

---

# EVALUATING PRESCHOOL FOR ALL EFFECTIVENESS

Executive Summary of findings of the effect of Preschool for All  
participation on school readiness skills.

August 2013

Report prepared by:



1871 The Alameda, Suite 180  
San Jose, CA 95126

Tel: 408.247.8319  
Fax: 408.260.7749

Study funded by:



## TABLE OF CONTENTS

Acknowledgments .....	3
Introduction.....	4
Methods .....	4
Participants.....	4
Measures .....	5
Language Development and Early Literacy.....	5
Early Mathematics .....	5
Self-Regulation.....	5
Procedures.....	6
Data Analysis.....	6
Findings.....	8
Early Literacy.....	8
Early Mathematics .....	8
Self-Regulation.....	9
Results by Language of Assessment .....	10
Effect Sizes .....	10
Summary.....	11

# ACKNOWLEDGMENTS

---

Applied Survey Research (ASR) would like to acknowledge the following San Francisco Unified School District (SFUSD) and First 5 San Francisco staff who provided their support during the planning, tool development, data analysis and report writing phases of the project:

- Wei-min Wang, Preschool For All Program Coordinator, First 5 San Francisco
- Ingrid Mezquita, Senior PFA Program Officer, First 5 San Francisco
- Meenoo Yashar, Director of Preschool Quality & Enhancement, Early Education Department, SFUSD
- Brent Stephens, Executive Director of Instructional Support, SFUSD
- SFUSD Achievement Assessments Office staff: Janice Link and Norm Ferrer

Of course, this assessment would not be possible without the support of the principals and site directors of the sampled schools and the preschool and kindergarten teachers who generously gave their time and energy to help us better understand the skills of the children entering their classrooms. We gratefully acknowledge the assistance of the principals, site directors, and teachers from the schools listed below.

1st Place to Start  
Alemany Head Start  
Bret Harte Elementary  
Bryant Elementary  
Cross Cultural Family Center – Richmond  
Cesar Chavez Elementary  
Chibi Chan Preschool  
Child’s Play  
Dr. Charles Drew Elementary  
Dr. William Cobb Elementary  
ER Taylor Elementary  
Frandelja Center  
George Moscone Elementary  
Glide Childcare and Family Support Center  
Gordon J. Lau Elementary  
Grattan Elementary  
Guadalupe Elementary  
Holy Family Day Home  
Jefferson Elementary  
John McLaren Early Education School  
Judith Baker Child Development Center  
Kai Ming – Broadway  
Leola M. Havard Early Education School  
Little Children’s Development Center  
Mission Head Start – Regina Chiong Family Center

Mission Kids  
Nihonmachi Little Friends  
Noriega Early Education School  
Orfalea Family Center  
Pacific Primary – Orange Sun School  
Pacific Primary – Yellow Sun School  
Playland Daycare and Preschool  
Paul Revere  
Presidio Early Education School  
Rosa Parks Elementary  
S.F. Montessori Early Education School  
San Miguel Early Education School  
Sanchez Elementary  
Shalom School  
Sheridan Preschool  
Southeast Head Start Center – SFSU  
Sunnydale Head Start Center - SFSU  
Tenderloin Elementary  
Theresa S. Mahler Early Education School  
Tule Elk Early Education School  
UCSF Laurel Heights Child Care Center  
Wah Mei School  
Wu Yee Children’s Services  
Zaida T. Rodriguez Early Education School

---

# EVALUATING PFA EFFECTIVENESS

## SUMMARY

This report summarizes results from a study examining the effect of PFA on children's readiness for school.

## INTRODUCTION

In March 2004, San Francisco voters passed Proposition H, which stated that, "It shall be the policy of the City and County of San Francisco to provide all four-year-old children who are City residents the opportunity to attend preschool,"<sup>1</sup> and First 5 San Francisco was designated as the implementing agency. First 5 San Francisco first began to offer Preschool for All (PFA) in four pioneering neighborhoods in 2005 and has since expanded to reach every corner of the city.

