *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

Teacher ratings

As was done in kindergarten, teachers used the Social Skills Rating System to rate former PEK children and their classmates on their social skills, problem behaviors, and academic competence in fall of first grade. The analyses presented here incorporate adjustments for demographic differences among the PEK and classmate comparison groups. Similar to the academic assessment results, the social skills results also suggest that PEK children's advantages were reduced by fall of first grade.

In the fall of kindergarten, former PEK children in Cohorts 1, 2, and 3 received significantly higher teacher ratings in social skills on average compared to their classmates without preschool or child care center experiences before kindergarten. PEK Cohorts 2 and 3 also had a significant advantage in social skills over their classmates with preschool experience. However, a year later, in fall of first grade, these advantages in social skills were no longer evident.

As for problem behaviors, PEK children in Cohort 1 were rated similarly to their classmates with and without preschool experience both in fall of kindergarten and in fall of first grade. On the other hand, PEK Cohorts 2 and 3 were rated as exhibiting significantly fewer problem behaviors in kindergarten compared to both of their classmate comparison groups, those with and those without preschool experience. By fall of first grade, PEK Cohort 2 continued to have a significant advantage in behavior over classmates with preschool experience, but not over classmates without such experience. The effect size for the difference between PEK Cohort 2 and classmates with preschool was estimated to be small (Figure A41). Advantages in problem behaviors over classmates with and without preschool experience were no longer evident for PEK Cohort 3 children in first grade.

In academic competence, PEK students in Cohorts 1, 2, and 3 had an advantage in fall of kindergarten over their respective classmate comparison groups with no preschool experience. In addition, Cohorts 2 and 3 had an advantage over their classmates with preschool experience. By fall of first grade, PEK Cohorts 1 and 3 but not Cohort 2 maintained their advantages in academic competence over classmates without preschool experience. Although its advantage over classmates without preschool experience was no longer evident, PEK Cohort 2 maintained its advantage over classmates with preschool experience in fall of first grade (Figures 11 and A38-A40). Effect sizes for the differences in academic competence observed in fall of first grade were in the small to medium range (Figure A41).

11. PEK school component. Teachers' ratings in first grade: PEK students vs. classmates

Assessment	PEK Cohort 1 compared to classmates[a]	
Social Skills Rating System	**With preschool/ child care center**	**Without preschool/ child care center**
Total Social Skills[b]	No difference	No difference
Problem Behaviors[b]	No difference	No difference
Academic Competence[b]	No difference	Advantage for PEK
	PEK Cohort 2 compared to classmates[a]	
	With preschool/ child care center	**Without preschool/ child care center**
Total Social Skills[b]	No difference	No difference
Problem Behaviors[b]	Advantage for PEK	No difference
Academic Competence[b]	Advantage for PEK	No difference
	PEK Cohort 3 compared to classmates[a]	
	With preschool/ child care center	**Without preschool/ child care center**
Total Social Skills[b]	No difference	No difference
Problem Behaviors[b]	No difference	No difference
Academic Competence[b]	No difference	Advantage for PEK

Note: *Includes only students who were tested on both social and academic skills. The analysis adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[a] *Classmates were divided into two groups: those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[b] *"Advantage" means higher social skills, fewer problem behaviors, or higher academic competence.*

Differences in second grade compared to classmates

PEK children in Cohorts 2 and 3 and their classmate comparison groups were assessed again in the fall of second grade, using the same assessments used in earlier years. At this time, PEK and comparison group students were compared on the progress made during their first-grade year as well as their academic and social skills results in fall of second grade. PEK Cohort 1 children were not assessed in second grade. As described earlier, the classmate comparison group consists of PEK children's kindergarten classmates in the 10 PEK schools, who are followed after kindergarten as long as they remain in schools in Saint Paul.

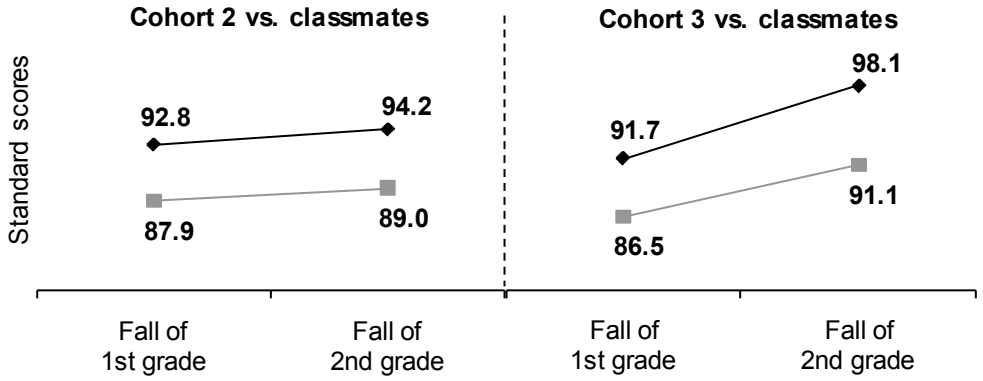
Academic assessments

Progress between first and second grade

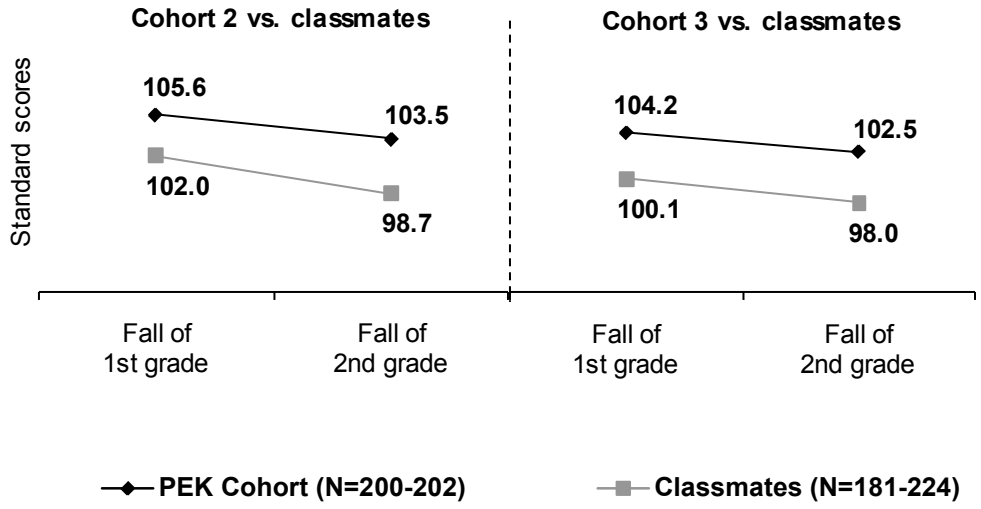
Between fall of first grade and fall of second grade, PEK Cohort 2 and 3 children made accelerated progress in vocabulary and slower than expected progress in reading and writing compared to peers nationally, on average. Cohort 3 children also made accelerated progress in math, while Cohort 2 children made normative progress. Their respective classmates made similar progress to PEK students on all four academic measures, except with Cohort 3 in vocabulary. In this case, PEK Cohort 3 children made significantly larger gains than their comparison classmates (Figures 12 and A42-A47).

12. PEK school component. Changes in academic test standard scores from first to second grade: PEK Cohort 2 vs. classmates* (fall 2008 to fall 2009) and PEK Cohort 3 vs. classmates* (fall 2009 to fall 2010)

Vocabulary

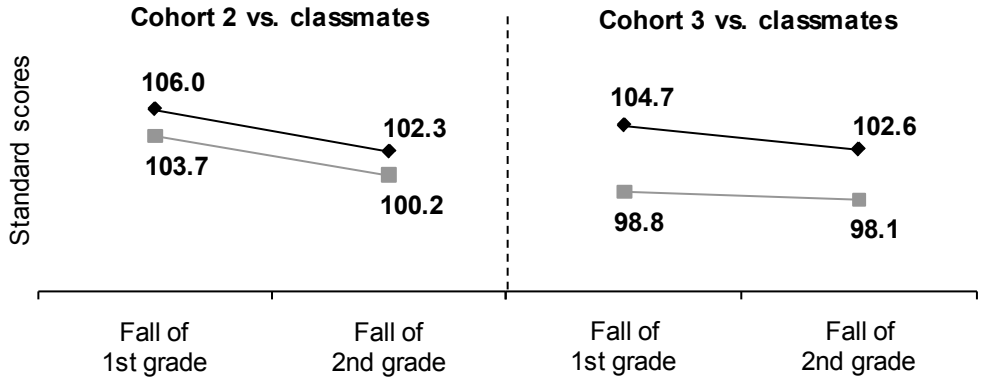


Reading

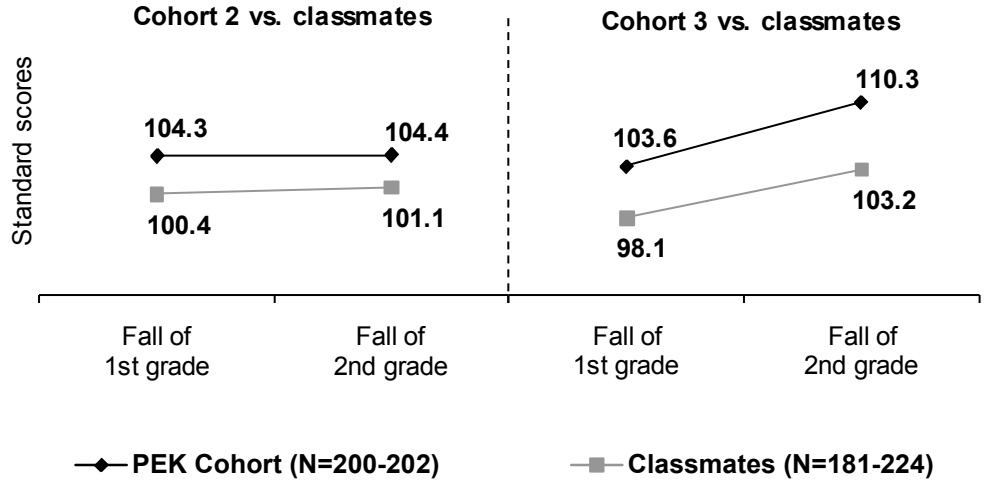


12. PEK school component. Changes in academic test standard scores from first to second grade: PEK Cohort 2 vs. classmates* (fall 2008 to fall 2009) and PEK Cohort 3 vs. classmates* (fall 2009 to fall 2010) (continued)

Writing



Math



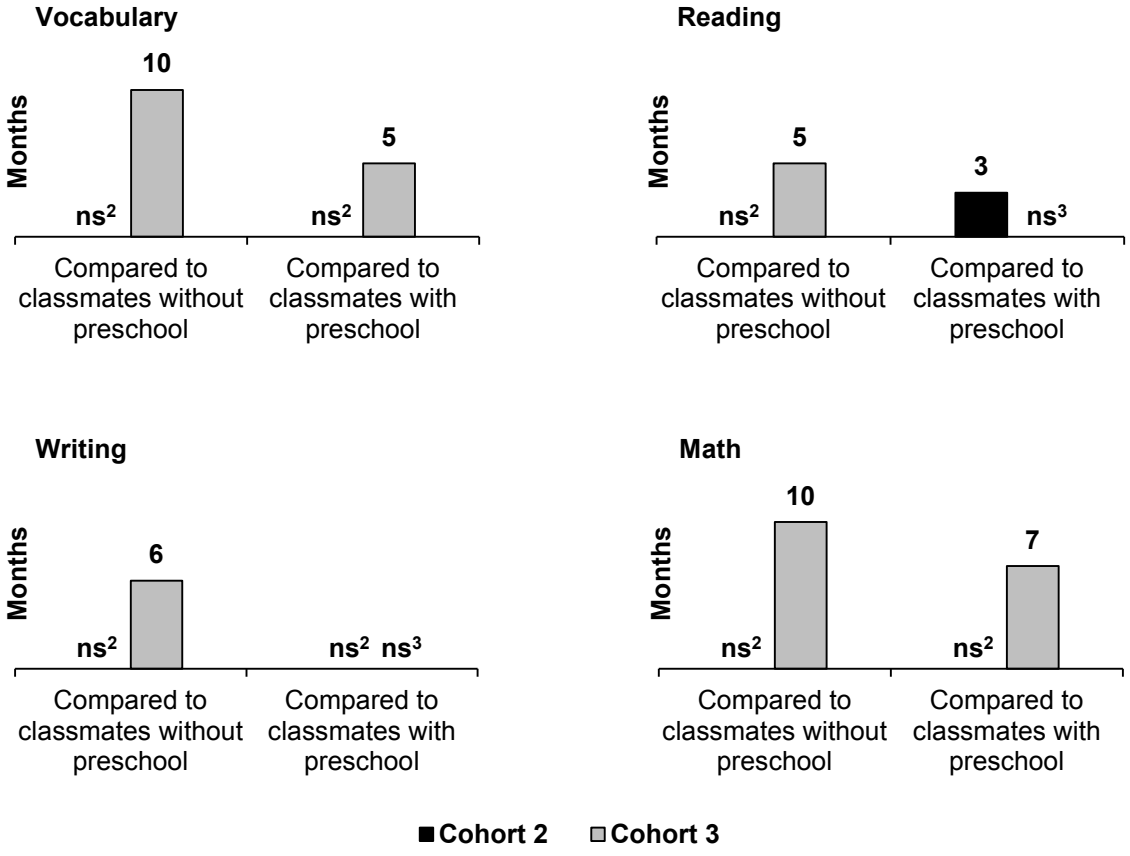
Notes: *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are also age-standardized. This means that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

** The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. For purposes of this analysis, the kindergarten classmate group includes both classmates with and classmates without prior preschool or child care experience.*

PEK's impact in second grade

PEK's impact on student academic skills in second grade seems to be larger for Cohort 3 than for Cohort 2 children. In fall of second grade, PEK Cohort 2 children continued to have an advantage over their classmates with other preschool or child care center experience prior to kindergarten in reading. Advantages over these students in the other academic measures and over the classmates without preschool were not evident (Figures A48-A49). In contrast, PEK Cohort 3 children scored higher on average than their classmate comparison group without preschool on all four measures and higher than their classmates with preschool on two measures. Effect sizes for the differences over those without prior preschool tended to be in the medium range, and for the differences found over those with prior preschool tended to be in the small range (Figure A50). As shown in Figure 13, PEK Cohort 3 children had a 10-month advantage in vocabulary and math, a 5-month advantage in reading, and a 6-month advantage in writing over classmates without preschool experiences. Compared to their classmates with preschool, PEK Cohort 3 children had five-month and seven-month advantages in vocabulary and math on average, respectively (Figures A50-A51).

13. PEK school component. Difference in age-equivalency scores in second grade: PEK Cohorts 2 and 3 compared to their classmates*



Note: *This figure presents the differences in months between the age-equivalency scores of PEK Cohorts 2-3 and their respective classmate comparison groups in fall of second grade, shown only for differences that were statistically significant based on the standard score results. Positive numbers indicate that the PEK age-equivalency score was higher by that number of months than the classmate group age-equivalency score. In other words, children who attended PEK were estimated to be that many months ahead of children in the classmate group when they entered second grade. All scores are adjusted for demographic and test date differences between the groups being compared.*

ns = No significant difference between the PEK cohort and the comparison group. The superscript numeral signifies the cohort.

** The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

Teacher ratings

Similar to the academic assessment results, PEK's impact on student social skills in second grade seems to be larger for Cohort 3 than Cohort 2 children. In fall of second grade, children in PEK Cohort 2 scored similarly to their classmates with and without prior preschool experience on teachers' ratings of social skills, problem behaviors, and academic competence (Figures 14 and A52). Hence, advantages seen in the fall of first grade were no longer present. PEK Cohort 3 children, however, scored higher than their classmates with and without prior preschool experience on teachers' ratings of social skills and academic competence. They also scored lower on problem behaviors (meaning they exhibited fewer problem behaviors) than their classmates without prior preschool experience (Figures 14 and A53). Effect sizes for differences tended to be in the small range (Figure A53).

14. PEK school component. Teachers' ratings in second grade: PEK students vs. classmates

Assessment	PEK Cohort 2 compared to classmates[a]	
Social Skills Rating System	With preschool/ child care center	Without preschool/ child care center
Total Social Skills[b]	No difference	No difference
Problem Behaviors[c]	No difference	No difference
Academic Competence[d]	No difference	No difference
	PEK Cohort 3 compared to classmates[a]	
	With preschool/ child care center	**Without preschool/ child care center**
Total Social Skills[b]	Advantage for PEK	Advantage for PEK
Problem Behaviors[c]	No difference	Advantage for PEK
Academic Competence[d]	Advantage for PEK	Advantage for PEK

Note: *Includes only students who were tested on both social and academic skills. The analysis adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[a] *Classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[b] *"Advantage" means higher social skills, fewer problem behaviors, or higher academic competence*

Differences in third grade compared to classmates

Children who participated in school-based Cohorts 1, 2, and 3 of PEK were in third grade in 2009-10, 2010-11, and 2011-12, respectively. Data on these children, along with their classmate comparisons, allow us to estimate the potential ongoing impact of PEK. Rather than conducting Peabody and Woodcock-Johnson assessments as in the earlier grades, we relied on available data from the statewide and district assessments. Third-grade students take the Minnesota Comprehensive Assessments (MCA) in the spring. Additionally, starting in spring 2011, third-grade students district-wide take the Measures of Academic Progress (MAP). Hence, MAP results are available for Cohorts 2 and 3. Both the MCA and MAP measure students' reading and math skills. To supplement the academic data, we examined students' third-grade attendance data and collected teachers' ratings of students' social skills based on the Social Skills Rating System completed in spring of third grade. Analyses compare PEK Cohort children with their respective kindergarten classmates now in third grade. Once again, the classmate comparison group was split into two groups: classmates with and classmates without preschool or child care experience prior to kindergarten.

Overall, some of the results obtained favored PEK children especially in Cohort 3. Cohort 3 PEK children performed better, on average, than their classmates *without* prior preschool experience on reading and math assessments, attendance, and teacher ratings of academic competence. Although Cohort 3 PEK children sometimes had slightly higher average scores on these measures than classmates *with* other preschool experiences, none of the differences was statistically significant. PEK Cohort 2 performed better in reading, on average, than their classmates without prior preschool experience. This was the only significant difference between PEK Cohort 2 children and their classmates in either comparison group. No significant differences were found between PEK Cohort 1 children and their classmates in either comparison group.

PEK's impact in third grade

Evaluators compared the MCA reading and math scale scores of PEK children with the scores of students in their classmate comparison groups, adjusting for demographic characteristics (gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences) among the groups being compared. The range of possible scale scores is 301 to 399 for third graders. Using average scores adjusted for demographic differences between groups, children in PEK Cohorts 1-3 scored slightly above the middle of this range in reading (353) while their classmates with and without preschool experience scored at or slightly below the middle (347-350), with the exception of the Cohort 3 comparison group with preschool experience (353). In math, average scores of Cohort 1 PEK children were slightly above

the middle (353) as were those of the comparison group with preschool experience (356) and that without preschool experience (352). Students' average math scores decreased somewhat when a new version of the MCA math test, based on revised state math standards, was introduced in spring 2011. PEK Cohorts 2 and 3 took the new MCA math test. Cohort 2 and 3 children performed slightly better than classmates on this test, on average, with the largest difference occurring between Cohort 3 PEK children and classmates without prior preschool experience (Figure A54).

None of the differences in average scores in reading and math between PEK Cohort 1 and the classmate comparison groups were statistically significant. In Cohort 2, one statistically significant difference was found – the average reading score for PEK children was significantly higher than that of classmates without prior preschool experience. In Cohort 3, both average reading and math scores of PEK children were significantly higher than those of classmates without prior preschool experience. (Note: The comparison group with prior preschool experience in Cohort 3 also had significantly higher average reading and math scores than the comparison group without preschool experience.) No statistically significant differences were found between the PEK children and classmates in the comparison group with prior preschool experience. These results are summarized in Figure 15.

15. PEK school component. Difference in reading and math assessments in third grade: PEK students vs. classmates

	PEK Cohort 1 compared to classmates[b]	
Assessment[a] in	**With preschool/ child care center**	**Without preschool/ child care center**
Reading	No difference	No difference
Math	No difference	No difference
	PEK Cohort 2 compared to classmates[b]	
Assessment[a] in	**With preschool/ child care center**	**Without preschool/ child care center**
Reading	No difference	Advantage for PEK
Math	No difference	No difference
	PEK Cohort 3 compared to classmates[b]	
Assessment[a] in	**With preschool/ child care center**	**Without preschool/ child care center**
Reading	No difference	Advantage for PEK
Math	No difference	Advantage for PEK

Note: *The analysis adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[a] *Assessments used were Minnesota Comprehensive Assessments (MCA) and Measures of Academic Progress (MAP). Results regarding PEK-comparison group differences were consistent across the two assessments.*

[b] *Classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

The magnitude of the difference in MCA scores between PEK children and classmates without preschool experience ("effect size") was estimated for those differences that were statistically significant. The magnitude of the effect was small for reading in both Cohort 2 (.25) and Cohort 3 (.30) and medium-large for math (.68) in Cohort 3 (Figure A54). (In comparison, the effect size for the difference between the Cohort 3 comparison group with preschool experience and the group without it was .29 for reading and .58 for math.)

In addition to examining scale scores, we also examined students' performance in terms of proficiency levels. The Minnesota state standards define cut points that establish four levels of proficiency: 1) does not meet standards, 2) partially meets standards, 3) meets standards, and 4) exceeds standards. Students who meet or exceed standards are considered to be "proficient." Results were generally consistent with the pattern of differences just presented between PEK children and the classmate comparison groups, based on MCA scale scores. That is, differences in the percentages proficient in reading and math tended to be higher for the PEK children than their classmates without preschool experience, but

more similar between PEK children and classmates with preschool experience. It was not possible to calculate precise proficiency rates for each group adjusting for demographic differences between the groups. Given this situation, we decided not to report proficiency rate differences between PEK children and their classmates. However, we can report the unadjusted rates for PEK for PEK children. In reading, 59 or 60 percent of PEK students were proficient in each of the three cohorts. In math, 69 percent of Cohort 1 PEK students were proficient. This dropped to 43 percent in Cohort 2 when the new MCA math test was introduced, but rose to 55 percent in Cohort 3.

We also examined the MAP reading and math scores for PEK Cohort 2 and 3 children and their comparison classmates, adjusting for demographic differences between the groups. The MAP results are consistent with the MCA results. PEK Cohort 2 and 3 children scored significantly higher in reading than classmates without preschool experience. Cohort 3 PEK children also scored significantly higher than classmates without preschool experience in math. Other differences were not found to be statistically significant. Similar to the MCA results, effect sizes for the statistically significant differences in reading in Cohorts 2 and 3 were small. The effect size in Cohort 3 for math (.48) was medium (Figure A55). (The Cohort 3 comparison group with preschool experience had a significantly higher average math score than the group without preschool experience, with an effect size of .37.)

Teacher ratings

Teachers rated PEK and comparison group students on social skills, problem behaviors, and academic competence in the spring of third grade. In Cohorts 1 and 2, there were no statistically significant differences between average teacher ratings of PEK children and their classmates in either comparison group in social skills, problem behaviors, and academic competence, after adjusting for demographic differences between the groups being compared (Figures A56-A57). However, in Cohort 3, the average rating of PEK children in academic competence was significantly higher than that for their classmates without preschool experience, with a medium effect size (.50). The average rating of academic competence in the comparison group with preschool experience was also significantly higher than that for the comparison group with no preschool experience, with a smaller effect size (.36). Ratings of social skills and problem behaviors did not differ significantly between the groups (Figure A58).

Attendance

We compared the third-grade attendance of PEK Cohort 1-3 children with that of their classmates with and without preschool experience, adjusting for demographic differences. Results show that both PEK Cohort 1 and 2 children attended school 96 percent of the

days they were enrolled, on average. The average attendance rates were similar for Cohort 1 and 2 classmates with and without preschool experience, at 95-96 percent for both comparison groups in both cohorts. In Cohort 3, the average attendance rate of PEK children was significantly higher than that of their classmates without preschool experience (96.1% vs. 94.6%), with a small effect size (Figure A59).

In addition to examining the percentage of days attended, we also examined chronic absenteeism. Students are considered to be "chronically absent" if they miss 11 or more days of school within a school year. It appeared that PEK children in Cohorts 1 and 3 had lower chronic absenteeism rates. However, no statistically significant differences were found between PEK children and their classmates in either comparison group after adjusting for demographic differences between the groups being compared.

Implementation efforts

This section explores the extent to which PEK's school component has been implemented as intended. Implementation results provide insights into factors that may have contributed to the changes seen in PEK Cohort 1, 2, and 3 school participants. We provide overviews of implementation results for the program's first three years, which focused on the program's alignment with the district's K-12 curricular model and promotion of language and literacy development, and for the fourth and fifth years, when the implementation evaluation focus shifted to program integration with kindergarten classrooms and professional development of kindergarten teachers. We then summarize implementation results for the most recent school year, 2010-11, and provide a more detailed presentation of 2010-11 findings in the Appendix. Detailed implementation reports for earlier years have been provided by the Saint Paul Public Schools program evaluator (Heinrichs, 2007) and the independent consultant of Saint Paul Public Schools (Passe, 2008), and summarized in our previous reports (Mohr, Mueller, & Gozali-Lee, 2008b; Mueller & Gozali-Lee, 2007).

Implementation during the initial three years (2005-06 through 2007-08)

For the first three years (2005-06 through 2007-08), the implementation evaluation examined the extent to which PEK classrooms align with the district's K-12 curricular model and promote language and literacy development based on structured classroom observations. Surveys with principals, teachers, and parents were also conducted to assess their satisfaction with PEK; teachers' communication with parents; and parent involvement in children's learning and school activities. Results through the 2007-08 school year indicated that program implementation had increased over time. By the end of the third year, all PEK classrooms were fully implementing at least a majority of the indicators in the district's K-12 curricular model. PEK classrooms had also achieved a high rate of implementation

of the Early Childhood Workshop model. Classrooms also showed a high rate of implementation for most of the indicators related to classroom rituals and routines. Classrooms generally met indicators related to the classroom environment, although in some areas there was room for moving beyond the basic expectations. The evaluation also specifically addressed the extent to which classrooms promote literacy and language development. To this end, independent observers conducted assessments each year using a research-based tool for preschool classrooms, the Early Language Literacy and Classroom Observation (ELLCO). Spring 2008 assessments found that overall, PEK classrooms created a strong "culture of literacy," and the impact of PEK's coaching was evident in teachers' practices. These implementation findings may help explain the stronger academic results for later PEK cohorts.

