

# Early Childhood Education: Lessons from Tulsa

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# DOES PRE-K BOOST SCHOOL READINESS? (2005)

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Perry Preschool Study (Schweinhart et al., 2005)

Abecedarian Project (Campbell & Ramey, 1995)

Chicago Child Parent Centers (Reynolds et al., 2002)

Georgia's Universal Pre-K Program (Henry et al., 2003)

Oklahoma's Universal Pre-K Program (Gormley & Gayer, 2005)



# Oklahoma Pre-K

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- Oklahoma established UPK in 1998
- Funded through school aid formula
- Public schools are primary service providers, but other providers may establish partnerships with public schools
- Every lead teacher must have B.A. and must be early childhood certified
- Pay comparable to K-12 teacher pay

# Georgetown University's TULSA Oklahoma Research

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Fall 2001: Cognitive Test Data

Fall 2003: Cognitive Test Data + Parent Survey

Fall 2006: Cognitive Test Data (English/Spanish) +  
Parent Survey + Classroom Visits + Socio-emotional  
Assessments

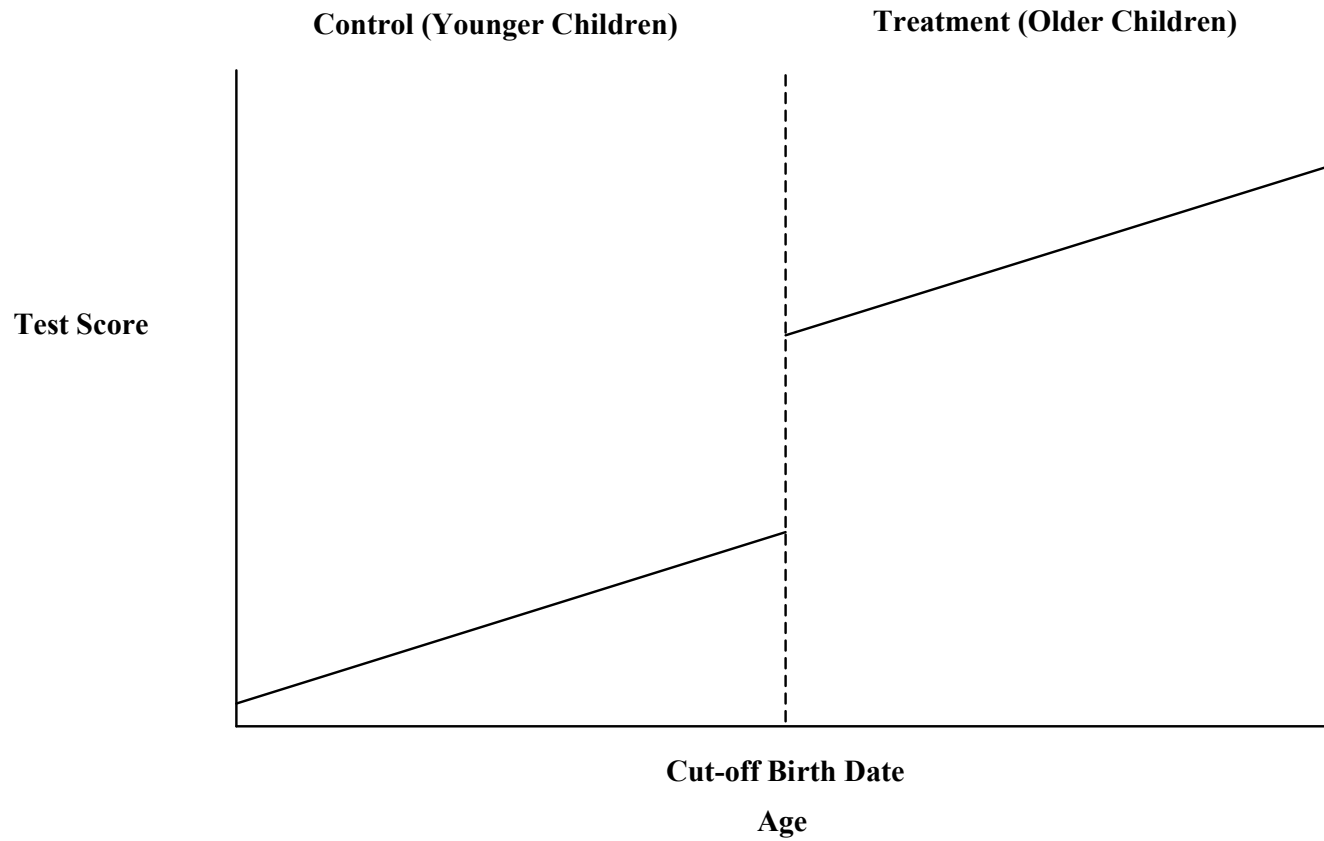


# Research Design

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- Regression Discontinuity Strategy to minimize selection bias
- Possible if September 1 eligibility date is strictly enforced
- Necessary to test alumni (5 year olds) and entrants (4 year olds) at same point in time using same test
- Important to determine whether observables balance on both sides of cutoff point

# Regression Discontinuity Design with Effective Treatment



# Testing

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- Woodcock Johnson Achievement Subtests: Letter-Word ID (pre-reading); Spelling (pre-writing); Applied Problems (pre-math)
- Tests administered to incoming kindergarten, pre-K, and Head Start students
- Tests administered August 2006, just before classes begin
- Tests administered by new teacher, trained by Georgetown University



# Sample Sizes

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- TPS Pre-K Entrants: 1492
- TPS Pre-K Alumni: 1264

