Research Brief

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The Impact of Chicago's Universal Pre-Kindergarten Expansion on Children's Test Scores through Grade 3: Evidence from the First Cohort of UPK Expansion

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Chicago Public Schools' universal pre-kindergarten (UPK) initiative dramatically expanded the share of CPS students who attended free, full-day pre-K in the district. In this research brief, we measure the impact of the UPK expansion on children's early school progress. We focus on state proficiency tests administered in third grade, and also examine teacher-observation assessments at the end of pre-K and at kindergarten entry. We find that the UPK expansion raised children's average grade 3 math achievement by 0.06 of a standard deviation and increased their math proficiency rates by 3 percentage points. In addition, the expansion produced consistent gains on assessments measured in pre-K and kindergarten across nearly every domain.

1. Chicago's UPK Expansion

Chicago Public Schools launched its UPK expansion in the 2018–19 school year, adding free, full-day pre-K seats in schools that lacked the capacity to serve their entire age-4 population. The expansion continued in subsequent years, with additional schools and classrooms being added as needed. The UPK expansion built on an earlier pre-K initiative for four-year-olds that primarily served schools with high proportions of low-income students, along with half-day seats elsewhere in the city (Ehrlich et al. 2020). Previous work found that the UPK expansion increased access to free, full-day pre-K without displacing historically marginalized populations, and that the new capacity was concentrated in neighborhoods with the largest gaps in access to free, full-day school-based pre-K (Sabol & Schanzenbach 2023, Gonzalez et al. 2025). In practice, the UPK expansion primarily converted half-day seats into full-day seats rather than creating brand new pre-K classrooms.

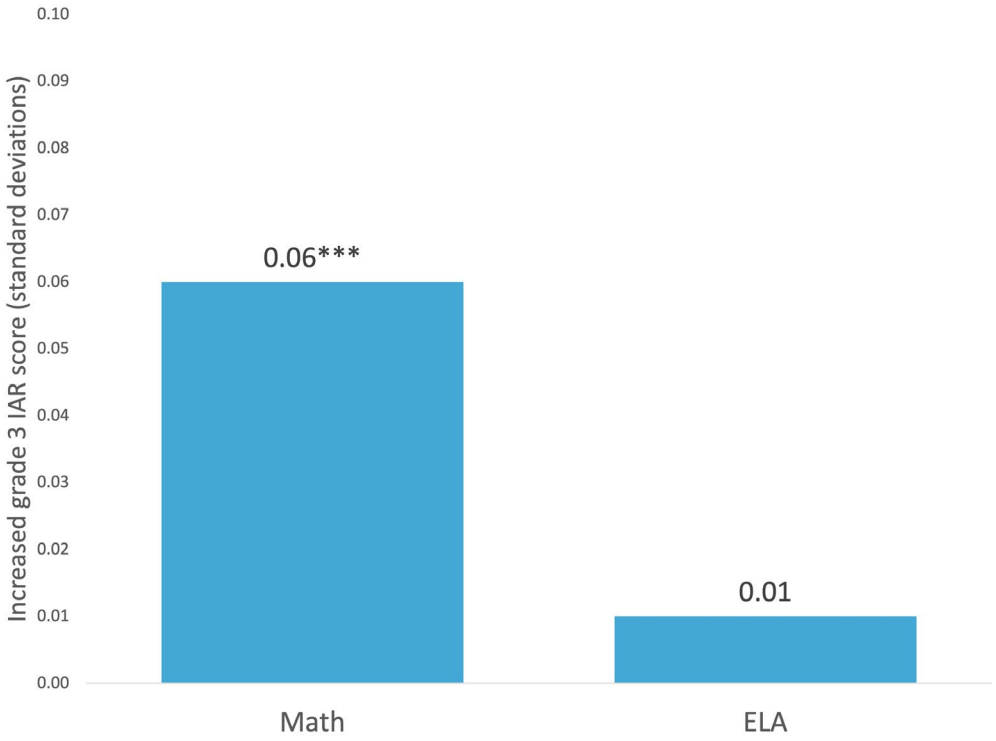
Enough time has passed since the UPK expansion started that we can now observe third-grade test scores of its first cohort of treated students. We estimate the impact of the expansion on these scores using a quasi-experimental design called "difference-in-differences." Specifically, we compare "treated" students who attended pre-K at a CPS elementary school that gained free, full-day 4-year-old pre-K seats in the first year of the UPK expansion, to a "comparison" group comprising students who attended schools that did not experience a change that year. The comparison group could be in one of three groups: they attended a school that already offered wide access to free, full-day pre-K and thus were not included in the expansion; they attended a pre-K at a school that would benefit from the UPK expansion in a subsequent year; or they did not attend pre-K in CPS. Children in the treatment group were 62 percentage points more likely to attend free, full-day pre-K than they would have been in the absence of the UPK expansion.