Principals, teachers, and parents reported high satisfaction with the PEK program. Principals participating in the spring 2008 survey spoke positively about the leadership and support provided by PEK staff. In another survey during the same year, PEK teachers strongly agreed that their school better prepares children for kindergarten because of the school's participation in PEK. Most teachers also strongly agreed that participation in PEK professional development has had a large impact on their teaching practices. Additionally, parents of Cohort 3 children surveyed in spring 2008 rated their child's experience in PEK as "excellent" (70% of parents) and "very good" (29%). Nearly all parents reported that there is enough effort made to involve parents, and parents were very satisfied with PEK teachers' communication.

Implementation from 2008-09 through 2009-10

After all three PEK cohorts completed their pre-kindergarten years, the implementation evaluation began focusing on the integration between PEK and kindergarten classrooms and professional development offered to kindergarten teachers (Schultz, Gozali-Lee, & Mueller, 2009; Maxfield, Gozali-Lee, & Mueller, 2010). Results from the 2008-2009 and 2009-2010 evaluations show that principals and kindergarten teachers appreciated having PEK in their schools. According to principals and kindergarten teachers in both years, PEK has noticeably improved students' readiness for kindergarten, and has pushed kindergarten classrooms to a higher level.

The PEK program has also made a number of strides in fostering linkages between PEK and kindergarten teachers. Such linkages are necessary to ensure children are well prepared for kindergarten and to ensure that their gains in PEK are built on and sustained in subsequent years. In 2008-09 and 2009-10, kindergarten teachers in four PEK schools (Dayton's Bluff, Wellstone, American Indian, and World Cultures) received intensive one-on-one professional development from PEK coaches in addition to the district-wide professional development. Results from the spring 2010 teacher survey show that the

kindergarten teachers from Dayton's Bluff, Wellstone, American Indian, and World Cultures were more likely to report that they have received training and support on how to effectively differentiate instruction to meet the needs of a diverse student population; that during the kindergarten transition period they and the PEK teachers communicated about students' skills and needs; and that they used student information given by the PEK teachers to develop lessons, activities, and grouping strategies for their students, compared to kindergarten teachers in the other six PEK schools. Preliminary results, based on progress of PEK Cohort 3 participants from fall of kindergarten to fall of first grade, also suggested that there is a significantly higher gain in vocabulary for students whose teachers received PEK coaching compared to students whose teachers did not receive PEK coaching. Other results, however, are not significantly different (Maxfield, Gozali-Lee, & Mueller, 2010).

Teacher professional development and school integration in 2010-11

In 2010-11, the implementation evaluation continued to focus on the linkage between PEK and kindergarten years, as PEK provided intensive coaching to more kindergarten teachers in the Saint Paul Public Schools. Wilder Research conducted a survey with 10 of the 13 kindergarten teachers who received intensive training and support from PEK coaches (Early Childhood Coaching) in May 2011. Similar to the previous years, kindergarten teachers in 2010-11 perceived the coach's training and support positively. When asked about the most positive aspects of participating in Early Childhood Coaching, teachers responded that they can share ideas with and get information, resources, and support from the coaches.

Regarding their ideas for furthering the connection between PEK and kindergarten programs, teachers wished for more collaboration with PEK, curriculum alignment between the grade levels, and more coaching. More detailed results of the kindergarten survey are presented in the Appendix.

Issues for consideration

A core component of PEK is the inclusion of a rigorous, ongoing evaluation that can be used to inform programming and ultimately assess program results. Based on the findings presented through 2010-11, following are several issues that can be taken into consideration in future planning for PEK school sites. Some of the considerations pertain to PEK staff and some pertain to the researchers studying PEK.

Promotion of differentiated instruction

PEK's success in increasing participants' skills can result in larger skill differences between them and their classmates when they reach kindergarten. These differences pose an instructional challenge for kindergarten teachers. For the program and district, they raise considerations about how to ensure that all children are able to build on their current skills and achieve substantial advances in kindergarten and beyond. It is possible that the narrowing of differences that we observed between PEK Cohort 1-3 children and their classmates from kindergarten to first grade could reflect instruction being targeted to a lower skill level than that of former PEK students.

District efforts to expand the PEK model to the Pre-Kindergarten Program district-wide should help address the issue to some extent by increasing the proportion of children who enter kindergarten in Saint Paul schools with similar preparation. Still, there will continue to be diversity in preparatory experiences among children entering kindergarten. Illustrating this, most kindergarten teachers surveyed every year from 2008 to 2011 felt that the former PEK children were more prepared academically and socially to enter kindergarten than their classmates. This points to the need for kindergarten teachers to differentiate their instruction to the varying skill levels of the children in their class. This is important for PEK children so that they maintain and continue to build on the benefits that PEK provided, and is also important for children without strong academic preparation so they are taught at an appropriate level. Although research on the effectiveness of differentiated instruction is still at an early stage, the principles on which it is based have some grounding in research (Hall, 2002). The district began efforts in this area in 2008-09 as mentioned.

Collaboration with kindergarten teachers

PEK has also made a number of strides in fostering linkages between PEK and kindergarten teachers. Such linkages are necessary to ensure children are well prepared for kindergarten, and to ensure their gains in PEK are built on and sustained in subsequent years. Understanding the skills of incoming PEK students may also help kindergarten teachers prepare to differentiate their instruction. Fostering these linkages is an ongoing process, and the program can continue to focus attention in this area. As mentioned, PEK began providing intensive coaching to kindergarten teachers at four schools in 2008-09, and in 2010-11 kindergarten teachers from seven schools participated in the training.

Elementary teachers' use of information provided by PEK teachers

While most kindergarten teachers felt that there was sufficient communication between them and the PEK teacher at their school, information about students' needs and skills for the purpose of differentiation of instruction in kindergarten was not always discussed or

used. More time to observe PEK classrooms, share teaching strategies with the PEK teachers, and discuss individual students' strengths and challenges are needed, according to kindergarten teachers surveyed. At the same time, kindergarten teachers also need to use the information shared by PEK teachers to help develop lessons, activities, and grouping strategies in kindergarten classrooms. It also seems important that this practice continue throughout the grade levels. Teachers' participation in Professional Learning Communities may help facilitate the connections between grade levels.

Connections with parents

Several principals in 2008 and 2009 surveys mentioned that PEK helps schools build connections with parents early on. PEK helps instill parent involvement in their children's education. That, coupled with the program's success, contributes to parents wanting to enroll their children in the elementary school. Additionally, along with implementing high-quality instruction, the parent education approach might yield large gains in learning and development with little impact on cost. Program staff should be commended for their efforts to involve parents.

Continuing to study PEK Cohorts

Advantages of PEK Cohorts 1-3 over their classmate groups at kindergarten entry decreased over time, from kindergarten through third grade. The fade-out of initial cognitive advantages are also found in other studies that examined long-term impacts of preschool programs, such as the Chicago Child-Parent Center, Head Start, Early Head Start, High/Scope Perry Preschool, Abecedarian (Barnett, 2011). In some studies, the initial advantages disappeared shortly after school entry, while in other studies, the advantages (effect size) although smaller were long lasting. In studies that show long-term effects, program participants also had lower rates of Special Education, higher rates of graduation, lower rates of grade repetition, better health behaviors, higher earnings in adulthood, and/or less dependency on social welfare programs (Barnett, 2011).

In our evaluation study, the impacts of PEK upon kindergarten entry on academic and social outcomes are stronger for the later cohorts. This was expected because of the maturing and strengthening of PEK implementation with each subsequent cohort. The advantages of PEK over classmate comparison groups, though reduced, persisted to some extent for those later cohorts. By spring of third grade, there were no significant differences between PEK Cohort 1 students and their classmates in either comparison group. In Cohort 2, PEK third graders had an advantage in reading over classmates without preschool experience. In Cohort 3, PEK third graders had an advantage over classmates without preschool experience in multiple areas – reading, math, teacher ratings of academic

competence, and attendance. However, prior significant advantages of PEK students over classmates with preschool or child care center experience were no longer evident.

Beyond 3rd grade, children attending Saint Paul Public Schools continue to be assessed through 10th grade on the MCA reading assessments, through 11th grade on the MCA math assessments, and through 9th grade on the MAP reading and math tests. These assessments are conducted every year by the Saint Paul school district and Minnesota Department of Education, and results are therefore readily available. Given PEK's positive impacts thus far, it would be worthwhile for the program to evaluate the progress of PEK children in later grades and possibly beyond.

PEK's contribution to early education

To our knowledge, the PEK evaluation study is the only pre-kindergarten program study in the United States that uses a quasi-experimental method and has a high percentage of ELL students. The PEK program and study contribute to a better understanding of how to prepare ELL children for school readiness, and of the academic and social impacts of pre-kindergarten programs for ELL children. To this end, it would be worthwhile to continue following the academic and social progress for these children into later grades.

Progress through 2011-12: Community-based PEK

This section provides results for the community-based child care portion of PEK. As described earlier, PEK extended the program to Saint Paul child care settings in recognition that parents use a variety of care arrangements for their children. The program considers this component a pilot, with the intent that a community-wide approach will help more children enter school with the skills needed to succeed. Participating sites include child care centers as well as family child care homes. As described in the report Introduction, the first group of providers recruited for the child care program began offering PEK in fall 2006.

This section begins by profiling children who participated during the program's first five years in child care settings: 2006-07 (Cohort 1), 2007-08 (Cohort 2), 2008-09 (Cohort 3), 2009-10 (Cohort 4), and 2010-11 (Cohort 5). Their progress during PEK is then discussed based on Individual Growth and Development Indicators (IGDIs) administered by PEK staff. Academic and social outcomes based on Wilder Research's assessments are then provided for the first five child care cohorts when they reached kindergarten (fall 2007 to fall 2011). Upon reaching kindergarten, Cohort 1 and 2 children were compared to children who had attended PEK at school sites those years as well as to the comparison groups of kindergarten classmates identified for those PEK school cohorts. A comparison group was not available for child care Cohort 3 children because new PEK school cohorts were not being followed at that time. Therefore, child care Cohort 3 academic and social outcomes are described in comparison to their peers nationally. For child care Cohorts 4 and 5, comparison groups were selected from all kindergarten children in Saint Paul Public Schools who did not attend PEK at either school or child care sites, based on matched school and demographic characteristics as described in the Evaluation section.

After summarizing student results, this section describes the program's implementation in child care settings during these five years. The section concludes with a list of issues for consideration that can be used to inform future planning in the child care component.

More specifically, results presented in this section are organized as follows:

- Overview of results
- Characteristics of children (Cohorts 1-5)
- Progress while in PEK (Cohorts 1-5)
- Kindergarten readiness compared to classmates (Cohorts 1-2, 4-5)

- Implementation efforts (Cohorts 1-5)
- Issues for consideration

Overview

Key findings

There was no consistent evidence for an academic advantage in fall of kindergarten for students who had participated in PEK child care as 4-year-olds, based on the five cohorts studied. Results from the first two cohorts suggested an academic advantage for PEK participants over kindergarten classmates without preschool or child care experience, but these results were not replicated in the last two cohorts. Nevertheless, students in the last two cohorts made accelerated progress on most of the academic measures in their pre-kindergarten year. Differences in the classmate comparison groups used to estimate PEK impacts in the first two cohorts versus the last two cohorts may be a factor in these inconsistent results.

Findings for 4-year-olds who participated in PEK child care were as follows:

- Change in academic skills during the pre-kindergarten year was studied in three PEK child care cohorts (Cohorts 3-5). In Cohorts 4 and 5, PEK children made faster progress than children nationally on three of the four academic measures (vocabulary, writing, and math, but not reading). In Cohort 3, accelerated progress was made only in writing.
- When they reached kindergarten, PEK child care participants in earlier cohorts (Cohort 1 and 2) appeared to have some academic advantages over classmates without preschool or child care center experience, based on the results of academic assessments and teacher ratings.
- In later cohorts (Cohorts 4 and 5), no academic advantage was found for PEK child care participants over their classmates in fall of kindergarten. Nevertheless, the PEK students' academic skills tended to be higher than their kindergarten peers nationally, and higher than in the earlier PEK cohorts. It could be that differences in the classmate comparison groups between the earlier and later cohorts account at least in part for the difference in results between these two sets of cohorts.
- It was possible to compare PEK child care children in the first two cohorts with PEK school-based children upon reaching kindergarten. Results indicated a slight advantage for PEK school-based children in reading and math but no difference in

vocabulary. Teachers tended to rate PEK school-based children higher in social skills and lower in problem behaviors compared to PEK child care children.

- In addition, teachers' ratings indicated that PEK child care children did not have any advantages in social skills over their kindergarten classmates. These classmates tended to have fewer behavior problems than PEK child care children according to teachers' ratings.

Key child care component findings also include the following:

- Overall, child care teachers participating in focus groups provided positive feedback about their experiences with PEK, the helpfulness of PEK's professional development, and the program's impact on children.

- Almost all parents with children entering kindergarten in the fall said their PEK child care teacher helped prepare their child for kindergarten.

- Overall, structured classroom observations found that PEK child care sites were strong in their support for language and literacy.

Characteristics of children

Figure 16 shows the number of children who participated in the first five cohorts at PEK child care sites. It is important to note that data for child care cohorts reflect all children enrolled in PEK child care during this time, whereas school cohorts are defined as students *tested* in fall of their PEK year. A total of 137 3- and 4-year-old children participated in PEK at child care sites during 2006-07 (Cohort 1), 114 participated in 2007-08 (Cohort 2), 183 participated in 2008-09 (Cohort 3), 252 participated in 2009-10 (Cohort 4), and 455 participated in 2010-11 (Cohort 5). Some of those children did not participate in PEK for the entire year either because of the timing of their entry or exit from the child care site or the timing of their provider's entry or exit from the program during the year. Outcomes data reported here reflect only the 4-year-olds in each cohort. Some of these children also participated in the program when they were younger. Child care programs extend PEK to 2½-year-olds, although their participation is not reported on here.

16. Children attending PEK child care sites, 2006-07 - 2010-2011

Cohort	3-year-olds	4-year-olds*	Total
Cohort 1 (PEK 2006-07)	65	72	137
Cohort 2 (PEK 2007-08)	59	55	114
Cohort 3 (PEK 2008-09)	84	99	183
Cohort 4 (PEK 2009-10)	125	127	252
Cohort 5 (PEK 2010-11)	225	230	455

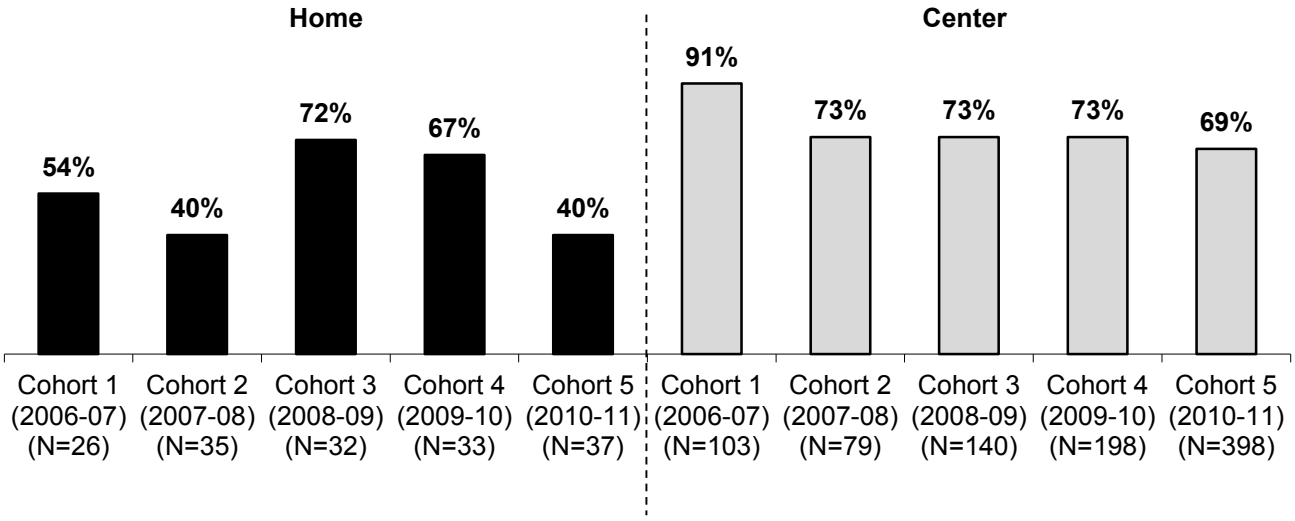
** Some children who participated in the cohort as 3-year-olds also participated in the following cohort as 4-year-olds.*

Note: *Child care cohorts reflect all children attending PEK child care. In contrast, school-based cohorts are defined as PEK students who were assessed in fall of their PEK year. It should also be noted that child care settings extend the program to 2½-year-olds, although those children are not reported on here.*

Demographics

In the first five years in both family child care homes and child care centers, approximately half of the PEK participants were age 3 and half age 4. Across the years, 40-72 percent of the children in family child care homes and 69-91 percent of the children in child care centers were in the PEK target population, meaning they were English Language Learners, came from low-income families, or needed Special Education services. Higher percentages of center than home care children came from low-income backgrounds (69-92% vs. 27-58%). PEK child care children whose primary home language was not English ranged from 0-19 percent of home care children and 6-15 percent of center care children across the five years. Those who received Special Education services ranged from 3-8 percent of home care children and 0-10 percent of center care children across the five years (Figures A62-A66). Figure 17 shows the percentages of PEK child care children in the program's target populations during the first five years of program operation in child care settings.

17. PEK community component. Representation of PEK target populations, 2006-07 to 2010-11



Note: *PEK targets services to children who are English Language Learners (ELL), from low-income families, or need Special Education services. "Target population" reflects the percentage of children who are in any of these three groups.*

Comparison group demographics

When they reached kindergarten, the first two cohorts of PEK child care participants were compared to children who participated in the PEK school component as well as children in the school component's comparison group. As in the school component, the comparison group is broken down into those with prior preschool or child care center experience and those without. In both Cohorts 1 and 2, we found that PEK child care children differed somewhat demographically from these three kindergarten comparison groups. First, the proportions of ELL children in these three comparison groups across the two cohorts (44-53%) were much higher than in child care Cohort 1 (23%) and Cohort 2 (3%). Second, these groups had higher proportions of Asian children (22-38%) than child care Cohort 1 (6%) and Cohort 2 (3%). A comparison group was not available for Cohort 3 children.

PEK Cohort 4 child care participants were compared to their classmates with prior preschool experience only. Due to the small sample of classmates without preschool experience, comparisons were not made with this group. The classmate group for Cohort 4 generally had a higher proportion of White children (49%) and lower proportion of children eligible for free or reduced-price lunch (57%) than Cohort 4 children (30% and 73%, respectively), but were similar in other demographic characteristics.

The PEK Cohort 5 child care participants differed demographically in some respects from their classmate comparison groups. The PEK group had a higher proportion of African American children (61%) and a lower proportion of White children (23%) than the classmate comparison groups with preschool/child care center experience and without it (36-44%

African American and 29-41% White). The comparison group without preschool experience also had a higher proportion of Asian students and ELL students (21% and 25%, respectively) than the PEK group (3% and 14%, respectively). The comparison group with preschool experience had a smaller proportion eligible for free/reduced-price lunch (37%) than the PEK group (61%).

As with analyses in the school component, we statistically adjusted for differences between PEK child care children and comparison group children on demographic characteristics, and when in the fall they were tested, in our analysis (Mueller, 2008).

Changes over time

As in the school component, it is possible for child care children's demographic characteristics to change over time. For example, some parents may not initially know whether their children need Special Education services. As another example, some parents may not initially know that their child is eligible for free or reduced-price lunch, may not apply until their child enters school, or may experience a change in their eligibility.

Changes due to attrition

Following PEK, Wilder Research assesses participants in the community-based portion if they attend kindergarten in Saint Paul. As in the school component, children attending kindergarten outside of Saint Paul are not reflected in the results. In fall 2007, we were able to assess 47 (65%) of the 4-year-olds who had participated in PEK at child care sites during 2006-07 (Cohort 1) and were beginning kindergarten in fall 2007. In the fall of 2008, assessments were conducted with 34 (62%) of the 4-year-olds who had participated in PEK at child care sites during 2007-08 (Cohort 2). In the fall of 2009, assessment were conducted with 77 (78%) of the 4-year-olds who had participated in PEK child care during 2008-09 and completed assessments in the fall of their PEK year (Cohort 3). In fall 2010, we were able to assess 30 (24%) of the 4-year-olds who had participated and completed PEK at child care sites during 2009-10 and completed assessments in the fall of their PEK year (Cohort 4). The low percentage assessed in Cohort 4 was due to the need to obtain active parent consent for children to participate in Wilder's kindergarten assessments, after the children had left PEK child care. Only passive parent consent was required with the previous cohorts. Due to the small representation of Cohort 4 children, results of their academic and social outcomes may not reflect all Cohort 4 children and should be interpreted in this context. Active parent consent was sought for Cohort 5 children while they were still in PEK child care with the assistance of their teacher. We were able to get more parent consent forms for Cohort 5 than Cohort 4 children, giving us permission to assess their children both in the fall of PEK child care and in fall of the kindergarten year. In fall 2011, we were able to assess 111 (70%) of the 4-year-olds who had participated in

PEK at child care sites during 2010-11 and completed assessments in the fall of their PEK year (Cohort 5).

Attendance

The time periods for which attendance data were available varied to some extent for the five child care cohorts, as indicated in the following paragraphs. Attendance data were generally available for September through June or August of each year, with the exception of Cohort 2. The initial group of child care providers participating in the program ended their contracts with PEK in April of Cohort 2 4-year-olds' year, and complete attendance data were not available for the remainder of that year (Figures A67-71).

From September 2006 through August 2007, 4-year-olds in Cohort 1 attended an average of 163 days at family child care homes with a range of 111-235 days, and attended an average of 165 days at child care centers with a range of 38-248 days. Eight (14%) of the center children attended 100 or fewer days. Three-year-olds' attendance was slightly higher during that time on average, with an average of 182 days at homes and 168 days at centers (Figure A67).

Attendance data for Cohort 2 are available for only September 2007 through April 2008, as previously described. During these eight months, 4-year-olds attended an average of 134 days at homes with a range of 70-158 days, and an average of 122 days at centers with a range of 20-164 days. Four of these home children (22%) and nine of these center children (24%) attended 100 or fewer days. Three-year-olds attended an average of 125 days at homes and 114 days at centers during this time (Figure A68).

Attendance rates for Cohort 3 children are generally higher than the previous two cohorts. From September 2008 through August 2009, 4-year-olds attended an average of 181 days at family child care homes with a range of 132 to 216 days, and attended an average of 192 days at child care centers with a range of 78 to 249 days. Three-year-olds attended an average of 159 days at homes and 198 days at centers (Figure A69).

For Cohort 4, attendance of 4-year-olds from September 2009 through June 2010 ranged from 61 to 214 days at family child care homes, and from 12 to 205 days at child care centers. The average number of days that 4-year-olds attended was 153 at homes and 149 at centers. Three-year-olds' attendance was slightly lower during that time, averaging 139 days at homes and 132 days at centers (Figure A70).

From September 2010 through June 2011, Cohort 5 4-year-olds attended an average of 115 days at family child care homes with a range of 26 to 187 days, and attended an average of 134 days at child care centers with a range of 4 to 206 days. Three-year-olds attended an

average of 122 days at homes and 118 days at centers (Figure A71). The attendance rates of Cohort 5 are generally similar to Cohort 2 and lower than the other cohorts.

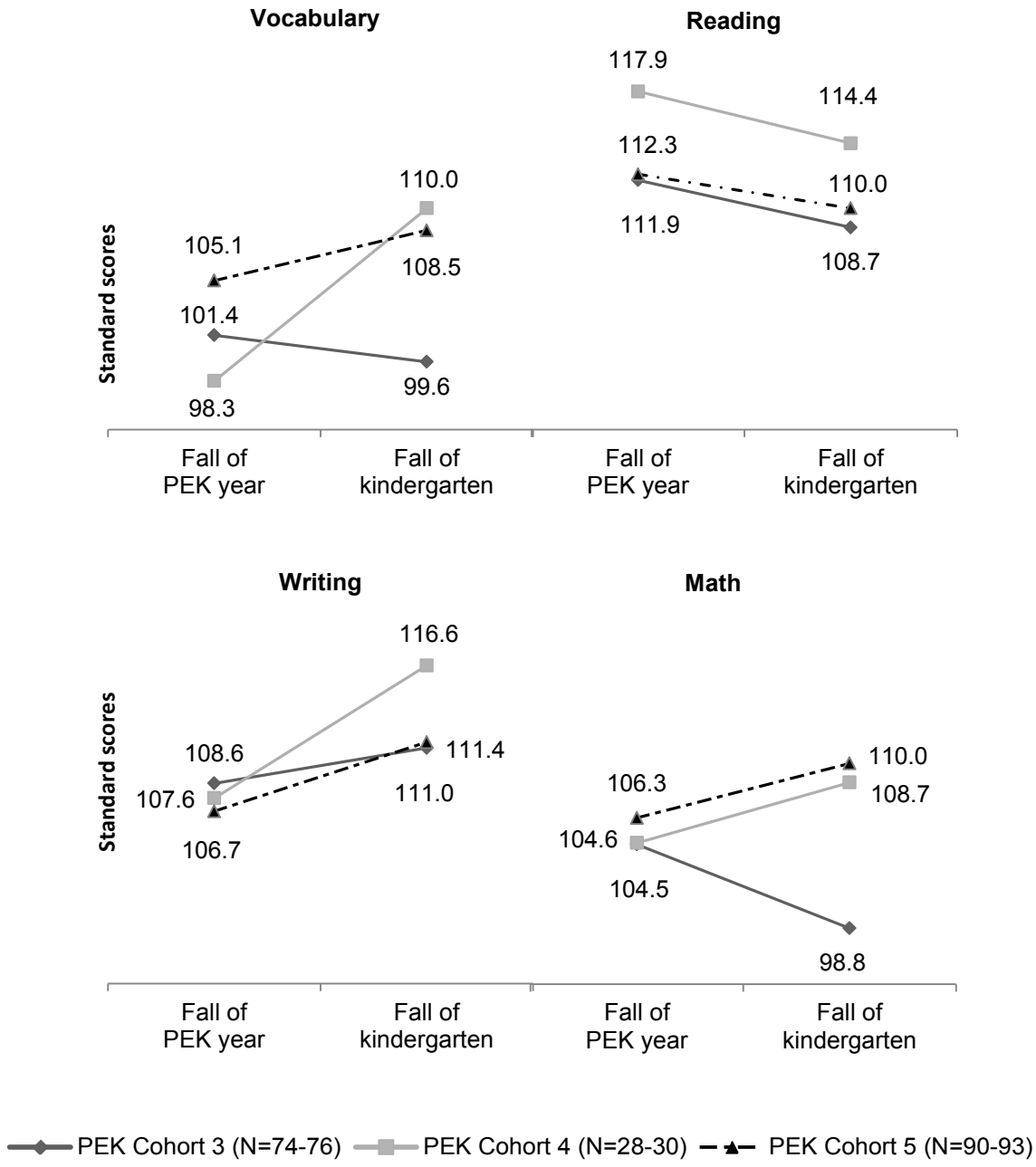
Progress while in PEK

Academic assessments

Children in Cohorts 3, 4, and 5 were assessed in both the fall of their pre-kindergarten year and the fall of their kindergarten year to examine their academic progress during PEK. As in the school component, the analysis was based on the Peabody and Woodcock-Johnson assessments conducted by Wilder Research. As previously described, scores are age-standardized. No change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.

