Closer to Home: More Equitable Pre-K Access and Enrollment in Chicago

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Abstract

As pre-kindergarten (pre-k) expands across the country, school districts are making choices about where to place pre-k classrooms and developing policies for how families can apply and which children are enrolled. In doing so, districts are pulling policy levers that influence students' access to pre-k. Research shows that some families have less access to pre-k than others, which contributes to inequitable enrollment within districts. This descriptive study explores whether and how Chicago's school-based pre-k system was more equitable after the district implemented a set of policies focused on changing access to and enrollment in school-based pre-k. Specifically, we compare patterns of enrollment and geographic access (i.e., distance from home to a school with pre-k and number of pre-k classrooms nearby), and use multilevel logistic regression analyses to examine how access was related to enrollment for different student groups before and after the policy changes. Results show that both access to, and enrollment in, full-day pre-k expanded substantially among Black students, lowest-income students, and students living in mostly-Black neighborhoods, even as overall school-based pre-k enrollment remained relatively constant. There was a modest association between access to and enrollment in full-day pre-k (but not any pre-k), and this relationship became stronger following the policy changes, especially for high-priority student groups. Findings demonstrate that the geographic distribution of school-based pre-k (particularly full-day) may be an important policy lever for addressing inequities in student access and enrollment in Chicago, and have implications for other school districts implementing similar efforts nationwide.

Table of Contents

Acknowledgements

Introduction

Pre-kindergarten (pre-k) enrollment has risen steadily in the United States in recent decades, largely driven by the mounting body of research evidence on the effectiveness of early childhood education, especially for students of color, students speaking a language other than English, and students from low-income families.[1] However, those same students, who are most at-risk for ongoing academic struggles and the most likely to benefit from high-quality early educational experiences, are least likely to have access to high-quality pre-k options.[2] This study explores whether Chicago helped to create more equity within the district's early education system by increasing access to pre-k for those students.

Over the last decade, many public school districts across the country have dramatically expanded their pre-k programs for four-year-old children.[3] In particular, full-day pre-k options have been expanding, supported by evidence that full-day pre-k provides greater opportunities for learning and development, especially among low-income, linguistically diverse, and racial/ethnic minority students.[4] As part of these expansion efforts, school districts everywhere have had to make choices about where to place pre-k classrooms and have developed policies regarding how families apply to those programs and who gets to enroll. In doing so, districts are (intentionally or unintentionally) pulling policy levers that change students' *access* to pre-k. Existing research evidence shows that differential access is an important contributing factor to inequities in enrollment,[5] and so we hypothesize that improvements in access may play a key role in the success of these policies by helping to increase enrollment rates among students who traditionally have benefitted the most from pre-k.

In Chicago—the focus of the current study—major policy efforts have been underway that were *intended to create more equitable access* to school-based pre-k programs, including through the expansion of full-day pre-k classrooms. Beginning in 2013, the City of Chicago launched major policy efforts intended to enroll more high-priority students who were those most likely to benefit from pre-k (students of color, students speaking a language other than English, and students living in neighborhoods with lower income and higher unemployment). Some of these policies were specifically aimed at school-based pre-k in Chicago Public Schools (CPS) in the years we studied—such as a centralized application process—while

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[1] Weiland & Yoshikawa (2013); Phillips (2017).

[2] Bassok (2012); Bassok & Galdo (2016); Fuller & Liang (1996).

[3] See Barnett, Hustedt, Robin, & Schulman (2003) and Friedman-Krauss, Barnett, Garver, Hodges, Weisenfeld, & DiCrecchio (2019) for enrollment of four-year-olds in publicly funded pre-k, many of which are offered through school districts.

[4] Atteberry, Bassok, & Wong (2019); Loeb, Bridges, Bassok, Fuller, & Rumberger (2007); Reynolds et al. (2014); Robin, Frede, & Barnett (2007).

[5] Burgess, Chien, Morrissey, & Swenson (2014); Dupéré, Leventhal, Crosnoe, & Dion (2010); Hastings, Van Weelden, & Weinstein (2007); McCoy, Connors, Morris Yoshikawa, & Friedman-Krauss (2015); Nores & Barnett (2014); West (2006).

others were city-wide. Chicago's main pre-k policy strategies included reallocating pre-k classrooms to neighborhoods with a history of under-enrollment in pre-k, increasing the number of full-day pre-k options in neighborhoods identified to have the greatest needs for full-day pre-k services, and centralizing the management of the pre-k application and enrollment process within CPS. Districts across the country, including New York City, Baltimore, Boston, Philadelphia, and Detroit, have taken many different approaches to increasing pre-k access for children with the most potential to benefit from it, but to date very few of these policies have been rigorously examined.

In this study, we aim to contribute to this important body of policy-relevant evidence. We examine the policy changes in Chicago that were hypothesized to result in higher enrollment among student groups identified as most likely to benefit from pre-k but who had historically low enrollment rates and lower school readiness. The expected increases in pre-k enrollment among these high-priority student groups were then anticipated to result in more comparable learning outcomes for students over time.

This report is divided into seven chapters. In **Chapter 1**, we provide background about pre-k in Chicago and describe the policies that were implemented regarding pre-k access and enrollment beginning in 2013–14 and compare them to prior policies, including information about who was more and less likely to enroll in CPS pre-k before and after those policy changes. This context sets us up to answer our key research questions, focused on examining "access" by looking at the availability of any school-based pre-k classrooms—and full-day classrooms—near the homes of potential four-year-old applicants. We explore questions that existing research has not yet fully addressed, including:

- If and how access to school-based pre-k was related to enrollment patterns for different student groups in CPS;
- Whether access changed in the three years after Chicago implemented a set of early childhood education (ECE) access reforms (2013–14 through 2015–16) compared to the three years prior to the policy shift (2010–11 through 2012–13); and
- Whether enrollment changed in corresponding ways to changes in access. Importantly, we first must understand whether access is a *potential* lever for changing enrollment patterns in Chicago.

We explore these questions by examining whether access is associated with a student's likelihood of enrolling. If access and enrollment are indeed related, we then examine whether access *changed* pre- to post-policy—overall and for individual student groups. If patterns of access *did not* change, we cannot assess whether changes in access are related to changes in enrollment over this period. In cases where access *did* change, we can then explore if enrollment patterns changed in corresponding ways. **Chapter 2** details our methods for addressing these questions, and results are presented in **Chapters 3–6**. In **Chapter 7**, we review key takeaways and discuss the implications of this work for Chicago and other cities and districts seeking to refine their pre-k application and enrollment strategies to ensure greater equity.