Through a series of child assessments conducted in fall 2012, this report examines the effectiveness of Preschool for All in preparing children for school, as guided by the following research questions:

- How does PFA participation influence children's readiness for school?
- How does PFA participation influence the language and literacy development, particularly of dual language learners?

## METHODS

This study seeks to examine the impact of the Preschool for All program on children's school readiness. A regression discontinuity design is brought to bear on the research questions outlined above.

## PARTICIPANTS

A stratified random sample of 46 PFA classrooms participated in the study and a total of 48 kindergarten and 7 transitional kindergarten classrooms from Early Education Elementary Schools participated in the study.

The regression discontinuity design requires two samples of students: (1) a **control group** of students currently enrolled in PFA, who were born on or after the cutoff date for 2012 SFUSD kindergarten eligibility, which was November 1, 2007; and (2) a **treatment group** of older students currently in kindergarten, who graduated from a PFA preschool and were born before November 1, 2007. The sample obtained was as follows:

- The full sample of 1,034 completed assessments was pruned to remove the following cases:
  - Students who were neither a current or previous PFA preschoolers (n=199)
  - Students with identified special needs (n=11);
  - Students who were currently attending their second year of a PFA preschool (n=21 )
- This resulted in a pruned sample of 803, which included 547 control cases and 256 treatment cases.
- A random sample of 350 was drawn from the much larger control group to more equally balance the numbers in each group, resulting in 606 cases overall<sup>2</sup>.
- These 606 cases included 306 boys (50.5%) and 300 girls (49.5%).

---

<sup>1</sup> San Francisco City Charter SEC. 16.123-2. Public Education Enrichment Fund.

<sup>2</sup> Jewell, Nicholas P. 2009. *Statistics for Epidemiology*. The author notes that in case-control designs, tests of independence are most powerful when the sample sizes are equal. In a series of prior studies employing RDD in evaluating preschool effectiveness (e.g., W. Steven Barnett, et al.), treatment and control groups were approximately equal.

## MEASURES

Measures were selected based on guidelines outlined in the National Education Goals Panel (NEGP).<sup>3</sup> In addition, a recent study adjudicating the relative importance of various early education efforts finds that of the myriad measures examined in their comprehensive analysis of 6 population-based datasets involving over 16,000 children, only three of the school-entry measures predicted subsequent academic success: early reading, early math, and attention skills.<sup>4</sup> Thus, the selected measures encompass skills in these domains.

### LANGUAGE DEVELOPMENT AND EARLY LITERACY

Early language and literacy skills that develop during the preschool years are important foundations for later literacy, and research has demonstrated links between early literacy and academic achievement, graduation rates, and enhanced productivity in adult life.<sup>5</sup>

The **Receptive One-Word Picture Vocabulary Test-4 (ROWPVT)** is a 15-20 minute test of receptive vocabulary administered in English<sup>6</sup> and Spanish (SBE)<sup>7</sup> and consists of a series of test plates, each with four pictures on them. The child is shown a plate and asked to identify which of the four pictures describes a stimulus word. Testing ends when the student responds incorrectly to six out of eight consecutive items. Because procedures for administration and scoring differ, scores are calculated separately for the ROWPVT and ROWPVT-SBE.

The **Letter-Word Identification** subscale of the Woodcock-Johnson III Tests of Achievement<sup>8</sup> and Bateria III Woodcock-Muñoz<sup>9</sup> Pruebas de Aprovechamiento measures early literacy (pre-reading and word decoding) skills in English- and Spanish-speaking students, respectively. The assessment consists of a series of test plates in which examinees are asked to accomplish a task in identifying letters, words, and distinguishing letters from pictures, using images on the test plate.

### EARLY MATHEMATICS

Early math skills have been found to be the single strongest predictor of later academic success. Moreover, K-5 students with persistently low math skills are less likely to finish high school and less likely to go to college.<sup>10</sup>

The **Applied Problems** subscale of the Woodcock-Johnson III Tests of Achievement/ Bateria III Woodcock-Muñoz Pruebas de Aprovechamiento assesses early mathematical skills. Items include tasks such as showing two fingers, counting objects, and adding or subtracting small numbers. Testing on Woodcock Johnson tools is completed when 6 consecutive items are answered incorrectly.