We compare test scores among children in the treated and comparison groups before and after the UPK expansion, and consider outcomes on three assessments administered at different points in a child's public schooling: the Illinois Assessment of Readiness (IAR) administered near the end of grade 3, the Kindergarten Individual Development Survey (KIDS) collected at the beginning of kindergarten, and the Teaching Strategies GOLD (TS GOLD) assessment from the end of pre-K. Our primary focus is whether the benefits of expanded full-day pre-K extend beyond school entry into the elementary grades. Third-grade IAR scores allow us to examine academic achievement four years after pre-K using a common statewide assessment. We also examine KIDS and TS GOLD to understand the expansion's earlier effects on children's skills. We include statistical controls for child-level characteristics and school fixed effects. The technical appendix presents the specification, cohort restrictions, and sample sizes in more detail.

2. Full-day pre-K raises children's grade 3 math scores

The UPK expansion produced positive, statistically significant gains in children's grade 3 math achievement four years later. We find that children in the treated group scored 0.06 of a standard deviation (SD) higher on the IAR Math assessment than children in the comparison group, or about 2.4 points on the IAR scale score (Figure 1). The effect on IAR English Language Arts (ELA) is close to zero and not statistically significant.

Figure 1: Impact of the 2018–19 UPK expansion on grade 3 IAR test scores



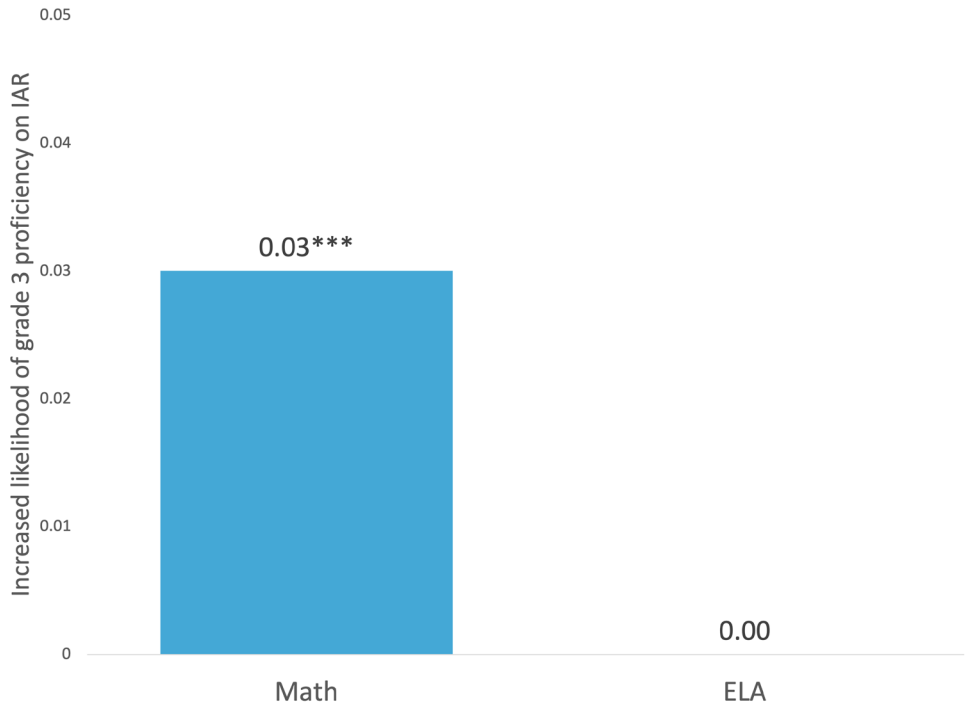
Note: This figure shows the estimated effect of the 2018–19 UPK expansion on children's IAR Math and IAR ELA scores in grade 3, in comparison-group standard-deviation units. Estimates come from difference-in-differences models that include grade 3 school fixed effects and child-level controls. Data are drawn from two cohorts: children in grade 3 in 2021–22 and 2022–23. *** p<0.01.