1. Pre-K Enrollment in CPS and New Policies Implemented in 2013–14

In this chapter, we present a short description of why this study focuses on school-based pre-k in CPS. We then present information regarding pre-k enrollment patterns before and after a set of policy changes that were introduced in 2013–14 and summarize those policy changes as they were described to us in key informant interviews.

Studying Enrollment in School-Based Pre-K in Chicago

This study focuses on pre-k access and enrollment in CPS (or *school-based*) pre-k. In Chicago, there are also publicly-funded programs for preschool-aged[6] children in community-based organizations (CBOs), which we do not focus on in this report[7], as well as families who select to enroll in private pre-k programs or not to enroll in any type of pre-k program. Families throughout the city, from across the income range, have true choice about if and where to apply to school-based pre-k. In this study, we focus on the proportion of students who enrolled in CPS for pre-k, which represents a substantial and important part of the city's preschool options—serving roughly one-half of the almost 40,000 four-year-olds in Chicago.[8]

This study focuses on school-based pre-k for two reasons. First, some research evidence suggests that pre-k in school settings may be of higher quality than other pre-k programs,[9] and thus understanding enrollment patterns in high-quality pre-k is of interest to the City of Chicago and CPS. Second, some of the policy changes that were implemented for the 2013–14 school year (such as a centralized application system, described below) were first implemented with school-based pre-k before being rolled out more widely to include other publicly funded, city-wide preschool programs. By focusing on school-based pre-k, we therefore study the changes that reflected the districts' first few years of policy implementation.

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[6] We use the term "preschool" as an umbrella term for all formalized early education programs available to three- to five-year-old children prior to kindergarten. When preschool is offered within a school setting, we use the more specific term "pre-k" most commonly used by districts.

[7] In Chicago, funding streams for preschool programming cross over these two settings. For example, Head Start, a federally-funded program, is available in both CBOs and schools (in 2015–16, 6,278 Head Start four-year-olds were enrolled in CBOs while 5,119 were enrolled in schools). Similarly, Illinois's state-funded pre-k (Preschool for All) is available in both schools and CBOs. We do not study enrollment in CBOs in this report, due to lack of data available at the time of this publication.

[8] Within CPS school-based pre-k, there are multiple types of pre-k programs: Head Start-funded, Preschool for All-funded (state-based pre-k), Child-Parent Centers (CPC; dual generation family-centered programs in high needs communities), and tuition-based programs, for which families pay full tuition for full-day pre-k programming. There are also a small number of Montessori pre-k classrooms, but they are not under the purview of CPS's Office of Early Childhood Education and are not included in this study. Funding streams are relevant for understanding the changes in pre-k access for families over time. In the early years of our study, most school-based full-day pre-k programs offered were tuition-based and thus only available to families who could afford them. In later years of our study, other sources of public funding (in particular the federal Preschool Development Grant-Expansion) allowed full-day pre-k to be extended to families who did not have the means to pay for a full-day program, enabling potential changes in who might opt to enroll in school-based pre-k.

[9] Bassok, Fitzpatrick, Greenberg, & Loeb (2016); Weiland & Yoshikawa (2013); Winsler, Tran, Hartman, Madigan, Manfra, & Bleiker (2008).

School-Based Pre-K Enrollment Patterns in Chicago from 2010–11 through 2012–13

In the early years of our study (2010–11 through 2012–13), students' likelihood of enrolling in school-based pre-k differed depending on their background characteristics and the neighborhoods in which they lived.

Enrollment in any school-based pre-k (pre-policy shift)

The rate of enrollment into any school-based pre-k was lowest among Black students, lowest-income students, and students in neighborhoods with high concentrations of Black residents, compared to other student groups.[10] As seen in **Figure 1-A**, between 2011–12 and 2013–14, 55 and 50 percent of Latinx and White CPS students, respectively, enrolled in school-based pre-k the year before kindergarten. [11,12] English Learners (ELs) made up the group that was most likely to enroll in CPS for pre-k, at 58 percent. This is in comparison to 47 percent of Black students during the same time period. Similar patterns emerged when comparing lowest- vs. highest-income students and the neighborhood groups that students lived in (see Chapter 2 for our approach to defining neighborhoods). For example, students in neighborhoods with the highest concentrations of Black residents were the least likely to enroll in any pre-k during these years. Although we believe that these differences across student groups are important, some are relatively modest. As shown in Figure 1-A, overall enrollment rates in any school-based pre-k hovered around 50 percent, varying from a low of 47 percent to a high of 58 percent.

Enrollment in a full-day school-based pre-k (pre-policy shift)

Enrollment patterns were slightly different when examining full-day pre-k in Chicago during this same time (2010–11 through 2012–13). As illustrated in **Figure 1-B**, White students, highest-income students, and students living in mostly-White neighborhoods enrolled in full-day pre-k at the highest rates; Latinx students and English Learners enrolled in full-day pre-k at the lowest rates. These patterns are especially striking in light of the fact that the overall population of CPS students was far more likely to be Black, Latinx, and/or lowest-income students than White and/or highest-income (see *Sample* description in Chapter 2, Table 4 on p.17). Note that about one-third of full-day pre-k classrooms in these pre-policy years were tuition-based programs, and therefore not all families could afford enrollment in those programs.

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[10] See Chapter 2 for details on how these variables are defined.

[11] This rate is calculated as the number of kindergarten students, within student groups, who enrolled in pre-k the prior year as four-year-olds. The denominator also includes a small number of students enrolled in school-based pre-k but *not* enrolled in CPS for kindergarten (9,533 over all six cohorts; about 1,500 each year).

[12] Although counter to much research on enrollment of Latinx families in pre-k, this relatively high enrollment rate among Latinx students is consistent with prior findings specific to Chicago; see López, Grindal, Zanoni, & Goerge (2017).

FIGURE 1

Pre-Policy, English Learners Were Most Likely to Enroll in Any Pre-K and White Students Were Most Likely to Enroll in Full-Day Pre-K

Panel A — *Percent enrollment in any CPS pre-k, pre-policy (2010–11 to 2012–13)*

Student Characteristics

Group	Rate
All Age-Eligible Students	50.9%
Black	47.2%
Latinx	55.3%
White	49.5%
Additional Race Categories	47.4%
Highest Income	50.7%
Lowest Income	49.2%
English Learners	57.5%

Neighborhood Characteristics

Group	Rate
Mostly Black	48.1%
Mostly Latinx	54.3%
Mostly White	48.8%
Racially Diverse, 1/2 Black	48.2%
Racially Diverse, 1/2 White	52.1%