### SELF-REGULATION

While specific definitions vary, behavioral self-regulation generally refers to the ability to concurrently inhibit impulses while executing intention.<sup>11</sup> Self-regulation skills are particularly important in the transition to kindergarten, as they enable children's successful adaptation to the classroom environment. Indeed, a growing

---

<sup>3</sup> Lorrie Shepard, Sharon Lynn Kagan and Emily Wurtz, Eds., *Principles and Recommendations for Early Childhood Assessments* (Washington, D.C.: National Education Goals Panel, 1998).

<sup>4</sup> Duncan, G., C.J. Dowsett, A. Claessens, K. Magnuson, A.C. Huston, P. Klebanov, L. S. Pagain, L. Feinstein, M. Engel, J. Brooks-Gunn, H. Sexton, & K. Duckworth. 2007. School Readiness and Later Achievement. *Developmental Psychology*, 43(6): 1428-1446.

<sup>5</sup> Dickinson, D.K., and P.O. Tabors (Eds.). 2001. *Beginning Literacy with Language: Young Children Learning at Home and School*. Baltimore, MD: Paul D. Brookes; Missall, K., A. Reschley, & J. Betts. 2007. Examination of the predictive validity of preschool early literacy skills. *School Psychology Review*, 36, 433-452.

<sup>6</sup> Martin, Nancy and Rick Brownell. 2011. *Receptive One-Word Picture Vocabulary Test – 4*. Novato, CA: Academic Therapy Publications.

<sup>7</sup> Brownell, Rick. 2001. *Receptive One-Word Picture Vocabulary Test – Spanish Bilingual Edition*. Novato, CA: Academic Therapy Publications.

<sup>8</sup> Woodcock, Richard W., Kevin S. McGrew, and Nancy Mather. 2001. *Woodcock Johnson-III Tests of Achievement*. Itasca, IL: Riverside Publishing.

<sup>9</sup> Muñoz-Sandoval, Ana. F., Richard W. Woodcock, Kevin S. McGrew, and Nancy Mather. 2005. *Bateria III Woodcock-Muñoz: Pruebas de habilidades cognitivas*. Itasca, IL: Riverside Publishing.

<sup>10</sup> <http://phys.org/news/2011-04-early-math-skills-academic-success.html>

<sup>11</sup> von Suchodoletz, et al. 2013; Wanless, S.B., M.M. McClelland, S.L. Tominey, & A.C. Acock. 2011. The influence of demographic risk factors on children's behavioral regulation in prekindergarten and kindergarten. *Early Education and Development*, 22: 461-488.

body of international literature finds that self-regulation skills provide a foundation for positive school experiences and predict later academic achievement.<sup>12</sup>

The **Head-Toes-Knees-Shoulders Task (HTKS)**<sup>13</sup> is a structured, five-minute assessment of a child's ability to self-regulate by asking them to perform the opposite of a response to four different commands. For example, when the examiner says, "Touch your toes," the child is instructed to do the opposite, which in this case, is to touch his/her head. The test was administered in English, Spanish, or Chinese.

## PROCEDURES

The assessments were conducted with each child individually, beginning with the Receptive One Word Picture Vocabulary Test, followed by Applied Problems, HTKS, and ending with Letter-Word Recognition. Children could discontinue assessments at any time once started, and/or opt out of participation altogether. If children seemed to need a break during the assessment, one was offered.

Each child's assessment language preference (English or Spanish for all measures; Chinese available for HTKS) was assessed by first asking teachers to identify language needs of each student in their class. In the few cases in which this information was unable to be obtained prior to the assessment date, the language routing protocol on the ROWPVT-SBE was used to determine language dominance.

For Chinese-speaking students, in the rare event that the preferred language was not able to be determined by conferring with the classroom teacher in advance of the assessment date, language needs were assessed by the assessor on a case-by-case basis. All three Chinese-bilingual assessors were native Chinese speakers and all but one of the five Spanish-bilingual assessors were native Spanish speakers.