Before the UPK expansion, treated schools already offered some full-day pre-K seats. The 0.06 SD estimate therefore averages the expansion's effects across children whose access changed and those who would have attended full-day pre-K anyway. Overall, the UPK expansion increased the likelihood that a child attended full-day pre-K instead of half-day pre-K by 62 percentage points (Appendix C1). To account for this, we can adjust the average test score impact (0.06 SD) by dividing it by the change in the likelihood of full-day pre-K (62 percentage points, or 0.62). The adjustment implies an average math achievement gain of approximately 0.10 SD for children whose attendance shifted from half-day to full-day pre-K because of the expansion.

Translated into the state's performance categories, the UPK expansion increased the likelihood that a student met the IAR math proficiency standard by 3 percentage points—an estimate that is statistically significant at the 1% level (Figure 2). Since 23% of the comparison group scored proficient, the UPK expansion impact represents a 13% increase in the share of treated children meeting the state's grade 3 math proficiency standard.

These estimates use the proficiency threshold in effect during the years covered by our data, defined as an IAR test score of 750 or higher. In August 2025, Illinois lowered the proficiency threshold to an IAR score of 732 or higher. Using this newer threshold, we similarly find a statistically significant 3 percentage-point increase in proficiency rates. This represents an 8% increase over the 37% proficiency rate among comparison-group students. The UPK expansion did not have statistically significant impacts on the share of students reaching other IAR performance thresholds (partial, approaching, or exceeding), nor did it affect IAR ELA proficiency rates.

Figure 2: Impact of the 2018–19 UPK expansion on grade 3 IAR proficiency rates



Note: This figure shows the estimated effect of the 2018–19 UPK expansion on children's IAR Math and IAR ELA proficiency rates (met or higher) in grade 3. Prior to the UPK expansion, proficiency rates among the comparison group were 23% in math and 21% in ELA. Estimates come from difference-in-differences models that include grade 3 school fixed effects and child-level controls. Data are drawn from two cohorts: children in grade 3 in 2021–22 and 2022–23. *** p<0.01.

3. How this impact compares to other studies

We could find no published study that examines the longer-term impacts of shifting from half- to full-day pre-K. However, several studies are broadly comparable, and the Chicago results fall within their range. Most closely related to our study, Gibbs (2017) studies the impact of moving from half- to full-day kindergarten and finds a 0.17 SD increase in third-grade math scores.

Other studies have examined expansions in pre-K access, but typically compare a treatment group receiving one additional year of school-based pre-K to a mixed comparison group of those attending Head Start, other pre-K programs, or no pre-K. Studies taking this approach report positive impacts on third-grade math scores, including similar impacts from pre-K expansion in Tulsa (0.18 SD, Hill et al. 2015) and on low-income students in Georgia and Oklahoma (0.06 SD, Cascio and Schanzenbach 2013).