Observed Enrollment Rate
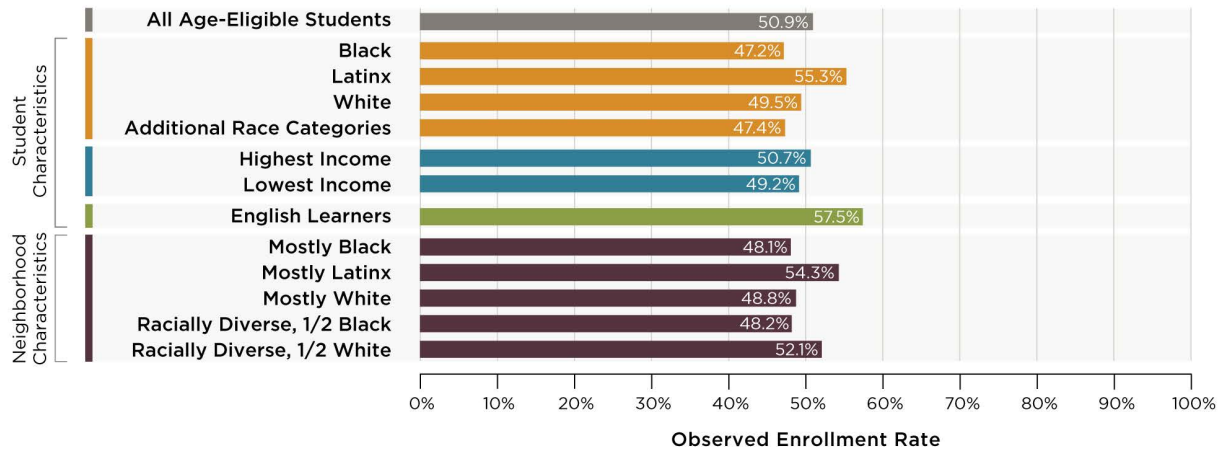
Panel B — *Percent enrollment in full-day CPS pre-k, pre-policy (2010–11 to 2012–13)*

Student Characteristics

Group	Rate
All Age-Eligible Students	3.1%
Black	4.1%
Latinx	0.9%
White	8.2%
Additional Race Categories	4.6%
Highest Income	6.5%
Lowest Income	4.5%
English Learners	0.8%

Neighborhood Characteristics

Group	Rate
Mostly Black	0.4%
Mostly Latinx	0.8%
Mostly White	9.6%
Racially Diverse, 1/2 Black	3.2%
Racially Diverse, 1/2 White	1.9%

Observed Enrollment Rate
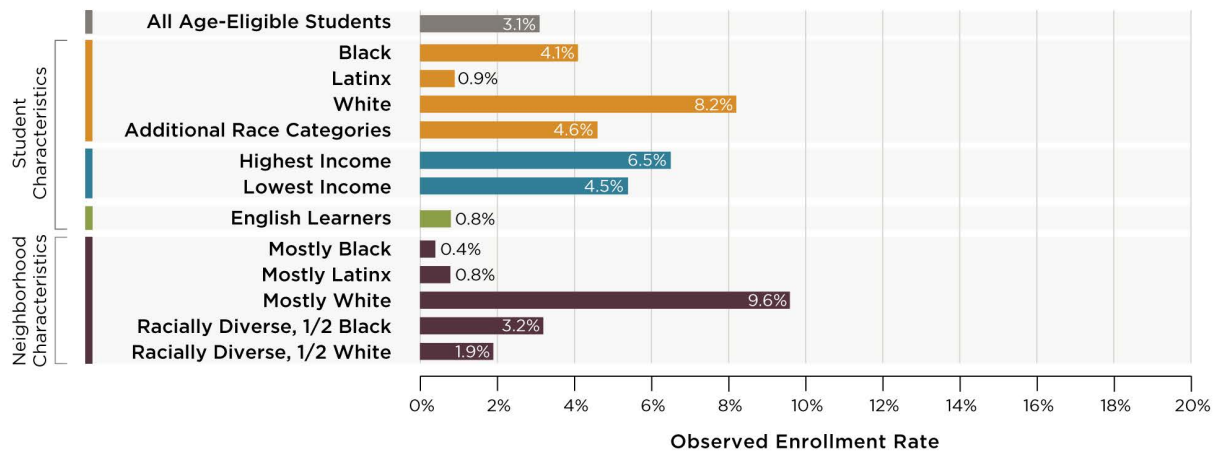
Note: Income for each student was calculated as a combination of the percent of families with income below the federal poverty line and the percent of males unemployed at the census block level. Students with a standard deviation >1 were considered lowest-income and those with a standard deviation <-1 were considered highest-income. To identify and describe CPS pre-k students' neighborhoods, we combined 12 tract-level census variables from the 2012 American Community Survey 5-year estimates that measure race/ethnicity, language, place of birth, and financial and socioeconomic characteristics. We have simplified their descriptions names of the neighborhood groups here to the defining racial characteristics as race was the strongest census variable for differentiating across neighborhood groups. Full details on the methodology, rationale, and outcomes of our neighborhood analyses can be found in a corresponding publication; see Easton et al. 2020 for details. Data for Asian, Asian/Pacific Islander, Multiracial, Native American/Alaskan Native, and Pacific Islander/Hawaiian students are represented in the Additional Race Categories group. All race/ethnicity categories used here come from CPS data files.

Overall, Figure 1 portrays inequities in pre-k enrollment, especially in full-day pre-k enrollment, in the years prior to the policy shift such that the largest student groups in Chicago—the same groups that were likely to benefit the most from pre-k—were some of the least likely to enroll in the district for pre-k in this non-universal pre-k system.

Chicago Pre-K Policy Context: How CPS Aimed to Increase Pre-K Access and Enrollment for Students who would Benefit the Most[13]

In 2012, the City of Chicago's Early Childhood Task Force outlined distinct strategies to reach the overarching goal of ensuring that every four-year-old from a low-income family had access to free publicly-funded preschool. These strategies for transforming early childhood services in Chicago included: serving a greater number of age-eligible children who were under-enrolled but most likely to benefit from pre-k, including through the expansion of full-day classrooms in neighborhoods with the highest need for them; increasing the quality of early childhood programs; and increasing transparency and accountability. As Chicago worked toward this overarching goal, the City and district implemented several policy changes designed to increase pre-k enrollment among age-eligible children in under-enrolled neighborhoods—including those in neighborhoods with more residents living below the federal poverty line—as well as students with specific needs (e.g., temporary living situations, diagnosed disability, English Learner). The most substantial of those changes are described below.

