



# Who Benefits From Universal Prekindergarten?

## Examining the Complementary Effects of Three California Education Reforms

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Rucker C. Johnson and Austin Land

### Summary

Between 2009 and 2019, California made major policy changes to key educational investments for preschool and elementary school students, including the California State Preschool Program (CSPP); transitional kindergarten (TK), created by the Kindergarten Readiness Act; and K–12 financing, overhauled with the Local Control Funding Formula (LCFF). This study finds that each investment produced substantial, equity-enhancing gains in math and reading achievement—and that these gains compounded across the early years. TK delivered its largest benefits to the children least likely to have access to high-quality prekindergarten (PreK), narrowing gaps by family income. Those benefits were larger for children who first attended CSPP as 3-year-olds, were larger still in well-funded schools, and persisted longest where resources were the greatest. The findings show that sequenced public investments can produce multiplier effects that exceed the sum of their parts.

The report on which this brief is based can be found [here](#).

### Key Findings

Key findings of the study include the following:

- Cohorts affected by the Kindergarten Readiness Act—who had access to TK at age 4 and attended CSPP at age 3 at much higher rates than prior cohorts—showed reading achievement nearly a full grade level higher and math achievement roughly two thirds of a grade level higher in 3rd and 4th grades than comparable earlier cohorts.
- For children from low-income backgrounds with English-speaking parents, TK attendance led to about 7 months of additional learning in 3rd-grade math and reading. Effects were much smaller for children from more advantaged backgrounds.
- Among low-income children, TK effects were larger for those who first attended CSPP. Low-income multilingual learners had nearly half a year of additional learning gains in 4th grade math when their TK attendance was preceded by CSPP attendance.
- A \$1,000 increase in CSPP per-pupil spending led to almost a quarter of a year of additional learning in math and reading 3 and 4 years after kindergarten, independent of TK and school spending.
- TK attendance and LCFF-induced school spending were mutually reinforcing: TK effects grew with elementary school funding and persisted longer in better-resourced schools.

# Introduction

Preschool has become the norm for most young children in the United States, yet its cost remains out of reach for many families. Public preschool programs aim to ensure that the benefits of early education are available to all children, regardless of family income. State investments have grown rapidly, from 7 states funding preschool in 1980 to 44 states and the District of Columbia by 2021. The [evidence base](#) shows that preschool gains tend to be largest for children from socioeconomically disadvantaged backgrounds and multilingual learners, who often start kindergarten with lower levels of measured skills.

At the same time, the field has long wrestled with two puzzles. First, the initial gains from preschool frequently appear to fade as children move through elementary school. Second, the effects of preschool may depend heavily on what comes before and after it: the early learning experiences children have at age 3 and the quality of the schools they enter afterward. Scholars have hypothesized that early and later educational investments may be complementary, but credible evidence has been scarce.

California offers a rare opportunity to study these questions at scale. Beginning in 2009, the state enacted three reforms that touched successive cohorts of children at different developmental stages: (1) the consolidation of state preschool funding into CSPP, (2) the creation of TK through the Kindergarten Readiness Act, and (3) the redesign of school funding under LCFF. Each reform aimed to narrow opportunity gaps that emerge early in childhood, particularly for children from low-income families and those whose parents do not speak English. Because these reforms rolled out on staggered timelines, researchers can disentangle their effects and examine their interactions.

This brief summarizes findings on the impacts of these reforms on math and reading achievement in 3rd and 4th grades. A central theme of the research is that the gains from public preschool depend on complementary investments in the years both before and after preschool.

California's sustained commitment to early education makes these lessons timely. In 2021, California passed legislation to make TK universal, and it became available to all 4-year-olds in 2025–26. The state's 2025–26 budget committed roughly \$4.1 billion to TK and \$2.8 billion to CSPP as it phased in universal preschool for all 4-year-olds and access for income-eligible 3-year-olds.

## How This Study Was Conducted

This study links child-level preschool enrollment records to longitudinal K–12 records for the full universe of California public school students from preschool through 4th grade. The analysis focuses on kindergarten cohorts from 2011 through 2014, with achievement outcomes observed through 2019 (before the COVID-19 pandemic). The achievement sample comprises more than 3 million student-year observations for over 1.6 million children across roughly 6,100 elementary schools and 935 districts. Test scores are normed to the National Assessment of Educational Progress and expressed in grade-level equivalents.