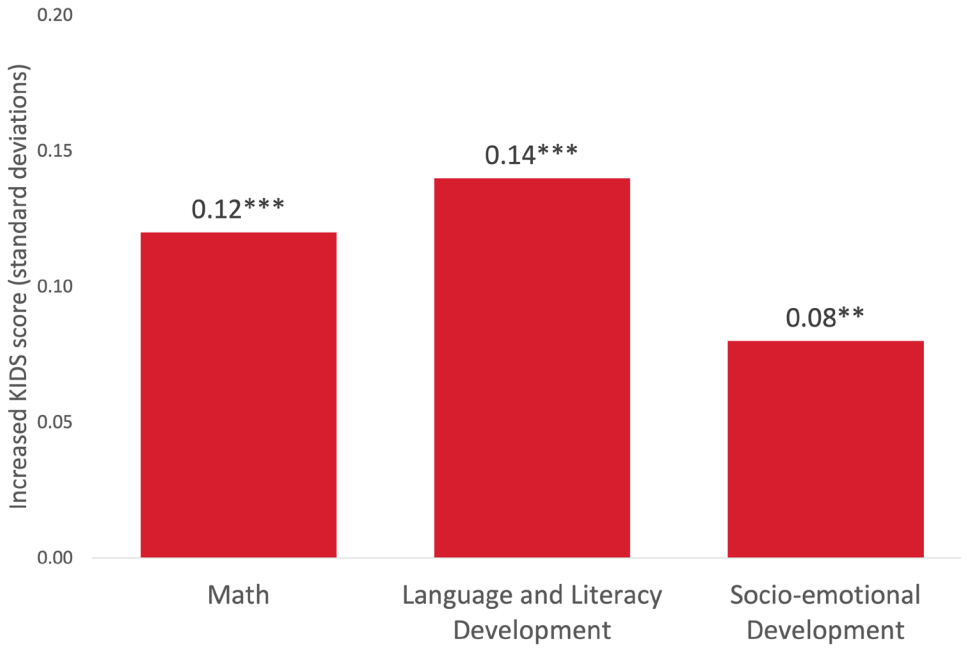
A recent Boston study generally found no effects of expanded pre-K access on math scores in grades 4–8, except for a positive impact in seventh grade (Weiland et al. 2025). The Chicago effects stand in sharp contrast to the widely discussed negative third-grade math outcomes observed in Tennessee (-0.18 SD, Lipsey et al. 2018).

4. Gains appear at the end of pre-K and at kindergarten entry

The earlier assessments complement the third-grade findings by showing how the expansion affected children's skills at the end of pre-K and at kindergarten entry. KIDS and TS GOLD draw on teachers' observations and cover a broader range of developmental domains than the IAR. Because the assessments differ in content, scoring, and administration, their estimated effects should not be interpreted as directly comparable measures of how much a particular gain persists over time.

We also find positive, significant impacts of the UPK expansion on earlier-grade outcomes. On KIDS at kindergarten entry, we estimate positive and statistically significant effects on all three of its domains: math, language and literacy development, and socio-emotional development (Figure 3).