Online information about preschool programs

To increase access to information about city-wide preschool options, the City of Chicago developed an early learning web portal that included information about all early childhood programs in the city. While CPS had their own search page prior to this time point, the new website—ChicagoEarlyLearning.org—provided more thorough information about all publicly-funded preschool options in Chicago including eligibility requirements, which programs had full- and half-day classrooms, whether programs were located in community-based organizations or schools, and information about program quality.[14]

On-the-ground efforts to encourage pre-k enrollment among families of high-priority students

The City contracted with Chicago-based early childhood non-profit agencies and a marketing firm to organize a set of community-based efforts to actively publicize pre-k options and provide targeted supports to families—especially those with age-eligible children in under-enrolled neighborhoods who stood to benefit the most from a pre-k experience. They focused their efforts on supporting families through the application and enrollment processes. This included training and dispatching a group of on-the-ground pre-k "application assistants" to provide assistance door-to-door and in community settings such as libraries and schools, a hotline that families could call for support with applying, and financial assistance for transportation to application centers for families living in targeted neighborhoods.

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[13] The information presented in this section was gathered through key informant interviews with staff from the City of Chicago Mayor's Office, CPS, and local early childhood non-profit organizations. See *Method* for more information.

[14] This was added to the website once Illinois's Quality Rating and Improvement System (QRIS) ratings were available.

Centralized application

CPS began using a centralized (as opposed to a school-by-school) application and enrollment process. The intent was that district administrators could help ensure more transparency and equity in the system by increasing the likelihood of enrollment for families who could benefit the most. They created an application algorithm to prioritize the placement of students with particular characteristics and experiences (including students from low-income families, living in a temporary living situation, with an identified disability,[15] and whose home language was not English) into one of three school-based pre-k programs selected by their family at the time of application. According to district leaders, students with these characteristics or experiences were the first ones placed into their top choice schools.[16] In addition, the district held seats in schools across the city for these high-priority students to ensure that those who applied later in the year were given opportunities to attend their top choices. Together, these methods of prioritization were intended to ensure that high-priority families were offered a chance to enroll in their school-based pre-k choice before other students.

However, implementing a centralized application process required a new process for families, whereby they could no longer apply for pre-k at their local schools as they had before. They were now required to travel to one of a limited number of application centers throughout the city.[17] As such, this study also explores whether the introduction of application centers, in place of any local school as the place to apply for pre-k, created barriers to enrollment for particular student groups (see the box titled *The Introduction of Application Centers into the Application Process*).

Increases in full-day pre-k

The number of schools with full-day pre-k classrooms in Chicago almost quadrupled in the years following the policy change (**see Table 1**). Although the total number of students enrolled in pre-k did not increase over our study years, the number of students that enrolled in full-day pre-k more than tripled (**see Figure 2**) while the number of students enrolled available in half-day classrooms decreased (not shown).

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[15] For example, students with an IEP (Individualized Education Program) or 504 Plan.
[16] We did not examine whether this prioritization and placement process was implemented as described, because we did not have the pre-k application data or the specific prioritization algorithm at the time of this publication.
[17] The number of application centers grew from 13 to 23 between 2013–14 and 2015–16.

TABLE 1

The Number of Elementary Schools With Full-Day Pre-K More Than Tripled in the Three Years After Policy Implementation

	School Year					
	2010–11	2011–12	2012–13	2013–14[a]	2014–15	2015–16
Total Number of Schools	397	394	395	372	370	368
Schools With Half-Day Pre-K Classrooms Only	357	358	349	314	293	221
Schools With Full-Day Pre-K Classrooms Only	24	21	22	18	36	69
Schools With Both Full- and Half-Day Pre-K Classrooms	16	15	24	40	41	78

Note: [a]A portion of the decrease in the number of schools with any pre-k in 2013–14 is likely due to CPS's closing of 49 elementary schools across the district.

These numbers reflect the district's strategy of converting many half-day classrooms (serving two sessions of students in the same room in a single day) into full-day classrooms (serving one session of students) in the last two years of this study. The intent of this full-day expansion was to address under-enrollment by providing a pre-k programming option that could better meet the needs of low-income families, with parents who were more likely to be working and/or in school, have challenges with transportation, and/or could not afford to supplement half-day care with additional child care. This expansion also coincided with Illinois receiving a federal Preschool Development Grant-Expansion in 2014, which increased state investment in full-day pre-k for children in "high need communities."[18]

FIGURE 2

The Proportion of CPS Elementary Schools Offering Full-Day Pre-K and the Corresponding Number of Students Who Enrolled Increased Substantially, Between 2013–14 and 2015–16

Percent of schools with full-day pre-k and number of students enrolled in full-day pre-k

Percent of Schools With Full-Day Pre-K ● Number of Students Enrolled in Full-Day Pre-K

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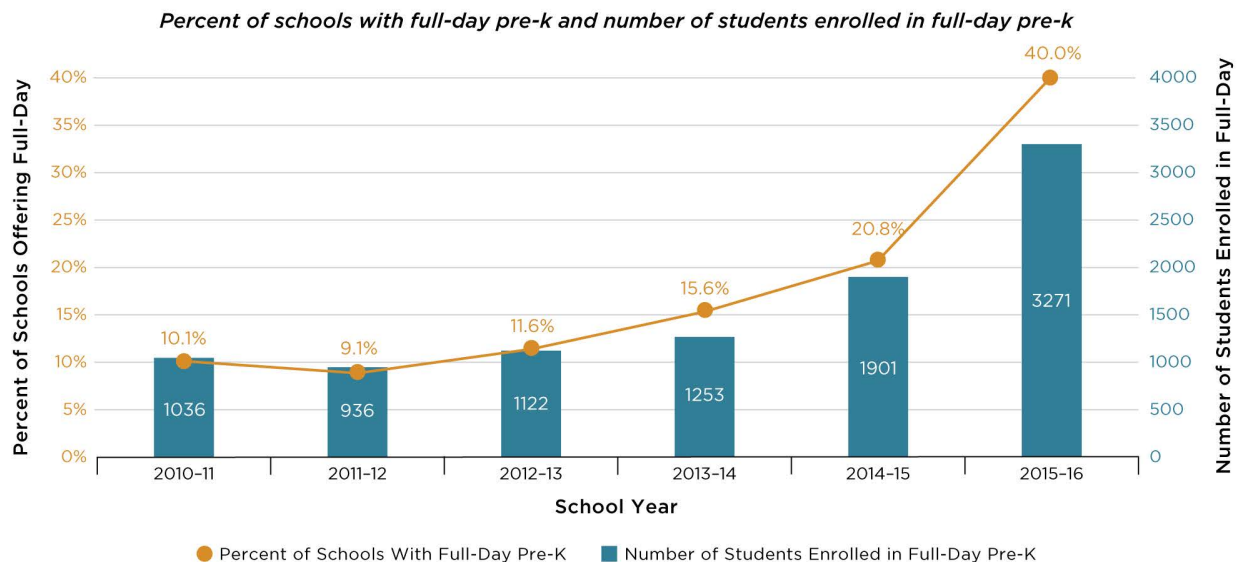
[18] U.S. Department of Education and the U.S. Department of Health and Human Services (2015).