## DATA ANALYSIS

To what extent does PFA participation lead to enhanced student readiness for school? While the Preschool for All program has expanded access to free and/or subsidized preschool to four-year-olds in San Francisco over the years, participation in PFA preschools remains completely voluntary. As such, direct comparisons of assessment results between students who have and have not attended PFA preschools are subject to potential selection bias. That is, certain families are more likely to select into sending their children to PFA preschools, and those families likely differ in systematic and unobservable ways from families who do not select into PFA, and those differences could lead to biases in results.

The regression discontinuity approach taken in this study uses assessment data from a "treatment group" of beginning kindergartners who are PFA graduates and comparing their means against the "control group" of current PFA preschoolers who are in the beginning of their last year of preschool. Comparing these two groups reduces potential selection bias, as both the treatment and control groups have already selected into PFA. "Treatment" and "control" group membership is determined by the SFUSD birthdate cutoff for kindergarten entry, which in 2012 was November 1, 2007.

The fundamental premise of the regression discontinuity approach is that a child born just before the cutoff would be statistically very similar to a child born after Nov. 1 except that one will have completed the PFA "treatment", and the other will not have. The effect of PFA can then be identified without the statistical

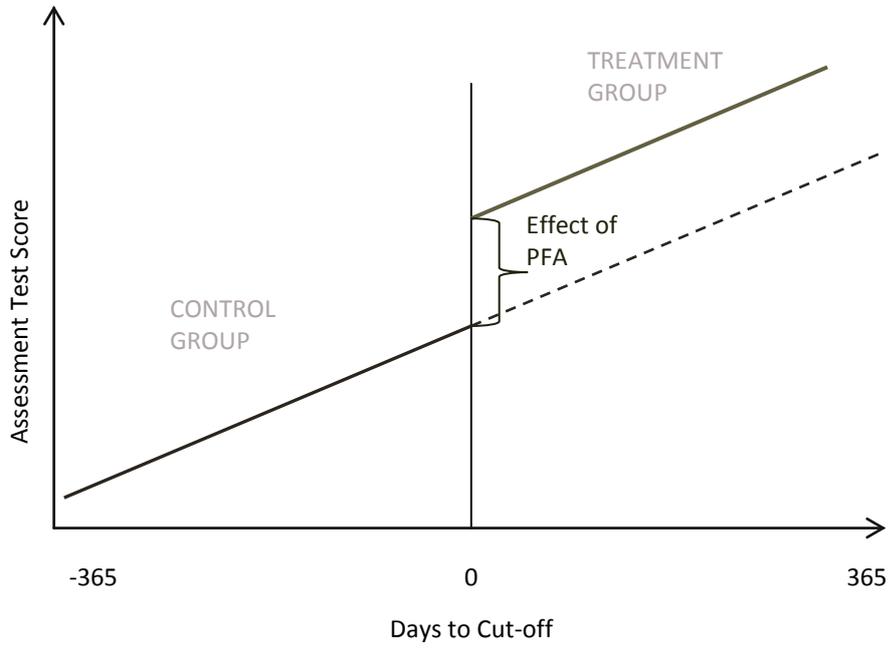
---

<sup>12</sup> Blair, C., & R.P. Razza. 2007. Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child Development*, 78: 647-663; McClelland, M.M., A.C. Acock, & F.J. Morrison. 2006. The impact of kindergarten learning-related skills on academic trajectories at the end of elementary school *Early Childhood Research Quarterly*, 21: 471-490; McClelland, M.M., C.E. Connor, C.L. Farris, A.M. Jewkes, & F.J. Morrison. 2007. Links between behavioral regulation and preschoolers' literacy, vocabulary and math skills. *Developmental Psychology*, 43: 947-959; von Suchodoletz, A., S. Gestsdottir, S.B. Wanless, M.M. McClelland, F. Birgisdottir, C. Gunzenhauser, & H. Ragnarsdottir. 2013. Behavioral self-regulation and relations to emergent academic skills among children in Germany and Iceland. *Early Childhood Research Quarterly*, 28: 62-73; Wanless, S.B., M.M. McClelland, A.C. Acock, C.C. Ponitz, S.H. Son, X. Lan, F.J. Morrison, J.L. Chen, F.M. Chen, K. Lee, M. Sung, S. Li. 2011. Measuring behavioral regulation in four societies. *Psychological Assessment*, 23(2): 364-378.