To support causal inference, this study combines three sources of quasi-experimental variation within a unified two-stage least squares framework: (1) a shift-share instrument that exploits contractor-level CSPP funding shocks; (2) a regression discontinuity design based on the December 2 birthday cutoff for TK eligibility; and (3) a simulated instrument that captures LCFF-induced changes in elementary school spending. A difference-in-differences event study of the staggered Kindergarten Readiness Act rollout complements these designs. Extensive validity checks—including density tests for birthdate manipulation, covariate-balance tests, placebo cutoffs, and falsification tests—support the causal interpretation of the results. More details can be found in the full report.

Source: Johnson, R. C., & Land, A. (2026). *Who benefits from public PreK expansions and increased K–5 spending? Dynamic complementarity in California’s education policies*. University of California, Berkeley; Getting Down to Facts, III.

## Three Investments in Early Educational Opportunity

California educates roughly one in eight public school students in the nation. Forty percent of California students speak a language other than English at home, making it the most diverse state system in the country. The state has long had among the largest achievement gaps by family income and home language. Roughly half of the gap that is visible in 3rd grade is already present at kindergarten entry, reflecting the deep footprint of children’s earliest experiences. The three reforms studied here were each designed, in different ways, to address those early gaps.

### The California State Preschool Program

In 2009, California consolidated several fragmented funding streams for center-based care of preschool-age children into a single, streamlined contract administered by the California Department of Education: CSPP. CSPP serves 3- and 4-year-olds from low- and middle-income families. Roughly half of its enrollees are multilingual, while about half live below the federal poverty line. CSPP became one of the largest state preschool programs in the country. From 2011 to 2019, about one in four children entering California’s public schools first attended CSPP for an average of 13 months, and CSPP accounted for roughly one in four 3-year-olds enrolled in state preschool nationwide. Providers—both school districts and community-based organizations—operate under annual contracts with the state, and the program follows a model typical of Head Start-aligned, whole-child programs, with a required staff-to-child ratio of 1:8 and early childhood permits for lead teachers. Despite this scale, rigorous evidence on CSPP’s effects on children’s learning has been limited. This study provides the first large-scale causal evidence on how CSPP funding shapes later achievement.

### Transitional Kindergarten and the Kindergarten Readiness Act

Before the Kindergarten Readiness Act, California’s December 2 kindergarten eligibility cutoff was among the latest in the nation, so children who turned 5 in the fall often entered kindergarten at age 4. More affluent families could afford to delay entry—“redshirting” their children to gain an extra year of preschool—while lower-income families typically could not, disproportionately providing a developmental benefit to socioeconomically advantaged children.

The Kindergarten Readiness Act of 2010 addressed this inequity by moving the kindergarten eligibility cutoff and creating TK as the first year of a 2-year kindergarten program for children with fall birthdays (September 2 to December 2). TK is California's first universal prekindergarten program. Eligibility is based solely on birthdate, and all districts are required to offer it. TK operates in public schools and is funded through LCFF.

Although the Kindergarten Readiness Act did not directly change CSPP, it reshaped the timing and sequence of early education for children with fall birthdays. Under the Kindergarten Readiness Act, children who turned age 5 in fall entered kindergarten a year later, allowing them to attend a TK program or stay in CSPP for an additional year. The Act in effect enabled these children to enroll in CSPP as early as 3 years before kindergarten. Children with fall birthdays were therefore more likely to attend at least 2 years of preschool before kindergarten: Indeed, the share of children enrolling in CSPP at age 3 rose from 8% before the Kindergarten Readiness Act to about 20% afterward.

## **The Local Control Funding Formula**

In the decade before LCFF, California consistently ranked among the lowest 15 states in per-pupil spending adjusted for cost of living. Enacted in 2013, LCFF raised funding levels and directed resources to districts in proportion to their enrollment of English learners, students from low-income backgrounds, and students in foster programs, with additional concentration grants for districts where these students make up a large share of enrollment. The reform also increased local control and reduced restrictions on how funds could be used. These investments have been sustained: Funding for K–12 public schools in the 2022–23 state budget was nearly triple the funding received in 2011. Because TK is funded through LCFF, the same formula that applies to elementary schools also shapes the resources available in TK classrooms.