Intentional placement of pre-k classrooms across the city

In addition to expanding the full-day portion of the pre-k system, CPS reallocated existing pre-k classrooms across the city in an effort to better reach high-priority students. Specifically, CPS allocated more pre-k classrooms—both half-day and especially full-day—in neighborhoods with a large proportion of age-eligible children living below the federal poverty line and with a history of low enrollment into pre-k. Some of these classrooms were new to the school or program in which it was placed, while others were converted from an existing half-day classroom to a full-day classroom. This effort resulted in substantially more full-day pre-k classrooms in mostly-Black neighborhoods. In **Figure 3**, the colors represent different neighborhood groupings (see Chapter 2). The circular black shading shows the distribution of full-day classrooms relative to the number of children under five years old living in that area; darker-shaded areas on the maps represent areas with relatively more full-day classrooms per child. Prior to the policy changes (see left-side map), full-day classrooms had been concentrated in mostly-White neighborhoods on the North Side of Chicago, but by 2015–16 (see right-side map), a couple years after the policy changes were implemented, the largest concentrations of full-day classrooms were in mostly-Black neighborhoods on the West and South Sides.

FIGURE 3

Full-Day School-Based Pre-K Options Increased the Most in Neighborhoods on the West and South Sides of Chicago

Pre-policy full-day pre-k (2010–11): *Distributions of seats* (per child under five) *by neighborhood groupings*

Post-policy full-day pre-k (2015–16): *Distributions of seats* (per child under five) *by neighborhood groupings*

Legend:
- Mostly Black
- Mostly Latinx
- Mostly White
- Racially Diverse, 1/2 Black
- Racially Diverse, 1/2 White
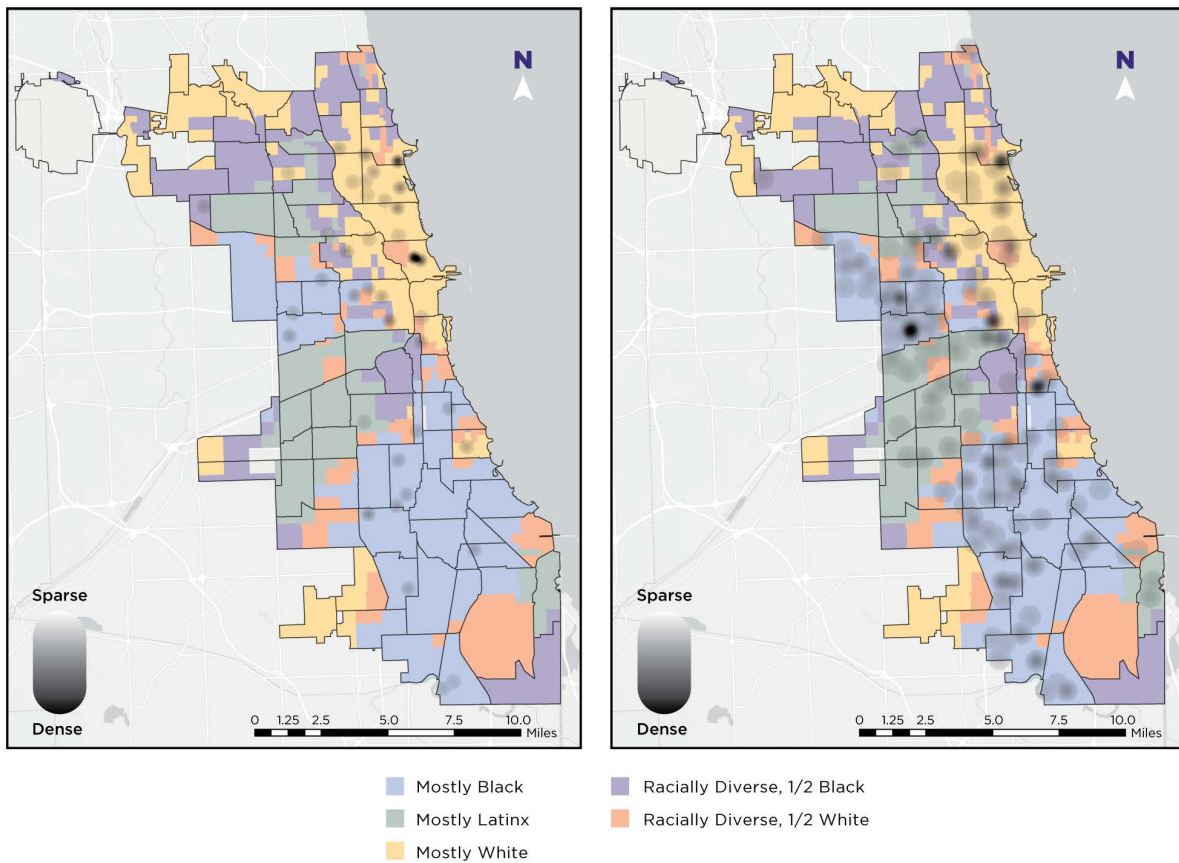
Note: Density is calculated using the number of seats (based on classrooms per school from CPS files) divided by the number of children under age five in that neighborhood (from Census data). To identify and describe CPS pre-k students' neighborhoods, we combined 12 tract-level census variables from the 2012 American Community Survey 5-year estimates that measure race/ethnicity, language, place of birth, and financial and socioeconomic characteristics. We have simplified the names of the neighborhood groups here to the defining racial characteristics, as race was the strongest census variable for differentiating across neighborhood groups. See Easton et al. (2020) for full details on the methodology, rationale, and outcomes of our neighborhood analyses.

Together, this set of policy changes implemented by CPS starting in 2013–14 can be thought of as the district's shift toward actively managing access to and enrollment in CPS school-based pre-k. **Table 2** provides an overview of the key access, application, and enrollment policy changes. Throughout this brief, the "policy" we refer to reflects this full set of strategies.

TABLE 2

School-Based Application and Enrollment Policies Changed Beginning in 2013–14

Chicago School-Based Pre-K Policy Component	Pre-2013 Policy Changes (2012–13 and prior)	Post-2013 Policy Changes (2013–14 to 2015–16)
Placement of pre-k classrooms within elementary schools	Pre-k classrooms were added upon individual principal request	CPS and city leaders made the determination about placement of classrooms within schools following a city-wide request for proposal encouraging all elementary schools to apply to have pre-k
Information available to families about school-based pre-k	Through a search function on CPS's website that identified available schools and grade levels	City-wide website (chicagoearlylearning.org) that included all publicly-funded preschool options along with eligibility criteria
Where families applied	At any CPS elementary school with pre-k	At limited number of application centers strategically placed throughout the city
Applications	Paper applications provided by the local school or central office and returned directly to school(s) of interest	A common, standardized application was submitted to the district (paper copy in 2013-2014 and online after that)
How applications were processed and enrollment decisions were made	Applications were processed and decisions about which students were offered seats were made by individual schools. Priority characteristics were specified by the district, but not centrally monitored.	Applications were processed and students were offered seats via a centrally-administered process at the district level. Enrollment decisions were based on an algorithm that assigned each student's application priority points based on the information provided.