<sup>13</sup> Ponitz, Claire E. Cameron, Megan McClelland, J.S. Matthews, and Frederick J. Morrison. 2009. Head-Toes-Knees-Shoulders Task.

“noise” that comes with selection bias. The figure below depicts the hypothesized effect of PFA as examined by the regression discontinuity design.

**Figure 1. Hypothesized effect of PFA**



## FINDINGS

A series of regression models were fit with the data to test for various assumptions of the regression discontinuity model. The table below contains the final results of an iterative process to obtain estimates of the effect of PFA in the most efficient, parsimonious model<sup>14</sup>. The following analyses in effect control for age to estimate the impact of PFA on each of the measures.

**Figure 2. The effect of PFA on school readiness outcomes**

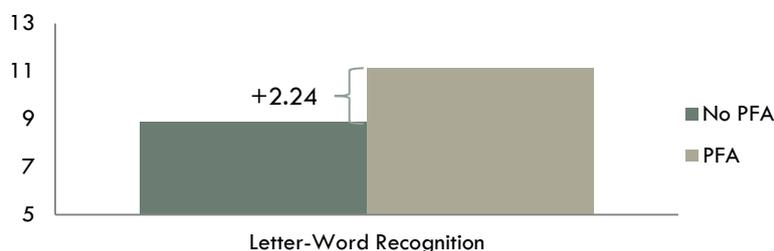
Measure	Beta	Standard Error	p-value	N
ROWPVT	-1.12	2.79	0.69	480
ROWPVT-SBE	4.74	4.19	0.26	124
WJ Letter-Word Recognition	2.24	0.87	0.01	605
WJ Applied Problems	1.59	0.65	0.01	583
HTKS	6.34	1.88	0.01	599

While no statistically significant effect of PFA was found on either the English or Spanish language versions of ROWPVT assessment, significant effects of PFA are found across other measures as follows.

### EARLY LITERACY

The effect of PFA on early literacy is statistically significant and it is estimated that a PFA preschool experience improves Letter-Word Recognition by an average of 2.24 points, which corresponds to an approximate 3-month gain in early literacy skills. This finding is comparable to prior studies using this method and measure<sup>15</sup>. The figure below illustrates the gain estimated by the regression discontinuity design.<sup>16</sup>

**Figure 3. Effect of PFA on Letter-Word Recognition**



Source: Woodcock Johnson III Tests of Achievement/Woodcock-Muñoz Pruebas de Aprovechamiento (2012). N=605.

### EARLY MATHEMATICS

Similar to results found in prior studies using the Woodcock-Johnson Applied Problems subscale<sup>17</sup>, estimates obtained indicate a 1.59-point increase in Applied Problems scores at the discontinuity, which corresponds to an approximate 3-4-month gain in early mathematical skills associated with PFA ( $p < 0.05$ ).

<sup>14</sup> Models include controls for days to cutoff and language of assessment.

<sup>15</sup> Gormley, William T. Jr., Ted Gayer, Deborah Phillips, and Brittany Dawson. 2005. "The Effects of Universal Pre-K on Cognitive Development". *Developmental Psychology*, 41(6):872-884. This study finds an effect size of 2.99.

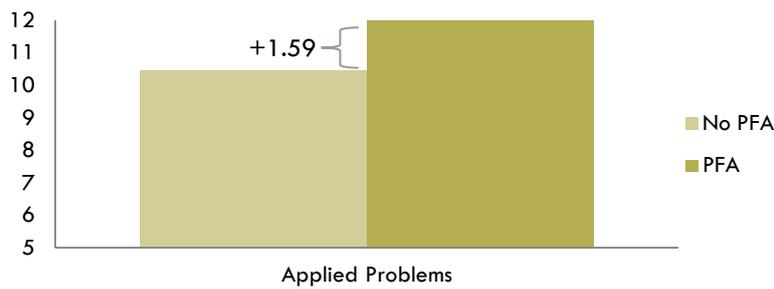
<sup>16</sup> Note that this series of figures is for illustrative purposes only. For a more detailed treatment of the results and method, readers are directed to the "Evaluating Preschool for All Effectiveness" report.