# **Findings**

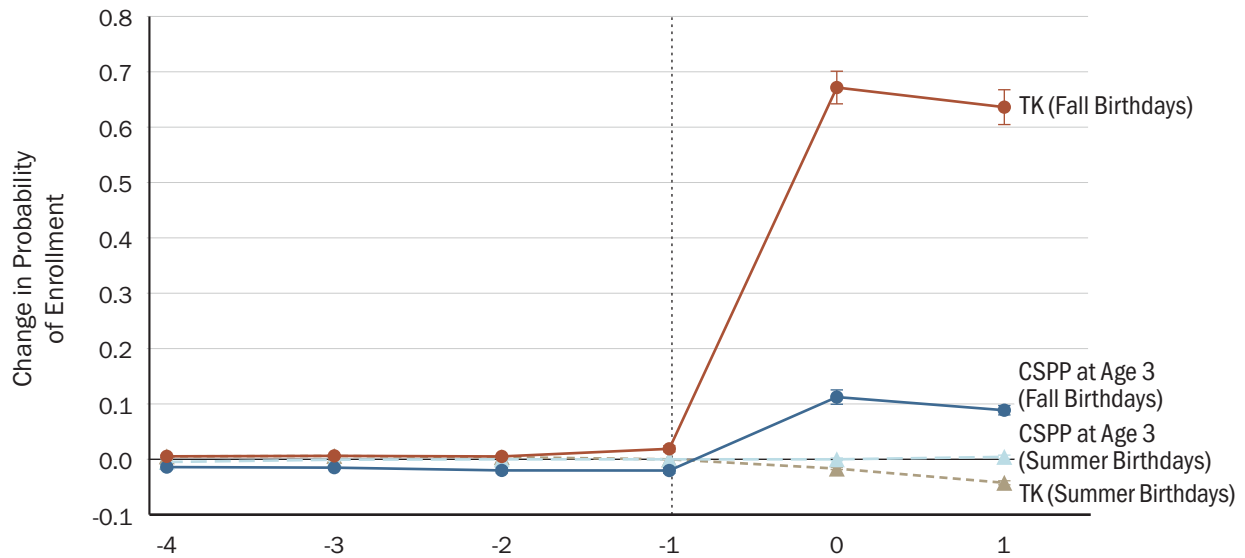
## **The Kindergarten Readiness Act Impact on 3rd- and 4th-Grade Achievement**

Our study finds that the Kindergarten Readiness Act had a large, positive effect on children's learning. To isolate this effect, this study compares children born in the 3 months after the September 1 cutoff (September, October, and November) with children born in the 3 months before the cutoff (June, July, and August) using a difference-in-differences event study design.

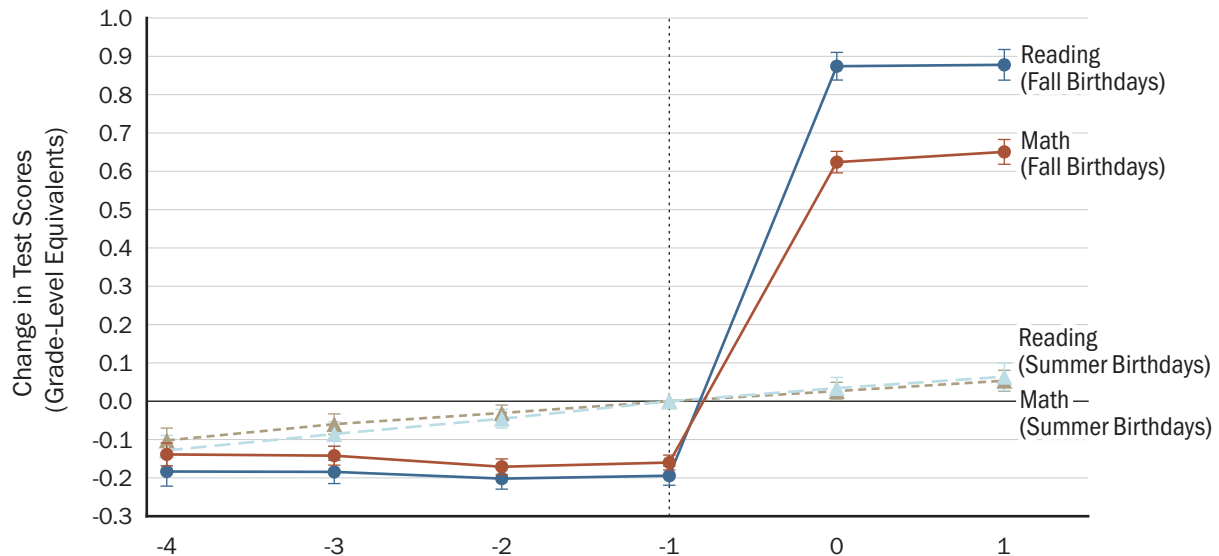
The results, shown in Panel A of [Figure 1](#), show a sharp jump at the point where eligibility changed following the Kindergarten Readiness Act. TK's introduction led to an average of 67% of age-eligible children enrolling in TK. The coincident shift in the timing of CSPP eligibility caused an 11-percentage-point increase in CSPP enrollment 2 years prior to kindergarten, about 2.5 times the pre-Act rate among TK-eligible children, with enrollment trends essentially flat in the cohorts before the policy.