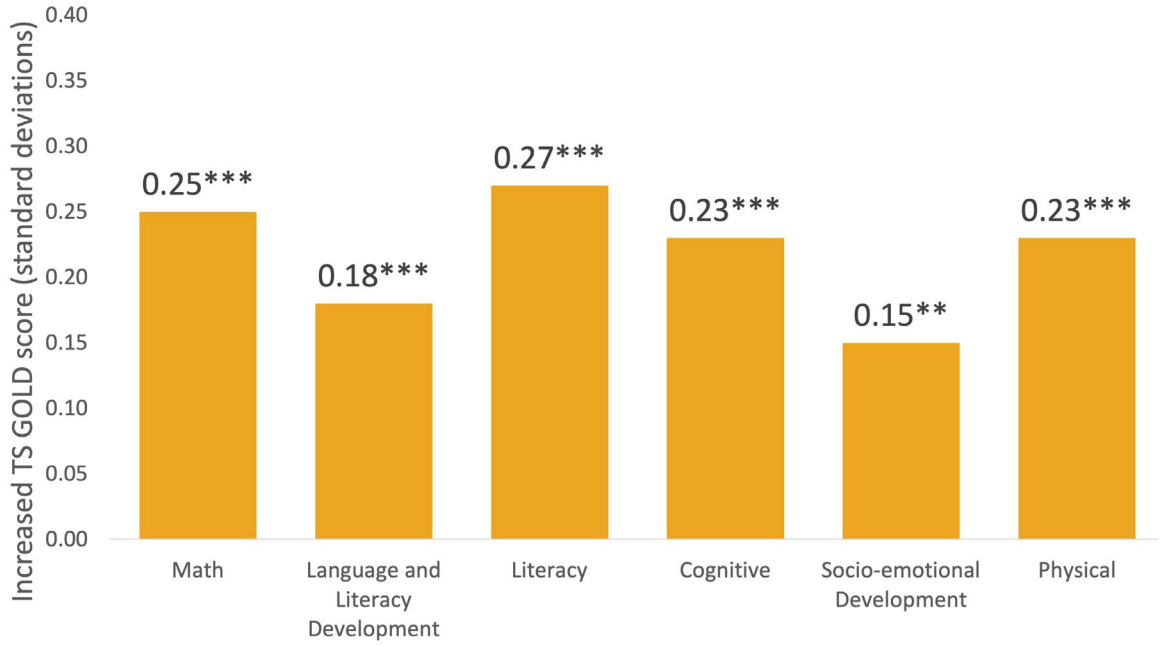
Figure 3: Impact of the 2018–19 UPK expansion on KIDS kindergarten entry test scores



Note: This figure shows the estimated effect of the 2018–19 UPK expansion on children's KIDS scores at the beginning of kindergarten, across three domains, in comparison-group standard-deviation units. Estimates come from a difference-in-differences model with grade 3 school fixed effects and child-level controls. Data are drawn from two cohorts: children in kindergarten in 2018–19 and 2019–20. *** p<0.01; ** p<0.05.

On TS GOLD at the end of pre-K, we find positive and statistically significant effects on all six domains measured: math, language, literacy, cognitive, socio-emotional, and physical development (Figure 4). A recent study of the impact of randomized assignment to half-day vs. full-day pre-K in Colorado finds impacts on the end-of-pre-K TS GOLD test nearly identical to these (Atteberry et al. 2019).

Figure 4: Impact of the 2018–19 UPK expansion on TS GOLD end of pre-K test scores



Note: This figure shows the estimated effect of the 2018–19 UPK expansion on children's TS GOLD scores at the end of pre-K, across six domains, in comparison-group standard-deviation units. Estimates come from a difference-in-differences model with grade 3 school fixed effects and child-level controls. Data are drawn from two cohorts: children in pre-K in 2017–18 and 2018–19. *** p<0.01; ** p<0.05.

Taken together, the results indicate benefits at school entry and a positive effect on math achievement four years after pre-K.

5. Implications

Children gain from full-day pre-K. The 2018–19 expansion primarily converted half-day pre-K seats into full-day ones. Children whose schools gained full-day seats scored 0.06 SD higher and were 3 percentage points more likely to be proficient in math in third grade than children whose schools did not, four years after their pre-K year. On end-of-pre-K TS GOLD, effects across six domains range from 0.15 to 0.27 SD.

Pre-K effects reach beyond kindergarten. Expanded pre-K offerings do more than improve kindergarten readiness. The IAR Math results are direct evidence that the pre-K expansion had impacts that persisted four years later.

A lingering question is why the expansion improved language and literacy outcomes at the end of pre-K and at kindergarten entry but did not produce a detectable effect on third-grade ELA scores. One possibility is that children in the comparison group caught up during the early elementary grades. Another is that the assessments capture different aspects of language and literacy at different ages. These results alone cannot distinguish between these explanations.

Additional unresolved questions include whether the findings extend to subsequent cohorts, which children and schools benefit most, and what conditions support benefits through third grade. We plan to address these questions in follow-up work as more data become available.