School-Based Enrollment Patterns after the Policy Shift (2013–14 through 2015–16)

Once the policy was implemented, there were indeed changes in which students were more and less likely to enroll in CPS for pre-k—both in terms of overall pre-k enrollment and enrollment in full-day pre-k. We examine each of these changes in turn.

Changes in enrollment in any school-based pre-k

Although the overall enrollment rates of students in any CPS pre-k did not appreciably change during the time frame studied, ***who*** **enrolled** ***did*** **change following the policy changes**. Namely, as shown in **Figure 4**, a smaller proportion of age-eligible[19] White students enrolled in pre-k during the post-policy years (42.4 percent) than during the years before the policy was implemented (49.5 percent). On the contrary, significantly *more* Black students enrolled in any CPS pre-k in the years after the policy changes, compared to the years before the policy enactment (from a 47.2 percent likelihood prior to 49.4 percent likelihood post policy changes). While these rates do reflect some meaningful differences between student groups, none of the enrollment rate changes were large.

[19] See Chapter 2 for our count of "eligible" students, which includes the full kindergarten cohort in the year following pre-k as well as students enrolled in pre-k as four-year-olds who did not enroll in kindergarten in CPS.

FIGURE 4

Black and Lowest-Income Students Experienced the Largest Increases in Enrollment in Any School-Based Pre-K After the Policy Changes, While White Students and Those in Mostly-White Neighborhoods Became Less Likely to Enroll

Enrollment in any CPS pre-k before and after policy changes, by student group
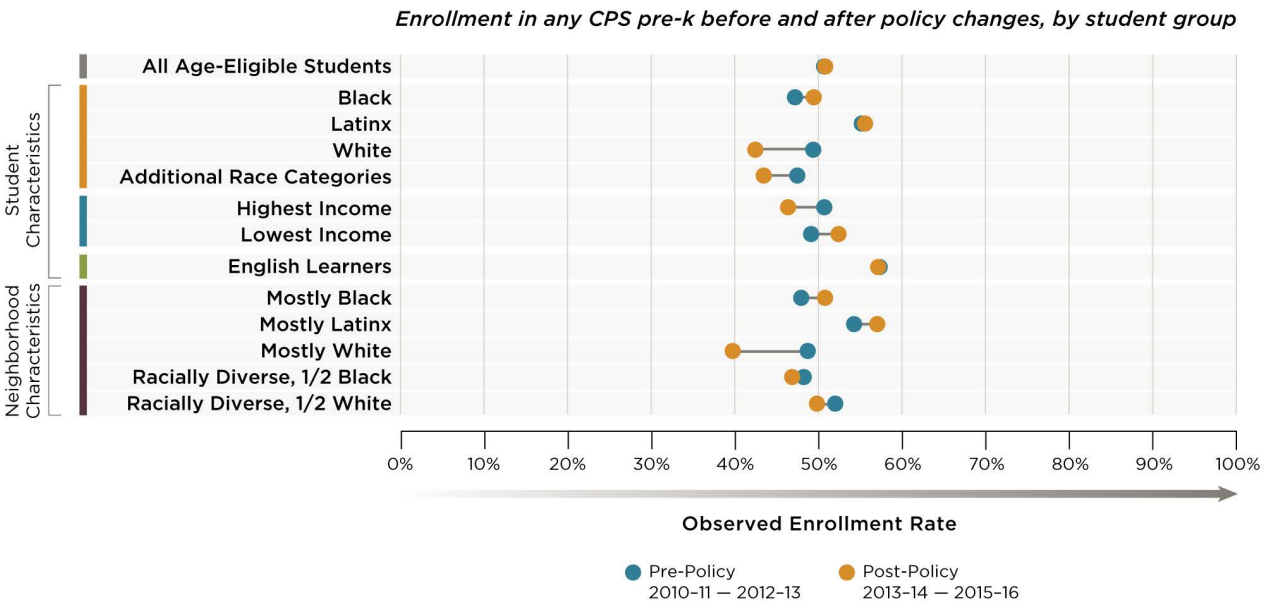
Note: The pre- to post-policy changes were statistically significantly different for all student groups except Latinx students; English Learners; students living in racially diverse, half Black neighborhoods; and all age-eligible students, after Bonferroni correction for multiple comparisons (p<0.004). Income for each student was calculated as a combination of the percent of families with income below the federal poverty line and the percent of males unemployed at the census block level. Students with a standard deviation of >1 were considered to be lowest-income and those with a standard deviation <-1 were considered to be highest-income. To identify and describe CPS pre-k students' neighborhoods, we combined 12 tract-level census variables from the 2012 American Community Survey 5-year estimates that measure race/ethnicity, language, place of birth, and financial and socioeconomic characteristics. We have simplified the names of the neighborhood groups here to the defining racial characteristics, as race was the strongest census v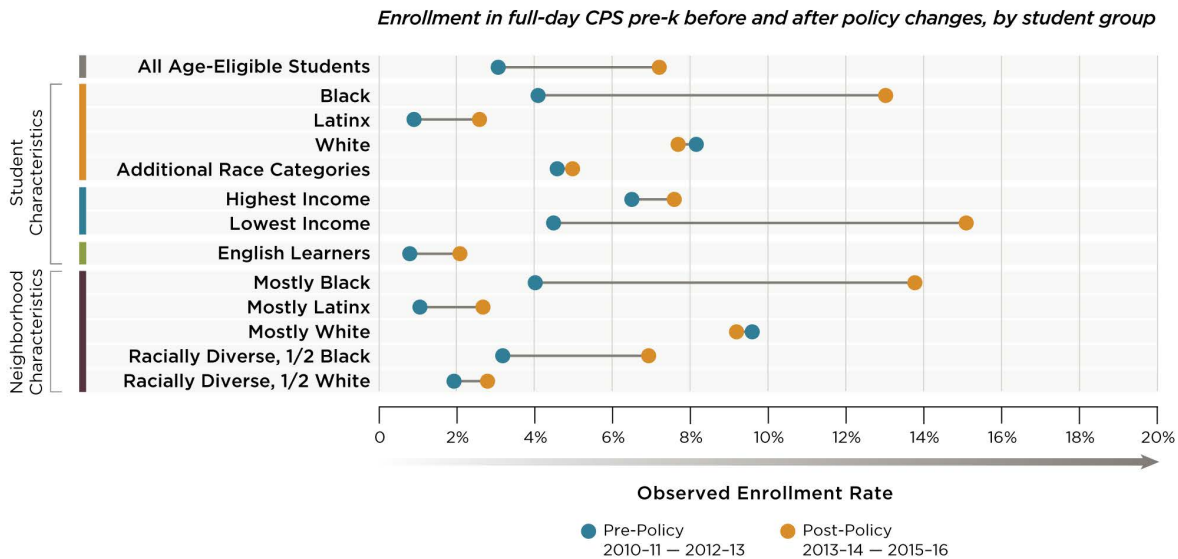ariable for differentiating across neighborhood groups. See Easton et al. (2020) for full details on the methodology, rationale, and outcomes of our neighborhood analyses. Data for Asian, Asian/Pacific Islander, Multiracial, Native American/Alaskan Native, and Pacific Islander/Hawaiian students are represented in the "Additional Race Categories" group. All race/ethnicity categories used for student characteristics here come from CPS data files.