Results in Figure 18 show that, on average, children in all three PEK cohorts made accelerated progress in writing skills during their PEK year. They were above the national average in writing in the fall of their PEK year and exceeded the national average even more by the fall of their kindergarten year. A similar pattern occurred for vocabulary in Cohort 4 and 5, with children in these two cohorts making accelerated progress and exceeding the national average in the fall of kindergarten. However, Cohort 3 children made slower than normative progress in vocabulary and were just below the national average in the fall of kindergarten. All three cohorts had average reading scores well above the national average in the fall of the PEK year. While they made less than normative progress in reading, they still all had average scores above the national average in the fall of kindergarten. In math, all three cohorts had average scores above the national average in the fall of the PEK year. Cohorts 4 and 5 made accelerated progress during the PEK year with their average math scores moving even higher above the national average by fall of kindergarten. Cohort 3 made slower than normative progress and their average math score fell to slightly below the national average in fall of kindergarten (see Figure A72 for further details of this analysis).

18. PEK community component. Changes in academic test standard scores from pre-kindergarten to kindergarten: PEK community child care Cohort 3 (fall 2008 to fall 2009), Cohort 4 (fall 2009 to fall 2010), and Cohort 5 (fall 2010 to fall 2011)



Teachers' assessments of early language and literacy development

Teachers use Individual Growth and Development Indicators (IGDIs) to monitor individual children's early language and literacy development over time. Preschool IGDIs measure children's progress in three areas: picture naming, alliteration, and rhyming. During the assessments, teachers hold up cards with pictures and ask children to name pictures, identify pictures starting with the same initial sound, and identify pictures that rhyme. The assessments provide teachers with feedback on individual children's progress over time toward developmental outcomes, and alert teachers when additional interventions may be needed (ECRIMGD, 1998; Get It! Got It! Go! website, n.d.). PEK established target scores of 26 for picture naming, 12 for rhyming, and 8 for alliteration for the end of the pre-kindergarten year.

PEK child care staff administer IGDIs three times each year. During 2010-11, IGDIs were administered in October, January, and April. Results reported here reflect 4-year-olds who took the pre-test in October and post-test in April. It should be noted, however, that IGDIs are also administered to 3-year-olds in PEK's community child care component.

Twenty-three percent of Cohort 1 4-year-olds met the program's target score for picture naming at pre-test, and 60 percent at post-test. Rhyming and alliteration experienced smaller increases between the percentages of children meeting targets at pre-test and post-test. Seven percent of Cohort 1 4-year-olds met the target for rhyming at pre-test, and 25 percent at post-test. For alliteration, 7 percent of Cohort 1 4-year-olds met the target at pre-test, and 31 percent at post-test.

For Cohort 2, 49 percent of 4-year-olds met the target for picture naming at pre-test, and 61 percent at post-test. Thirty-six percent of Cohort 2 4-year-olds met the target in rhyming at pre-test, and 85 percent at post-test. For alliteration, 24 percent of Cohort 2 4-year-olds met the target at pre-test, and 55 percent at post-test.

Thirty percent of Cohort 3 4-year-olds met the program's target score for picture naming at pre-test and 46 percent at post-test. For rhyming, 19 of Cohort 3 4-year-olds met the target at pre-test, and 42 percent at post-test. Sixteen percent of Cohort 3 4-year-olds met the target for alliteration at pre-test and 36 percent at post-test.

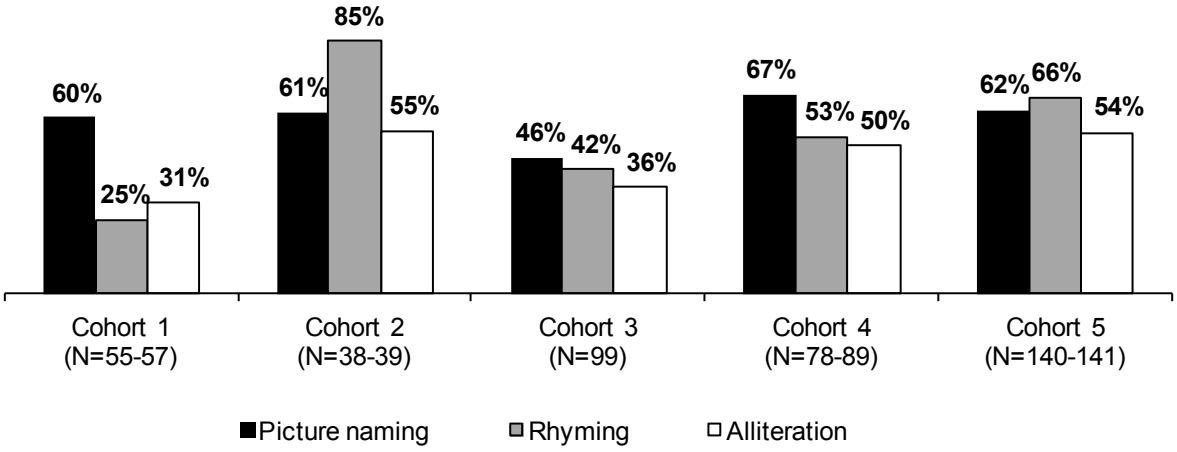
Thirty-three percent of Cohort 4 4-year-olds met the program's target score for picture naming at pre-test and 67 percent at post-test. For rhyming, 25 of Cohort 4 4-year-olds met the target at pre-test, and 53 percent at post-test. Nineteen percent of Cohort 4 4-year-olds met the target for alliteration at pre-test and 50 percent at post-test.

For Cohort 5, 24 percent of 4-year-olds met the target for picture naming at pre-test, and 62 percent at post-test. Twenty-five percent of Cohort 5 4-year-olds met the target in

rhyming at pre-test, and 66 percent at post-test. For alliteration, 16 percent of Cohort 5 4-year-olds met the target at pre-test, and 54 percent at post-test.

Figure 19 shows the results for all cohorts by the end of the program. Four of the five cohorts scored similarly in picture naming with 60-67% meeting the target score. A lower proportion met the target score in Cohort 3 (46%). Results for rhyming vary by cohorts. Eighty-five percent of Cohort 2 4-year-olds met the target score in rhyming by the end of the program year, compared to 25 percent of Cohort 1, 42 percent of Cohort 3, 53 percent of Cohort 4, and 66 percent for Cohort 5. Half or more (50-55%) of the children in Cohorts 2, 4, and 5 met the target score for alliteration, compared to about one-third (31-36%) of the children in Cohorts 1 and 3. The lower proportions of Cohort 3 children meeting the IGDI targets are generally consistent with their lower performance on literacy measures (vocabulary, reading) in fall of kindergarten compared to Cohorts 4 and 5 (as reported earlier in Figure 18).

19. PEK community component. Percentages of Cohorts 1-5 children meeting IGDI targets at post-test, 2006-07 - 2010-11



In addition to IGDIs, Cohort 5 4-year-olds were assessed in their knowledge about upper-case and lower-case alphabets. PEK established target scores of 14 for upper-case alphabet and 11 for lower-case alphabet for the end of the pre-kindergarten year. Results show that 59 percent of 4-year-olds met the target for upper-case alphabet at pre-test and 87 percent met the target at post-test. Similarly, 54 percent of 4-year-olds met the target for lower-case alphabet at pre-test and 86 percent met the target at post-test.

Kindergarten readiness compared to classmates

Academic assessments

When they reached kindergarten, Cohort 1 and 2 children were compared to children who had attended PEK at school sites those years as well as to the comparison groups of kindergarten classmates identified for those PEK school cohorts. A comparison group was not available for child care Cohort 3 children because new PEK school cohorts were not being followed at that time. For child care Cohorts 4 and 5, comparison groups were selected from all kindergarten children in Saint Paul Public Schools who did not attend PEK at either school or child care sites, based on matched school and demographic characteristics as described in the Evaluation section. The same assessments used in the school component, the Peabody and Woodcock-Johnson academic assessments and the Social Skills Rating System, were used with child care children and their comparison groups. Again, we adjusted for demographic and test date differences among the groups being compared. Compared to school-based PEK cohorts, the PEK child care cohorts studied are considerably smaller and there are some concerns about the classmate comparison groups as described later. Due to these limitations, results for PEK child care are less definitive than for school-based PEK. We do not report effect sizes for differences observed between PEK child care children and their classmates for this reason.

Comparisons to classmate comparison groups

Little consistency was found in the differences on academic assessments between PEK child care children and their classmates in the comparison groups across Cohorts 1, 2, 4, and 5 (no comparison group was available for Cohort 3). Differences were more likely to be in favor of PEK children in Cohorts 1 and 2 than in Cohorts 4 and 5. Some of the differences in favor of PEK Cohorts 1 and 2 were statistically significant while there were no statistically significant results in favor of PEK Cohorts 4 and 5. Nevertheless, PEK Cohort 4 and 5 children tended to score higher than PEK Cohort 1 and 2 children on the academic assessments in the fall of kindergarten and had accelerated progress on three of the four academic assessments during the prekindergarten year. This unexpected pattern of PEK-comparison group differences across cohorts may be due to differences in the comparison groups for Cohorts 1-2 versus Cohorts 4-5.

The comparison groups for Cohorts 1 and 2 had much higher proportions of ELL children than did the PEK Cohort 1 and 2 groups. Despite statistical adjustments for ELL differences and other demographic differences between the Cohort 1 and 2 PEK and comparison groups, the ELL difference could still have influenced results. For Cohorts 4 and 5, active parental consent was required for children to be included in the comparison groups while

passive parental consent was used for the Cohorts 1 and 2 comparison groups. Approximately 45 percent of the parents consented using the active approach while almost all consented using the passive approach. Consequently, it is possible that requiring active parental consent may have introduced a selectivity factor into the comparison groups for Cohorts 4 and 5 not found in earlier comparison groups – i.e., a difference between parents (and their children) who consent and those who didn't that affected children's academic or behavioral development. For example, parents who consented to have their children in the study may be more engaged in their children's schooling which could positively influence their children's learning. While we adjusted for differences in demographic characteristics between PEK children and comparison group children, this may have not been sufficient to eliminate the influence of this potential factor on results. In any case, there is no consistent academic advantage for PEK Cohort 4 and 5 child care children over comparison children (with and without prior preschool/child care center experience) based on study results. Details of the results are described below.

It appeared that PEK Cohorts 1 and 2 children had an advantage on some academic measures compared to their kindergarten classmates in the comparison groups who did not participate in PEK. However, the advantages were not very consistent across the two cohorts. The most consistent finding was for vocabulary, where PEK child care children in both Cohorts 1 and 2 scored significantly higher on average compared to classmates without prior preschool or child care center experience. PEK child care Cohort 1 children also scored significantly higher in vocabulary than their classmates with preschool experience. As indicated, it is possible that this advantage is related to the higher proportions of ELL children in the comparison groups, even though we adjusted for this factor in our analyses. In the area of reading, PEK Cohort 1 child care children scored significantly higher on average than the comparison group without preschool or child care center experience, but not higher than the group with such experience. Children in PEK child care Cohort 2 did not appear to have an advantage in reading over either of the kindergarten classmate comparison groups. However, PEK child care Cohort 2 children did have significant advantages on average in the areas of writing and math skills over their classmates without preschool experience, but not over their classmates with such experience. Advantages in writing and math were not observed for PEK Cohort 1child care children, who did not differ significantly from their classmates in these areas (Figures A73-A74).

On the academic assessments child care Cohort 4 children scored similarly to their classmate comparison group who had prior preschool experience. Comparison with classmates without prior preschool experience was not conducted due to a very small number of children in this group. It should be noted that due to the small percentage of children assessed in kindergarten, the results may not reflect the academic outcomes of all Cohort 4 children (Figure A75).

Cohort 5 was much larger than Cohort 4. However, as with Cohort 4, no advantage was found for Cohort 5 PEK children over comparison group children with prior preschool experience on the academic assessments. Similarly, no advantage was found for PEK Cohort 5 children over comparison group children without preschool experience (Figure A76).

These results were unexpected given the generally higher scores on the academic assessments of PEK Cohort 4 and 5 children compared to earlier PEK child care cohorts in the fall of kindergarten. The comparison groups for Cohorts 4 and 5 also tended to score higher than the comparison groups in the earlier child care cohorts. In addition to the analysis reported here that adjusted statistically for demographic differences between PEK and comparison group children, we also carried out an alternative analysis. Cohort 4 and 5 children were exactly matched one-to-one with children in the comparison groups on the demographic characteristics included in the original analysis. Results of the analysis using the matched pairs turned out to be the same as those from the original analysis. That is, no differences were found on the academic assessments between PEK Cohort 4-5 children and children in the comparison groups.

Comparisons to school-based PEK

PEK child care Cohort 1 was also compared to PEK school-based Cohort 2 when both groups reached kindergarten in fall 2007. Likewise, PEK child care Cohort 2 was compared to PEK school-based Cohort 3 when both groups reached kindergarten in fall 2008. Adjustments were made for differences in demographic characteristics and test date between the groups being compared in these analyses as well. Children who attended PEK at school sites scored somewhat higher on average in reading and math in both cohorts, but none of the differences were statistically significant. In addition, children who attended school-based PEK scored somewhat, though not significantly, higher on average in writing compared to child care Cohort 1 but not compared to child care Cohort 2. Average vocabulary scores were about the same across the child care and school-based cohorts (Figures A77-A78).

Teacher ratings

Analyses involving the same comparison groups were also conducted for teacher ratings of social skills, problem behaviors, and academic competence when PEK child care Cohorts 1, 2, 4, and 5 reached kindergarten. Again, we adjusted for differences in student characteristics across the groups. No analysis was conducted for PEK Cohort 3 because a comparison group was not available. Average social skills and academic competence ratings were somewhat higher for Cohort 3, and average problem behavior ratings were lower (i.e., fewer behavior problems), than for the other four cohorts.

Comparisons to classmate comparison groups

In the area of academic competence, children in PEK child care tended to have higher average ratings than their classmates in the comparison groups. The only statistically significant differences were in Cohorts 1 and 2 where PEK child care children had higher average ratings of academic competence than classmate comparison groups without prior preschool or child care center experience. The differences in favor of PEK child care children in Cohorts 4 and 5 were very small and not statistically significant. No significant differences favoring PEK child care cohorts over their respective classmate groups were found in social skills ratings. However, in Cohort 4, comparison children with preschool experience had significantly higher average social skills ratings than PEK children. Turning to ratings of problem behaviors, PEK child care children tended to be rated higher (meaning *more* problem behaviors) on average than both classmate comparison groups. Differences were significant for all comparisons in Cohorts 4 and 5, and for the comparison to children with prior preschool or child care center experience in Cohort 1 (Figures A79-A82).

In short, it appeared that PEK children may have a slight edge in teacher ratings of academic competence, especially in Cohorts 1 and 2 in comparison to classmates without preschool or child care experience. For social skills, ratings were inconsistent and favored neither PEK children nor comparison group children. There was a consistent pattern of comparison group children being rated as having fewer behavior problems on average than PEK children. This pattern was strongest in Cohorts 4 and 5. Similar to the academic assessment results, teacher ratings favorable to PEK children were more likely to be found in Cohorts 1 and 2 rather than Cohorts 4 and 5. These results may be related to differences in the composition of the comparison groups for the two sets of cohorts, as discussed earlier. As with the academic assessments, we repeated the PEK-comparison group analysis for Cohorts 4 and 5 using matched pairs, and the results were the same as those just reported.

Comparisons to school-based PEK

As on the academic assessments, children who participated in PEK at school sites appeared to have some advantages over children who participated in PEK at child care sites in their social skills and problem behaviors. In fall of kindergarten, teachers rated school-based Cohort 2 students significantly higher than child care Cohort 1 in social skills. However, the social skills advantage for school-based PEK was not observed the following year in the comparison of child care Cohort 2 and school-based Cohort 3. On the other hand, school-based PEK had an advantage over both of the child care cohorts in terms of behavior. In fall of kindergarten, teachers rated the school-based PEK cohorts significantly lower on average in problem behaviors (meaning fewer problem behaviors) compared to

their respective child care cohorts. No significant differences were found between school-based PEK and child care PEK in the area of academic competence (Figures A83-A84).

Implementation efforts

This section explores the extent to which PEK's child care component has been implemented as intended. Implementation results are provided through the end of the program's fifth year of operation in child care settings. We provide overviews of implementation results which focused on the program's alignment with the district's K-12 curricular model for the program's first four years, and on early language and literacy supports for the program's second to fourth years. Key findings from focus groups with teachers and directors in spring 2008 and 2009, as well as parent interviews during the same times, are described. We then summarize implementation results for the most recent school year, 2010-11. Detailed reports on the earlier results were prepared by the University of Minnesota's Center for Early Education and Development (CEED) (Hawley, 2008, 2009, and 2010), and summarized in our previous evaluation reports (Mohr, Mueller, & Gozali-Lee, 2008; Schultz, Gozali-Lee, & Mueller, 2009; Maxfield, Gozali-Lee, & Mueller, 2010).

Implementation during the first four years (2006-07 through 2009-10)

Overall, PEK child care sites showed progress in instruction and practices that are aligned with the district's K-12 curricular model from fall to spring observations, according to the CEED annual reports across the years. Most environmental components and routines were implemented to some extent across sites. In general, the observations found the child care environments to be "literacy rich." There seemed to be room for improvement, however, in the extent to which teachers actively used environmental components throughout the day to promote literacy. In the area of routines, the 2008 and 2009 reports found that "teachers were fairly consistent about putting a particular routine into place but were less consistent in implementing all of the components" (Hawley, 2008 and 2009). In 2010, the observer found that all of the classrooms posted a daily schedule and had a word wall, but only a few teachers actually referred to them (Hawley, 2010). The classroom observations in 2006-07 served as a pilot for the observation tool, and the observation tool used in 2007-08 through 2009-10 reflected revisions made to the tool based on the professional development priorities developed in the program's second year.

Across the four years, PEK child care sites attained strong fidelity in implementation in general, with a few areas of alignment identified as having "varied fidelity," meaning fidelity was "high in some programs, low in others." Observations in 2008 and 2009 found wide variation in practices associated with the use of active learning time, as well as the extent to which teachers differentiated small groups and the number of children in

the small group (Hawley, 2009). In 2010, observations found wide variation in practices associated with the use of shared reading, interactive writing, use of transitions, the intentional use of conversation to promote vocabulary, and opportunities to communicate with parents about school readiness (Hawley, 2010).

Structured observations also assessed language and literacy supports in PEK child care settings. From 2007-08 to 2009-10, the Early Language Literacy and Classroom Observation (ELLCO) tool was used to assess center classrooms and the similar Child/Home Early Language and Literacy Observation (CHELLO) tool was used in family child care homes (Hawley 2008, 2009, and 2010).

Results across years show that PEK sites were found to be strong in their support for language and literacy. For example, all sites in 2008 observations strongly emphasized the alphabet and writing, and incorporated repeated reading, small groups, and community circle time into the day. The 2009 classroom observations indicate that growth occurred in all areas that ELLCO measures, from the availability of books and writing materials to intentional implementation of routines and curriculum that support early literacy. Growth in all areas is also evident in the CHELLO measures for family child care literacy in 2009. The 2010 classroom observations indicate that most ELLCO scores remained the same at a high level from spring 2009 to spring 2010. These results included mostly teachers who stayed with the program for both program years. However, there were also a few improvements found in 2010, with the biggest improvement found in the use of assessments to evaluate learning and adjust instruction, followed by recognition of the diversity that students bring into the classroom and approaches to curriculum integration.

While center and home sites were strong in their supports for language and literacy overall, results across years found that there were also variations among sites. The observer noted that teacher-child interactions that are more general in nature, such as classroom climate and behavior management, continued to be a struggle for some center teachers. In child care homes, teachers had to make adjustments to their routines because they work with multi-age groups of children. Despite these challenges, the observer noted that early literacy environments and interactions were remarkably consistent across home sites in 2010 (Hawley, 2010). The observer indicated that there is still room for growth in centers and homes in 2010, especially in individualizing instruction, making intentional interactions throughout the day, and continuing communication with families. Overall, however, child care sites were found to be strong in their language and literacy supports and alignment with the district's K-12 curricular model across the years.

Other feedback about implementation in 2007-08 and 2008-09

Evaluators conducted focus groups and surveys in 2008 and 2009 with center teachers and directors and family child care home providers about the benefits of PEK. Providers in both years were generally positive about their experience with the program and had favorable perceptions of the program's effectiveness. Teachers and center directors perceived strong academic gains in children participating in PEK, and felt that children were behaving better and more engaged in learning. Teachers said they were better able to prepare children for school as a result of participating in PEK.

Both center directors and teachers participating in the focus groups found PEK's professional development to be very helpful. During 2008-09, child care directors were asked to be the instructional leaders for PEK implementation at their centers. Directors attended six months of training prior to their teachers attending PEK training to equip them with a solid overview of the program. In the focus group, directors expressed that through PEK participation, they have changed the way they interact with their teachers. Instead of a sole supervisory role, directors indicated that they are now asking purposeful questions about the classroom environment and specific activities. As instructional leaders, the directors stated that they are more active in the classroom. Additionally, some directors indicated that they are more aware of what their teachers are going through and are better able to explain the PEK program to parents. In the focus groups, teachers indicated that the program has improved their focus, purpose, and organizational skills, and given them useful strategies to incorporate into the classroom. Detailed reports from the focus group results are available from Wilder Research (Mohr, Mueller, & Gozali-Lee, 2008; Broton & Gozali-Lee, 2009).

Wilder Research staff also conducted telephone interviews with parents of 3- and 4-year-old children participating in PEK at child care centers and family child care homes. Results from 2008 and 2009 parent surveys show that almost all parents had heard or were familiar with the fact that their provider was working with PEK. The parent interview also included questions about parents' involvement in their children's learning. In general, parents in 2008 and 2009 indicated they were involved in their children's learning in a variety of ways, and responses were fairly similar across centers and homes. Parents with children entering kindergarten in the fall were asked questions about their child's preparedness. Almost all parents in both years said the child care center or family child care home helped prepare their child for kindergarten. Detailed findings of parent interviews are provided in the earlier evaluation reports (Mohr, Mueller, & Gozali-Lee, 2008; Schultz, Gozali-Lee, & Mueller, 2009)

Implementation in 2010-11

In 2010-11, consistent with the measure used in other PEK school-based programs in the district, PEK started to use the Classroom Assessment Scoring System (CLASS) for assessing child care center classrooms. The CHELLO tool was still being used in family child care homes.

Observers from the University of Minnesota's Center for Early Education and Development conducted the CLASS observations in fall 2010 and spring 2011 on 18 child care classrooms and prepared a report for PEK. A few key findings are summarized here. The CLASS scores are grouped into three domains: Emotional Support, Classroom Organization, and Instructional Support. Each item in the domains is scored on a seven-point Likert scale with scores ranging from low (1-2), mid (3-5) to high (6-7). Four observation cycles were completed per classroom to generate an overall CLASS score for each classroom observation. The total observation time was two hours per classroom.

Results show improvement in CLASS domain scores from fall to spring observations, as shown in Figure 20. Despite this improvement, in both fall and spring the average scores in Emotional Support and Classroom Organization were in the mid-range, and the average score in Instructional Support was in the low range. However, observers also found that variances in scores among classrooms in spring observations were smaller than in the fall observations. In other words, classrooms look more similar to one another by the end of program year (Cox, 2011).

20. CLASS means by subscale: fall 2010 to spring 2011

Subscale	Mean score at pre-test	Mean score at post-test[a]
Emotional Support	5.4	5.9
Positive Climate	5.4	5.8
Negative Climate[b]	6.3	6.8
Teacher Sensitivity	4.9	5.5
Regard for Student Perspectives	5.1	5.6
Classroom Organization	5.2	5.4
Behavior Management	5.0	5.2
Productivity	5.8	5.9
Instructional Learning Formats	4.9	5.0
Instructional Support	2.3	2.8
Concept Development	2.0	2.6
Quality of Feedback	2.2	2.6
Language Modeling	2.8	3.2

[a] *This analysis compares 18 classrooms observed at both pre- and post-test.*

[b] *Negative climate is reverse scored, with 1=high and 7=low. Therefore, higher scores are better for this scale.*

Source: *University of Minnesota's Center for Early Education and Development, August 2011.*

During the same time, CHELLO observations were conducted on nine child care homes by coaches from Resources for Child Caring. A report was prepared by the University of Minnesota's Center for Early Education and Development (Hawley, 2011). Similar to CLASS observations, in general growth occurred across all areas (subscales) that CHELLO measures, ranging from the availability of books and writing materials and organization of the classroom environment to adult support and teaching strategies to support for early literacy. Looking at individual items within CHELLO, the largest improvements occurred in the daily schedules that allow children to experience activities that promote engagement in learning as well as meet their individual needs and interests, the use of books in the classrooms, and use of data to monitor children's progress (Figure A85). There is still room for growth, however. Similar to the 2010 observation results, individualizing, intentional interactions throughout the rest of the day and continuing communication with families are all areas with room for improvement (Hawley, 2011).