<sup>17</sup> Gormley, William T. Jr., Ted Gayer, Deborah Phillips, and Brittany Dawson. 2005. "The Effects of Universal Pre-K on Cognitive Development". *Developmental Psychology*, 41(6):872-884. This study finds an effect size of 1.94.

Hustedt, Jason T., W. Steven Barnett, Kwanghee Jung, and Allison H. Friedman. 2010. "The New Mexico PreK Evaluation: Impacts From the Fourth Year (2008-2009) of New Mexico's State-Funded PreK Program. This study finds an effect size of 1.58 points.

Lamy, Cynthia, Steven Barnett, and Kwanghee Jung. 2005. "The Effects of the Michigan School Readiness Program on Young Children's Abilities at Kindergarten Entry". This study finds an effect size of 2.18 points.

**Figure 4. Effect of PFA on early mathematics skills**



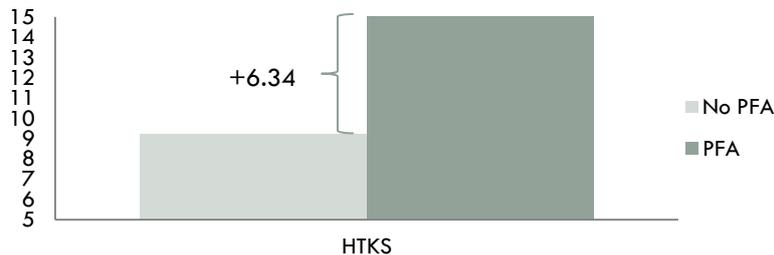
Source: Woodcock Johnson III Tests of Achievement/Woodcock-Muñoz Pruebas de Aprovechamiento (2012). N=583

## SELF-REGULATION

Although prior studies evaluating program effectiveness on self-regulation using the HTKS as an outcome measure in a regression discontinuity design are unknown to the authors as of the time of this writing, a robust effect of PFA is found on scores on the Head-Toes-Knees-Shoulders task, amounting to a 6.34-point gain in HTKS scores associated with PFA treatment.<sup>18</sup>

By comparison, a previous study of self-regulation by HTKS developers finds a 4.8-point increase between fall and spring administrations of the HTKS is found among a sample of kindergarten students in Michigan, and a 1.2-point increase in Oregon.<sup>19</sup>

**Figure 5. Effect of PFA on self-regulation skills**



Source: Head-Toes-Knees-Shoulders Task (2012). N=599

<sup>18</sup> The scatterplot and regression lines fitting the actual data are presented in Appendix C in the full report. These findings are consistent with a fall-to-spring preschool study that found a 9-point gain between the fall pre-test and the spring post-test among students of an urban preschool in New Jersey (Corbo, Melissa. 2012. Measuring behavioral regulation and its relation to early language skills and teacher-rated behavior in a culturally diverse school district. Doctoral dissertation submitted to the Graduate School of Applied and Professional Psychology of Rutgers, the State University of New Jersey).

<sup>19</sup> Cameron Ponitz, C., M.M. McClelland, J.S. Matthews, and F.J. Morrison. 2009. A structured observation of behavioral self-regulation and contribution to kindergarten outcomes. *Developmental Psychology*, 45(3): 605-619.

## RESULTS BY LANGUAGE OF ASSESSMENT

As shown in the table below, PFA appears to have a slightly greater impact on early literacy skills among children assessed in English on the Letter-Word Recognition subtest, raising their test scores by 2.15 points as compared to the 2.04 points raised among children assessed in Spanish.

Results on the Applied Problems subtest and on the Head-Toes-Knees-Shoulders task suggest a greater effect of PFA on children assessed in Spanish.<sup>20</sup> The most dramatic effects are found in of self-regulation, in which a 5-point increase in the HTKS score is found among students assessed in Chinese or in English, and a 12-point gain is observed in scores among students assessed in Spanish.