Changes in enrollment in a full-day school-based pre-k

Overall, only a small subset of all CPS pre-k students were enrolled in full-day pre-k. However, full-day pre-k enrollment rates grew substantially over the years of our study. In 2010–11, only 3.2 percent of all age-eligible students enrolled in full-day pre-k, but in 2015–16 nearly three times as many (11.6 percent) enrolled. As **Figure 5** illustrates, Black students, lowest-income students, and students living in mostly-Black neighborhoods, enrolled in full-day pre-k at a rate that was three times greater after the policy changes than before. Interestingly, Black students who lived in racially-diverse, half-White neighborhoods (with a lower concentration of Black residents) did not benefit from these same enrollment rate increases experienced by their Black peers in other groupings neighborhoods. Latinx students and students living in mostly-Latinx neighborhoods also exhibited meaningful increases in enrollment in full-day pre-k, particularly in the 2015–16 school year. But even so, their enrollment rates remained far lower than the city average at only about 5.2 percent in 2015–16.

FIGURE 5

Black Students, Lowest-Income Students, and Students Living in Mostly-Black Neighborhoods Were More Likely to Enroll in Full-Day, School-Based Pre-K After Chicago's Pre-K Policy Changes

Enrollment in full-day CPS pre-k before and after policy changes, by student group

Observed Enrollment Rate

Pre-Policy
2010–11 — 2012–13

Post-Policy
2013–14 — 2015–16

Note: There were statistically significant improvements in enrollment for all student groups except for White students, students in the "Additional Race Categories" group, and students living in mostly-White neighborhoods, after a Bonferroni correction for multiple comparisons (p<0.004). Income for each student was calculated as a combination of the percent of families with income below the federal poverty line and the percent of males unemployed at the census block level. Students with a standard deviation of >1 were considered to be lowest-income and those with a standard deviation <-1 were considered to be highest-income. To identify and describe CPS pre-k students' neighborhoods, we combined 12 tract-level census variables from the 2012 American Community Survey 5-year estimates that measure race/ethnicity, language, place of birth, and financial and socioeconomic characteristics. We have simplified the names of the neighborhood groups here to the defining racial characteristics, as race was the strongest census variable for differentiating across neighborhood groups. See Easton et al. (2020) for full details on the methodology, rationale, and outcomes of our neighborhood analyses. Data for Asian, Asian/Pacific Islander, Multiracial, Native American/Alaskan Native, and Pacific Islander/Hawaiian students are represented in the "Additional Race Categories" group. All race/ethnicity categories used for student characteristics here come from CPS data files.

Together, these shifting enrollment patterns and the context of Chicago's policy changes regarding pre-k access, application, and enrollment begin to paint a picture of movement toward a more equitable pre-k system in Chicago.

Exploring the Link between Chicago's Policy Changes and Enrollment Patterns

The enrollment rates presented in the previous section suggest that patterns of pre-k enrollment in Chicago were different before and after policy changes—particularly for full-day pre-k. However, it remains unknown whether these changes in enrollment rates were related to Chicago's policy changes, and specifically to intentional changes made to pre-k *access* for high-priority student groups. To study whether the enrollment changes described above were indeed related to Chicago's policy changes and the district's hypothesized mechanism of access, we compare patterns of access before this set of policies was implemented to patterns afterward. We then examine how access is related to enrollment for different student groups before and after the policy changes. The key access levers that we examine include:

- Placing *a pre-k (or full-day pre-k) classroom in a school* closer to a student's home (distance)
- Increasing the *number of pre-k (or full-day pre-k) classrooms* near a student's home

Overall, this descriptive study seeks to understand: Is the geographic placement of pre-k classrooms related to who opts to enroll in school-based pre-k? Specifically, we ask four research questions:

Research Question 1 (RQ 1): Pre-policy changes, were families more likely to enroll their children in school-based pre-k when it was closer to their home? This question helps us identify whether—prior to the policy changes—access was even a viable lever for Chicago to consider when trying to change school-based pre-k enrollment patterns. We define access in two ways: 1) the distance from a student's home to the closest school with (full-day) pre-k; and 2) the number of (full-day) pre-k classrooms near a student's home. Based on prior research, we expect to find a positive relationship between access (e.g., shorter distance to a school with pre-k and proximity to a larger number of classrooms) and enrollment.

Research Question 2 (RQ 2): Post-policy changes, did access change—overall and for high-priority student groups? We ask this to identify whether Chicago's policies were successful in changing access for high-priority student groups. Given the City's policy goals and implementation tactics, we expect that access increased for high-priority students following the policy shift.

Research Question 3 (RQ 3): Post-policy changes, were changes in access associated with more equitable enrollment rates for high-priority student groups? To answer the question of whether access was a potentially successful lever for increasing equity around pre-k enrollment in Chicago, we examine how access and enrollment changed *together* in the context of the policy implementation. We expect to see enrollment patterns change in ways that closely mirror any changes to access that we find.

Research Question 4 (RQ 4): Post-policy changes, was access still related to enrollment in the same direction and with the same magnitude as it had been before? To contextualize our findings related to Research Question 3, we explore whether access continued to play the same role as a lever for changing pre-k enrollment patterns in the context of Chicago's other complementary policy changes. Given the introduction of various other supports for families during this time period, that were also aimed at increasing pre-k enrollment among high-priority students (e.g., better information, on-the-ground supports for completing applications), we expect to find that the association between access and enrollment may have changed with the policy shift. However, we do not have an *a priori* expectation about exactly *how* the relationship changed—that is, there are plausible reasons to believe that it either got stronger *or* weaker following the policy shift.