In summer 2011, the researcher from CEED conducted a focus group and survey with the family child care providers and provided a report to PEK (Hawley, 2011). A few key findings are presented here. In the focus group, providers voiced a strong relationship of trust with the coaches. They expressed their appreciation for the coaches' ability to work

with what they have, see their strengths, and be willing to offer new things if something doesn't work as well as expected. Providers also mentioned the difference PEK is making for the children and families they serve. Nearly all providers reported talking to parents about what their children are learning, with several specifically mentioning the IGDI scores and sending books and activities for parents to do with their children at home.

The report concluded by describing overarching findings as follows:

> The 2011 Project Early Kindergarten family child care process report included analysis of data-rich documentation as well as quantitative tools such as the CHELLO, all of which indicate that PEK continues to offer rich, evidence-based professional development that results in behavior change for both providers and children. …. Ongoing lessons learned, community changes, and changes in SPPS Pre-K have implications for continued tweaking in child care in order to increase the likelihood that children will arrive in kindergarten with common experiences, routines, and vocabulary that equip them for the future (Hawley, 2011).

Issues for consideration

Based on the findings through 2010-11, following are issues that can be taken into consideration in the future planning of PEK's child care component. As in the school section, some of the considerations pertain to PEK staff and some pertain to the researchers studying PEK.

Improving student outcomes during PEK year

At the end of the PEK year, almost half to two-thirds of Cohorts 1-5 child care children assessed by their teachers met targets in picture naming. The proportion of children meeting targets in rhyming at the end of the PEK year varied greatly across cohorts, ranging from 25 percent to 85 percent across the five cohorts. For alliteration, 31 percent to 55 percent across the cohorts met the target score at year's end.

Results of Wilder assessments show that Cohort 3 child care children made expected progress or slower than expected progress in vocabulary, early reading, and math from fall of PEK to fall of kindergarten, and accelerated progress in writing. PEK Cohort 4 and 5 results were better than those for PEK Cohort 3. PEK Cohort 4 and 5 students made accelerated progress in vocabulary, writing, and math, but not reading. However, comparisons of these students to classmates in the fall of kindergarten did not indicate that they had an academic advantage, even though their average scores were higher than those of their peers nationally.

These results are both encouraging and discouraging. They suggest that PEK child care is may be effective in achieving learning gains in some areas while there may room for improvement in other areas such as early reading skills.

Strengthening child care evaluation and assessing PEK effects

Initially, evaluation of the child care component focused on the professional development of providers and implementation of PEK practices in child care settings. Later, project funders' became more interested in PEK child care outcomes and impacts on kindergarten readiness. To strengthen the assessment of program impacts, the following additions were made to the evaluation after the 2009-10 school year: 1) student assessments in the fall of the PEK year so that academic progress can be estimated from fall of PEK to fall of kindergarten (Cohorts 3-5), and 2) comparison groups of kindergarten classmates for later cohorts (Cohorts 4-5) . Active parental consent was needed for children to participate in the classmate comparison groups for Cohorts 4 and 5 while passive parental consent was used for classmate comparison groups in earlier cohorts. Requiring active consent in these later cohorts might have introduced a selectivity factor not found in earlier comparison groups that could have influenced results of the PEK-classmate comparisons. For example, parents who consented to have their children in the study may be more engaged in their children's schooling than parents who didn't consent. This could influence their children's academic performance. While we adjusted for differences in demographic characteristics between PEK children and comparison group children, this possible factor could have played a role in the lack of differences found between PEK Cohort 4 and 5 children and their kindergarten classmates.

Social skills and problem behaviors

Based on earlier evaluation findings that children who participated in PEK child care had some advantages over kindergarten classmates in academic skills but not in social skills, the program offered "Positive Behavioral Interventions and Supports" training to teachers. Results were promising for PEK Cohort 3 children who performed better than the previous two cohorts in social skills in kindergarten. However, PEK children in Cohorts 4 and 5 tended to have more behavior problems in kindergarten than their classmates, suggesting the need for additional attention to behavioral management in PEK child care settings.

Supporting teachers in developing strong language and literacy environments

Creating environments that are strong in their intentional promotion of literacy is a process. Due to variations among sites in their supports for language and literacy, it is important to use site-level data to target support to the needs of individual sites. In conjunction with implementation of targeted professional development, CEED researchers suggested using peer mentoring which "has been shown to increase teacher feelings of efficacy and increase social and emotional well-being of workers. By pairing well-qualified experienced teachers with less experienced teachers, this model provides growth of leadership and quality within a program and support for teachers when coaches are unavailable" (Cox, 2011). Opportunities to connect with other providers and learn from each other were also suggested by family child care home providers in 2008 and 2009 focus groups.

Adjusting the program to fit the child care setting

PEK should be commended for its efforts to collaborate with the community child care partners by offering professional development that is rigorous and adaptable to home and center environments. Program staff listen to the feedback from child care providers. Because homes and centers have different needs, the program began offering separate training sessions for each setting in 2008-09. To maintain stability in teaching practices and address the teacher turnover issue, training workshops are extended to assistant teachers and directors. Program staff are probably in the best position to determine whether more can be done to accommodate needs while maintaining program integrity.

Lessons learned

Results from the PEK evaluation provide useful information for determining effective strategies for preparing children for school. In addition to providing information on the effectiveness of the overall PEK model, the evaluation offers insights into what components of the model seem integral and what components may need to be strengthened or may be more discretionary. The PEK evaluation also includes a separate report on the cost-effectiveness of the overall program.

This section provides a list of "lessons learned" from the PEK evaluation that may be useful to practitioners and policymakers making decisions about planning and funding early childhood programs. These include lessons about what seems important to the program's success, and what has not worked as well. Eight years after receiving initial program funding and seven years after serving the first group of children, a number of programmatic successes and challenges have been identified.

- *School component's effectiveness at promoting kindergarten-readiness*. There is quite strong evidence of the effectiveness of the school component in preparing children for kindergarten. All three cohorts of children in the school component showed significant academic and social advantages over their peers when they reached kindergarten and results were stronger with each cohort. These initial advantages lessened as PEK children moved through the primary grades but some academic advantages over classmates without prior preschool experience were still apparent in third grade for the later cohorts, especially the last cohort.

- *Child care component's effectiveness at promoting kindergarten-readiness*. The child care component's effectiveness in preparing children for kindergarten was not clearly established. Early cohorts suggested some academic advantages but these were not replicated in later cohorts. Nevertheless, it was promising that the last two child care cohorts made accelerated progress on most academic measures during the prekindergarten year. Behavior management appears to be an issue that could benefit from further attention in the child care program as participants tended to exhibit more behavior problems than classmates when they reached kindergarten.

- *Importance of professional development component*. Consistent with the Saint Paul Public Schools' K-12 curricular model, PEK emphasizes intensive, ongoing professional development. To date, teacher reports validate the importance of the professional development component. Teachers have credited the program's professional development with impacting their teaching practices. Within this component, coaching seems to be an important means for ensuring teachers understand and can

implement what is learned in training, and for providing accountability for expectations communicated in trainings.

- *Importance of emphasis on early literacy skills*. Based on results available to date, PEK's strong emphasis on early literacy skills seems to be a key program component. When they reached kindergarten, PEK school-based children showed advantages in vocabulary and early reading and writing compared to similar children who had chosen but not yet received PEK. Structured classroom assessments found that, overall, PEK school sites meet standards for promoting language and literacy in the classroom.

- *Program adaptations needed to fit child care settings.* PEK illustrates how core program principles can be implemented in diverse settings. For example, all PEK teachers receive implementation manuals providing information in support of program tenets, including alignment with the Saint Paul Public Schools' K-12 curricular model and standards-based instruction and assessment. However, methods for implementing PEK, teacher professional development, and curricular materials differ depending on whether the environment is a school, child care center, or family child care home. Program adaptations reflect challenges unique to each setting, such as high teacher turnover faced by some child care sites, as well as differences in classroom environments, such as family child care homes in which one teacher holds primary responsibility for instruction and behavior management of multiple ages of children. Those seeking to implement early childhood education programs across diverse settings may find PEK's program adaptations to be instructive.

- *Importance of administrative buy-in*. The program's integration into schools and expansion across the district have required the support and buy-in of school principals and district administrators. As the "instructional leader" of PEK at their school, principals are involved in classrooms and oversee classrooms' implementation of the program model. The program has recognized a need for similar buy-in at child care centers, and assigned the second and third cohorts of center directors with a comparable role. At the district level, leadership within the Division of Academic Services has been actively involved in the consolidation of 4-year-old programs under the PEK model. In the larger community, leadership at Resources for Child Caring has championed the program model with child care providers and initiated similar programs with four other school districts.

- *Inclusion of parent involvement component*. In the 2009 survey, several principals at the PEK schools mentioned that PEK helps educate parents about the importance of parent involvement in their children's education. Principals also appreciated building the connections with parents early on. It is difficult to know the relative importance of

the parent involvement component to the results we have seen in children. Results indicate that parents are involved in their children's learning in a number of ways and that there also may be room for improvement in some areas. Although it may be difficult to make claims about the parent involvement component based on data currently available from this study, other research validates the inclusion of this component. Research indicates that strong center-based early childhood programs involving parents can impact parenting in ways that affect school readiness (Brooks-Gunn & Markman, 2005).

- *Importance of linkages with early elementary instruction*. Results from the school component suggest that program strategies need to address the program's implications for early elementary grades. Results in general indicate that PEK children's advantages over their classmates began to narrow after the children reached kindergarten. Principals described a need for differentiated instruction in kindergarten to meet the varying needs of incoming children, including relatively high skill levels of children who attended PEK. Toward this end, PEK leaders have worked with schools to equip kindergarten teachers to differentiate their instruction based on children's incoming skill levels. Differentiation of instruction is also needed beyond kindergarten.

In addition to lessons developed by researchers based on evaluation results, program staff have also suggested lessons they perceive as important based on their work with the program:

- *Using data to drive instruction*. PEK teachers use the Work Sampling System portfolio and Individual Growth and Development Indicators assessment (in schools and child care settings) to monitor children's progress over the course of their PEK year. Program staff perceive this progress monitoring as an important tool for differentiating instruction based on individual students' needs. According to program staff, these assessments can also be used to motivate teachers by demonstrating students' progress over time. Evaluation results also suggest that teachers value the data received from these assessments.

- *Establishing high expectations*. Program staff also perceive a key component of the program to be its establishment of clear and high expectations for teachers and students. The program emphasizes academic rigor and the development of critical thinking skills. Program staff perceive teachers' and students' awareness of specific program expectations to be key to the progress they have made.

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Appendix

Standardization and scoring interpretation of child assessments

School-based PEK

Community-based PEK

Standardization and scoring interpretation of child assessments

The following section describes the samples included in the norming or standardization studies of these assessments. Assessment results (age-standardized scores) based on these nationally representative samples are used as a reference point for understanding how well PEK students are performing and progressing.

Standardization of child assessments

This section explains the samples included in the standardization studies of the Peabody, Woodcock Johnson, and Social Skills Rating System. The information is reported for the age groups relevant to our study. This information comes from the assessment manuals (Dunn & Dunn, 1997; Woodcock, McGrew, & Mather, 2001; Gresham & Elliott, 1990).

Peabody

The standardization of the Peabody Picture Vocabulary Test-III (Dunn & Dunn, 1997) was conducted during 1995 and 1996. The standardization sample was selected to match proportionately the U.S. census data from the March 1994 Current Population Survey. A total of 2,725 persons were included in the sample (ages 2½ to 90+). Because of the rapid changes in vocabulary development in children between the ages of 2½ and 6, samples were divided into six-month age intervals for these early years. For ages 7 through 9, when vocabulary development follows a more moderate but steady growth pattern, whole-year intervals were used. For each of the age intervals, 100 children were included, with about an equal number of boys and girls. The PPVT III sample was generally representative of the U.S. population. The sample came from the Northeast, North Central, South, and West geographic regions of the US. For 2-9 year olds, the sample includes 21-22 percent African-American, 13-14 percent Hispanic, 59-61 percent White, and 5 percent other racial/ethnic groups.

Woodcock Johnson

Normative data for the Woodcock Johnson Tests of Achievement-III (Woodcock, McGrew, & Mather, 2001) were gathered from 8,818 subjects in over 100 geographically diverse U.S. communities. The preschool sample (ages 2 to 5) included 1,143 children, and the K-12 sample included 4,783 children. According to the manual, the norming sample was selected to be representative, within practical limits, of the U.S. populations from age 24 months to age 90 years and older according to the 2000 census projections. For preschool and grades K-12, subjects were randomly selected within a stratified sampling design that controlled for specific community and subject variables: regions (Northeast, Midwest,

South, and West); community size (central city, larger community, and smaller community); sex; race (White, Black, American Indian, Asian and Pacific Islander); Hispanic (Hispanic, non-Hispanic); type of school (public, private, and home); and father's and mother's education levels. The population for preschool and K-12 during the norming time was composed of White (78-79%); Black (16-17%); American Indian (1%); and Asian and Pacific Islander (5%). About half of the population was male (51%) and female (49%).

Social Skills Ratings System

The Social Skills Rating System (Gresham & Elliott, 1990) was standardized on a national sample of 4,170 children using their self-ratings as well as the ratings of children made by 1,027 parents and 259 teachers collected in spring 1988. The 259 teachers made 1,335 ratings of children, including 1,021 elementary and 314 secondary school children. In all, 6,933 ratings of social skills were made by teachers, parents, and students.

Overall, about 27 percent of the standardization sample consisted of minority students, while about 31 percent of the U.S. population was from racial or ethnic minorities according to the 1990 census projections. The sample was selected from four U.S. regions: Northeast, North Central, South, and West regions, including a total of 18 states. Central cities, suburban or small town, and rural communities were represented in the sample.

Age-standardized scores

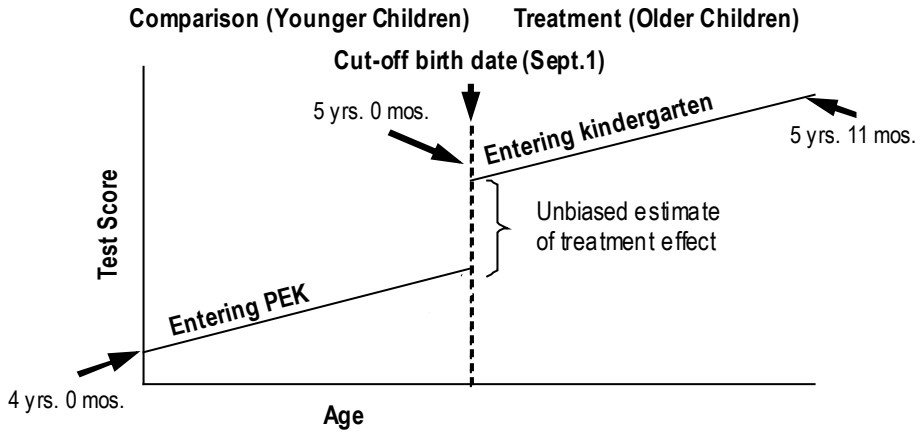
For some analyses, results are reported as age-standardized scores, which have a mean of 100 and a standard deviation of 15 in the national normative sample. This enables us to gauge the level of PEK children's academic skills with reference to a nationally representative sample of children. The national norms serve as useful reference points, in part because a key goal of the program is to close the achievement gap. However, PEK children, as a group, differ demographically from the national normative samples. For this reason, the national norms are used only as reference points and are not used to estimate the impact of PEK. Instead, local comparison groups, developed for the study, are used for estimating the program's impact.

Age-equivalent scores

In some cases, results are reported as age-equivalent scores reported in years and months. The age-equivalent scores are not as mathematically precise as the age-standardized scores, but they are helpful in interpreting what the results mean (i.e., equating academic skill levels to chronological age).

School-based PEK

A1. PEK school component. "Birthday cutoff" method illustration, assuming effective treatment



Regression lines:

- Estimated relationship between age and test score for each cohort
- The gap between the lines at the "cut-off birth date" is the estimated treatment effect (impact of PEK)

Note: *The PEK school component uses the "birthday cutoff" method. In this method, treatment and comparison groups are defined by whether a child's fourth birthday falls before or on/after September 1, the birthday cutoff date used to determine eligibility for PEK. For students attending PEK in 2005-06, the treatment group consists of children who enrolled in PEK in fall 2005 and whose fourth birthdays, therefore, fell before September 1, 2005 (Cohort 1). The comparison group consists of children who entered PEK a year later in fall 2006 and whose fourth birthdays fell on/after September 1, 2005, but before September 1, 2006 (Cohort 2). Upon kindergarten entry, the treatment group (Cohort 1 in this case) is compared to the comparison group which is just entering PEK (Cohort 2 in this case). The comparison is carried out using a regression-discontinuity research design in which two regression lines estimating test scores by age are developed, one for the treatment group and one for the comparison group. The regression-discontinuity approach assumes that a child who just made the age cutoff and a child who just missed it have similar characteristics, except that the former child has received the treatment (PEK) while the latter child has not. Given this assumption, the estimated test score difference at the cutoff date should provide an unbiased estimate of the treatment effect (Barnett et al., 2005; Gormley et al., 2005). For students attending PEK in 2006-07, the treatment group consists of Cohort 2 and the comparison group consists of Cohort 3.*

A2. PEK school component. Demographic characteristics of Cohorts 1, 2, and 3 in fall of their PEK year

Characteristics		Cohort 1 (fall 2005) N=325-326	Cohort 2 (fall 2006) N=324-329	Cohort 3 (fall 2007) N=312
Gender	Female	51%	47%	49%
	Male	49%	53%	51%
Race/ethnicity	American Indian	3%	4%	4%
	Asian	27%	24%	30%
	Latino	20%	16%	18%
	Black	31%	39%	33%
	White	19%	17%	15%
Home language	English	50%	55%	52%
	Hmong	24%	20%	22%
	Spanish	17%	13%	13%
	Other	9%	12%	12%
ELL	Yes	49%	45%	48%
	No	51%	55%	52%
Free/reduced-price lunch eligibility	Eligible	61%	74%	71%
	Ineligible[a]	39%	26%	29%
Special Education	Yes	12%	12%	11%
	No	88%	88%	89%
In target population[b]	Yes	79%	88%	87%
	No	21%	12%	13%

[a] *Includes families who were not eligible for free or reduced-price lunch as well as families who did not apply.*

[b] *Child is in one or more of the following categories: eligible for free or reduced-price lunch, ELL, or receives Special Education services.*

Notes: *This figure presents demographic data from fall of the PEK year for children who were assessed at that time. The "Ns" in this figure may differ somewhat from those in other figures in this report and previous reports. One reason is that for purposes of this demographic profile, we included children who were assessed in Spanish and therefore excluded from analyses of results. Another reason is that a few children who were tested were subsequently excluded from results because their birth date did not fall within the range for their cohort based on the program's birthday cutoff date. There could also be some slight differences in "Ns" between this and other figures based on children being assessed with either the Peabody or Woodcock-Johnson, but not both. It is important to note that methods for obtaining PEK children's demographic characteristics changed in 2006 after the district introduced a new application process for 4-year-old programs. It should also be noted that children's demographic characteristics, such as their free- or reduced-price lunch status, can change over time.*

A3. PEK school component. Demographic characteristics of Cohort 1 and comparison group (preschool and no preschool) in fall 2006 (kindergarten), using fall 2006 demographic data

Characteristics		Cohort 1 (n=263)	Comparison group[a]	
			With preschool/ child care center (n=156)	Without preschool/ child care center (n=100)
Gender	Female	52%	47%	54%
	Male	48%	53%	46%
Race/ethnicity	American Indian	3%	7%	5%
	Asian	27%	19%	37%
	Latino	18%	16%	17%
	Black	31%	40%	19%
	White	21%	19%	22%
ELL	Yes	47%	40%	50%
	No	53%	60%	50%
Free/reduced-price lunch eligibility	Eligible	65%	89%*	87%*
	Ineligible	35%	11%	13%
Special Education	Yes	14%	15%	3%
	No	86%	85%	97%

[a] The comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.

** p<.05, compared to Cohort 1.*

A4. PEK school component. Demographic characteristics of Cohort 2 and comparison group (preschool and no preschool) in fall 2007 (kindergarten), using fall 2007 demographic data

Characteristics		Cohort 2 (n=266)	Comparison group[a]	
			With preschool/ child care center (n=139)	Without preschool/ child care center (n=145)
Gender	Female	47%	42%	48%
	Male	53%	58%	52%
Race/ethnicity	American Indian	5%	1%	2%
	Asian	24%	22%	38%*
	Latino	17%	25%	13%
	Black	36%	40%	32%
	White	18%	12%	15%
ELL	Yes	44%	53%	46%
	No	56%	47%	54%
Free/reduced-price lunch eligibility	Eligible	56%	68%	55%
	Ineligible	44%	32%	45%
Special Education	Yes	17%	12%	3%*
	No	83%	88%	97%

[a] The comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not. Children with missing data on preschool/child care experience were included in the no preschool/child care center group.

** p<.05, compared to Cohort 2.*

A5. PEK school component. Demographic characteristics of Cohort 3 and comparison group (preschool and no preschool) in fall 2008 (kindergarten), using fall 2008 demographic data

Characteristics		Cohort 3 (n=235)	Comparison group[a]	
			With preschool/ child care center (n=156)	Without preschool/ child care center (n=79)
Gender	Female	48%	49%	46%
	Male	52%	51%	54%
Race/ethnicity	American Indian	5%	6%	8%
	Asian	28%	14%*	39%
	Latino	20%	22%	24%
	Black	34%	44%	18%*
	White	14%	14%	11%
ELL	Yes	50%	44%	62%
	No	50%	56%	38%
Free/reduced-price lunch eligibility	Eligible	57%	77%*	76%*
	Ineligible	43%	23%	24%
Special Education	Yes	10%	14%	3%
	No	90%	86%	97%

[a] *The comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

** p<.05, compared to Cohort 3.*

A6. PEK school component. Academic test standard score change for PEK students from fall of PEK to fall of kindergarten

Test	Number assessed	Mean standard scores[a] PEK (fall 2005)	Kindergarten (fall 2006)	Change[b]
Cohort 1				
Peabody Picture Vocabulary Test III	253	88.1	91.9	+3.8***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	250	97.5	102.2	+4.7***
Spelling (writing)	251	99.6	102.8	+3.2***
Applied Problems (math)	245	95.1	94.4	-0.7
Cohort 2		**PEK (fall 2006)**	**Kindergarten (fall 2007)**	**Change[b]**
Peabody Picture Vocabulary Test III	266	86.2	92.1	+5.9***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	263	97.2	103.2	+6.0***
Spelling (writing)	265	94.7	104.1	+9.4***
Applied Problems (math)	251	92.0	95.0	+3.0***
Cohort 3		**PEK (fall 2007)**	**Kindergarten (fall 2008)**	**Change[b]**
Peabody Picture Vocabulary Test III	220	88.8	96.0	+7.2***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	217	98.1	107.6	+9.4***
Spelling (writing)	219	98.1	110.6	+12.6***
Applied Problems (math)	211	96.4	98.0	+1.7

Note: *The average number of days between the fall of preschool and fall of kindergarten testing periods has varied somewhat by cohort, ranging from 375 days for Cohort 2 to 390 days for Cohort 1 and 435 days for Cohort 3.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to one's peers.*

[b] *Fall of kindergarten score minus fall of PEK score.*

*** *p<.001*

A7. PEK school component. Academic test age-equivalency change for PEK students from fall of PEK to fall of kindergarten

Test	Number assessed	Mean age-equivalency scores (years-months) PEK (fall 2005)	Kindergarten (fall 2006)	Change
Cohort 1				
Peabody Picture Vocabulary Test III	253	3-09	5-00	+15 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	250	4-08	5-10	+14 months
Spelling (writing)	251	4-06	5-11	+17 months
Applied Problems (math)	245	4-03	5-03	+12 months
Cohort 2		**PEK (fall 2006)**	**Kindergarten (fall 2007)**	**Change**
Peabody Picture Vocabulary Test III	266	3-06	5-00	+18 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	263	4-08	6-00	+16 months
Spelling (writing)	265	4-06	5-11	+17 months
Applied Problems (math)	251	4-03	5-03	+12 months
Cohort 3		**PEK (fall 2007)**	**Kindergarten (fall 2008)**	**Change**
Peabody Picture Vocabulary Test III	220	3-06	5-06	+24 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	217	4-08	6-03	+19 months
Spelling (writing)	219	4-06	6-04	+22 months
Applied Problems (math)	211	4-03	5-07	+16 months

Note: *The average number of days between the fall of preschool and fall of kindergarten testing periods has varied somewhat by cohort, ranging from 375 days for Cohort 2 to 390 days for Cohort 1 and 435 days for Cohort 3.*

A8. Change in Peabody standard scores: Cohort 3 fall 2007 to fall 2008 by student characteristics

			Mean standard scores (standard deviation)		
		N	Fall 2007	Fall 2008	Change score[a]
Race[b]	American Indian	11	96.73 (12.69)	97.00 (10.46)	+0.27
	Asian	66	77.11 (21.96)	89.58 (13.82)	+12.47
	Hispanic	31	90.61 (12.65)	95.48 (17.71)	+4.87
	African American	79	90.63 (13.24)	97.08 (9.73)	+6.44
	Caucasian	33	103.24 (15.02)	106.36 (11.68)	+3.12
ELL status[c]	Yes	103	80.41 (19.75)	90.92 (14.88)	+10.51
	No	117	96.13 (13.86)	100.45 (10.78)	+4.32
Eligible for free or reduced-price lunch	Yes	122	86.59 (18.85)	95.04 (12.07)	+8.45
	No	98	91.48 (17.96)	97.17 (15.46)	+5.69
Special education status	Yes	24	89.38 (18.32)	96.79 (9.72)	+7.42
	No	196	88.69 (18.66)	95.89 (14.12)	+7.20

Note: Includes only students with fall 2007 and fall 2008 assessments.

[a] 2008 standard score minus 2007 standard score.

[b] Significant differences in change scores between Asians and American Indians (p<.05), Asians and Hispanics (p<.05), Asians and African Americans (p<.05), and Asians and Caucasians (p<.01).

[c] Significant difference in change scores between ELL and non-ELL students (p<.001).