**Figure 6. The effect of PFA on school readiness outcomes by language of assessment**

Variable	Letter-Word Recognition	Applied Problems	HTKS
<b>English assessment*</b>	(N=498)	(N=476)	(N=498)
<b>Coefficient (p-value)</b>	2.15 (0.04)	1.51 (0.04)	5.10 (0.02)
<b>SE</b>	1.03	0.75	2.13
<b>Spanish assessment</b>	(N=106)	(N=106)	(N=100)
<b>Coefficient (p-value)</b>	2.04 (0.12)	2.22 (0.08)	12.09 (0.00)
<b>SE</b>	1.28	1.25	3.95

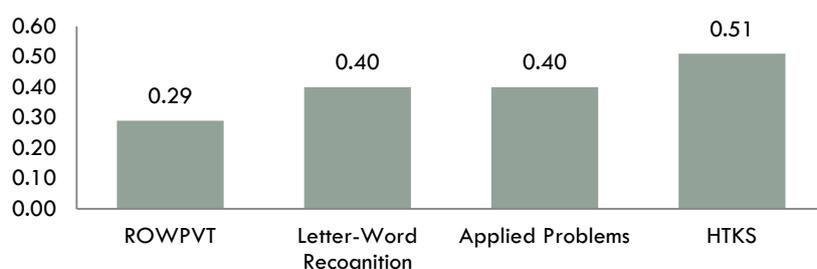
Included in each model is a control for the number of days from the cutoff birthdate.

\*Note that for the HTKS, data from students assessed in Chinese are pooled with data from students assessed in English, as no statistically significant differences are found between these two groups on this measure.

## EFFECT SIZES

In the figure below, overall results are presented as effect sizes, which use a common metric to standardize the estimated effects of PFA. Effect sizes facilitate comparison of results across the different measures. Consistent with results presented above, the greatest impact of PFA, as identified by effect sizes, can be found in the area of self-regulation. A relatively larger effect size of 0.51 of a standard deviation is found on the Head-Toes-Knees-Shoulders Task, as illustrated below.

**Figure 7. Effect of PFA across school readiness measures<sup>21</sup>**



The effect sizes reported here are similar in magnitude to those reported in other state-funded preK programs, which range from 0.23-0.53.<sup>22</sup> Effect sizes found are also comparable to those obtained in regression discontinuity studies of the impact of universal preK programs in Oklahoma and New Mexico. These effect sizes ranged from 0.38 to 0.79 of a standard deviation.<sup>23</sup>

<sup>20</sup> Due to the small Spanish language sample size, results reported must be interpreted as suggestive, rather than conclusive.

<sup>21</sup> Effect sizes are typically expressed as the standardized difference between means. Following Hustedt, et al., 2010, here, effect sizes are calculated as  $\beta_x / SD_c$ , where  $\beta_x$  = estimated effect of PFA in the RDD equations,  $SD_c$  = Standard deviation of the outcome variable for the control group.

<sup>22</sup> Gilliam, W. and E. Zigler. 2001. A critical meta-analysis of all evaluations of state-funded preschool from 1977 to 1998: Implications for policy, service delivery and program evaluation. *Early Childhood Research Quarterly*, 15, 441-473o.

<sup>23</sup> See Gormley, W. T., et al., 2005 in Oklahoma and Hustedt, J.T., W.S. Barnett, K. Jung, and A.H. Friedman. 2010. The New Mexico PreK Evaluation: Impacts from the Fourth Year (2008-2009) of New Mexico's State-Funded PreK Program.

## SUMMARY

This report brief examined the effects of PFA preschool attendance on children’s school readiness at kindergarten entry along dimensions of receptive language, early literacy, early mathematics, and self-regulation skills development. For those who select into PFA preschools, strong evidence of improvements in early literacy, early mathematics, and self-regulation skills is found.

Preschool for All appears to have strongest impact on self-regulation skills, an effect that is particularly robust among Spanish-speaking students.

While no statistically significant effects were found in receptive language development, solid evidence pointing to significant effects of PFA on early literacy skill development was found for both native English speakers as well as for those students whose preferred language is Spanish.