## Figure 1. Effects of the Kindergarten Readiness Act on Enrollment and Achievement

Panel A: Enrollment — TK at Age 4 and CSPP at Age 3



Panel B: 3rd & 4th Grade Achievement — Math and Reading



Cohorts Before and After TK Eligibility Began (0 = First Affected Cohort)

Notes: TK = transitional kindergarten; CSPP = California State Preschool Program. Event study estimates are from a difference-in-differences design comparing children born in months that became eligible for TK following the Kindergarten Readiness Act (September, October, and November) with children born in the three prior months (June, July, and August), before and after the policy change. The analysis included cohorts that entered kindergarten in 2011 to 2014. “Cohort relative to treatment” centers each pair at the last cohort before eligibility changed (where -1 on the x-axis represents cohorts immediately preceding policy change born in the same months; -2 represents cohorts 2 years before policy change; 0 represents first affected cohort; and so on). Bars show 90% confidence intervals.

Source: Johnson, R. C., & Land, A. (2026). *Who benefits from public PreK expansions and increased K-5 spending? Dynamic complementarity in California’s education policies*. University of California, Berkeley; Getting Down to Facts, III.

The Kindergarten Readiness Act had enormous impacts on student achievement. Panel B of [Figure 1](#) shows that students affected by the Act exhibited about 11 months of additional learning in reading and about 8 months in math, relative to comparable children born in identical months in earlier cohorts, measured when these students were in 3rd and 4th grades. Across earlier cohorts, achievement among children in the affected birth months was flat, while achievement in the comparison months drifted modestly upward. Young-for-grade students affected by the Act were falling further behind before the policy took effect, and preexisting trends cannot account for the jump that follows.