A9. Change in Letter-Word Identification standard scores: Cohort 3 fall 2007 to fall 2008 by student characteristics

			Mean standard scores (standard deviation)		
		N	Fall 2007	Fall 2008	Change score[a]
Race	American Indian	11	93.55 (11.77)	99.64 (11.55)	+6.09
	Asian	65	96.89 (15.36)	109.11 (9.75)	+12.22
	Hispanic	30	93.10 (11.04)	106.50 (12.67)	+13.40
	African American	78	100.18 (16.50)	106.65 (13.05)	+6.47
	Caucasian	33	101.91 (15.15)	110.39 (11.87)	+8.48
ELL status	Yes	100	99.40 (16.45)	110.26 (11.69)	+10.86
	No	117	97.07 (14.12)	105.29 (11.76)	+8.22
Eligible for free or reduced- price lunch	Yes	121	98.72 (15.31)	106.70 (13.47)	+7.98
	No	96	97.42 (15.22)	108.69 (9.70)	+11.27
Special education status [b]	Yes	24	100.13 (15.02)	104.63 (12.05)	+4.50
	No	193	97.90 (15.30)	107.95 (11.93)	+10.05

Note: *Includes only students with fall 2007 and fall 2008 assessments.*

[a] *2008 standard score minus 2007 standard score.*

[b] *Significant difference in change scores between students with special needs and other students (p<.05).*

A10. Change in Spelling standard scores: Cohort 3 fall 2007 to fall 2008 by student characteristics

			Mean standard scores (standard deviation)		
		N	Fall 2007	Fall 2008	Change score[a]
Race	American Indian	11	94.91 (11.93)	104.45 (9.05)	+9.55
	Asian	66	99.62 (13.65)	111.76 (11.34)	+12.14
	Hispanic	30	99.77 (9.45)	109.83 (11.78)	+10.07
	African American	79	96.65 (14.49)	109.87 (11.74)	+13.23
	Caucasian	33	97.79 (14.61)	112.88 (13.30)	+15.09
ELL status	Yes	102	101.36 (13.10)	112.71 (11.99)	+11.34
	No	117	95.17 (13.27)	108.79 (11.37)	+13.62
Eligible for free or reduced- price lunch	Yes	122	97.55 (14.51)	110.45 (12.72)	+12.90
	No	97	98.69 (12.21)	110.82 (10.60)	+12.13
Special education status	Yes	24	93.96 (15.53)	105.25 (12.64)	+11.29
	No	195	98.65 (13.21)	111.28 (11.56)	+12.72

***Note**: Includes only students with fall 2007 and fall 2008 assessments.*

[a] 2008 standard score minus 2007 standard score.

A11. Change in Applied Problems standard scores: Cohort 3 fall 2007 to fall 2008 by student characteristics

			Mean standard scores (standard deviation)		
		N	Fall 2007	Fall 2008	Change score[a]
Race[b]	American Indian	11	94.36 (15.83)	95.09 (13.66)	+0.73
	Asian	60	91.78 (18.35)	97.10 (10.25)	+5.32
	Hispanic	30	95.77 (15.18)	97.97 (10.37)	+2.20
	African American	78	96.79 (10.86)	97.22 (9.20)	+0.42
	Caucasian	32	105.22 (15.06)	102.81 (11.56)	-2.41
ELL status	Yes	96	94.06 (17.48)	97.31 (10.44)	+3.25
	No	115	98.30 (12.92)	98.63 (10.39)	+0.32
Eligible for free or reduced- price lunch	Yes	117	94.82 (15.67)	96.71 (10.04)	+1.89
	No	94	98.31 (14.63)	99.67 (10.69)	+1.36
Special education status	Yes	22	92.41 (19.73)	93.86 (14.20)	+1.45
	No	189	96.84 (14.67)	98.51 (9.81)	+1.68

Note: *Includes only students with fall 2007 and fall 2008 assessments.*

[a] *2008 standard score minus 2007 standard score.*

[b] *Significant differences in change scores between Asians and Caucasians ($p<.05$).*

A12. PEK school component. PEK effect sizes[a] using birthday cutoff method compared to other studies

Assessment instrument	PEK 2005-06[b]	PEK 2006-07[c]	PreK in five states; Barnett et al., 2005	PreK in Tulsa, Oklahoma; Gormley et al., 2005	PreK in Arkansas; Hustedt et al., 2007	PreK in New Mexico; Hustedt et al. 2007	PreK in New Mexico; Hustedt et al. 2008
Peabody Picture Vocabulary Test	.69	.58	.26	-	.36	.36	.25
W-J Letter-Word Identification (reading)	.75	.71	-	.79	-	-	-
W-J Spelling (writing)	.96 (.69[d])	.77 (1.02[e])	-	.64	-	-	-
W-J Applied Problems (math)	.88 (.67[d])	.06[f] (.35[e])	.28	.38	.24	.39	.50

Note: *Caution is needed in interpreting Cohort 1 and Cohort 2 results as they may be misleading due to baseline test score differences in the cohorts compared using the birthday cutoff method. These differences at baseline tend to inflate the effect sizes for Cohort 1 and diminish the effect sizes for Cohort 2 for most of the measures. A crude adjustment has been made to compensate for these differences in some cases (as indicated above) where they were statistically significant. We are currently developing a more appropriate statistical adjustment. Additionally, it is important to note that PEK effect sizes were calculated based on the standard deviation for the pooled treatment and comparison group, whereas effect sizes in the other studies were calculated based on the standard deviation for the comparison group only.*

[a] *Small effect = 0.2, medium effect = 0.5, large effect = 0.8. Effect sizes are calculated using Cohen's d (1988).*

[b] *The effect of PEK is based on the comparison between Cohort 1 and Cohort 2 in fall 2006 (see Mueller & Gozali-Lee, 2007).*

[c] *The effect of PEK is based on the comparison between Cohort 2 and Cohort 3 in fall 2007.*

[d] *Effect size adjusted for differences between Cohorts 1 and 2 at baseline (fall of PEK year).*

[e] *Effect size adjusted for differences between Cohorts 2 and 3 at baseline (fall of PEK year).*

[f] *No statistically significant difference at the birthday cutoff.*

A13. PEK school component (fall 2006). Academic test age-equivalency scores[a] at the birthday cutoff point (estimate of the effect of PEK on Cohort 1 students based on birthday cutoff method)

Assessment instrument	Just missed birthday cutoff (Cohort 2)	Just made cutoff (Cohort 1)	Difference
Peabody Picture Vocabulary Test	3 – 09	4 – 09	12 months
W-J Letter-Word Identification (reading)	4 – 11	5 – 07	8 months
W-J Spelling (writing)	4 – 06	5 – 06	12 months (9 months[b])
W-J Applied Problems (math)	4 – 03	5 – 01	10 months (6 months[b])

Note: *The expected age equivalency score is 5 years, 0 months at the birthday cutoff based on national norms.*

[a] *In years and months.*

[b] *Adjusted for differences between Cohorts 1 and 2 at baseline (fall of PEK year).*

A14. PEK school component (fall 2007). Academic test age-equivalency scores[a] at the birthday cutoff point (estimate of the effect of PEK on Cohort 2 students based on birthday cutoff method)

Assessment instrument	Just missed birthday cutoff (Cohort 3)	Just made cutoff (Cohort 2)	Difference
Peabody Picture Vocabulary Test	3-11	4-09	10 months
W-J Letter-Word Identification (reading)	5-01	5-07	6 months
W-J Spelling (writing)	4-09	5-06	9 months (12 months[b])
W-J Applied Problems (math)	4-08	4-11	3 months[c] (4 months[b])

Note: *The expected age equivalency score is 5 years, 0 months at the birthday cutoff based on national norms.*

[a] *In years and months.*

[b] *Adjusted for differences between Cohorts 2 and 3 at baseline (fall of PEK year).*

[c] *This difference is not statistically significant based on the regression discontinuity (birthday cutoff) analysis.*

A15. PEK school component. Studies that use the birthday cutoff method (continues on following page)

A. Program features	PEK 2005-06 and 2006-07	Barnett et al., 2005	Gormley et al., 2005	Hustedt et al., 2007	Hustedt et al., 2007 and 2008
Location(s)	Saint Paul, Minnesota	Michigan, New Jersey, Oklahoma, South Carolina, West Virginia	Tulsa, Oklahoma	Arkansas	New Mexico
Funding	school district funding plus private grant	state-funded	state-funded	state-funded	state-funded
Sites	public schools	public schools and private centers	public schools	public schools and private centers	public schools and private centers
Provider education	All are licensed teachers with four-year college degrees plus preschool certification	Nearly all are teachers with four-year college degrees with an early childhood specialization	All teachers have four-year college degrees plus certification in early childhood education	Nearly all (94%) are teachers with at least a four-year college degree	Lead teachers at each site must have four-year college degrees and certification in early childhood education within 5 years of becoming PreK site. In spring 2006, 71% of lead teachers responding to a survey reported having a bachelor's degree
Length of day	half-day	Varies	Varies	-	-
Teacher[a]/child ratio	1:10	1:8 to 1:10	1:10 or less	-	1:10
Maximum class size	20	15 to 20	20	-	20
Target low-income or at-risk	Yes	Varies	No	Yes	Yes

A15. PEK school component. Studies that use the birthday cutoff method (continued)

B. Characteristics of study samples	PEK Cohorts 1 & 2 2005-06	PEK Cohorts 2 & 3 2006-07	Barnett et al. 2005	Gormley et al. 2005[b]	Hustedt et al. 2007	Hustedt et al. 2007	Hustedt et al. 2008
Sample size							
Treatment	263	268	2,728	1,461	504	382	405
Control	319	296	2,550	1,567	407	504	519
Gender							
Female	49%	48%	52%	48%	48%	49%	54%
Male	51%	52%	48%	52%	52%	51%	46%
Race/ethnicity							
American Indian	4%	4%	3%	9%	<1%	28%	19%
Asian	25%	28%	2%	1%	1%	1%	2%
Latino	15%	15%	21%	14%	6%	56%	57%
Black	36%	36%	25%	39%	36%	1%	2%
White	19%	16%	47%	36%	57%	10%	19%
Other	-	-	-	-	-	2%	<1%
Free/reduced-price lunch							
Eligible	69%	63%	-	66%	-	-	-
Ineligible	31%	37%	-	34%	-	-	-
Age upon PreK entry	4	4	4	4	4	4	4

Note: *Demographic characteristics are provided for the combined treatment and control groups.*

[a] *Includes certified teachers and teaching assistants.*

[b] *Demographic breakdowns for the combined treatment and control groups are approximations calculated from data provided in the published study.*

A16. PEK school component (fall 2006). Academic test standard scores in kindergarten: PEK Cohort 1 vs. kindergarten classmates

Assessment		PEK Cohort 1	Mean standard scores[a] Kindergarten classmates[b] With preschool/ child care center	Mean standard scores[a] Kindergarten classmates[b] Without preschool/ child care center
Peabody Picture Vocabulary Test III	Mean	91.47	87.40	83.60
	Adjusted mean[c]	91.02	86.95**	85.43**
	Number assessed	263	143	99
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	Mean	101.89	98.79	95.23
	Adjusted mean[c]	101.67	99.84	94.29***
	Number assessed	263	142	99
Spelling (writing)	Mean	102.25	99.75	97.89
	Adjusted mean[c]	102.05	101.02	96.59***
	Number assessed	263	143	99
Applied Problems (math)	Mean	93.93	91.45	88.98
	Adjusted mean[c]	93.70	91.88	88.97**
	Number assessed	262	142	98

Note: *Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *Kindergarten classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

** *p<.01, compared to PEK Cohort 1.*

*** *p<.001, compared to PEK Cohort 1.*

A17. PEK school component (fall 2007). Academic test standard scores in kindergarten: PEK Cohort 2 vs. kindergarten classmates

		Mean standard scores[a]	
		Kindergarten classmates[b]	
Test	PEK Cohort 2	With preschool/ child care center	Without preschool/ child care center
Peabody Picture Vocabulary Test III			
Mean	92.1	85.7	83.1
Adjusted mean[c]	91.6	86.6**	83.1***
Number assessed	266	139	145
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)			
Mean	103.1	98.0	96.3
Adjusted mean[c]	103.4	98.5***	95.3***
Number assessed	266	139	145
Spelling (writing)			
Mean	104.1	99.9	97.2
Adjusted mean[c]	104.7	100.2**	95.9***
Number assessed	266	139	145
Applied Problems (math)			
Mean	94.5	91.4	87.9
Adjusted mean[c]	94.8	91.8*	87.1***
Number assessed	266	139	140

Note: *Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *Kindergarten classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

** p<.05, compared to PEK Cohort 2.*

*** p<.01, compared to PEK Cohort 2.*

**** p<.001, compared to PEK Cohort 2.*

A18. PEK school component (fall 2008). Academic test standard scores in kindergarten: PEK Cohort 3 vs. kindergarten classmates

		Mean standard scores[a]	
		Kindergarten classmates[b]	
Test	PEK Cohort 3	With preschool/ child care center	Without preschool/ child care center
Peabody Picture Vocabulary Test III			
Mean	94.6	87.6	81.1
Adjusted mean[c]	94.7	87.0***	81.9***
Number assessed	235	152	78
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)			
Mean	106.9	102.3	98.4
Adjusted mean[c]	106.8	103.0***	97.3***
Number assessed	234	152	78
Spelling (writing)			
Mean	110.0	105.1	101.1
Adjusted mean[c]	109.7	106.0**	99.9***
Number assessed	234	152	78
Applied Problems (math)			
Mean	96.7	90.1	84.6
Adjusted mean[c]	96.7	90.6***	83.9***
Number assessed	234	152	78

Note: *Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *Kindergarten classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

** p<.05, compared to PEK Cohort 3.*

*** p<.01, compared to PEK Cohort 3.*

**** p<.001, compared to PEK Cohort 3.*

A19. PEK school component. PEK academic test effect sizes in kindergarten: PEK students vs. kindergarten classmates

Test	Estimated size of PEK effects[a]	
Cohort 1	**Cohort 1 vs. preschool comparison group**	**Cohort 1 vs. no preschool comparison group**
Peabody Picture Vocabulary Test III	.23	.30
Woodcock-Johnson Tests of Achievement III		
Letter-Word Identification (reading)	.15	.61
Spelling (writing)	.08	.44
Applied Problems (math)	.15	.37
Cohort 2	**Cohort 2 vs. preschool comparison group**	**Cohort 2 vs. no preschool comparison group**
Peabody Picture Vocabulary Test III	.30	.49
Woodcock-Johnson Tests of Achievement III		
Letter-Word Identification (reading)	.49	.77
Spelling (writing)	.36	.73
Applied Problems (math)	.27	.60
Cohort 3	**Cohort 3 vs. preschool comparison group**	**Cohort 3 vs. no preschool comparison group**
Peabody Picture Vocabulary Test III	.49	.70
Woodcock-Johnson Tests of Achievement III		
Letter-Word Identification (reading)	.32	.80
Spelling (writing)	.31	.90
Applied Problems (math)	.52	.95

[a] *Effect size was calculated using Cohen's d (1988): the difference between the adjusted means of Cohort 1 and the comparison group divided by the pooled standard deviation of the two groups (using standard scores). Small effect = 0.2, medium effect = 0.5, large effect = 0.8. These results are based on adjustments for demographic (gender, age, race/ethnicity, free/reduced-price lunch eligibility, ELL status, and Special Education status) and test date differences of the groups being compared.*

A20. PEK school component. Academic test age-equivalency scores[a] in kindergarten: PEK students vs. kindergarten classmates

Test		Mean adjusted[b] age-equivalency scores (years-months)	
		Kindergarten classmates[c]	
Cohort 1	**PEK Cohort 1 (N=262-3)**	**With preschool/ child care center (N=142-3)**	**Without preschool/ child care center (N=98-9)**
Peabody Picture Vocabulary Test III	4-11	4-08	4-06
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)	5-10	5-09	5-06
Spelling (writing)	5-09	5-09	5-06
Applied Problems (math)	5-03	5-01	4-11
Cohort 2	**PEK Cohort 2 (N=266)**	**With preschool/ child care center (N=139)**	**Without preschool/ child care center[d] (N=145)**
Peabody Picture Vocabulary Test III	4-11	4-05	4-02
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)	6-00	5-07	5-06
Spelling (writing)	5-11	5-09	5-06
Applied Problems (math)	5-03	5-01	4-09
Cohort 3	**PEK Cohort 3 (N=235)**	**With preschool/ child care center (N=152)**	**Without preschool/ child care center (N=78)**
Peabody Picture Vocabulary Test III	5-04	4-08	4-05
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)	6-02	6-00	5-09
Spelling (writing)	6-04	6-02	5-09
Applied Problems (math)	5-05	5-01	4-09

[a] *In years and months.*

[b] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

[c] *Kindergarten classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[d] *Children with missing data on preschool/child care experience were included in the no preschool/child care center group.*

A21. PEK school component (fall 2006). Teachers' ratings in kindergarten: PEK Cohort 1 vs. kindergarten classmates

Assessment		PEK Cohort 1	Mean standard scores[a] Kindergarten classmates[b] With preschool/ child care center	Mean standard scores[a] Kindergarten classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills[d]	Mean	103.60	99.96	101.03
	Adjusted mean[c]	103.61	100.71	99.96*
	Number assessed	235	139	98
Problem Behaviors[e]	Mean	94.64	95.25	94.91
	Adjusted mean[c]	94.68	94.34	96.09
	Number assessed	236	141	100
Academic Competence[f]	Mean	97.14	94.32	88.37
	Adjusted mean[c]	96.62	95.38	88.06***
	Number assessed	221	132	84

Note: *Includes only students who were assessed on both social and academic skills. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *Kindergarten classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[d] *Higher scores indicate higher social skills.*

[e] *Higher scores indicate more problem behaviors.*

[f] *Higher scores indicate higher academic competence.*

** p<.05, compared to PEK Cohort 1.*

**** p<.001, compared to PEK Cohort 1.*

A22. PEK school component (fall 2007). Teachers' ratings in kindergarten: PEK Cohort 2 vs. kindergarten classmates

Assessment		PEK Cohort 2	Mean standard scores[a] Kindergarten classmates[b] With preschool/ child care center	Mean standard scores[a] Kindergarten classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills[d]	Mean	106.35	100.39	101.52
	Adjusted mean[c]	106.67	100.79**	100.60**
	Number assessed	238	119	132
Problem Behaviors[e]	Mean	93.62	96.42	95.86
	Adjusted mean[c]	93.25	96.07*	96.85**
	Number assessed	244	129	139
Academic Competence[f]	Mean	97.10	93.79	87.60
	Adjusted mean[c]	97.27	94.48*	86.66***
	Number assessed	242	130	140

Note: *Includes only students who were assessed on both social and academic skills. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *Kindergarten classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[d] *Higher scores indicate higher social skills.*

[e] *Higher scores indicate more problem behaviors.*

[f] *Higher scores indicate higher academic competence.*

** p<.05, compared to PEK Cohort 2.*

*** p<.01, compared to PEK Cohort 2.*

**** p<.001, compared to PEK Cohort 2.*

A23. PEK school component (fall 2008). Teachers' ratings in kindergarten: PEK Cohort 3 vs. kindergarten classmates

Assessment		PEK Cohort 3	Mean standard scores[a] Kindergarten classmates[b] With preschool/ child care center	Mean standard scores[a] Kindergarten classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills[d]	Mean	104.9	96.1	99.0
	Adjusted mean[c]	104.5	97.2***	98.0**
	Number assessed	206	140	72
Problem Behaviors[e]	Mean	93.9	99.9	98.0
	Adjusted mean[c]	93.8	99.3***	99.4**
	Number assessed	207	142	74
Academic Competence[f]	Mean	98.2	90.9	86.0
	Adjusted mean[c]	97.8	91.3***	86.2***
	Number assessed	205	142	73

Note: *Includes only students who were assessed on both social and academic skills. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *Kindergarten classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[d] *Higher scores indicate higher social skills.*

[e] *Higher scores indicate more problem behaviors.*

[f] *Higher scores indicate higher academic competence.*

** p<.05, compared to PEK Cohort 3.*

*** p<.01, compared to PEK Cohort 3.*

**** p<.001, compared to PEK Cohort 3.*

A24. PEK school component. Academic test standard score one-year change, fall 2006 (kindergarten) to fall 2007 (first grade): PEK Cohort 1 and classmates[a]

Test	Number assessed	Mean standard scores[b] Kindergarten (fall 2006)	Mean standard scores[b] 1st grade (fall 2007)	Change[c]
PEK Cohort 1				
Peabody Picture Vocabulary Test III	238	91.1	93.4	+2.3**
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	237	101.8	103.3	+1.5*
Spelling (writing)	238	102.2	104.0	+1.8**
Applied Problems (math)	237	93.8	102.7	+8.9***
Classmates				
Peabody Picture Vocabulary Test III	261	86.1	90.0	+3.9***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	259	97.1	100.1	+3.0***
Spelling (writing)	260	98.3	102.5	+4.2***
Applied Problems (math)	258	90.1	100.4	+10.3***

Note: *The analysis examines change from fall of kindergarten to fall of first grade using paired samples t-tests. The analysis was conducted separately for PEK Cohort 1 and for classmates.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

[c] *Fall of first grade score minus fall of kindergarten score.*

** p<.05*

*** p<.01*

**** p<.001*

A25. PEK school component. Adjusted academic test standard score one-year change, fall 2006 (kindergarten) to fall 2007 (first grade): PEK Cohort 1 versus classmates[a]

Test	Number assessed	Adjusted mean standard scores[b] Kindergarten (fall 2006)	1st grade (fall 2007)	Change[c]	Significance[d]
Peabody Picture Vocabulary Test III					
PEK Cohort 1	232	90.9	93.3	+2.4	
Classmates	261	86.3	90.4	+4.1	ns
WJ-III Letter-Word Identification (reading)					
PEK Cohort 1	232	101.7	103.2	+1.5	
Classmates	259	97.4	100.4	+3.0	ns
WJ-III Spelling (writing)					
PEK Cohort 1	232	102.0	103.9	+1.9	
Classmates	260	98.6	102.7	+4.1	*
WJ-III Applied Problems (math)					
PEK Cohort 1	231	93.6	102.6	+9.0	
Classmates	258	90.3	100.5	+10.2	ns

Note: The analysis examines change from fall of kindergarten to fall of first grade using Repeated Measures Analysis of Covariance. The analysis examines both groups (PEK Cohort 1 and classmates) together and adjusts for *gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of kindergarten). The group-by-change interaction indicates whether the change between kindergarten and first grade differs significantly between PEK Cohort 1 and the classmate comparison group.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally. The scores are adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of kindergarten).*

[c] *Fall of first grade score minus fall of kindergarten score.*

[d] *Indicates whether the change between kindergarten and first grade differs significantly between PEK Cohort 1 and the classmate comparison group.*

[ns] *Not significant*

** p<.05*

A26. PEK school component. Academic test standard score one-year change, fall 2007 (kindergarten) to fall 2008 (first grade): PEK Cohort 2 and classmates[a]

Test	Number assessed	Mean standard scores[b] Kindergarten (fall 2007)	Mean standard scores[b] 1st grade (fall 2008)	Change[c]
PEK Cohort 2				
Peabody Picture Vocabulary Test III	225	92.2	92.3	+0.2
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	224	103.5	105.4	+1.9**
Spelling (writing)	224	104.6	105.6	+1.0
Applied Problems (math)	224	94.7	103.9	+9.2***
Classmates				
Peabody Picture Vocabulary Test III	214	84.2	87.9	+3.8***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	214	97.8	101.4	+3.6***
Spelling (writing)	214	99.2	103.3	+4.0***
Applied Problems (math)	210	90.0	100.2	+10.2***

Note: *The analysis examines change from fall of kindergarten to fall of first grade using paired samples t-tests. The analysis was conducted separately for PEK Cohort 2 and for classmates.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

[c] *Fall of first grade score minus fall of kindergarten score.*

** p<.05*

*** p<.01*

**** p<.001*

A27. PEK school component. Adjusted academic test standard score one-year change, fall 2007 (kindergarten) to fall 2008 (first grade): PEK Cohort 2 versus classmates[a]

Test	Number assessed	Adjusted mean standard scores[b] Kindergarten (fall 2007)	1st grade (fall 2008)	Change[c]	Significance[d]
Peabody Picture Vocabulary Test III					
PEK Cohort 2	223	91.5	91.9	+0.4	
Classmates	212	84.9	88.6	+3.7	***
WJ-III Letter-Word Identification (reading)					
PEK Cohort 2	222	103.4	105.6	+2.2	
Classmates	212	97.9	101.3	+3.4	ns
WJ-III Spelling (writing)					
PEK Cohort 2	222	104.7	105.8	+1.1	
Classmates	212	99.0	103.1	+4.1	**
WJ-III Applied Problems (math)					
PEK Cohort 2	222	94.6	104.1	+9.5	
Classmates	209	90.2	100.3	+10.1	ns

Note: *The analysis examines change from fall of kindergarten to fall of first grade using Repeated Measures Analysis of Covariance. The analysis examines both groups (PEK Cohort 2 and classmates) together and adjusts for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of kindergarten). The group-by-change interaction indicates whether the change between kindergarten and first grade differs significantly between PEK Cohort 2 and the classmate comparison group.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally. The scores are adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of kindergarten).*

[c] *Fall of first grade score minus fall of kindergarten score.*

[d] *Indicates whether the change between kindergarten and first grade differs significantly between PEK Cohort 2 and the classmate comparison group.*

[ns] *Not significant*

** *p<.01*

*** *p<.001*

A28. PEK school component. Academic test standard score one-year change, fall 2008 (kindergarten) to fall 2009 (first grade): PEK Cohort 3 and classmates[a]

Test	Number assessed	Mean standard scores[b] Kindergarten (fall 2008)	1st grade (fall 2009)	Change[c]
PEK Cohort 3				
Peabody Picture Vocabulary Test III	215	94.3	92.5	-1.8**
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	214	106.6	104.3	-2.3***
Spelling (writing)	214	109.8	104.4	-5.4***
Applied Problems (math)	214	96.6	103.9	+7.3***
Classmates				
Peabody Picture Vocabulary Test III	258	85.6	86.1	+0.5
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	257	99.8	99.4	-0.5
Spelling (writing)	256	103.0	98.8	-4.2***
Applied Problems (math)	255	88.5	98.1	+9.6***

Note: *The analysis examines change from fall of kindergarten to fall of first grade using paired samples t-tests. The analysis was conducted separately for PEK Cohort 3 and for classmates.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

[c] *Fall of first grade score minus fall of kindergarten score.*

*** p<.01*

**** p<.001*

A29. PEK school component. Adjusted academic test standard score one-year change, fall 2008 (kindergarten) to fall 2009 (first grade): PEK Cohort 3 versus classmates[a]

Test	Number assessed	Adjusted mean standard scores[b] Kindergarten (fall 2008)	1st grade (fall 2009)	Change[c]	Significance[d]
Peabody Picture Vocabulary Test III					
PEK Cohort 3	214	94.7	92.7	-2.0	
Classmates	256	85.4	86.0	+0.6	**
WJ-III Letter-Word Identification (reading)					
PEK Cohort 3	213	106.3	104.0	-2.3	
Classmates	255	100.1	99.7	-0.4	*
WJ-III Spelling (writing)					
PEK Cohort 3	213	109.6	104.2	-5.4	
Classmates	254	103.1	99.2	-3.9	ns
WJ-III Applied Problems (math)					
PEK Cohort 3	213	96.6	103.7	+7.1	
Classmates	253	88.6	98.5	+9.9	**

Note: *The analysis examines change from fall of kindergarten to fall of first grade using Repeated Measures Analysis of Covariance. The analysis examines both groups (PEK Cohort 3 and classmates) together and adjusts for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of kindergarten). The group-by-change interaction indicates whether the change between kindergarten and first grade differs significantly between PEK Cohort 3 and the classmate comparison group.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally. The scores are adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of kindergarten).*

[c] *Fall of first grade score minus fall of kindergarten score.*

[d] *Indicates whether the change between kindergarten and first grade differs significantly between PEK Cohort 3 and the classmate comparison group.*

[ns] *Not significant*

** p<.05*

*** p<.01*

A30. PEK school component. Academic test age equivalency one-year change, fall 2006 (kindergarten) to fall 2007 (first grade): PEK Cohort 1 and classmates[a]

Test	Number assessed	Mean age-equivalency scores (years-months) Kindergarten (fall 2006)	1st grade (fall 2007)	Change[b]
PEK Cohort 1				
Peabody Picture Vocabulary Test III	238	4-11	6-01	+14 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	237	5-10	6-11	+13 months
Spelling (writing)	238	5-09	6-11	+14 months
Applied Problems (math)	237	5-03	6-08	+17 months
Classmates				
Peabody Picture Vocabulary Test III	261	4-07	5-10	+15 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	259	5-07	6-09	+14 months
Spelling (writing)	260	5-06	6-09	+15 months
Applied Problems (math)	258	4-11	6-08	+21 months

[a] The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.