# Snapshot of Tulsa Pre-K, 2005-06

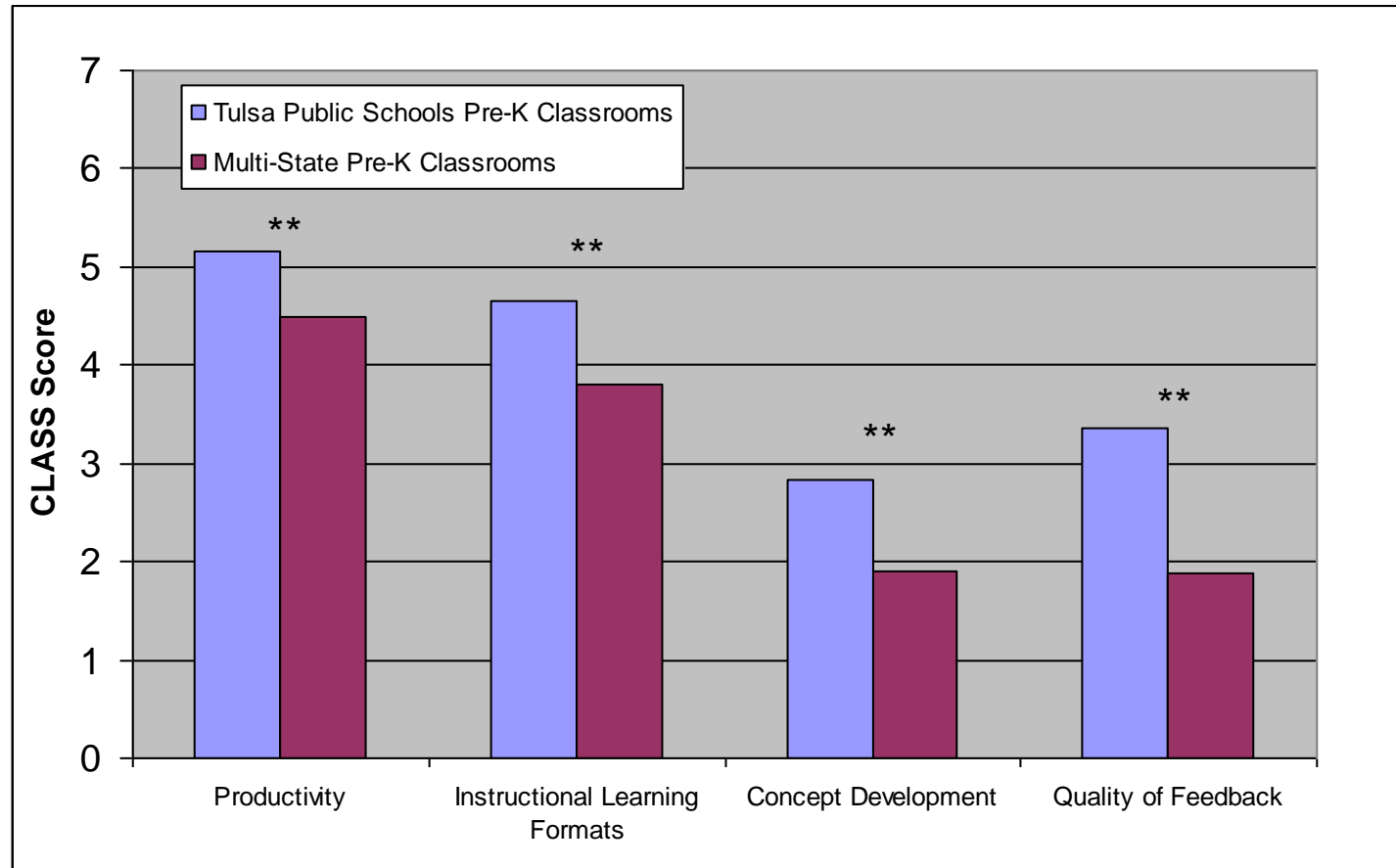
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- 40 % of eligible students enrolled in pre-K and 11 % in Head Start
- 74 % of pre-K entrants received free or reduced price lunch
- Pre-K entrants: 34 % white, 33 % black, 21 % Hispanic, 11 % Native American, 1 % Asian American