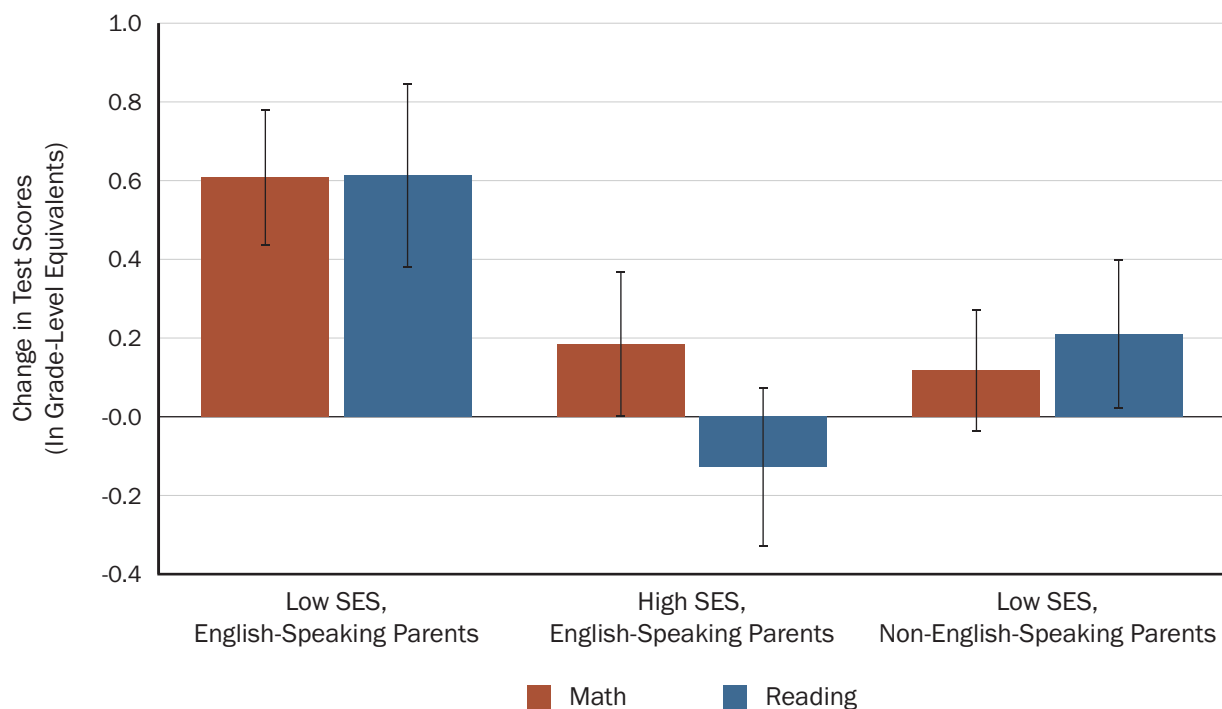
These event-study estimates captured the combined effect of the entire policy change. Children affected by the Kindergarten Readiness Act attended CSPP at age 3 at much higher rates, were eligible for TK at age 4, and entered kindergarten with more maturity. Isolating the independent contribution of TK—and understanding how earlier CSPP participation shapes TK’s effects—requires a within-cohort design that compares children born just a few weeks apart on either side of the TK eligibility cutoff. The sections that follow turn to that analysis.

## Unpacking the Benefits of Transitional Kindergarten

Take-up of TK was modestly higher among low-income families and families whose parents do not speak English. As [Figure 2](#) shows, the effects of TK were largest for children from low-income backgrounds whose parents spoke English. For these children, TK attendance led to about 7 months of additional learning in 3rd-grade math and reading, relative to similar children in the same school and kindergarten cohort who did not attend TK. By contrast, effects were smaller for children from more advantaged backgrounds (i.e., 3.6 months of additional learning in 4th-grade math and negligible in reading), perhaps because these families could already access private preschool before the introduction of TK. This distribution of benefits suggests that TK succeeded in reducing achievement gaps by family income.

Effects on 4th-grade achievement for children from low-income backgrounds whose parents did not speak English were more modest on average: about 0.15 grade levels in math and 0.2 in reading. Two features of the policy environment during these early TK years may have limited the program’s impacts. First, English-only instruction policies, in effect through 2016, restricted the bilingual supports that were available to multilingual children in TK and the early grades. Second, district English learner classification policies, which often limited access to mainstream curriculum, may have differentially affected multilingual TK students, who were assessed a year younger and therefore more likely to be designated English learners.<sup>1</sup>

**Figure 2. TK's Effects on 3rd-Grade Achievement, by Family Income and Home Language**



Notes: TK = transitional kindergarten; SES = socioeconomic status. This figure represents marginal effects of TK attendance (in grade-level equivalents) on 3rd-grade math and reading, by parental socioeconomic status and home language, from the regression discontinuity design. Bars show 90% confidence intervals. We excluded the group of high socioeconomic status, non-English families due to small sample size.