[b] Fall of first grade score minus fall of kindergarten score.

A31. PEK school component. Academic test age equivalency one-year change, fall 2007 (kindergarten) to fall 2008 (first grade): PEK Cohort 2 and classmates[a]

Test	Number assessed	Mean age-equivalency scores (years-months) Kindergarten (fall 2007)	1st grade (fall 2008)	Change[b]
PEK Cohort 2				
Peabody Picture Vocabulary Test III	225	5-00	6-02	+14 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	224	6-00	7-00	+12 months
Spelling (writing)	224	5-11	7-00	+13 months
Applied Problems (math)	224	5-03	6-11	+20 months
Classmates				
Peabody Picture Vocabulary Test III	214	4-03	5-09	+18 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	214	5-07	6-10	+15 months
Spelling (writing)	214	5-06	6-11	+17 months
Applied Problems (math)	210	4-11	6-08	+21 months

[a] The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.

[b] Fall of first grade score minus fall of kindergarten score.

A32. PEK school component. Academic test age equivalency one-year change, fall 2008 (kindergarten) to fall 2009 (first grade): PEK Cohort 3 and classmates[a]

Test	Number assessed	Mean age-equivalency scores (years-months) Kindergarten (fall 2008)	1st grade (fall 2009)	Change[b]
PEK Cohort 3				
Peabody Picture Vocabulary Test III	215	5-04	6-02	+10 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	215	6-02	7-00	+10 months
Spelling (writing)	215	6-04	7-00	+8 months
Applied Problems (math)	215	5-05	6-11	+18 months
Classmates				
Peabody Picture Vocabulary Test III	258	4-07	5-07	+11 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	258	5-09	6-09	+12 months
Spelling (writing)	258	5-11	6-09	+10 months
Applied Problems (math)	257	4-10	6-05	+19 months

[a] The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.

[b] Fall of first grade score minus fall of kindergarten score.

A33. PEK school component (fall 2007). Academic test standard scores in first grade: PEK Cohort 1 versus classmates[a]

Test		Mean standard scores[b]		
			Classmate comparison group in 1st grade[c]	
		PEK Cohort 1 (N=238)	With preschool/ child care center (N=121)	Without preschool/ child care center (N=140)
Peabody Picture Vocabulary Test III	Mean	93.4	91.6	88.7
	Adjusted mean[d]	93.3	91.0	89.3**
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	Mean	103.2	101.2	98.9
	Adjusted mean[d]	102.8	102.2	98.7**
Spelling (writing)	Mean	104.0	103.9	101.2
	Adjusted mean[d]	103.7	104.8	100.9*
Applied Problems (math)	Mean	102.4	100.3	100.0
	Adjusted mean[d]	102.0	101.1	100.0

Note: *The analysis compares test scores of PEK Cohort 1 with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

** p<.05, compared to PEK Cohort 1.*

*** p<.01, compared to PEK Cohort 1.*

A34. PEK school component (fall 2008). Academic test standard scores in first grade: PEK Cohort 2 versus classmates[a]

Test		Mean standard scores[b]: PEK Cohort 2 (N=230-232)	Classmate comparison group in 1st grade[c]: With preschool/ child care center (N=110)	Classmate comparison group in 1st grade[c]: Without preschool/ child care center (N=71)
Peabody Picture Vocabulary Test III	Mean	92.1	88.9	86.7
	Adjusted mean[d]	91.1	90.8	86.9*
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	Mean	105.4	99.2	103.5
	Adjusted mean[d]	105.3	100.5***	101.8*
Spelling (writing)	Mean	105.7	101.6	104.7
	Adjusted mean[d]	105.8	102.7*	102.8*
Applied Problems (math)	Mean	104.0	99.8	101.3
	Adjusted mean[d]	103.6	101.2	100.5

Note: *The analysis compares test scores of PEK Cohort 2 with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

** p<.05, compared to PEK Cohort 2.*

*** p<.01, compared to PEK Cohort 2.*

A35. PEK school component (fall 2009). Academic test standard scores in first grade: PEK Cohort 3 versus classmates[a]

Test		Mean standard scores[b]		
			Classmate comparison group in 1st grade[c]	
		PEK Cohort 3 (N=237)	With preschool/ child care center (N=131-132)	Without preschool/ child care center (N=66)
Peabody Picture Vocabulary Test III	Mean	92.1	87.0	84.6
	Adjusted mean[d]	92.1	86.5***	85.7**
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	Mean	104.2	101.5	97.7
	Adjusted mean[d]	104.1	102.4	96.6***
Spelling (writing)	Mean	104.5	99.9	98.0
	Adjusted mean[d]	104.3	100.6*	97.1**
Applied Problems (math)	Mean	103.3	99.2	96.5
	Adjusted mean[d]	103.1	99.8*	96.0**

Note: *The analysis compares test scores of PEK Cohort 3 with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

** p<.05, compared to PEK Cohort 3.*

*** p<.01, compared to PEK Cohort 3.*

**** p<.001, compared to PEK Cohort 3.*

A36. PEK school component. Academic test age-equivalency scores in first grade: PEK students versus classmates[a]

	Mean adjusted[b] age-equivalency scores (years-months)		
		Classmate comparison group in 1st grade[c]	
Test	**PEK Cohort 1 (N=238)**	**With preschool/child care center (N=121)**	**Without preschool/ child care center (N=140)**
Peabody Picture Vocabulary Test III	6-02	6-00	5-10**
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)	6-11	6-10	6-08**
Spelling (writing)	6-11	6-11	6-09*
Applied Problems (math)	6-08	6-08	6-05
	PEK Cohort 2 (N=232)	**With preschool/child care center (N=110)**	**Without preschool/ child care center (N=71)**
Peabody Picture Vocabulary Test III	6-00	6-00	5-08*
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)	7-00	6-10***	6-11*
Spelling (writing)	7-00	6-11*	6-11*
Applied Problems (math)	6-11	6-08	6-08
	PEK Cohort 3 (N=237)	**With preschool/child care center (N=131-132)**	**Without preschool/ child care center (N=66)**
Peabody Picture Vocabulary Test III	6-01	5-07***	5-06**
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)	7-00	6-11	6-07***
Spelling (writing)	6-11	6-09*	6-07**
Applied Problems (math)	6-11	6-05*	6-02**

Note: *The analysis compares test scores of the PEK Cohorts with the scores of their respective classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

**p<.05, **p<.01, ***p<.001, compared to the respective PEK Cohort (based on results of the analysis comparing standard scores)*

A37. PEK school component. PEK academic test effect sizes in first grade: PEK students versus classmates

Test	Estimated size of PEK effects[a]	
Cohort 1	**Cohort 1 vs. preschool comparison group**	**Cohort 1 vs. no preschool comparison group**
Peabody Picture Vocabulary Test III	ns	0.26
Woodcock-Johnson Tests of Achievement III		
Letter-Word Identification (reading)	ns	0.30
Spelling (writing)	ns	0.23
Applied Problems (math)	ns	ns
Cohort 2	**Cohort 2 vs. preschool comparison group**	**Cohort 2 vs. no preschool comparison group**
Peabody Picture Vocabulary Test III	ns	0.28
Woodcock-Johnson Tests of Achievement III		
Letter-Word Identification (reading)	0.37	0.26
Spelling (writing)	0.25	0.25
Applied Problems (math)	ns	ns
Cohort 3	**Cohort 3 vs. preschool comparison group**	**Cohort 3 vs. no preschool comparison group**
Peabody Picture Vocabulary Test III	0.37	0.40
Woodcock-Johnson Tests of Achievement III		
Letter-Word Identification (reading)	ns	0.57
Spelling (writing)	0.25	0.59
Applied Problems (math)	0.24	0.55

[a] Effect size was calculated using Cohen's d (1988): the difference between the adjusted means of the PEK cohort and the comparison group divided by the pooled standard deviation of the two groups (using standard scores). Small effect = 0.2, medium effect = 0.5, large effect = 0.8. These results are based on adjustments for demographic (gender, age, race/ethnicity, free/reduced-price lunch eligibility, ELL status, and Special Education status) and test date differences of the groups being compared.

[ns] Not significant

A38. PEK school component (fall 2007). Teachers' ratings in first grade: PEK Cohort 1 versus classmates[a]

Assessment		PEK Cohort 1	Mean standard scores[b] Classmate comparison group in 1st grade[c] With preschool/ child care center	Mean standard scores[b] Classmate comparison group in 1st grade[c] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills[e]	Mean	99.9	99.2	103.9
	Adjusted mean[d]	99.9	100.1	103.0
	Number assessed	210	108	117
Problem Behaviors[f]	Mean	97.8	98.0	96.6
	Adjusted mean[d]	97.9	96.9	97.4
	Number assessed	211	109	117
Academic Competence[g]	Mean	95.4	93.4	91.5
	Adjusted mean[d]	95.2	93.9	91.4**
	Number assessed	212	107	118

Note: *Includes only students who were assessed on both social and academic skills. The analysis compares ratings of PEK Cohort 1 with the ratings of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[c] *First-grade classmates were divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status.*

[e] *Higher scores indicate higher social skills.*

[f] *Higher scores indicate more problem behaviors.*

[g] *Higher scores indicate higher academic competence.*

** *p<.01, compared to PEK Cohort 1.*

A39. PEK school component (fall 2008). Teachers' ratings in first grade: PEK Cohort 2 versus classmates[a]

Assessment		PEK Cohort 2	Mean standard scores[b] Classmate comparison group in 1st grade[c] With preschool/ child care center	Without preschool/ child care center
Social Skills Rating System				
Total Social Skills[e]	Mean	101.5	98.6	101.4
	Adjusted mean[d]	101.5	99.2	100.4
	Number assessed	206	94	57
Problem Behaviors[f]	Mean	96.7	101.4	99.5
	Adjusted mean[d]	96.6	101.0*	100.5
	Number assessed	208	94	57
Academic Competence[g]	Mean	95.3	90.8	92.7
	Adjusted mean[d]	95.4	91.2**	92.0
	Number assessed	211	94	58

Note: *Includes only students who were assessed on both social and academic skills. The analysis compares ratings of PEK Cohort 2 with the ratings of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[c] *First-grade classmates were divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status.*

[e] *Higher scores indicate higher social skills.*

[f] *Higher scores indicate more problem behaviors.*

[g] *Higher scores indicate higher academic competence.*

** p<.05, compared to PEK Cohort 2.*

*** p<.01, compared to PEK Cohort 2.*

A40. PEK school component (fall 2009). Teachers' ratings in first grade: PEK Cohort 3 versus classmates

Assessment		PEK Cohort 3	Mean standard scores[a] Classmates[b] With preschool/ child care center	Mean standard scores[a] Classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills[d]	Mean	103.1	100.6	103.8
	Adjusted mean[c]	102.9	101.8	102.1
	Number assessed	177	99	49
Problem Behaviors[e]	Mean	96.7	100.3	95.3
	Adjusted mean[c]	97.0	98.9	96.8
	Number assessed	178	100	49
Academic Competence[f]	Mean	95.9	92.8	90.0
	Adjusted mean[c]	95.5	93.6	89.9**
	Number assessed	178	100	49

Note: *Includes only students who were assessed on both social and academic skills. The analysis compares ratings of PEK Cohort 3 with the ratings of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. Classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[d] *Higher scores indicate higher social skills.*

[e] *Higher scores indicate more problem behaviors.*

[f] *Higher scores indicate higher academic competence.*

** *p<.01, compared to PEK Cohort 3.*

A41. PEK school component. PEK social skills effect sizes in first grade: PEK students versus classmates

Test	Estimated size of PEK effects[a]	
Cohort 1	**Cohort 1 vs. preschool comparison group**	**Cohort 1 vs. no preschool comparison group**
Social Skills Rating System		
Total Social Skills	ns	ns
Problem Behaviors	ns	ns
Academic Competence	ns	0.28
Cohort 2	**Cohort 2 vs. preschool comparison group**	**Cohort 2 vs. no preschool comparison group**
Social Skills Rating System		
Total Social Skills	ns	ns
Problem Behaviors	0.29	ns
Academic Competence	0.33	ns
Cohort 3	**Cohort 3 vs. preschool comparison group**	**Cohort 3 vs. no preschool comparison group**
Social Skills Rating System		
Total Social Skills	ns	ns
Problem Behaviors	ns	ns
Academic Competence	ns	0.45

[a] Effect size was calculated using Cohen's d (1988): the difference between the adjusted means of the PEK cohort and the comparison group divided by the pooled standard deviation of the two groups (using standard scores). Small effect = 0.2, medium effect = 0.5, large effect = 0.8. These results are based on adjustments for demographic (gender, age, race/ethnicity, free/reduced-price lunch eligibility, ELL status, and Special Education status) and test date differences of the groups being compared.

[ns] Not significant

A42. PEK school component. Academic test standard score one-year change, fall 2008 (first grade) to fall 2009 (second grade): PEK Cohort 2 and classmates[a]

Test	Number assessed	Mean standard scores[b] 1st grade (fall 2008)	2nd grade (fall 2009)	Change[c]
PEK Cohort 2				
Peabody Picture Vocabulary Test III	202	92.8	94.2	+1.4*
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	201	105.6	103.5	-2.0***
Spelling (writing)	200	106.0	102.3	-3.7***
Applied Problems (math)	200	104.3	104.4	+0.1
Classmates				
Peabody Picture Vocabulary Test III	181	87.9	89.0	+1.0
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	181	102.0	98.7	-3.3***
Spelling (writing)	181	103.7	100.2	-3.5***
Applied Problems (math)	181	100.4	101.1	+0.7

Note: *The analysis examines change from fall of first grade to fall of second grade using paired samples t-tests. The analysis was conducted separately for PEK Cohort 2 and for classmates.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

[c] *Fall of second grade score minus fall of first grade score.*

** p<.05*

**** p<.001*

A43. PEK school component. Adjusted academic test standard score one-year change, fall 2008 (first grade) to fall 2009 (second grade): PEK Cohort 2 versus classmates[a]

Test	Number assessed	Adjusted mean standard scores[b] 1st grade (fall 2008)	2nd grade (fall 2009)	Change[c]	Significance[d]
Peabody Picture Vocabulary Test III					
PEK Cohort 2	200	92.1	93.6	+1.5	
Classmates	179	88.9	89.7	+0.8	ns
WJ-III Letter-Word Identification (reading)					
PEK Cohort 2	199	105.7	103.8	-1.9	
Classmates	179	102.0	98.6	-3.4	ns
WJ-III Spelling (writing)					
PEK Cohort 2	198	106.1	102.5	-3.6	
Classmates	179	103.6	100.1	-3.5	ns
WJ-III Applied Problems (math)					
PEK Cohort 2	198	104.1	104.3	+0.2	
Classmates	179	100.7	101.4	+0.7	ns

Note: *The analysis examines change from fall of first grade to fall of second grade using Repeated Measures Analysis of Covariance. The analysis examines both groups (PEK Cohort 2 and classmates) together and adjusts for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of kindergarten). The group-by-change interaction indicates whether the change between first grade and second grade differs significantly between PEK Cohort 2 and the classmate comparison group.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally. The scores are adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of first grade).*

[c] *Fall of second grade score minus fall of first grade score.*

[d] *Indicates whether the change between first and second grade differs significantly between PEK Cohort 2 and the classmate comparison group.*

[ns] *Not significant*

A44. PEK school component. Academic test age equivalency one-year change, fall 2008 (first grade) to fall 2009 (second grade): PEK Cohort 2 and classmates[a]

Test	Number assessed	Mean age-equivalency scores (years-months) 1st grade (fall 2008)	2nd grade (fall 2009)	Change[b]
PEK Cohort 2				
Peabody Picture Vocabulary Test III	202	6-02	7-03	+13 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	201	7-01	7-11	+10 months
Spelling (writing)	200	7-00	7-10	+10 months
Applied Problems (math)	200	6-09	7-09	+12 months
Classmates				
Peabody Picture Vocabulary Test III	181	5-09	6-08	+12 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	181	6-10	7-07	+9 months
Spelling (writing)	181	6-10	7-08	+10 months
Applied Problems (math)	181	6-06	7-06	+12 months

[a] The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.

[b] Fall of second grade score minus fall of first grade score.

A45. PEK school component. Academic test standard score one-year change, fall 2009 (first grade) to fall 2010 (second grade): PEK Cohort 3 and classmates[a]

Test	Number assessed	Mean standard scores[b] 1st grade (fall 2009)	2nd grade (fall 2010)	Change[c]
PEK Cohort 3				
Peabody Picture Vocabulary Test III	202	91.7	98.1	+6.4***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	202	104.2	102.5	-1.7***
Spelling (writing)	202	104.7	102.6	-2.1***
Applied Problems (math)	202	103.6	110.3	+6.6***
Classmates				
Peabody Picture Vocabulary Test III	223	86.5	91.1	+4.6***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	222	100.1	98.0	-2.1***
Spelling (writing)	224	98.8	98.1	-0.7
Applied Problems (math)	223	98.1	103.2	+5.1***

Note: *The analysis examines change from fall of first grade to fall of second grade using paired samples t-tests. The analysis was conducted separately for PEK Cohort 3 and for classmates.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

[c] *Fall of second grade score minus fall of first grade score.*

*** *p<.001*

A46. PEK school component. Adjusted academic test standard score one-year change, fall 2009 (first grade) to fall 2010 (second grade): PEK Cohort 3 versus classmates[a]

Test	Number assessed	Adjusted mean standard scores[b] 1st grade (fall 2009)	2nd grade (fall 2010)	Change[c]	Significance[d]
Peabody Picture Vocabulary Test III					
PEK Cohort 3	202	91.8	98.3	+6.5	
Classmates	223	86.4	90.9	+4.5	*
WJ-III Letter-Word Identification (reading)					
PEK Cohort 3	202	103.8	102.0	-1.8	
Classmates	222	100.5	98.5	-2.0	ns
WJ-III Spelling (writing)					
PEK Cohort 3	202	104.4	102.2	-2.2	
Classmates	224	99.1	98.4	-0.7	ns
WJ-III Applied Problems (math)					
PEK Cohort 3	202	103.5	110.0	+6.5	
Classmates	223	98.2	103.4	+4.9	ns

Note: *The analysis examines change from fall of first grade to fall of second grade using Repeated Measures Analysis of Covariance. The analysis examines both groups (PEK Cohort 3 and classmates) together and adjusts for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of first grade). The group-by-change interaction indicates whether the change between first grade and second grade differs significantly between PEK Cohort 3 and the classmate comparison group.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally. The scores are adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status (as of fall of first grade).*

[c] *Fall of second grade score minus fall of first grade score.*

[d] *Indicates whether the change between first and second grade differs significantly between PEK Cohort 3 and the classmate comparison group.*

[ns] *Not significant*

** p<.05.*

A47. PEK school component. Academic test age equivalency one-year change, fall 2009 (first grade) to fall 2010 (second grade): PEK Cohort 3 and classmates[a]

Test	Number assessed	Mean age-equivalency scores (years-months) 1st grade (fall 2009)	2nd grade (fall 2010)	Change[b]
PEK Cohort 3				
Peabody Picture Vocabulary Test III	202	6-00	7-05	+17 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	202	7-00	7-10	+10 months
Spelling (writing)	202	7-00	7-10	+10 months
Applied Problems (math)	202	6-09	8-04	+19 months
Classmates				
Peabody Picture Vocabulary Test III	223	5-06	6-10	+16 months
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	222	6-09	7-07	+10 months
Spelling (writing)	224	6-08	7-06	+10 months
Applied Problems (math)	223	6-04	7-09	+17 months

[a] The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.

[b] Fall of second grade score minus fall of first grade score.

A48. PEK school component (fall 2009). Academic test standard scores in second grade: PEK Cohort 2 versus classmates[a]

Test		Mean standard scores[b]		
			Classmate comparison group in 2nd grade[c]	
		PEK Cohort 2 (N=220-221)	With preschool/ child care center (N=92)	Without preschool/ child care center (N=68)
Peabody Picture Vocabulary Test III	Mean	94.2	89.7	89.1
	Adjusted mean[d]	92.8	91.5	91.0
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	Mean	103.0	95.8	100.6
	Adjusted mean[d]	102.4	97.6**(0.36 [e])	100.0
Spelling (writing)	Mean	102.2	98.1	101.9
	Adjusted mean[d]	101.6	100.2	101.0
Applied Problems (math)	Mean	104.2	100.0	101.5
	Adjusted mean[d]	103.4	101.9	101.2

Note: *The analysis compares test scores of PEK Cohort 2 with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

[e] *Effect size was calculated using Cohen's d (1988): the difference between the adjusted means of Cohort 2 and the comparison group divided by the pooled standard deviation of the two groups (using standard scores). Small effect = 0.2, medium effect = 0.5, large effect = 0.8.*

*** p<.01, compared to PEK Cohort 2.*

A49. PEK school component (fall 2009). Academic test age-equivalency scores in second grade: PEK Cohort 2 versus classmates[a]

Test	Mean adjusted[b] age-equivalency scores (years-months)		
		Classmate comparison group in 2nd grade[c]	
	PEK Cohort 2 (N=220-221)	With preschool/ child care center (N=92)	Without preschool/ child care center (N=68)
Peabody Picture Vocabulary Test III	7-02	7-00	6-11
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)	7-10	7-07**	7-08
Spelling (writing)	7-08	7-08	7-08
Applied Problems (math)	7-09	7-09	7-06

Note: *The analysis compares test scores of PEK Cohort 2 with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

*** p<.01 compared to PEK Cohort 2 (based on results of the analysis comparing standard scores)*

A50. PEK school component (fall 2010). Academic test standard scores in second grade: PEK Cohort 3 versus classmates[a]

Test		Mean standard scores[b]		
			Classmate comparison group in 2nd grade[c]	
		PEK Cohort 3 (N=208)	With preschool/ child care center (N=123-124)	Without preschool/ child care center (N=56)
Peabody Picture Vocabulary Test III	Mean	97.9	93.1	87.1
	Adjusted mean[d]	97.7	92.6***(0.32 [e])	88.8***(0.58 [e])
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	Mean	102.7	99.4	95.5
	Adjusted mean[d]	102.3	100.1	95.6***(0.46 [e])
Spelling (writing)	Mean	102.8	99.8	96.2
	Adjusted mean[d]	102.3	100.5	96.2***(0.47 [e])
Applied Problems (math)	Mean	110.4	104.3	101.1
	Adjusted mean[d]	109.9	104.9**(0.29 [e])	101.7***(0.50 [e])

Note: *The analysis compares test scores of PEK Cohort 3 with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

[e] *Effect size was calculated using Cohen's d (1988): the difference between the adjusted means of Cohort 3 and the comparison group divided by the pooled standard deviation of the two groups (using standard scores). Small effect = 0.2, medium effect = 0.5, large effect = 0.8.*

** *p<.01, compared to PEK Cohort 3.*

*** *p<.001, compared to PEK Cohort 3.*

A51. PEK school component (fall 2010). Academic test age-equivalency scores in second grade: PEK Cohort 3 versus classmates[a]

Test	Mean adjusted[b] age-equivalency scores (years-months)		
		Classmate comparison group in 2nd grade[c]	
	PEK Cohort 3 (N=208)	With preschool/ child care center (N=123-124)	Without preschool/ child care center (N=56)
Peabody Picture Vocabulary Test III	7-05	7-00***	6-07***
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)	7-10	7-08	7-05***
Spelling (writing)	8-00	7-10	7-06***
Applied Problems (math)	8-04	7-09**	7-06***

Note: *The analysis compares test scores of PEK Cohort 3 with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

** *p<.01 compared to PEK Cohort 3 (based on results of the analysis comparing standard scores)*

*** *p<.001 compared to PEK Cohort 3 (based on results of the analysis comparing standard scores)*

A52. PEK school component (fall 2009). Teachers' ratings in second grade: PEK Cohort 2 versus classmates

Assessment		PEK Cohort 2	Mean standard scores[a] Classmates[b] With preschool/ child care center	Mean standard scores[a] Classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills[d]	Mean	102.4	100.0	102.3
	Adjusted mean[c]	101.9	100.6	103.0
	Number assessed	163	67	58
Problem Behaviors[e]	Mean	97.3	98.1	96.2
	Adjusted mean[c]	97.7	97.5	95.8
	Number assessed	165	67	58
Academic Competence[f]	Mean	94.6	90.6	93.8
	Adjusted mean[c]	94.3	91.0	94.2
	Number assessed	165	68	58

Note: *Includes only students who were assessed on both social and academic skills. The analysis compares ratings of PEK Cohort 2 with the ratings of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. Classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[d] *Higher scores indicate higher social skills.*