# A Worm's Eye View of Tulsa Pre-K in 2005-06

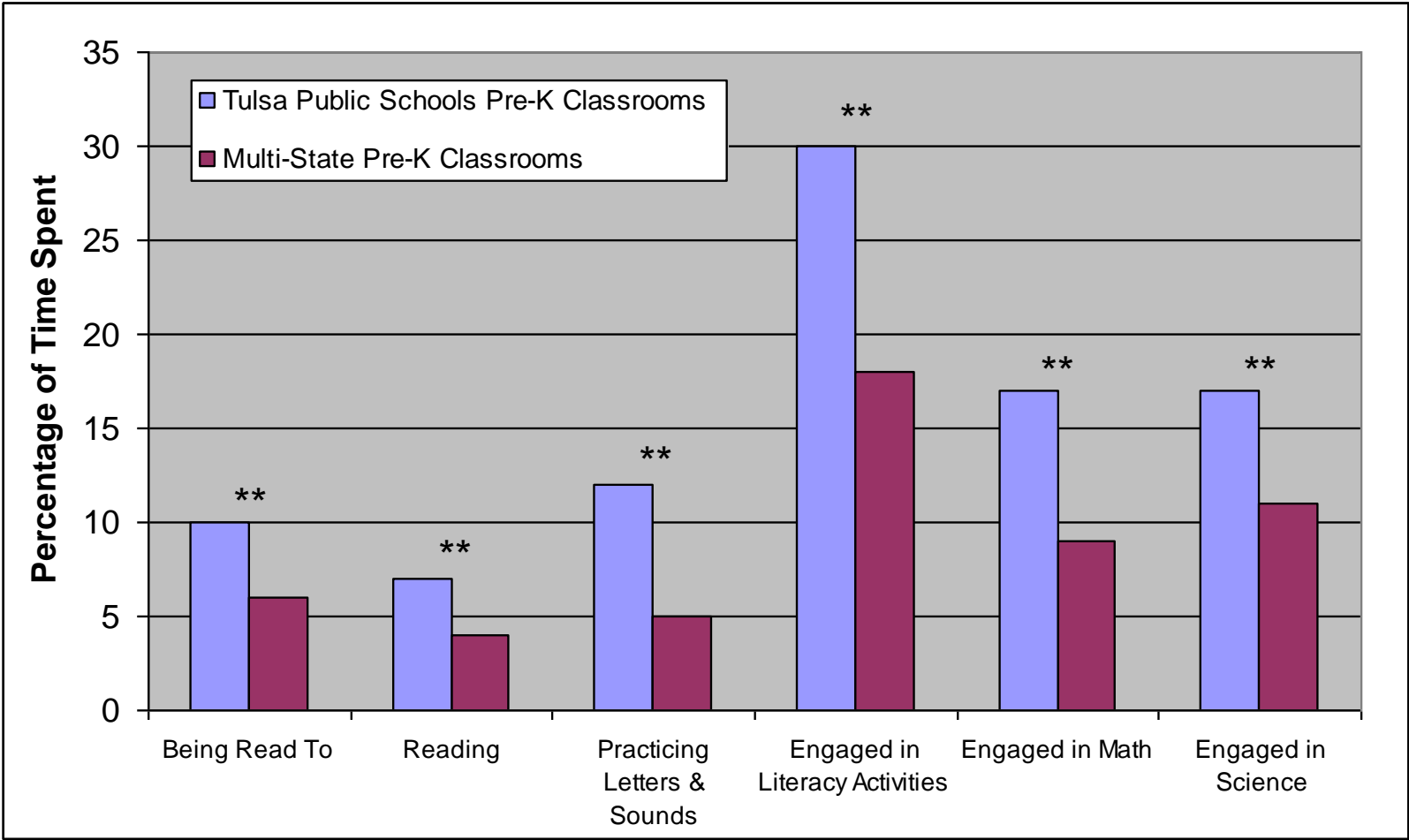


# Tulsa Pre-K Classrooms Score Higher on CLASS than Other Pre-K Classrooms



Mean Classroom Assessment Scoring System (CLASS) scores for Tulsa Public Schools pre-K classrooms ( $n = 71$ ) and multi-state school-based pre-K classrooms ( $n = 241$ ). † $p < .10$ . \* $p < .05$ . \*\* $p < .01$ .