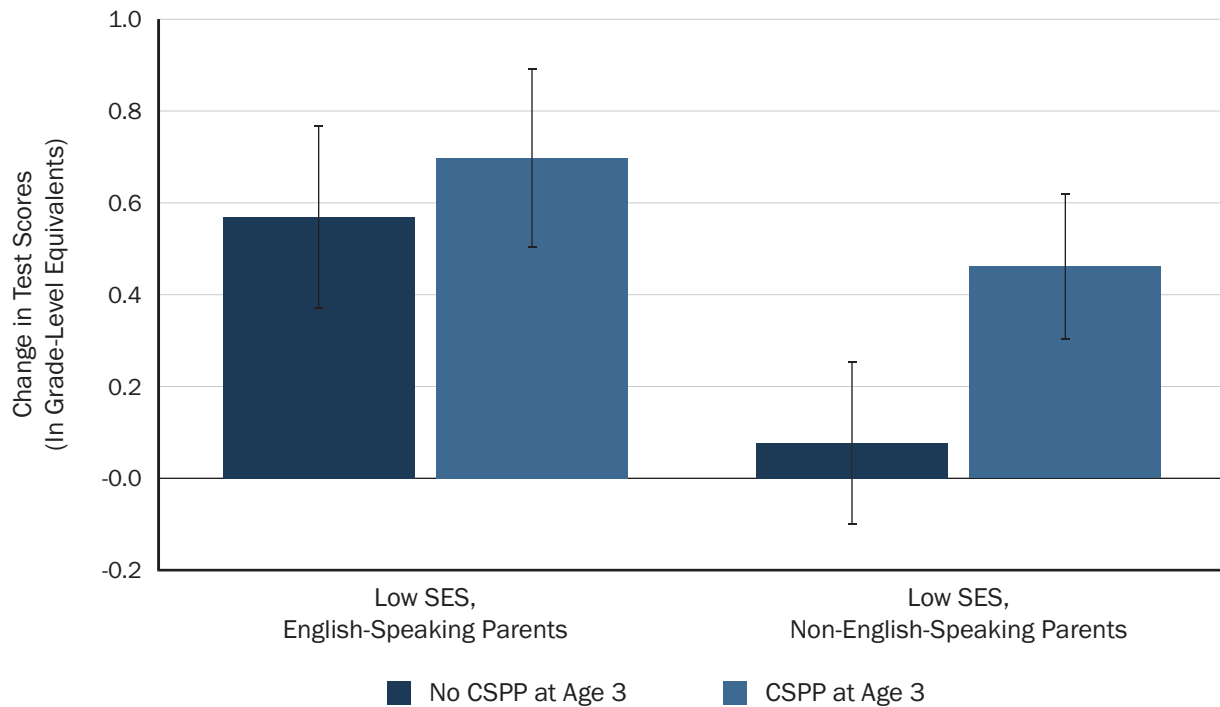
Source: Johnson, R. C., & Land, A. (2026). *Who benefits from public PreK expansions and increased K–5 spending? Dynamic complementarity in California’s education policies*. University of California, Berkeley; Getting Down to Facts, III.

## Preschool Before Transitional Kindergarten: The California State Preschool Program Difference

During the introduction of TK, roughly one in five TK attendees first attended CSPP as 3-year-olds. This study descriptively compared children who attended CSPP at age 3 prior to attending TK and children who did not.

TK’s effects were significantly larger for children who first attended CSPP at age 3. Among socioeconomically disadvantaged students, TK’s impacts on 3rd- and 4th-grade math and reading were roughly 0.2 grade levels higher for these early CSPP-goers. The pattern was most pronounced for multilingual children. As [Figure 3](#) illustrates for 4th-grade math, TK attendance produced only small effects for children from low-income, multilingual backgrounds who had not attended CSPP, but roughly half a year of learning gains among those who did. TK effects for these children were roughly 5 times larger in math and 3 times larger in reading when they attended CSPP first.

**Figure 3. TK's Impacts on 4th-Grade Math Achievement for Children From Low-Income Families, by Prior CSPP Enrollment at Age 3**



Notes: TK = transitional kindergarten; CSPP = California State Preschool Program; SES = socioeconomic status. This figure represents marginal effects of TK for students who were and were not enrolled in CSPP at age 3. Bars show 90% confidence intervals.

Source: Johnson, R. C., & Land, A. (2026). *Who benefits from public PreK expansions and increased K–5 spending? Dynamic complementarity in California’s education policies*. University of California, Berkeley; Getting Down to Facts, III.