[e] *Higher scores indicate more problem behaviors.*

[f] *Higher scores indicate higher academic competence.*

A53. PEK school component (fall 2010). Teachers' ratings in second grade: PEK Cohort 3 versus classmates

Assessment		PEK Cohort 3	Mean standard scores[a] Classmates[b] With preschool/ child care center	Mean standard scores[a] Classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills[d]	Mean	104.4	98.8	99.8
	Adjusted mean[c]	103.9	100.2* (0.21[g])	98.5* (0.30[g])
	Number assessed	171	107	51
Problem Behaviors[e]	Mean	97.1	100.9	102.3
	Adjusted mean[c]	97.4	99.8	103.4** (0.39[g])
	Number assessed	172	107	51
Academic Competence[f]	Mean	95.9	92.6	90.7
	Adjusted mean[c]	95.7	93.1* (0.20[g])	90.7** (0.39[g])
	Number assessed	172	107	51

Note: *Includes only students who were assessed on both social and academic skills. The analysis compares ratings of PEK Cohort 3 with the ratings of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. Classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[d] *Higher scores indicate higher social skills.*

[e] *Higher scores indicate more problem behaviors.*

[f] *Higher scores indicate higher academic competence.*

[g] *Effect size was calculated using Cohen's d (1988): the difference between the adjusted means of Cohort 3 and the comparison group divided by the pooled standard deviation of the two groups (using standard scores). Small effect = 0.2, medium effect = 0.5, large effect = 0.8.*

A54. PEK school component. MCA scale scores in third grade: PEK Cohort 1 versus classmates[a] (spring 2010), PEK Cohort 2 versus classmates[a] (spring 2011) and PEK Cohort 3 versus classmates[a] (spring 2012)

Minnesota Comprehensive Assessment			Mean scale scores[b] Classmate comparison group in 3rd grade[c] With preschool/ child care center	Without preschool/ child care center
PEK Cohort 1				
MCA-II Reading	Mean	353.8	348.0	347.0
	Adjusted mean	352.6	349.4	349.0
	Number assessed	199	89	62
MCA-II Math	Mean	354.7	354.3	351.4
	Adjusted mean	354.0	355.5	351.8
	Number assessed	199	90	62
PEK Cohort 2				
MCA-II Reading	Mean	353.6	347.8	347.9
	Adjusted mean	352.7	349.8	348.0* (0.25[d])
	Number assessed	195	90	61
MCA-III Math	Mean	347.6	344.9	344.9
	Adjusted mean	346.9	346.7	344.7
	Number assessed	196	90	61
PEK Cohort 3				
MCA-II Reading	Mean	353.7	352.3	348.7
	Adjusted mean	353.4	353.2	347.4* (0.30[d])
	Number assessed	183	111	44
MCA-III Math	Mean	350.4	347.0	340.8
	Adjusted mean	350.1	348.2	339.2*** (0.68[d])
	Number assessed	183	111	44

Note: *The analysis compares test scores of PEK children in each cohort with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. Both unadjusted means ("Mean") and adjusted means are reported. Significance tests were conducted on the adjusted means based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups (i.e., one-tailed test).*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *The range of possible scale scores for third grade is 301-399.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *Effect size was calculated using Cohen's d (1988): the difference between the adjusted means of Cohort group and the comparison group divided by the pooled standard deviation of the two groups (using standard scores). Small effect = 0.2, medium effect = 0.5, large effect = 0.8.*

** p<.05, *** p<.001*

A55. PEK school component. MAP scale scores in third grade: PEK Cohort 2 versus classmates[a] (spring 2011) and PEK Cohort 3 versus classmates[a] (spring 2012)

Measures of Academic Progress			Mean scale scores: Classmate comparison group in 3rd grade[b] — With preschool/ child care center	Mean scale scores: Classmate comparison group in 3rd grade[b] — Without preschool/ child care center
PEK Cohort 2				
Reading	Mean	192.5	188.5	187.7
	Adjusted mean	191.7	190.2	187.8* (0.27 [c])
	Number assessed	193	90	62
Math	Mean	199.8	197.3	197.7
	Adjusted mean	199.2	198.9	197.5
	Number assessed	193	88	62
PEK Cohort 3				
Reading	Mean	191.7	189.4	187.5
	Adjusted mean	191.5	190.0	186.7* (0.32 [c])
	Number assessed	180	109	44
Math	Mean	200.6	197.3	194.5
	Adjusted mean	200.3	198.3	193.2** (0.48 [c])
	Number assessed	181	109	44

Note: *The analysis compares test scores of PEK Cohort 2 and PEK Cohort 3 with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. Both unadjusted means ("Mean") and adjusted means are reported. Significance tests were conducted on the adjusted means based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups (i.e., one-tailed test).*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul.*

[b] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[c] *Effect size was calculated using Cohen's d (1988): the difference between the adjusted means of Cohort group and the comparison group divided by the pooled standard deviation of the two groups (using standard scores). Small effect = 0.2, medium effect = 0.5, large effect = 0.8.*

** p<.05*

*** p<.001*

A56. PEK school component (spring 2010). Teachers' ratings in third grade: PEK Cohort 1 versus classmates

Assessment		PEK Cohort 1	Mean standard scores[a] Classmates[b] With preschool/ child care center	Mean standard scores[a] Classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills[d]	Mean	99.3	99.5	102.4
	Adjusted mean[c]	98.6	101.9	101.4
	Number assessed	150	66	49
Problem Behaviors[e]	Mean	101.7	103.9	98.4
	Adjusted mean[c]	102.3	101.3	100.1
	Number assessed	151	66	49
Academic Competence[f]	Mean	93.8	92.5	91.2
	Adjusted mean[c]	93.2	94.1	91.0
	Number assessed	150	65	49

Note: *The analysis compares ratings of PEK Cohort 1 with the ratings of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups. Adjusted means did not differ significantly among the groups for social skills, problem behaviors, and academic competence.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. Classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[d] *Higher scores indicate higher social skills.*

[e] *Higher scores indicate more problem behaviors.*

[f] *Higher scores indicate higher academic competence.*

A57. PEK school component (spring 2011). Teachers' ratings in third grade: PEK Cohort 2 versus classmates

Assessment		PEK Cohort 2	Mean standard scores[a] Classmates[b] With preschool/ child care center	Mean standard scores[a] Classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills[d]	Mean	101.9	102.5	101.8
	Adjusted mean[c]	101.7	103.7	100.6
	Number assessed	174	74	53
Problem Behaviors[e]	Mean	98.6	101.7	98.4
	Adjusted mean[c]	98.9	100.2	99.4
	Number assessed	174	74	54
Academic Competence[f]	Mean	94.0	93.1	91.9
	Adjusted mean[c]	93.3	94.8	91.5
	Number assessed	174	74	54

Note: *The analysis compares ratings of PEK Cohort 2 with the ratings of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. . Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups. Adjusted means did not differ significantly among the groups for social skills, problem behaviors, and academic competence.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. Classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[d] *Higher scores indicate higher social skills.*

[e] *Higher scores indicate more problem behaviors.*

[f] *Higher scores indicate higher academic competence.*

A58. PEK school component (spring 2012). Teachers' ratings in third grade: PEK Cohort 3 versus classmates

Assessment		PEK Cohort 3	Mean standard scores[a] Classmates[b] With preschool/ child care center	Mean standard scores[a] Classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills[d]	Mean	104.3	102.7	101.7
	Adjusted mean[c]	103.7	104.2	100.1
	Number assessed	153	103	41
Problem Behaviors[e]	Mean	97.1	100.7	99.8
	Adjusted mean[c]	97.6	98.8	102.4
	Number assessed	153	103	44
Academic Competence[f]	Mean	95.9	92.2	91.4
	Adjusted mean[c]	95.5	93.7	89.2** (0.50[g])
	Number assessed	150	100	41

Note: *The analysis compares ratings of PEK Cohort 3 with the ratings of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. . Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. Classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[d] *Higher scores indicate higher social skills.*

[e] *Higher scores indicate more problem behaviors.*

[f] *Higher scores indicate higher academic competence.*

[g] *Effect size was calculated using Cohen's d (1988): the difference between the adjusted means of Cohort 3 and the comparison group divided by the pooled standard deviation of the two groups (using standard scores). Small effect = 0.2, medium effect = 0.5, large effect = 0.8.*

*** p<.01*

A59. PEK school component. Third grade attendance: PEK Cohort 1 versus classmates (2010), PEK Cohort 2 versus classmates (2011), and Cohort 3 versus classmates (2012)

Attendance			Percentage of days attended Classmates[a] With preschool/ child care center	 Without preschool/ child care center
PEK Cohort 1	Mean	96.2%	95.2%	95.0%
	Adjusted mean[b]	96.1%	95.5%	94.9%
	Number assessed	185	81	63
PEK Cohort 2	Mean	95.8%	96.0%	96.2%
	Adjusted mean[b]	96.0%	95.8%	96.0%
	Number assessed	168	83	52
PEK Cohort 3	Mean	96.2%	95.1%	95.0%
	Adjusted mean[b]	96.1%	95.4%	94.6%* (0.30[c])
	Number assessed	183	110	47

Note: *Includes students who were enrolled in the district for at least 160 days during the 2009-10 school year for Cohort 1, 160 days during the 2010-11 school year for Cohort 2, and 160 days during the 2011-12 school year for Cohort 3. The analysis compares attendance of PEK Cohort students with attendance of their classmate comparison groups using Analysis of Covariance, adjusting for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. . Significance tests were conducted based on a directional hypothesis that former PEK children had higher attendance rates than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. Classmates were divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[b] *Adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[c] *Effect size was calculated using Cohen's d (1988): the difference between the adjusted means of Cohort 3 and the comparison group divided by the pooled standard deviation of the two groups (using standard scores). Small effect = 0.2, medium effect = 0.5, large effect = 0.8.*

** p<.05*

Teacher professional development and school integration in 2010-11

In 2010-11, the implementation evaluation continued to focus on the linkage between PEK and kindergarten years, as PEK provided intensive coaching to more kindergarten teachers in the Saint Paul Public Schools. Teachers from seven schools participated in the Early Childhood Coaching.

In May 2011, Wilder Research conducted a survey of kindergarten teachers who received intensive training and support from PEK coaches (Early Childhood Coaching). Teachers were given an option to complete the survey on their own (self-administered) or through a phone interview with a Wilder Research staff. Ten out of 13 kindergarten teachers who received coaching from PEK in 2010-11 completed the survey. Nine teachers completed the survey on their own and one teacher completed the survey by telephone interview.

Asked how long they have been receiving Early Childhood Coaching, three teachers reported that 2010-11 was their first year, three reported that it was their second year, and four reported that it was their third year. Six of the nine teachers responding to the question indicated that they participated in the coaching sessions twice a month. The other three teachers reported that they participated once a month or once every other month. The number of coaching sessions varied for each of the kindergarten teachers because their participation was voluntary. PEK worked with school principals to ensure that all kindergarten teachers will receive at least two coaching sessions every month in the 2011-12 school year, as a commitment to the project.

Generally, teachers perceived the coach's training and support positively. Nine of the 10 teachers indicated they "strongly agree" or "somewhat agree" that participating in Early Childhood Coaching has made a significant impact on their teaching practices. Similarly, asked about goals of the coaching, all or almost teachers indicated they "strongly agree" or "somewhat agree" that goal setting is a valuable part of their teaching, that they have a literacy-rich classroom environment, and they regularly use individual student assessment data to inform and tailor teaching in their classroom (Figure A60). When asked about the most positive aspects of participating in Early Childhood Coaching, teachers responded that they can share ideas with and get information, resources, and support from the coaches.

Example of teachers' comments follow:

> I learn so much from the coach, and that makes me a better teacher.
>
> It's nice to have someone to go to, e-mail, ask questions, get information, and [get] feedback [from]. It has helped me focus my teaching on the students and how to keep them engaged and learning.

> It got the grade-level team talking and sharing concerns and ideas.
>
> Share ideas, talk out problems. The positive feedback, making me aware of all the good teaching practices I have. They helped me with classroom set up and literacy centers in September and throughout the year.
>
> Having [coach's name] be an extra person in the classroom; also all of her resources.

Similarly, teachers gave positive ratings for the usefulness of Early Childhood Coaching components, with almost all teachers receiving the components indicating they were "very helpful" or "somewhat helpful." These components included the coach's supports with Professional Learning Community and grade-level meetings; setting goals and building literacy-rich classroom environments; examining or discussing student performance data; and interpreting classroom observation data collected by the coach using video clips and/or the Classroom Assessment Scoring System (CLASS). In addition, the coach provided Mondo literacy curriculum training and assistance in implementing Mondo in the classrooms and provided teachers with research articles or materials. Results show that, among the components, reflective conversations with the coach received the highest ratings, with 7 of 10 teachers rating the training component as "very helpful" (Figure A61).

Additionally, some teachers commented on the helpfulness of individual Early Childhood Coaching components. Overall, most teachers gave favorable comments across the training components. Examples of the teachers' comments follow:

> It helped me see things from a different perspective. My coach gave me new ideas to help ELL students and help develop oral language.
> *-comment about reflective conversations with the coach*
>
> We discussed an article by Susan Neuman, "Whatever Happened to Developmentally Appropriate Practice in Early Literacy?" We shared similar philosophies about teaching and learning. We also were able to share similar experiences with what we have learned from watching and listening to children's play. We see the benefits of structured-meaningful play experiences and feel that more of these experiences should be put back into early childhood programs.
> *-comment about research articles or materials provided by the coach*
>
> This was very helpful in helping me decide what to teach each student and to be able to differentiate.
> *-comment about examining student performance data with the coach*
>
> By looking at the data, I changed methods and was able to meet my children's needs.
> *-comment about examining student performance data with the coach*

> Discussing my own video clips was very helpful. She was able to see things I didn't see.
> *-comment about reviewing video clips with the coach*
>
> This helped me see where I was doing well and where I needed to improve my instructional strategies.
> *-comment about discussing results of the coach's observations on teacher's classroom*
>
> I am doing a lot more Mondo this year because of the training.
> *-comment about Mondo training*
>
> Team work is so enlightening. We learn so much from everyone on our team.
> *-comment about support in Professional Learning Community*
>
> Coaching and team work help a teacher stay goal-oriented and move along.
> *-comment about goal setting*
>
> Good center discussions and ideas.
> *-comment about building a literacy-rich environment*

While teachers had positive experiences participating in each of the training components overall, a few of their comments suggested that a better or different way of delivering the training could also be helpful. For example, teachers commented that their busy schedule prevented them from reading or using the research articles or materials provided by the coach and that they needed help to implement Mondo in their classrooms. Their comments are listed below:

> This is such a complex program. It is good to have all the Mondo training. It was very helpful. But I would like to see more help with small group instruction when I am trying to hold a reading group. It is ridiculous to think that 5 year olds can work independently while the teacher is doing small group work. I really would like to see how a successful teacher gets these young ones to work independently while the teacher is busy in small group lessons.
>
> Since we were the lab school last year, I felt I had a better grasp and understanding of Mondo than the coach who only had pre-k experience. My coach did not have any input on my Mondo training.
>
> Not that much [Mondo] training, mostly own reading.
>
> Helpful in using [Mondo] Datazone - for kindergarten; some of the information was repetitive.
>
> Our time to discuss the articles is limited.

> The coach often had research articles she shared but in the busy schedule of teaching and life, I have not had much time to reflect on them.
>
> I don't have the time to read them.

Asked about the most challenging aspects of participating in the Early Childhood Coaching sessions, teachers responded that their busy schedules and limited time to meet with the coach were the most challenging aspects of participating. Examples of teachers' comments follow:

> This year we didn't have a lot of time with our coach so that was somewhat frustrating. She was stretched very thin this year and I didn't get to work with her as much as in the past.
>
> Trying to find time to meet with her after applying the skills she taught me. [We have] very busy schedules.
>
> Finding time to talk and reflect.
>
> The time it has taken – using prep time, lunchtime. Our days are very busy. If a coaching session is going to be required, [we] should be compensated or it should be part of weekly after-school meeting in place of another meeting. Not in addition [to it].

Additionally, teachers were asked in the survey for their opinions about the most positive aspects of having PEK in their school and ideas for furthering the connection between PEK and kindergarten in their school. Almost all teachers responding reported that PEK has helped children to become more prepared for kindergarten.

Below are examples of teachers' comments.

> Children who come from the Pre-Kindergarten program are better prepared for kindergarten, socially and academically.
>
> Pre-Kindergarten has been helpful to get children used to school and learning very basic skills like concepts of print, how to listen and interact with print.
>
> I see the results of their previous program and their progress is wonderful.
>
> Students come to kindergarten well-prepared. The Pre-Kindergarten program is excellent and it is noticeable how well those students are prepared compared with those who have not had a Pre-K experience.

Regarding their ideas for furthering the connection between PEK and kindergarten programs, teachers wished for more collaboration with PEK, curriculum alignment between the grade levels, and more coaching. Having more adults in the kindergarten classrooms – the same adult-child ratio as in the PEK classrooms – was mentioned by two teachers as a way to provide consistency and further the connection between the grade levels.

> More time collaborating with Pre-K teachers in the fall.
>
> There should be more coaching available in kindergarten and time scheduled for Pre-K and kindergarten teachers to work together and have workshops together to learn similar strategies. There also needs to be more adults' support in kindergarten classrooms to maintain the level of assistance students get in Pre-K.
>
> Visits and collaborations.
>
> Aligning curriculum.
>
> Sharing what results have been in teaching such as how various reading process and progress have been [made].
>
> Getting more adults to work in our classrooms. The kindergarten ratio should be the same as Pre-K.
>
> I think Pre-K should focus on getting their curriculum and resources pulled together. Kindergarten has unfortunately moved away from thematic teaching so it will be difficult to connect on that level. The kindergarten expectations align more with the model for primary grades than Pre-K.

A60. Perceptions of Early Childhood Coaching

How much do you agree or disagree with the following statement	N	Number of participants: Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
Participating in Early Childhood Coaching has made a significant impact on my teaching practices.	10	6	3	-	1
Goal setting is a valuable part of my teaching.	10	8	2	-	
I have a literacy-rich classroom environment.	10	9	-	1	-
I regularly use individual student assessment data to inform and tailor teaching in my classroom.	10	9	1	-	-

A61. Usefulness of Early Childhood Coaching components

How helpful each component in improving your teaching practices?	N	Number of participants: Very helpful	Somewhat helpful	Not helpful at all
Reflective conversations with Early Childhood Coach.	10	7	2	1
The research articles and other materials provided by my Early Childhood Coach.	7	2	4	1
Examining student performance data with my Early Childhood Coach.	9	5	3	1
Support in Professional Learning Community.	8	5	2	1
Support in Grade Level Meetings.	10	5	5	-
Mondo training.	5	2	2	1
Support in implementing Mondo materials in my classroom.	6	5	1	-
Goal setting.	6	3	3	-
Building a literacy-rich environment.	6	4	1	1
Using the CLASS tool to guide conversation.	4	2	2	-
Reviewing video clips (on Mondo or classroom) with Early Childhood Coach	7	3	3	1
Discussing results of the Early Childhood Coach's observations (which was gathered using video tapes, photos, and notes) on my classroom.	7	4	3	-

Note: *Respondents answered the questions as* "very helpful," "somewhat helpful," "not helpful at all," or "not applicable." Not applicable responses were not included in the analysis.

A62. PEK community component. Demographic characteristics of PEK community-based Cohort 1 (2006-07)

	Home		Center	
	N	Percent	N	Percent
Age as of September 1, 2006				
3	13	48%	52	47%
4	14	52%	58	53%
Total	27	100%	110	100%
Gender				
Male	15	56%	50	45%
Female	12	44%	60	55%
Total	27	100%	110	100%
Free/reduced-price lunch eligibility				
Eligible	13	50%	90	87%
Ineligible[a]	13	50%	13	13%
Total	26	100%	103	100%
Ethnicity				
American Indian	0	0%	2	2%
Asian	4	15%	7	6%
Latino	1	4%	19	17%
Black	8	31%	58	53%
White	13	50%	21	19%
Bi-racial or Multiracial	0	0%	2	2%
Total	26	100%	109	100%
Home language				
English	27	100%	94	85%
Hmong	0	0%	4	4%
Spanish	0	0%	8	7%
Other	0	0%	4	4%
Total	27	100%	110	100%

A62. PEK community component. Demographic characteristics of PEK community-based Cohort 1 (2006-07) (continued)

	Home		Center	
	N	Percent	N	Percent
Received Special Education services				
Yes	2	8%	3	3%
No	23	92%	99	97%
Total	25	100%	102	100%
In target population[b]				
Yes	14	54%	94	91%
No	12	46%	9	9%
Total	26	100%	103	100%

[a] Includes families who were not eligible for free or reduced-price lunch as well as families who did not apply.

[b] Child is in one or more of the following categories: eligible for free or reduced-price lunch, ELL, or receives Special Education services.

Notes: *Because children in the first three child care cohorts were not assessed in fall of their PEK year, child care Cohorts 1, 2, and 3 reflect all children attending PEK child care. In contrast, school-based cohorts are defined as PEK students who were assessed in fall of their PEK year.*

A63. PEK community component. Demographic characteristics of PEK community-based Cohort 2 (2007-08)

	Home		Center	
	N	Percent	N	Percent
Age as of September 1, 2007				
3	17	49%	42	53%
4[a]	18	51%	37	47%
Total	35	100%	79	100%
Gender				
Male	17	49%	42	57%
Female	18	51%	32	43%
Total	35	100%	74	100%
Free/reduced-price lunch eligibility				
Eligible	9	27%	56	92%
Ineligible[b]	24	73%	5	8%
Total	33	100%	61	100%
Ethnicity				
American Indian	0	0%	2	3%
Asian	2	6%	4	6%
Latino	7	20%	6	8%
Black	7	20%	47	64%
White	19	54%	14	19%
Total	35	100%	73	100%
Home language				
English	32	91%	67	92%
Hmong	0	0%	3	4%
Spanish	3	9%	3	4%
Total	35	100%	73	100%
Received Special Education services				
Yes	2	6%	0	0%
No	30	94%	60	100%
Total	32	100%	60	100%

A63. PEK community component. Demographic characteristics of PEK community-based Cohort 2 (2007-08) (continued)

	Home		Center	
	N	Percent	N	Percent
In target population[c]				
Yes	14	40%	58	73%
No	21	60%	21	27%
Total	35	100%	79	100%

[a] *One child who was 5 years old as of September 1, 2007, is included in the 4-year-old group.*

[b] *Includes families who were not eligible for free or reduced-price lunch as well as families who did not apply.*

[c] *Child is in one or more of the following categories: eligible for free or reduced-price lunch, ELL, or receives Special Education services.*

Notes: *Because children in the first three child care cohorts were not assessed in fall of their PEK year, child care Cohorts 1, 2, and 3 reflect all children attending PEK child care. In contrast, school-based cohorts are defined as PEK students who were assessed in fall of their PEK year.*

A64. PEK community component. Demographic characteristics of PEK community-based Cohort 3 (2008-09)

	Home		Center	
	N	Percent	N	Percent
Age as of September 1, 2008				
3	16	44%	68	46%
4[a]	20	56%	79	54%
Total	36	100%	147	100%
Gender				
Male	22	61%	71	48%
Female	14	39%	76	52%
Total	36	100%	147	100%
Free/reduced-price lunch eligibility				
Eligible	17	53%	97	69%
Ineligible[b]	15	47%	44	31%
Total	32	100%	141	100%
Ethnicity				
American Indian	2	6%	3	2%
Asian	1	3%	2	1%
Latino	1	3%	19	13%
Black	14	42%	79	54%
White	15	45%	43	29%
Total	33	100%	146	100%
Home language				
English	29	81%	137	94%
Russian	4	11%	-	-
Spanish	1	3%	7	5%
Other	2	6%	2	1%
Total	36	100%	146	100%
Received Special Education services				
Yes	2	6%	5	3%
No	32	94%	140	97%
Total	34	100%	145	100%

A64. PEK community component. Demographic characteristics of PEK community-based Cohort 3 (2008-09) (continued)

	Home		Center	
	N	Percent	N	Percent
In target population[c]				
Yes	23	72%	102	73%
No	9	28%	38	27%
Total	32	100%	140	100%

[a] *One child who was 5 years old as of September 1, 2008, is included in the 4-year-old group.*

[b] *Includes families who were not eligible for free or reduced-price lunch as well as families who did not apply.*

[c] *Child is in one or more of the following categories: eligible for free or reduced-price lunch, ELL, or receives Special Education services.*

Notes: *Because children in the first three child care cohorts were not assessed in fall of their PEK year, child care Cohorts 1, 2, and 3 reflect all children attending PEK child care. In contrast, school-based cohorts are defined as PEK students who were assessed in fall of their PEK year.*

A65. PEK community component. Demographic characteristics of PEK community-based Cohort 4 (2009-10)

	Home		Center	
	N	Percent	N	Percent
Age as of September 1, 2009				
3	25	57%	100	48%
4[a]	19	43%	108	52%
Total	44	100%	208	100%
Gender				
Male	22	52%	105	51%
Female	20	48%	100	49%
Total	42	100%	205	100%
Free/reduced-price lunch eligibility				
Eligible	19	58%	139	70%
Ineligible[b]	14	42%	60	30%
Total	33	100%	199	100%
Ethnicity				
American Indian	-	-	6	3%
Asian	1	3%	3	1%
Latino	-	-	27	13%
Black	27	68%	107	53%
White	12	30%	60	30%
Total	40	100%	203	100%
Home language				
English	39	93%	185	94%
Russian	3	7%	-	-
Spanish	-	-	9	5%
Other	-	-	3	2%
Total	42	100%	197	100%
Received Special Education services				
Yes	3	7%	14	7%
No	39	93%	191	93%
Total	42	100%	205	100%

A65. PEK community component. Demographic characteristics of PEK community-based Cohort 4 (2009-10) (continued)

	Home		Center	
	N	Percent	N	Percent
In target population[c]				
Yes	22	67%	145	73%
No	11	33%	53	27%
Total	33	100%	198	100%

[a] *Three children who were 5 years old as of September 1, 2009, are included in the 4-year-old group.*

[b] *Includes families who were not eligible for free or reduced-price lunch as well as families who did not apply.*

[c] *Child is in one or more of the following categories: eligible for free or reduced-price lunch, ELL, or receives Special Education services.*

Notes: *Child care cohorts reflect all children attending PEK child care. In contrast, school-based cohorts are defined as PEK students who were assessed in fall of their PEK year.*