# Tulsa Pre-K Spends More Time on Academics

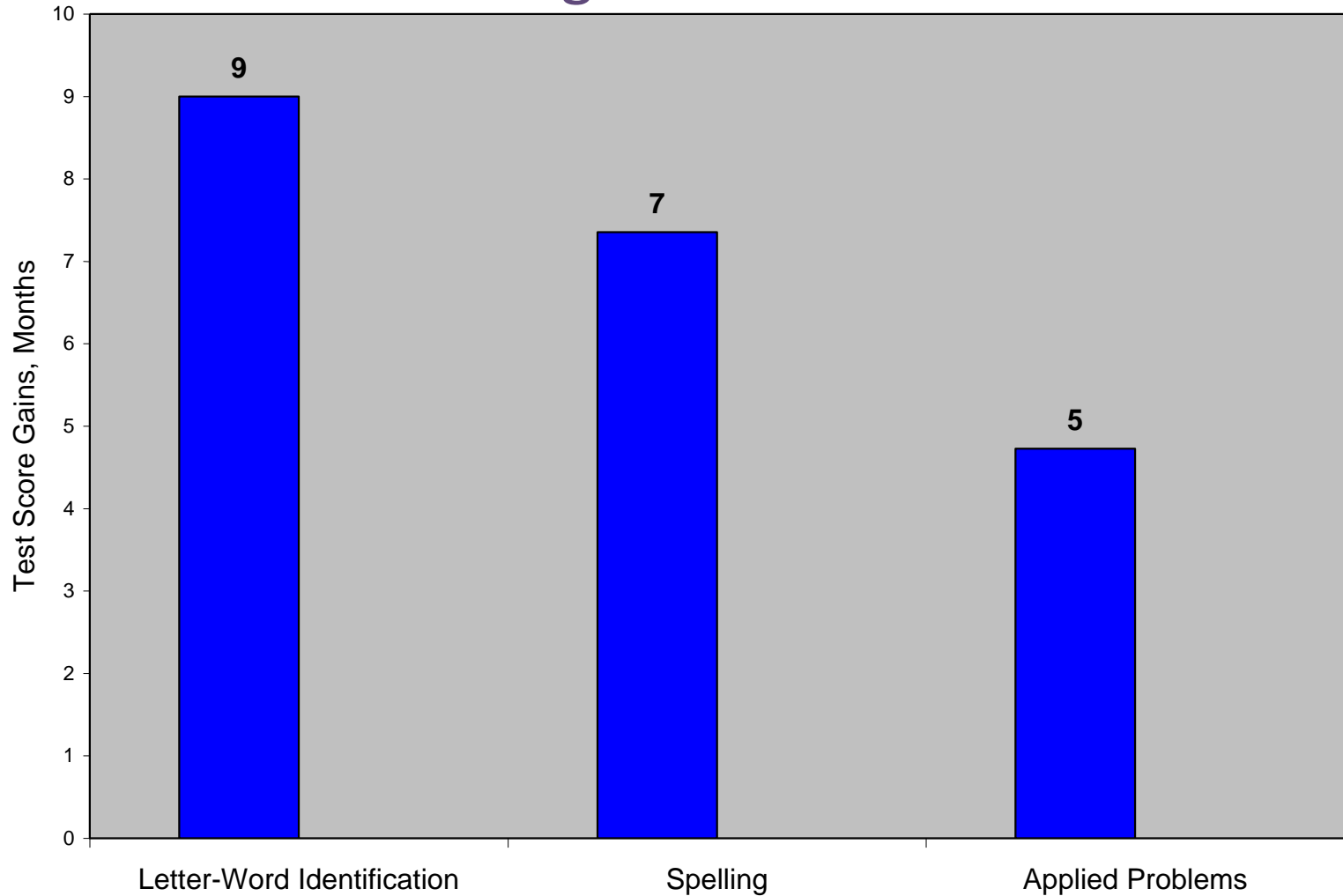


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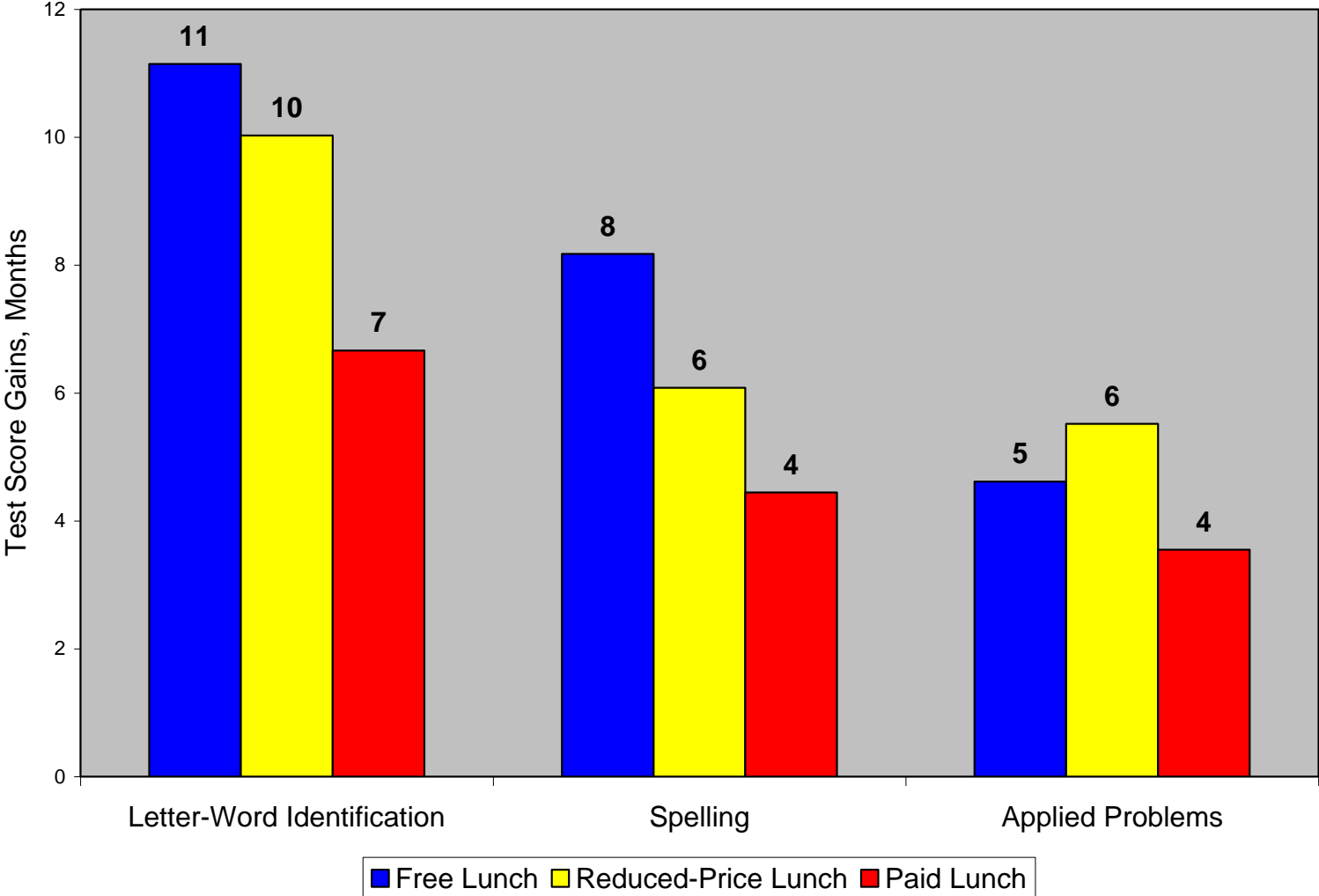
# Effects of Tulsa Pre-K at the Beginning of Kindergarten in Fall 2006

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# Children in Tulsa Pre-K are Months Ahead of Peers, on Cognitive Skills



# Children who Attended Tulsa Pre-K & Received FRL are Months Ahead of Peers





# Key Findings on School Readiness, Tulsa

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- The TPS Pre-K program improves school readiness
- Disadvantaged students receive bigger boost but all students benefit
- The TPS pre-K program is above average in instructional quality

# Longer Term Effects?

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- Fadeout - Short term differences between treatment group and control group children diminish or disappear over time
- Persistence - Differences between treatment group and control group children remain discernible several years after the intervention

# Two Possibilities

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**FADE-OUT** – Short term impacts disappear over time

**FADE-OUT PLUS PERSISTENCE** – Short-term impacts diminish but do not disappear over time

# Fragile Scaffolding



# Durable Scaffolding



# Results of Tulsa Pre-K in Kindergarten & 3<sup>rd</sup> Grade, Spring 2010

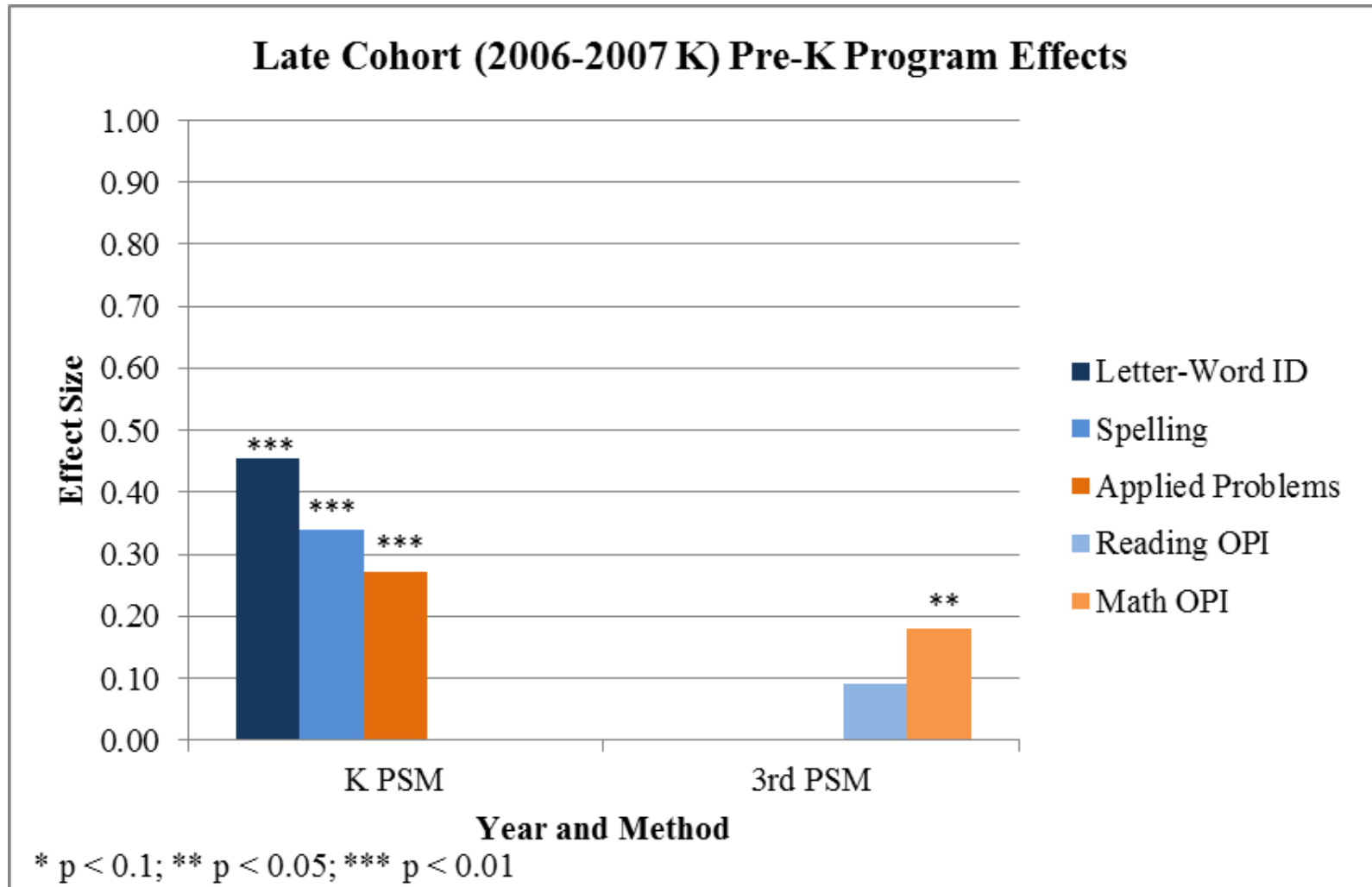
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# Propensity Score Matching