Why would children who first attended CSPP benefit more from TK? It is important to acknowledge that families who navigate its enrollment process may differ in ways that independently predict stronger outcomes. Even so, the consistency of the pattern points to a potentially important finding: The preschool experiences that come before TK appear to amplify its benefits. Prior research has found that preschool effects increase with higher dosage. Children who attend 2 years of preschool tend to show larger learning gains than children who attend only 1 year, though the added benefit of the second year varies across studies and subjects.<sup>2</sup> Most of this evidence comes from children who attended the same program for both years, but CSPP and TK are structurally quite different programs. There could be several reasons that attending CSPP and TK had synergistic effects on later learning. For example, children who form secure relationships with early educators tend to build stronger relationships with later teachers and engage more in the classroom,<sup>3</sup> so a year of CSPP may help children benefit more from TK instruction. Early language exposure also supports future learning—especially for multilingual learners—and CSPP may have supported early language development. Since the CSPP workforce is also far more linguistically diverse than the TK workforce, this program may therefore provide cultural and linguistic alignment that eases the transition into a more academically focused, English-dominant TK classroom.<sup>4</sup>

To further understand the unique impact of CSPP, this study exploited contractor-level funding changes in 2011 to estimate the effects of CSPP spending. A \$1,000 increase in CSPP per-pupil spending over the 2-year eligibility period led to almost a quarter of a year of additional learning in math and reading 3 and 4 years after kindergarten, independent of TK attendance and later school spending. A key takeaway from these results is that the impacts of investments in school readiness are most successful when they address not only children's readiness for school, but also schools' readiness for children.

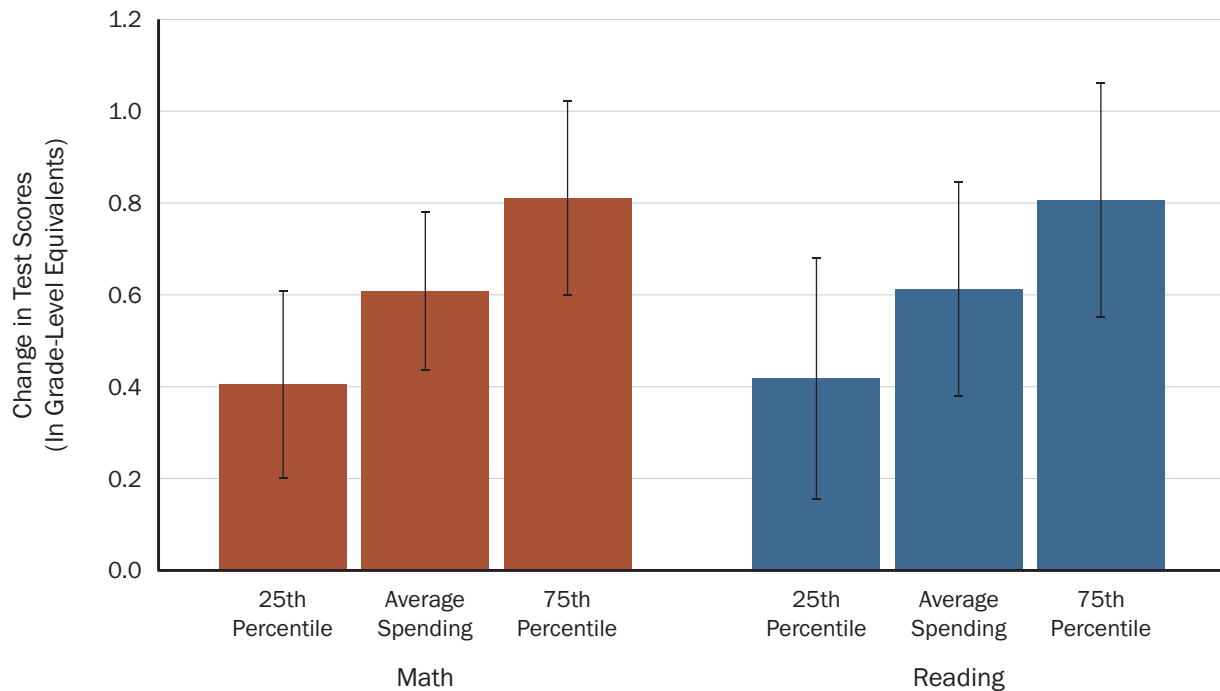
## **School Spending After Transitional Kindergarten: Dynamic Complementarity**

A long-standing hypothesis in the early education literature holds that the persistence of early learning gains depends on the quality of the learning environments children subsequently enter.<sup>5</sup> Because children who attended TK went on to elementary schools with widely varying levels of per-pupil spending—variation driven by the staggered rollout of California's Local Control Funding Formula—our study tested this hypothesis directly in a causal way. The results revealed strong evidence of dynamic complementarity, as reflected in the large magnitude and high statistical significance of the interactive effects of TK and per-pupil spending in the years after TK.