References

Atteberry, A., Bassok, D., & Wong, V. C. (2019). "The effects of full-day prekindergarten: Experimental evidence of impacts on children's school readiness." *Educational Evaluation and Policy Analysis,* 41(4), 537–562.

Cascio, E. U., & Schanzenbach, D. W. (2013). "The Impacts of Expanding Access to High-Quality Preschool Education." *Brookings Papers on Economic Activity,* Fall 2013, 127–192.

Ehrlich, S.B., Connors, M.C., Stein, A.G., Francis, J., Easton, J.Q., Kabourek, S.E., & Farrar, I.C. (2020). *Closer to home: More equitable pre-k access and enrollment in Chicago* (Research Snapshot). Chicago, IL: University of Chicago Consortium on School Research, NORC at the University of Chicago, and Start Early.

Gibbs, C. R. (2017). "Does Full-Day Kindergarten Reduce Achievement Gaps? Evidence from Statewide Full-Day Kindergarten Expansions." Working paper, University of Notre Dame.

Gonzalez, K., Fleming, N., Sabol, T., Schanzenbach, D. W., & Wallace, K. (2025). *Access to free, full-day pre-K by school-level racial and ethnic characteristics*. Institute for Policy Research Rapid Research Report.

Hill, C. J., Gormley, W. T., & Adelstein, S. (2015). "Do the short-term effects of a high-quality preschool program persist?" *Early Childhood Research Quarterly*, 32, 60–79.

Lipsey, M. W., Farran, D. C., & Durkin, K. (2018). "Effects of the Tennessee Prekindergarten Program on children's achievement and behavior through third grade." *Early Childhood Research Quarterly*, 45, 155–176.

Sabol, T., & Schanzenbach, D. W. (2023). *The Chicago Universal Pre-K Study: The impact of Chicago's universal prekindergarten expansion on access to school-based pre-K.* Institute for Policy Research Rapid Research Report.

Weiland, C., Wu, T., Unterman, R., Shapiro, A., Lightner, S., Staines, T., & Taylor, A. (2025). "Impacts of Oversubscribed Boston Pre-K Programs through Middle School." Annenberg Ed Working Paper No. 25-1194. Brown University.

Technical Appendix

A. Data source and cohort restrictions

All analysis is restricted to children who attended CPS in kindergarten. Analyses focus on two cohorts, observed as follows. Sample sizes (N) are the number of children in each cohort with a valid score on at least one domain of the given assessment.

	Pre-expansion cohort	Post-expansion cohort
TS GOLD (pre-K)	2017–18 (N=8370)	2018–19 (N=8,751)
KIDS (Kindergarten)	2018–19 (N=16,902)	2019–20 (N=16,017)
IAR (Grade 3)	2021–22 (N=16,294)	2022–23 (N=16,159)

B. Difference-in-differences specification

Our main specification is a difference-in-differences model of the form:

$$Y_{ist} = \beta Treated_s + \gamma Post_t + \delta(Treated_s \times Post_t) + X_i'\theta + \alpha_r + \varepsilon_{irt}$$

where Y_{ist} is the outcome of child i in school s in year t, standardized using the control group's pre-expansion mean and standard deviation; $Treated_s$ is an indicator that equals one if the child attended pre-K at a school that received UPK treatment in 2018–19; $Post_t$ is an indicator for the child being in the post-expansion cohort; X_i is a vector of child-level controls (race and ethnicity, gender, age at test, English learner status, IEP status, and FRPL eligibility); and α_r is the third-grade school fixed effect. Results are little changed if kindergarten school fixed effects are used instead. The coefficient of interest is δ, the impact of the 2018–19 expansion on children's outcomes. Standard errors are clustered at the third-grade school level, matching the level of the fixed effects.

C. Regression results

Appendix Tables C1 through C4 present the main estimates for whether a child is enrolled in free, full-day CPS pre-K, and for each outcome family under the fixed-effects specification outlined in section B. Standard errors, clustered at the school level, are shown in parentheses. Significance: *** p<0.01; ** p<0.05; * p<0.10.