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- Goal: identify comparison group children in the control group who are most similar to treatment group children.
- Use boosted regression to obtain propensity scores
- Construct matches using propensity scores: we use nearest neighbor one-to-one matching, with replacement
- Using matched samples, estimate regression (with covariates) to obtain treatment effect

# Children Enrolled in Tulsa's Pre-K Program in 2006 Perform Better on Kindergarten Cognitive Scores & 3<sup>rd</sup> Grade Test Scores





# DO PRE-K PROGRAM IMPACTS PERSIST OVER TIME? (2015)

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Meta-Analysis (Duncan & Magnuson, 2013)

Meta-Analysis (Kay & Pennucci, 2014)

Head Start Impact Study (ACF, 2012)

Tennessee Voluntary Pre-K Program (Lipsey et al., 2013)

New Jersey Abbott School Program (Barnett et al., 2013)

Oklahoma Universal Pre-K Program (Hill et al., 2015)

# NEW FOCUS: EFFECTS ON 7th GRADE SCHOOL OUTCOMES

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Cohort – kindergarten students in Tulsa Public Schools, 2006-07

- 7<sup>th</sup> & 6th graders combined
- Students in TPS and three surrounding districts
- State data for Oklahoma standardized test scores
- A wide range of outcomes: letter grades, standardized test scores, honors courses, gifted student, special education student, grade retention, absenteeism, retention

# CONTROL VARIABLES

## Categorized By Data Source

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**Administrative Data** (enrollments, gender, race/ethnicity, school lunch eligibility, academic success, overage at Kindergarten entry (redshirting), school site, district, etc.)

**Parent Surveys** (mother's education, presence of biological father at home, Internet access at home, etc.)

**Census Bureau Data** (neighborhood median income)

# SUMMARY OF FINAL SAMPLE

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Approximately 58% of original sample from 2006 (identified in 2014)

- Original sample and analytic sample have similar gender and school lunch eligibility percentages; differences in race/ethnicity

Approximately 75% of original sample for state test score data

# ESTIMATION

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## Propensity score weighting

- Goal: identify comparison group members most similar to treatment group members
- Use boosted regression to obtain propensity scores
- Using propensity scores, construct analytic weights to estimate ATT
- Estimate weighted regression (with covariates) to obtain treatment effect

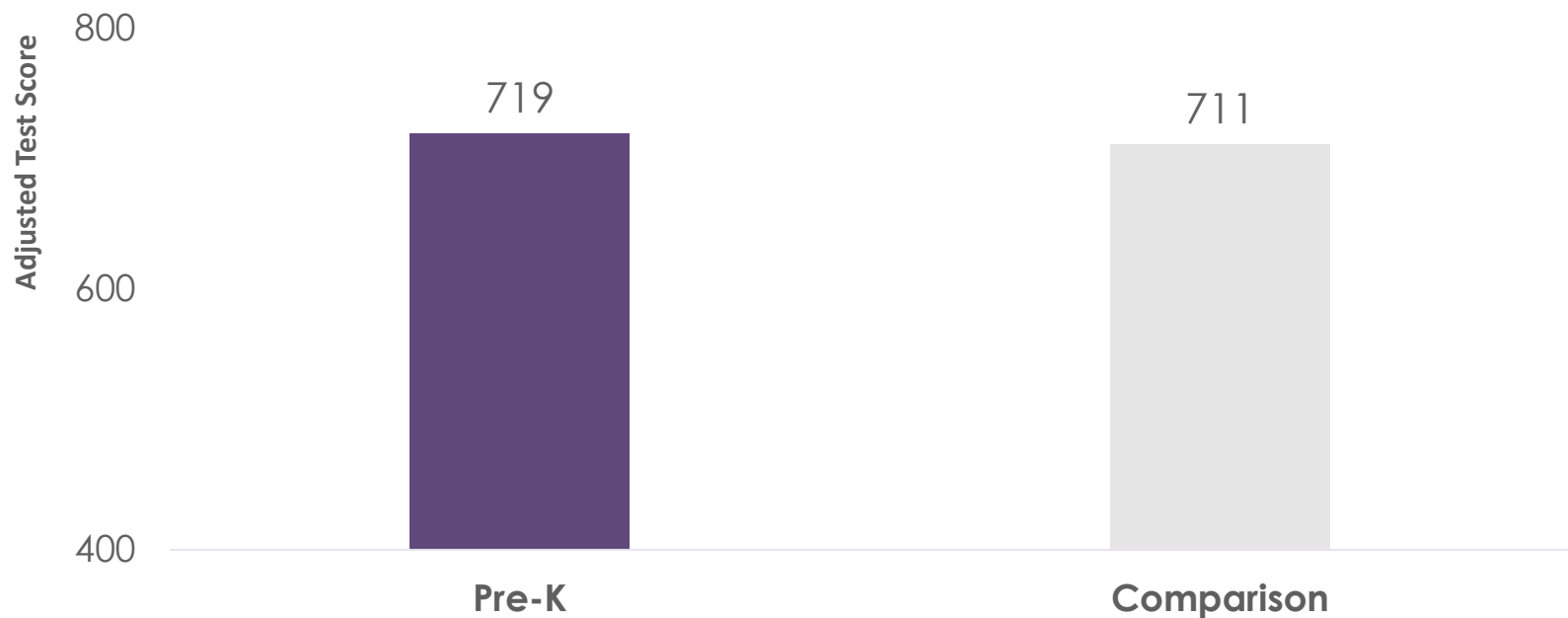
Missing data (parent survey) with 40 imputed datasets