This study found that TK's effects were consistently and substantially larger in better-resourced schools. Specifically, a \$1,000 increase in elementary school spending sustained over 3 consecutive years produced between 0.8 and a full grade level of additional achievement in 3rd and 4th grades on average, consistent with prior LCFF findings.<sup>6</sup>

As [Figure 4](#) shows, for children from low-income backgrounds with English-speaking parents, TK attendance led to about a 0.6 grade level of improvement in 3rd-grade math and reading at schools with average per-pupil spending (about \$12,000). At schools at the 75th percentile of spending (about \$13,000), the same children gained roughly 0.8 grade levels—nearly 10 months of learning. At schools at the 25th percentile (about \$11,000), TK's effects were still consequential, but half the effect size as for similar children at the 75th percentile.

**Figure 4. TK's Impact on 3rd-Grade Test Scores at Varying Levels of Elementary School Spending, for Students With Low-Income, English-Speaking Parents**



Notes: TK = transitional kindergarten. This figure shows marginal effects of TK attendance on 3rd-grade math and reading for low-income children with English-speaking parents at the 25th percentile, average, and 75th percentile of elementary school per-pupil spending (grades 1–3). Bars show 90% confidence intervals.

Source: Johnson, R. C., & Land, A. (2026). *Who benefits from public PreK expansions and increased K–5 spending? Dynamic complementarity in California's education policies*. University of California, Berkeley; Getting Down to Facts, III.

The resources children encountered after TK also shaped how long the gains lasted. In well-resourced schools, TK-induced gains persisted into 4th grade, especially in math, with reading gains of more than 8 months still evident. In schools where LCFF-induced changes in spending were smallest, TK's effects remained positive but became statistically indistinguishable from zero by 4th grade.

In sum, the investments in TK and LCFF reinforced one another. TK and LCFF-induced spending exhibited positive, synergistic effects—the combined impact exceeded the sum of the parts. To put the magnitudes in context, the largest effects are comparable to the roughly 0.22 standard deviation gain from reducing class size by a third.

# Policy Considerations

The central lesson of this research is that the benefits of public preschool depend on both the early learning that preceded it and the school resources that follow. This has direct implications as California phases in universal TK for all 4-year-olds. Policy considerations include the following:

- **Continue to invest in TK.** This study shows that in its early years, TK had large, positive effects on children's elementary school achievement, particularly for children who are from socioeconomically disadvantaged backgrounds. This indicates that California's investments in universal TK for all 4-year-olds are on the right track.
- **Sustain investment in state preschool for 3-year-olds.** Because TK's effects for students from low-income families were consistently larger for children who had attended CSPP the year before—especially for multilingual learners—the expansion of TK appears most powerful when paired with access to preschool at age 3. Universal TK and a strong CSPP are complements, not substitutes.
- **Pair preschool expansion with adequate school funding.** TK gains were largest and most durable in well-resourced elementary schools. Maintaining the progressive funding that LCFF provides is essential to ensuring that early gains are sustained rather than lost.
- **Invest in supports for multilingual learners.** The smaller TK effects for children with non-English-speaking parents—and the much larger effects when CSPP came first—point to the potential importance of targeted supports for children whose first language is not English. Research suggests that culturally and linguistically aligned instruction, alongside developmentally appropriate assessment and reclassification policies, could benefit multilingual learners.
- **Design early learning sequences in which successive programs build on one another.** TK appeared more beneficial for children who had attended CSPP the prior year, perhaps because the two programs are structurally complementary. The CSPP model supports a developmental foundation that may support learning in TK classrooms.

Taken together, these implications point toward a coherent strategy: Invest in early childhood programs and treat early childhood and K–12 as a connected pipeline rather than separate systems. California's historic commitments to universal TK and expanded preschool create an opportunity to put that strategy into practice, provided that districts receive the support they need to implement TK well and that preschool access and equitable school funding are sustained alongside it.

# Endnotes

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