Appendix Table C1: Probability of Attending Free, Full-day CPS Pre-K

	Attend Free Full-day CPS pre-K
	(1)
Treated*Post	0.62***
	(0.02)
Treated	-0.03**
	(0.02)
Post	0.03***
	(0.01)
Child-level Covariates	Yes
Grade 3 FE	Yes
Control group mean (pre)	0.23
Treatment group mean (pre)	0.09
Observations	28,405

Note: Sample restricted to children who attended CPS kindergarten in 2018–19 or 2019–20, and CPS grade 3 in 2021–22 or 2022–23.

Appendix Table C2: Grade 3 IAR Results

	Math		ELA	
	Score (standard deviation units)	Proficient (probability)	Score (standard deviation units)	Proficient (probability)
	(1)	(2)	(3)	(4)
Treated*Post	0.06***	0.03***	0.01	0.00
	(0.02)	(0.01)	(0.03)	(0.01)
Treated	0.05**	0.00	0.05**	0.01
	(0.02)	(0.01)	(0.02)	(0.01)
Post	0.06***	0.01	0.08***	0.03***
	(0.01)	(0.01)	(0.02)	(0.01)
Child-level Covariates	Yes	Yes	Yes	Yes
Grade 3 FE	Yes	Yes	Yes	Yes
Control group mean (pre)	0.00	0.23	-0.00	0.21
Treatment group mean (pre)	-0.02	0.20	-0.03	0.18
Observations	28,278	28,278	28,349	28,349

Note: Sample restricted to children who attended CPS kindergarten in 2018–19 or 2019–20, and CPS grade 3 in 2021–22 or 2022–23. Test scores are reported in standard deviation units scaled by the pre-treatment control group.

Appendix Table C3: Kindergarten Entry KIDS Results

	Math	Language and Literacy Development	Socio-emotional Development
	(1)	(2)	(3)
Treated*Post	0.12***	0.14***	0.08**
	(0.04)	(0.03)	(0.04)
Treated	0.13***	0.12***	0.14***
	(0.03)	(0.03)	(0.03)
Post	0.02	-0.01	0.05**
	(0.02)	(0.02)	(0.02)
Child-level Covariates	Yes	Yes	Yes
Grade 3 FE	Yes	Yes	Yes
Control group mean (pre)	-0.00	-0.00	0.00
Treatment group mean (pre)	-0.15	-0.19	-0.12
Observations	28,153	28,152	28,211

Note: Sample restricted to children who attended CPS kindergarten in 2018–19 or 2019–20, and CPS grade 3 in 2021–22 or 2022–23. Test scores are reported in standard deviation units scaled by the pre-treatment control group.

Appendix Table C4: End of Pre-K TS GOLD Results

	Math	Language	Literacy	Cognitive	Socio-emotional	Physical
	(1)	(2)	(3)	(4)	(5)	(6)
Treated*Post	0.25***	0.18***	0.27***	0.23***	0.15**	0.23***
	(0.05)	(0.06)	(0.05)	(0.06)	(0.06)	(0.06)
Treated	-0.07	-0.05	-0.16***	-0.02	0.01	-0.05
	(0.05)	(0.05)	(0.04)	(0.05)	(0.05)	(0.04)
Post	-0.02	0.02	-0.05*	-0.03	-0.01	0.02
	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
Child-level Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Grade 3 FE	Yes	Yes	Yes	Yes	Yes	Yes
Control group mean (pre)	0.00	-0.00	-0.00	-0.00	-0.00	-0.00
Treatment group mean (pre)	-0.08	-0.10	-0.30	0.01	0.05	-0.02
Observations	13,129	12,884	12,902	13,143	13,368	13,183

Note: Sample restricted to children who attended CPS pre-K in 2017–18 or 2018–19, CPS kindergarten in 2018–19 or 2019–20, and CPS grade 3 in 2021–22 or 2022–23. Test scores are reported in standard deviation units scaled by the pre-treatment control group.