# Pre-K Results, 7<sup>th</sup> Grade (Spring, 2014)

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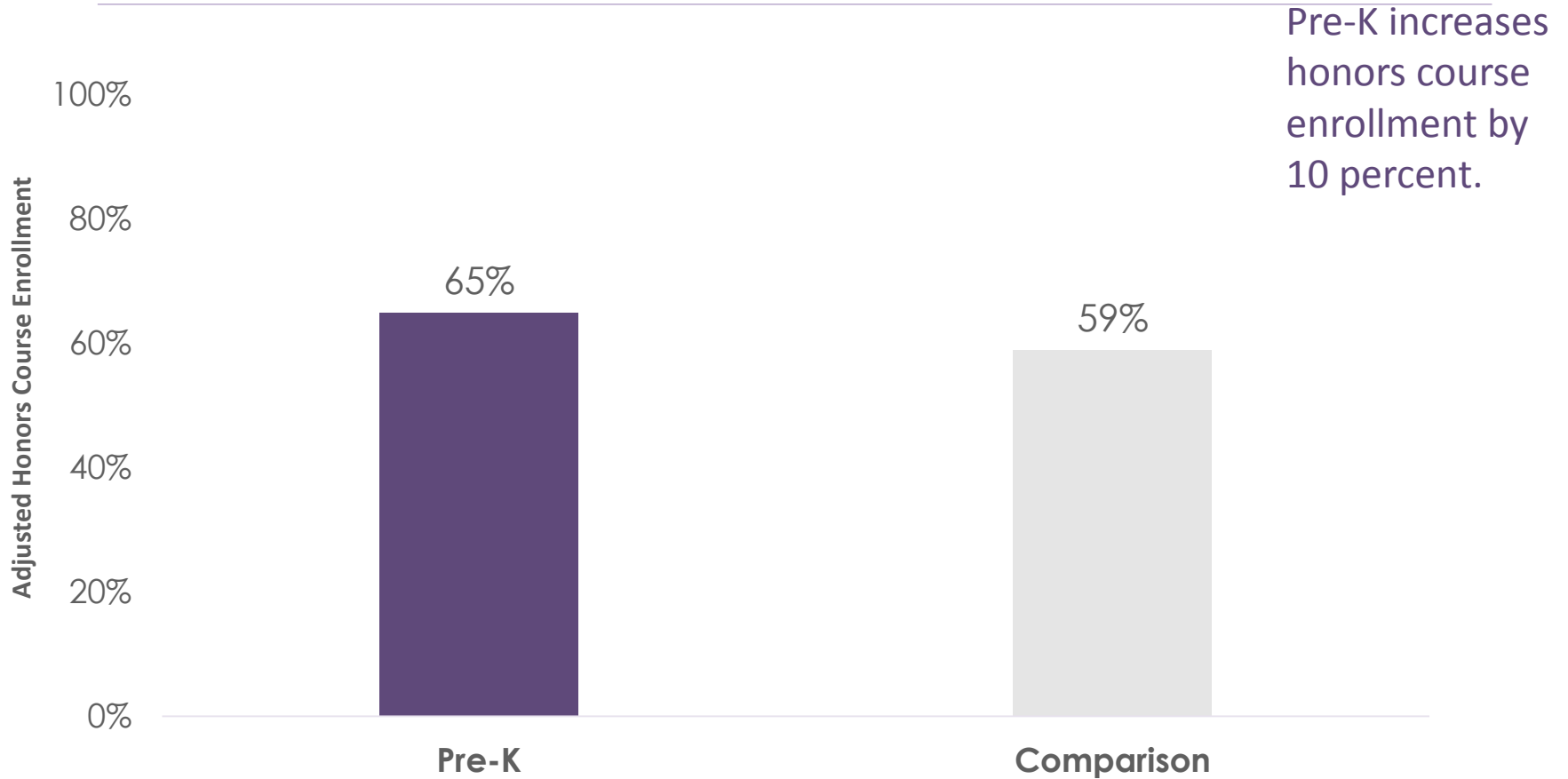
# Standardized Math Test Results

For students as a whole, we see a modest statistically significant positive relationship between pre-K enrollment and standardized math test scores, for the equivalent **effect size** of **0.10**.