A66. PEK community component. Demographic characteristics of PEK community-based Cohort 5 (2010-11)

	Home		Center	
	N	Percent	N	Percent
Age as of September 1, 2010				
3	22	56%	203	49%
4[a]	17	44%	213	51%
Total	39	100%	416	100%
Gender				
Male	19	51%	230	57%
Female	18	49%	171	43%
Total	37	100%	401	100%
Free/reduced-price lunch eligibility				
Eligible	13	46%	255	69%
Ineligible[b]	15	53%	116	31%
Total	28	100%	371	100%
Ethnicity				
American Indian	1	3%	14	4%
Asian	-	-	12	3%
Latino	5	14%	35	9%
Black	19	53%	251	64%
White	11	31%	82	21%
Total	36	100%	394	100%
Home language				
English	32	87%	369	93%
Spanish	3	8%	12	3%
Amharic	-	-	6	2%
Other	1	5%	9	2%
Total	37	100%	396	100%
Received Special Education services				
Yes	1	3%	36	10%
No	36	97%	339	90%
Total	37	100%	375	100%

A66. PEK community component. Demographic characteristics of PEK community-based Cohort 5 (2010-11) (continued)

	Home		Center	
	N	Percent	N	Percent
In target population[c]				
Yes	15	40%	276	69%
No	22	60%	122	31%
Total	37	100%	398	100%

[a] *Three children who were 5 years old as of September 1, 2010, are included in the 4-year-old group.*

[b] *Includes families who were not eligible for free or reduced-price lunch as well as families who did not apply.*

[c] *Child is in one or more of the following categories: eligible for free or reduced-price lunch, ELL, or receives Special Education services.*

Notes: *Reflect all the child care children who attended PEK child care.*

A67. PEK community component. PEK community-based Cohort 1 children's attendance (September 1, 2006, to August 31, 2007)

	Home		Center	
Number of days present	**N**	**Percent**	**N**	**Percent**
Age 3				
Fewer than 60 days	-	-	-	-
60-80	-	-	3	6%
81-100	-	-	6	12%
101-120	-	-	3	6%
121-140	2	15%	4	8%
141-160	1	8%	5	10%
161-180	2	15%	6	12%
181-200	3	23%	7	13%
201-220	4	31%	6	12%
More than 220 days	1	8%	12	23%
Total	13	100%	52	100%
Average	182		168	
Median	184		178	
Range	121-239		65-241	
Age 4				
Fewer than 60 days	-	-	2	3%
60-80	-	-	1	2%
81-100	-	-	5	9%
101-120	1	7%	2	3%
121-140	2	14%	3	5%
141-160	4	29%	11	19%
161-180	3	21%	12	21%
181-200	1	7%	9	16%
201-220	2	14%	4	7%
More than 220 days	1	7%	9	16%
Total	14	100	58	100%
Average	163		165	
Median	161		175	
Range	111-235		38-248	

Note: *The number of days offered by family child care homes varied widely, with some homes not participating in PEK during this entire period. The range was 129 to 252 days between September 1, 2006, and August 31, 2007. For child care centers, it was 250 to 253 days.*

A68. PEK community component. PEK community-based Cohort 2 children's attendance (September 1, 2007, to April 30, 2008)

	Home		Center	
Number of days present	**N**	**Percent**	**N**	**Percent**
Age 3				
Fewer than 60 days	2	12%	3	7%
60-80	-	-	6	14%
81-100	2	12%	11	26%
101-120	1	6%	2	5%
121-140	3	18%	3	7%
141-160	9	53%	12	29%
161-180	-	-	5	12%
181-200	-	-	-	-
201-220	-	-	-	-
More than 220 days	-	-	-	-
Total	17	100%	42	100%
Average	125		114	
Median	141		116	
Range	40-159		37-165	
Age 4				
Fewer than 60 days	-	-	4	11%
60-80	2	11%	4	11%
81-100	2	11%	1	3%
101-120	-	-	4	11%
121-140	3	17%	5	14%
141-160	11	61%	17	46%
161-180	-	-	2	5%
181-200	-	-	-	-
201-220	-	-	-	-
More than 220 days	-	-	-	-
Total	18	100%	37	100%
Average	134		122	
Median	151		144	
Range	70-158		20-164	

Notes: *In 2007-08, attendance was recorded for both centers and homes from September 1, 2007 through April 30, 2008. Some of the family child care programs did not offer PEK during this entire period, however. The number of months offered by family child care homes ranged from six to eight months during this period.*

A69. PEK community component. PEK community-based Cohort 3 children's attendance (September 1, 2008, to August 31, 2009)

	Home		Center	
Number of days present	N	Percent	N	Percent
Age 3				
60-80	1	6%	-	-
81-100	1	6%	-	-
101-120	-	-	2	3%
121-140	3	19%	6	9%
141-160	2	12%	4	6%
161-180	4	25%	11	16%
181-200	2	12%	7	10%
201-220	2	12%	12	185
More than 220 days	1	6%	26	38%
Total	16	100%	68	100%
Average	159		198	
Median	168		206	
Range	72-225		107-249	
Age 4				
60-80	-	-	1	1%
81-100	-	-	3	4%
101-120	-	-	2	3%
121-140	1	5%	3	4%
141-160	3	15%	6	8%
161-180	4	20%	14	18%
181-200	9	45%	13	16%
201-220	3	15%	15	19%
More than 220 days	-		22	28%
Total	20	100%	79	100%
Average	181		192	
Median	185		197	
Range	132-216		78-249	

Note: *The range in the number of days offered at family child care homes was 171 to 251 days between September 1, 2008, and August 31, 2009, with the exception of one child care home that offered 87 days. For child care centers, it was 247 to 253 days.*

A70. PEK community component. PEK community-based Cohort 4 children's attendance (September 1, 2009, to June 30, 2010)

	Home		Center	
Number of days present	**N**	**Percent**	**N**	**Percent**
Age 3				
Fewer than 60 days	4	17%	10	10%
60-80	-	-	3	3%
81-100	1	4%	8	8%
101-120	2	9%	22	22%
121-140	3	13%	13	13%
141-160	3	13%	11	11%
161-180	2	9%	14	14%
181-200	6	26%	15	15%
201-220	2	9%	4	4%
More than 220 days	-	-	-	-
Total	23	100%	100	100%
Average	139		132	
Median	159		130	
Range	23-214		12-203	
Age 4				
Fewer than 60 days	-	-	10	10%
60-80	1	6%	4	4%
81-100	-	-	5	5%
101-120	4	22%	7	7%
121-140	2	11%	9	9%
141-160	1	6%	14	13%
161-180	5	28%	23	22%
181-200	3	17%	25	24%
201-220	2	11%	8	8%
More than 220 days	-	-	-	-
Total	18	100%	105	100%
Average	153		149	
Median	167		163	
Range	61-214		12-205	

Note: *The range in the number of days offered at family child care homes was 171 to 251 days between September 1, 2009, and June 30, 2010, with the exception of one child care home that offered 87 days. For child care centers, it was 247 to 253 days. Two family child care homes that reported incomplete data are excluded from these results.*

A71. PEK community component. PEK community-based Cohort 5 children's attendance (September 1, 2010, to June 30, 2011)

	Home		Center	
Number of days present	**N**	**Percent**	**N**	**Percent**
Age 3				
Fewer than 60 days	6	27%	41	20%
60-80	-	-	19	9%
81-100	-	-	26	13%
101-120	1	5%	17	8%
121-140	1	5%	11	5%
141-160	10	46%	18	9%
161-180	2	9%	29	14%
181-200	1	5%	35	17%
More than 200 days	1	5%	7	3%
Total	22	100%	203	100%
Average	122		118	
Median	152		119	
Range	16-209		3-205	
Age 4				
Fewer than 60 days	3	18%	26	12%
60-80	3	18%	20	9%
81-100	-	-	23	11%
101-120	2	12%	13	6%
121-140	3	18%	13	6%
141-160	3	18%	19	9%
161-180	1	6%	44	21%
181-200	2	12%	51	24%
More than 200 days	-	-	4	2%
Total	17	100%	213	100%
Average	115		134	
Median	128		154	
Range	26-187		4-206	

Note: *The range in the number of days offered at family child care homes was 133 to 212 days between September 1, 2010, and June 31, 2011. For child care centers, it was 180 to 213 days, with the exception of one child care center that offered 81 days.*

A72. PEK community-based component. Academic test standard score one-year change, Cohort 3 community-based (2008-2009), Cohort 4 community-based (2009-10), and Cohort 5 community-based (2010-11)

Test	Number assessed	Mean standard scores[a] Pre-Kindergarten	Kindergarten	Change[b]
PEK Cohort 3 community based				
Peabody Picture Vocabulary Test III	76	101.4	99.6	-1.8
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	76	111.9	108.7	-3.2*
Spelling (writing)	74	108.6	111.0	+2.4*
Applied Problems (math)	74	104.5	98.8	-5.7***
PEK Cohort 4 community based				
Peabody Picture Vocabulary Test III	30	98.3	110.0	+11.7***
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	30	117.9	114.4	-3.5
Spelling (writing)	30	107.6	116.6	+8.9**
Applied Problems (math)	28	104.6	108.7	+4.1
PEK Cohort 5 community based				
Peabody Picture Vocabulary Test III	93	105.1	108.5	+3.4**
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	92	112.3	110.0	-2.3*
Spelling (writing)	92	106.7	111.4	+4.6**
Applied Problems (math)	90	106.3	110.0	+3.7**

Note: *The analysis examines change from fall of pre-kindergarten to fall of kindergarten using paired samples t-tests.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample. These scores are age-standardized, meaning that no change in scores from one year to the next indicates normative progress, positive change indicates accelerated progress, and negative change indicates slower progress in comparison to children nationally.*

[b] *Fall of kindergarten score minus fall of pre-kindergarten score.*

** p<.05*

*** p<.01*

**** p<.001*

A73. PEK community component (fall 2007). Achievement test standard scores in kindergarten: PEK community-based Cohort 1 vs. kindergarten classmates

	Standard score[a]		
		Kindergarten classmates[b]	
Test	PEK community-based Cohort 1	With preschool/ child care center (not PEK)	Without preschool/ child care center
Peabody Picture Vocabulary Test III			
Mean	97.4	85.7	83.1
Adjusted mean[c]	93.0	87.1*	83.2**
Number assessed	47	139	145
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)			
Mean	102.0	98.0	96.3
Adjusted mean[c]	101.3	98.9	95.7*
Number assessed	47	139	145
Spelling (writing)			
Mean	103.0	99.9	97.2
Adjusted mean[c]	99.5	101.0	97.2
Number assessed	47	139	145
Applied Problems (math)			
Mean	96.0	91.4	87.9
Adjusted mean[c]	92.8	92.7	87.7
Number assessed	47	139	140

Note: *Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *Upon kindergarten entry, PEK community-based Cohort 1 children were compared to PEK school-based Cohort 2 (Figure A27) as well as the PEK school-based Cohort 2 comparison group (presented here). The comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center (other than PEK) prior to attending kindergarten, and those who did not. Children with missing data on preschool/child care experience were included in the no preschool/child care center group.*

[c] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

**p<.05, compared to PEK community-based Cohort 1*

***p<.01, compared to PEK community-based Cohort 1.*

A74. PEK community component (fall 2008). Achievement test standard scores in kindergarten: PEK community-based Cohort 2 vs. kindergarten classmates

Test	Standard score[a] PEK community-based Cohort 2	Kindergarten classmates[b] With preschool/ child care center (not PEK)	Kindergarten classmates[b] Without preschool/ child care center
Peabody Picture Vocabulary Test III			
Mean	101.5	87.6	81.1
Adjusted mean[c]	93.1	88.1	83.6**
Number assessed	34	152	78
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)			
Mean	105.9	102.3	98.4
Adjusted mean[c]	101.8	103.2	98.3
Number assessed	34	152	78
Spelling (writing)			
Mean	111.3	105.1	101.1
Adjusted mean[c]	107.7	106.2	100.4**
Number assessed	34	152	78
Applied Problems (math)			
Mean	97.7	90.1	84.6
Adjusted mean[c]	93.1	91.1	84.7**
Number assessed	34	152	78

Note: *Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *Upon kindergarten entry, PEK community-based Cohort 2 children were compared to PEK school-based Cohort 3 (Figure A28) as well as the PEK school-based Cohort 3 comparison group (presented here). The comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center (other than PEK) prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

** p<.05, compared to PEK community-based Cohort 2.*

*** p<.01, compared to PEK community-based Cohort 2.*

A75. PEK school component (fall 2010). Academic test standard scores in kindergarten: Cohort 4 community-based versus classmates[a]

Test		Mean standard scores[b]: PEK Cohort 4 community based (N=30)	Mean standard scores[b]: Classmate comparison group in kindergarten[c] With preschool/child care center (N=51)
Peabody Picture Vocabulary Test III	Mean	110.0	112.8
	Adjusted mean[d]	110.8	112.3
Woodcock-Johnson Tests of Achievement III			
Letter-Word Identification (reading)	Mean	114.4	114.8
	Adjusted mean[d]	115.2	114.4
Spelling (writing)	Mean	116.6	115.2
	Adjusted mean[d]	116.8	115.1
Applied Problems (math)	Mean	106.2	106.8
	Adjusted mean[d]	106.7	106.5

Note: *The analysis compares test scores of PEK Cohort 4 community-based with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools.

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared.*

A76. PEK school component (fall 2011). Academic test standard scores in kindergarten: Cohort 5 community-based versus classmates[a]

Test		Mean standard scores[b]		
			Classmate comparison group in kindergarten[c]	
		PEK Cohort 5 community based	With preschool/ child care center	Without preschool/ child care center
Peabody Picture Vocabulary Test III	Mean	106.9	115.0	107.0
	Adjusted mean	108.4	112.6[d]	110.6
	Number assessed	111	139	28
Woodcock-Johnson Tests of Achievement III				
Letter-Word Identification (reading)	Mean	109	110.6	112.1
	Adjusted mean	110.8	108.9	113.5
	Number assessed	109	139	28
Spelling (writing)	Mean	110.3	113.1	110.7
	Adjusted mean	112.0	111.6	111.1
	Number assessed	109	138	28
Applied Problems (math)	Mean	108.2	110.9	106.1
	Adjusted mean	109.8	109.3	108.0
	Number assessed	109	138	28

Note: *The analysis compares test scores of PEK Cohort 5 community-based with the scores of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared. An interaction term (group by free and reduced -price lunch eligibility status interaction) was included in the analysis of the Peabody scores. Both unadjusted means ("Mean") and adjusted means are reported. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher than each of the two classmate groups.*

[a] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools.*

[b] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[c] *The classmate comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center prior to attending kindergarten, and those who did not.*

[d] *If we had used a non-directional hypothesis instead of a directional hypothesis, then this result would have been statistically significant ($p<0.05$) compared to PEK community-based Cohort 5.*

A77. PEK community component (fall 2007). Achievement test standard scores in kindergarten: PEK community-based Cohort 1 vs. PEK school-based Cohort 2

Test	Standard score[a] PEK community-based Cohort 1	PEK school-based Cohort 2
Peabody Picture Vocabulary Test III		
Mean	97.4	92.1
Adjusted mean[b]	92.7	92.9
Number assessed	47	266
Woodcock-Johnson Tests of Achievement III		
Letter-Word Identification (reading)		
Mean	102.0	103.1
Adjusted mean[b]	100.4	103.4
Number assessed	47	266
Spelling (writing)		
Mean	103.0	104.1
Adjusted mean[b]	100.9	104.5
Number assessed	47	266
Applied Problems (math)		
Mean	96.0	94.5
Adjusted mean[b]	92.8	95.1
Number assessed	47	266

Note: *There were no statistically significant differences in adjusted mean test scores between the two groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences between the groups being compared.*

A78. PEK community component (fall 2008). Achievement test standard scores in kindergarten: PEK community-based Cohort 2 vs. PEK school-based Cohort 3

Test	Standard score[a]: PEK community-based Cohort 2	Standard score[a]: PEK school-based Cohort 3
Peabody Picture Vocabulary Test III		
Mean	101.5	94.6
Adjusted mean[b]	95.9	95.4
Number assessed	34	235
Woodcock-Johnson Tests of Achievement III		
Letter-Word Identification (reading)		
Mean	105.9	106.9
Adjusted mean[b]	105.3	107.0
Number assessed	34	234
Spelling (writing)		
Mean	111.3	110.0
Adjusted mean[b]	109.7	110.2
Number assessed	34	234
Applied Problems (math)		
Mean	97.7	96.7
Adjusted mean[b]	95.1	97.1
Number assessed	34	234

Note: *There were no statistically significant differences in adjusted mean test scores between the two groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences between the groups being compared.*

A79. PEK community component (fall 2007). Teacher ratings of social skills, problem behaviors, and academic competence in kindergarten: PEK community-based Cohort 1 vs. kindergarten classmates

Assessment		PEK community-based Cohort 1	Standard score[a] Kindergarten classmates[b] With preschool/ child care center (not PEK)	Standard score[a] Kindergarten classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills	Mean	98.4	100.4	101.5
	Adjusted mean[c]	99.3	101.2	100.6
	Number assessed	38	119	132
Problem Behaviors	Mean	103.3	96.4	95.9
	Adjusted mean[c]	101.4	95.7[d]	97.0
	Number assessed	38	129	139
Academic Competence	Mean	93.7	93.8	87.6
	Adjusted mean[c]	93.9	94.5	86.8**
	Number assessed	38	130	140

Note: *Includes only students who were assessed on both social and academic skills. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *Upon kindergarten entry, PEK community-based Cohort 1 children were compared to PEK school-based Cohort 2 (Figure A48) as well as the PEK school-based Cohort 2 comparison group (presented here). The comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center (other than PEK) prior to attending kindergarten, and those who did not. Children with missing data on preschool/child care experience were included in the no preschool/child care center group.*

[c] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[d] *If we had used a non-directional hypothesis instead of a directional hypothesis, then this result would have been statistically significant ($p<0.05$) compared to PEK community-based Cohort 1.*

** *$p<.01$, compared to PEK community-based Cohort 1.*

A80. PEK community component (fall 2008). Teacher ratings of social skills, problem behaviors, and academic competence in kindergarten: PEK community-based Cohort 2 vs. kindergarten classmates

Assessment		PEK community-based Cohort 2	Standard score[a] Kindergarten classmates[b] With preschool/ child care center (not PEK)	Standard score[a] Kindergarten classmates[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills	Mean	99.7	96.1	99.0
	Adjusted mean[c]	100.2	97.0	97.1
	Number assessed	27	140	72
Problem Behaviors	Mean	105.7	99.9	98.0
	Adjusted mean[c]	102.9	99.3	100.2
	Number assessed	27	142	74
Academic Competence	Mean	95.6	90.9	86.0
	Adjusted mean[c]	93.9	91.2	85.9**
	Number assessed	27	142	73

Note: *Includes only students who were assessed on both social and academic skills. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *Upon kindergarten entry, PEK community-based Cohort 2 children were compared to PEK school-based Cohort 3 (Figure A50) as well as the PEK school-based Cohort 3 comparison group (presented here). The comparison group was divided into two groups – those who attended preschool, Head Start, or a child care center (other than PEK) prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

*** p<.01, compared to PEK community-based Cohort 2.*

A81. PEK community component (fall 2010). Teachers' ratings in kindergarten: PEK community-based Cohort 4 versus classmates

Assessment		PEK Cohort 4 community based	Mean standard scores[a] Classmate comparison group in kindergarten[b] With preschool/ child care center (not PEK)
Social Skills Rating System			
Total Social Skills	Mean	99.5	105.1
	Adjusted mean[c]	99.1	105.4[d]
	Number assessed	24	37
Problem Behaviors	Mean	105.8	96.6
	Adjusted mean[c]	105.4	96.8[d]
	Number assessed	24	39
Academic Competence	Mean	97.0	97.6
	Adjusted mean[c]	98.4	96.7
	Number assessed	24	38

Note: *The analysis compares ratings of PEK Cohort 4 community-based with the ratings of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. Classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

[d] *If we had used a non-directional hypothesis instead of a directional hypothesis, then this result would have been statistically significant ($p<0.05$) compared to PEK community-based Cohort 4.*

A82. PEK community component (fall 2011). Teachers' ratings in kindergarten: PEK community-based Cohort 5 versus classmates

Assessment		PEK Cohort 5 community based	Mean standard scores[a] Classmate comparison group in kindergarten[b] With preschool/ child care center (not PEK)	Mean standard scores[a] Classmate comparison group in kindergarten[b] Without preschool/ child care center
Social Skills Rating System				
Total Social Skills	Mean	99.4	107.3	100.3
	Adjusted mean[c]	101.1	104.7	99.2
	Number assessed	88	124	24
Problem Behaviors	Mean	104.1	94.5	96.3
	Adjusted mean[c]	102.8	94.7[e]	94.9[f]
	Number assessed	87	124	24
Academic Competence	Mean	95.8	96.1	94.9
	Adjusted mean[c]	96.9	95.2	95.3
	Number assessed	87	124	24

Note: *The analysis compares ratings of PEK Cohort 5 community-based with the ratings of the classmate comparison groups using Analysis of Covariance, adjusting for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, Special Education status, and test date differences among the groups being compared. An interaction term (group by free and reduced -price lunch eligibility status interaction) was included in the analysis of Total Social Skills ratings.. Significance tests were conducted based on a directional hypothesis that former PEK children scored higher (lower for Problem Behaviors) than each of the two classmate groups.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *The classmate comparison group was defined as kindergarten classmates of former PEK students in the 10 PEK schools. After kindergarten, they are followed as long as they remain in schools in Saint Paul. Classmates were divided into two groups – those who attended preschool, Head Start or a child care center prior to attending kindergarten, and those who did not.*

[c] *Adjusted for gender, race/ethnicity, English Language Learner status, and Special Education status differences among the groups being compared.*

[d] *Effect size was calculated using Cohen's d (1988): the difference between the adjusted means of PEK Cohort 5 community-based and the comparison group divided by the pooled standard deviation of the two groups (using standard scores). Small effect = 0.2, medium effect = 0.5, large effect = 0.8.*

[e] *If we had used a non-directional hypothesis instead of a directional hypothesis, then this result would have been statistically significant ($p<0.001$) compared to PEK community-based Cohort 5.*

[f] *If we had used a non-directional hypothesis instead of a directional hypothesis, then this result would have been statistically significant ($p<0.05$) compared to PEK community-based Cohort 5.*

A83. PEK community component (fall 2007). Teacher ratings of social skills, problem behaviors, and academic competence in kindergarten: PEK community-based Cohort 1 vs. PEK school-based Cohort 2

Assessment		Standard score[a] PEK community-based Cohort 1	PEK school-based Cohort 2
Social Skills Rating System			
Total Social Skills	Mean	98.4	106.4
	Adjusted mean[b]	98.7	106.3**
	Number assessed	38	238
Problem Behaviors	Mean	103.3	93.6
	Adjusted mean[b]	101.9	93.8***
	Number assessed	38	244
Academic Competence	Mean	93.7	97.1
	Adjusted mean[b]	93.1	97.2
	Number assessed	38	242

Note: *Includes only students who were assessed on both social and academic skills.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

** *p<.01, compared to PEK community-based Cohort 1.*

*** *p<.001, compared to PEK community-based Cohort 1.*

A84. PEK community component (fall 2008). Teacher ratings of social skills, problem behaviors, and academic competence in kindergarten: PEK community-based Cohort 2 vs. PEK school-based Cohort 3

Assessment		Standard score[a] PEK community-based Cohort 2	PEK school-based Cohort 3
Social Skills Rating System			
Total Social Skills	Mean	99.7	104.9
	Adjusted mean[b]	101.5	104.7
	Number assessed	27	206
Problem Behaviors	Mean	105.7	93.9
	Adjusted mean[b]	103.6	94.1**
	Number assessed	27	207
Academic Competence	Mean	95.6	98.2
	Adjusted mean[b]	97.3	97.9
	Number assessed	27	205

Note: *Includes only students who were assessed on both social and academic skills.*

[a] *Standard scores have a mean of 100 and a standard deviation of 15 in the national normative sample.*

[b] *Adjusted for gender, age, race/ethnicity, free/reduced-price lunch eligibility, English Language Learner status, and Special Education status differences among the groups being compared.*

*** p<.01, compared to PEK community-based Cohort 2.*

A85. PEK community component: Language and literacy supports in Cohort 5 child care homes, spring/fall 2010 to spring 2011

CHELLO indicator and possible points for each indicator	2010 Average score N=9	2011 Average score N=9	Change in average score and percent out of possible points	
Literacy Environment Checklist (26)	19.3	20.6	+1.3	5%
Book Area (5)	3.9	4.8	+0.9	18%
Book Use (9)	7.0	7.1	+0.1	1%
Writing Materials (6)	4.2	4.3	+0.1	2%
Toys (3)	2.4	2.6	+0.2	7%
Technology (3)	1.8	1.8	0.0	0%
Group/Family Observation: Physical Environment (15)	10.7	13.2	+2.5	17%
Organization of the Environment (5)	4.0	4.6	+0.6	12%
Materials in the Environment (5)	3.8	4.5	+0.7	14%
Daily Schedule (5)	2.9	4.1	+1.2	24%
Group/Family Observation: Support for Learning(15)	10.7	11.8	+0.9	6%
Adult Affect (5)	4.1	4.5	+0.4	8%
Adult-Child Language Interaction (5)	3.7	4.1	+0.4	8%
Management strategies (5)	2.9	3.3	+0.4	8%
Group/Family Observation: Adult Teaching Strategies (35)	22.0	25.1	+3.1	9%
Vocabulary Building (5)	3.2	3.7	+0.5	10%
Responsive Strategies (5)	3.8	3.7	-0.1	-2%
Use of Print (5)	2.6	3.1	+0.5	10%
Storybook/Storytelling activities (5)	3.3	3.9	+0.6	12%
Writing/Drawing activities (5)	3.4	3.5	+0.1	2%
Monitoring children's progress (5)	2.4	3.3	+0.9	18%
Family support and interaction (5)	3.4	4.0	+0.6	12%
Overall score (91)	62.8	70.6	+7.8	9%

Source: *Classroom observations conducted by Resources for Child Caring Early Childhood Coach.*

[a] *Only classrooms (same teachers) with pre and post assessments are included. The pre assessments were conducted in May 2010 for two child care homes and in August-September 2010 for seven child care homes new to PEK, and the post assessments were conducted in May-June 2011.*