# Honors Courses

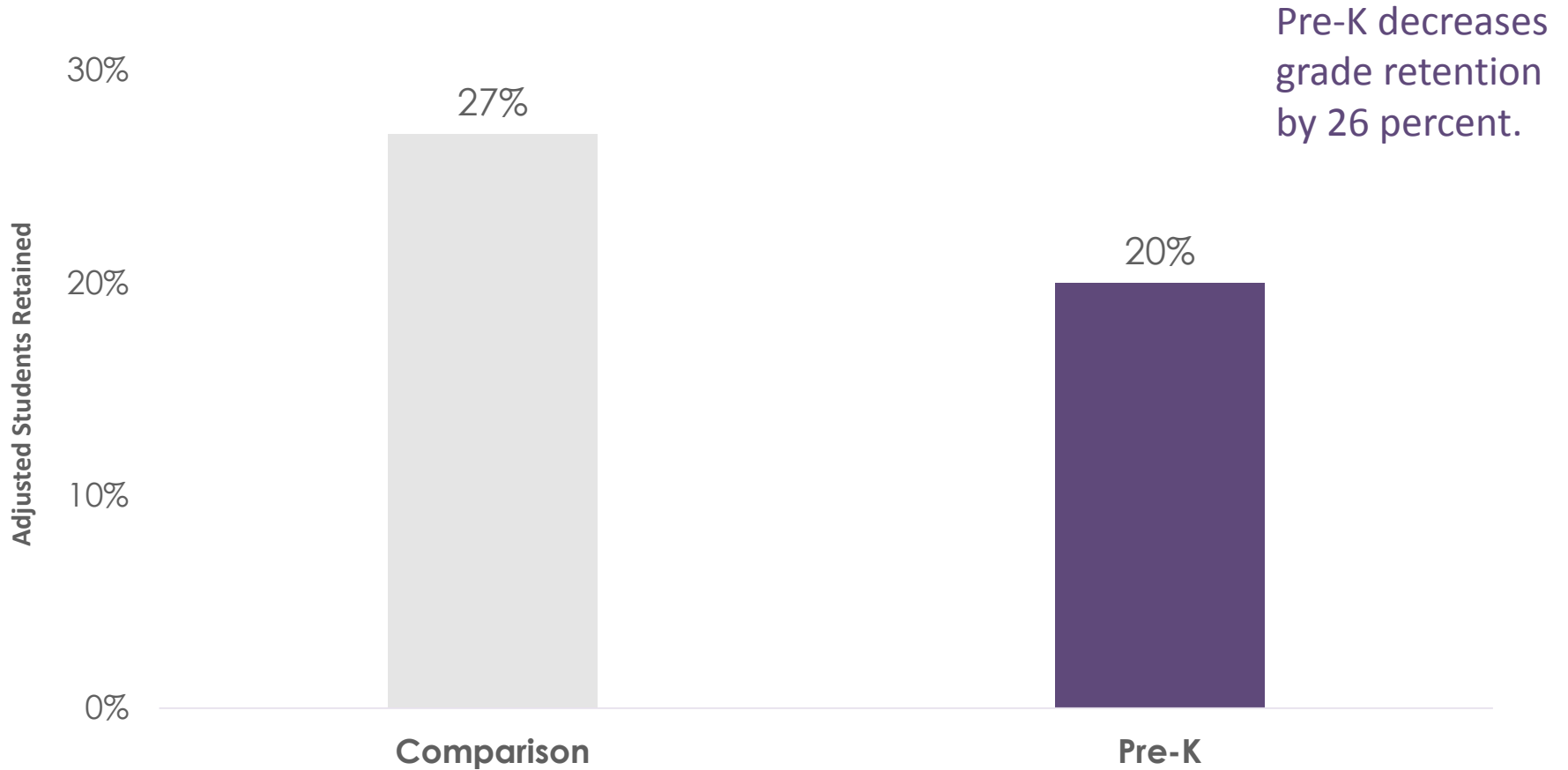
We also see a statistically significant positive relationship between pre-K enrollment and enrollment in an honors course eight years later.





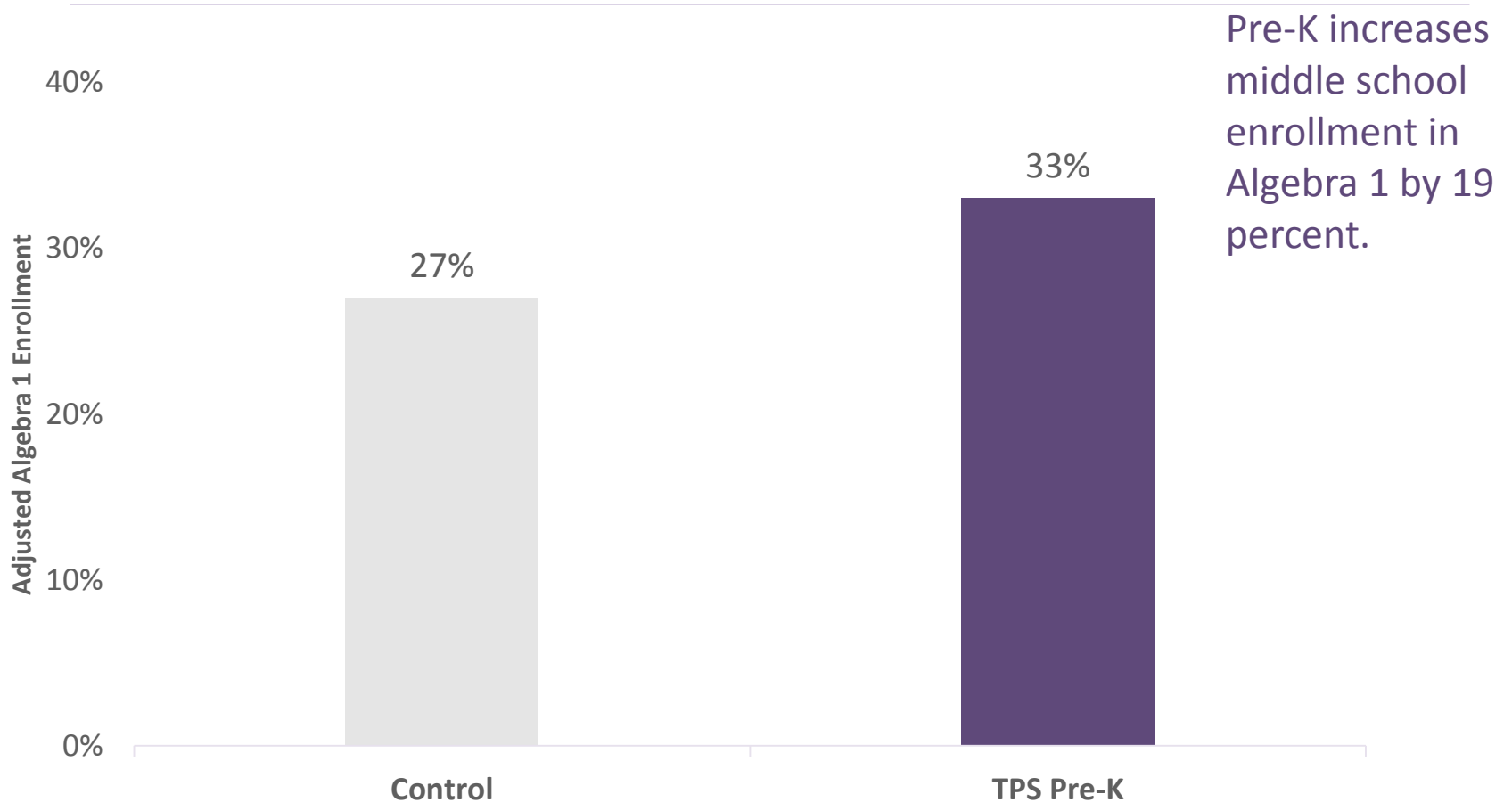
# Grade Retention

Pre-K is associated with a 7 percentage point reduction in grade retention.



# Enrollment in Algebra 1 in middle school

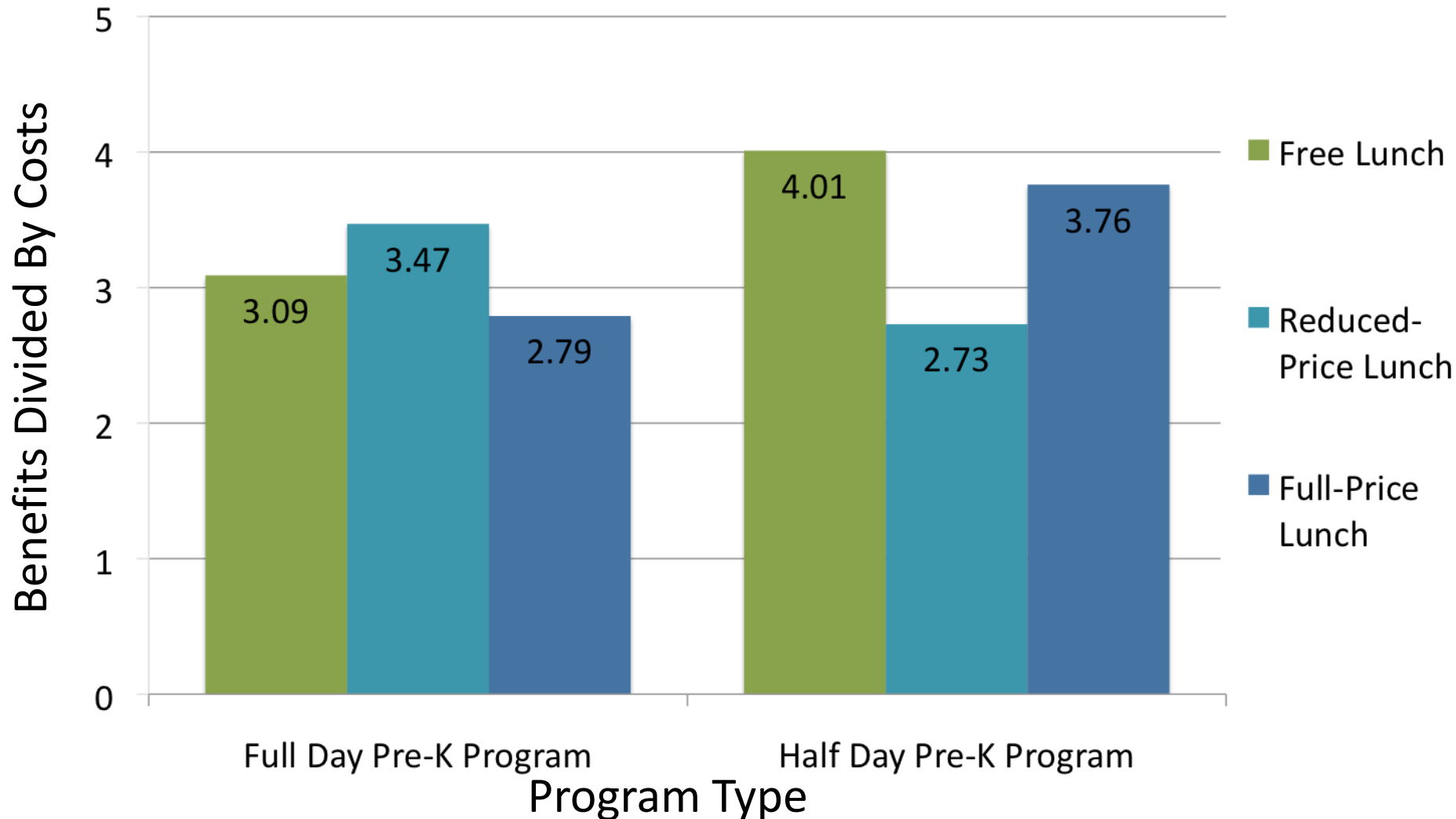
Pre-K is associated with a 6 percentage point increase in middle school enrollment in Algebra 1.



DO THE BENEFITS  
EXCEED THE  
COSTS?

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# Ratio of Expected Adult Earnings to Costs, Tulsa Pre-K Program



Source: Bartik, Gormley, & Adelstein, 2012

# Benefit-Cost Analysis of Tulsa Pre-K Program Based on Grade Retention and Crime Effects

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	<b>B/C Ratio</b>
Overall	1.89
Free Lunch	1.73
Reduced Lunch	3.10
Paid Lunch	1.15

**Source:** Bartik, Gormley, Belford & Anderson, 2016

# HOW DOES PRE-K PARTICIPATION INFLUENCE HIGH SCHOOL OUTCOMES?

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Magnet Schools (more likely to apply to/attend magnet schools)

Stability (more likely to remain within Tulsa Public Schools)

Peer Effects

# Factors that Promote Persistent Pre-K Effects

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Pre-K Program Quality

Pre-K Program Maturity + Penetration Rate

Magnet School Enrollment

# CONCLUSIONS

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The strong positive effects of the Tulsa pre-K program on academic success diminish over time but do not disappear

Math effects are more durable, reading effects are more fragile

Grade retention effects are substantial and extend to all key subgroups

Both disadvantaged and middle class students experience longer term benefits from pre-K



# TO LEARN MORE:

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CROCUS website:

<http://www.crocus.Georgetown.edu>