We explore these questions by looking at the relationship between access and enrollment in 1) any pre-k classroom, and 2) a full-day pre-k classroom. Because full-day pre-k expanded so dramatically over the time period of our study, we expect that examining these questions within that portion of Chicago's system may be particularly useful in advancing our understanding of the potential role changing access can have on who enrolls within a pre-k system.

2. Method

Data Sources

Key informant interviews

Early in 2019, we conducted semi-structured interviews with six key informants who provided a detailed historical perspective on the design, intent, and implementation of Chicago's changes to their pre-k application and enrollment policies and practices beginning in 2013–14. These informants were intentionally selected based on their knowledge and involvement with the school-based pre-k system in Chicago from 2011–16, and included staff who currently or previously worked at the City of Chicago's Office of the Mayor, CPS, or local early childhood organizations that delivered programs and worked on Chicago- and Illinois-based policy and advocacy.

Quantitative data

This study focused on quantitative analyses of existing data from CPS and other publicly available data. In particular, this study utilizes:

- Student-level data files collected by and obtained from CPS between the school years of 2010–11 and 2016–17. These included information about enrollment and background information for four-year-old pre-k students and kindergarten students (see *Measures* section), their geographic location, and information on full- vs. half-day pre-k classrooms available at each school over time.
- The study links geographic information about students and schools in the CPS files to information about neighborhoods in the Census Bureau's American Community Survey (ACS) from 2012 and 2015.

Using data from both CPS and ACS files, we measured the distance between children's homes to school-based pre-k options and measured characteristics about the neighborhoods in which these students lived.

Sample

In this study, we are interested in which students were most and least likely to enroll in CPS for pre-k. The base sample for each cohort is composed of our best approximation of the total number of students who might have considered CPS for pre-k (see cohorts in **Table 3**). We therefore define our full potential "population" who could have enrolled in CPS pre-k as those who enrolled in CPS for kindergarten as well as those who enrolled in CPS for pre-k but did not continue into CPS kindergarten. [20] For our analyses, we then look at the proportion of these "cohorts" who enrolled in CPS for pre-k as four-year-olds, both overall and within student groups.

Cohorts Included in Analyses, Before and After Chicago's Access, Application, and Enrollment Policy Changes

	Cohort By Year								
	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16	2016–17	2017–18	2018–19
Cohort 1	Pre-K	K	1st	2nd	3rd				
Cohort 2		Pre-K	K	1st	2nd	3rd			
Cohort 3			Pre-K	K	1st	2nd	3rd		
Cohort 4				Pre-K	K	1st	2nd	3rd	
Cohort 5					Pre-K	K	1st	2nd	3rd
Cohort 6						Pre-K	K	1st	2nd

■ Cohorts that would have experienced pre-k enrollment prior to policy changes.
■ Cohorts that would have experienced pre-k enrollment after policy changes.

As shown in **Table 4**, across the years of the study, total school-based pre-k enrollment remained relatively stable. However, enrollment in full-day pre-k increased substantially (from approximately 1,300 students in 2010–11 to 5,000 students in 2015–16).

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[20] For each cohort, we only include first-time kindergarteners who are between the ages of four and six, as well as any four-year-old students enrolled in CPS pre-k the prior year who did not continue into CPS for kindergarten. CPS pre-k students who did not continue into CPS for kindergarten were more likely to be Black or White, and less likely to be Latinx or English Learners.

TABLE 4

Full Population of Cohorts in Study and the Subsample of Students Who Had Been Enrolled in CPS Pre-K as Four-Year-Olds the Prior Year

CPS Full Sample – Kindergarten Cohorts						
	2011–12 (Cohort 1)	2012–13 (Cohort 2)	2013–14 (Cohort 3)	2014–15 (Cohort 4)	2015–16 (Cohort 5)	2016–17 (Cohort 6)
Total Age-Eligible Kindergarten Cohort	**32,762**	**33,804**	**32,986**	**31,286**	**29,979**	**28,537**
Students in CPS Kindergarten Cohort	31,031 (94.7%)	32,064 (94.9%)	31,322 (95.0%)	29,785 (95.2%)	28,576 (95.3%)	27,043 (94.8%)
Students in CPS for Pre-K But Not Kindergarten	1,731 (5.3%)	1,740 (5.1%)	1,664 (5.0%)	1,501 (4.8%)	1,403 (4.7%)	1,494 (5.2%)
% Male	50.4	50.2	50.1	50.6	50.5	51.3
% Black	38	37.3	37.6	37.2	38.4	36.9
% Latinx	44.8	44.6	44.5	44.1	43.1	43.9
% White	11	11.2	11.5	12.2	12.1	12.6
% Additional Race Categories[a]	4.9	5.1	5	5.6	5.8	6.2
% Highest Income[b]	9.5	10	10.1	9.8	8.8	9
% Lowest Income[b]	17.3	18.5	18.6	17.9	18.4	17.7
% Highest Education[c]	7.7	7.6	7.5	8.3	8.4	8.6
% Lowest Education[c]	24.3	25.3	24.6	24.2	23.9	23.9
% English Learners	33.3	33.7	33	33.2	29.3	31.1
% Special Education	9.2	9.8	10.6	10.9	11.2	11.5

Subsample of 4-Year-Olds who Attended School-Based Pre-K in CPS						
	2010–11 (Cohort 1)	2011–12 (Cohort 2)	2012–13 (Cohort 3)	2013–14 (Cohort 4)	2014–15 (Cohort 5)	2015–16 (Cohort 6)
Total Age-Eligible Kindergarten Cohort	**16,609** (51%)	**17,023** (50%)	**16,988** (52%)	**15,816** (51%)	**15,089** (50%)	**14,804** (52%)
% Male	50.2	50.2	50	50.7	51.2*	52.0*
% Black	35.1*	34.9*	34.8*	35.4	37.1*	36.8
% Latinx	48.8*	48.3*	48.4*	48.2*	47.3*	47.8*
% White	11	11.1	10.7*	10.9*	9.9*	9.8*
% Additional Race Categories[a]	4.7	4.7*	4.6*	4.8*	5.2*	5.0*
% Highest Income[b]	9.4	10	10	10	7.6*	7.3*
% Lowest Income[b]	16.0*	18.2	18.5	18.1	18.8	18.7*
% Highest Education[c]	7.7	7.1*	6.4*	6.8*	6.3*	6.5*
% Lowest Education[c]	23.6*	25.9*	25.5*	24.9*	25.5*	25.7*
% English Learners	35.3*	35.5*	35.4*	34.5*	31.0*	30.5*
% Special Education	11.3*	12.3*	13.0*	13.9*	14.6*	14.8*

Note: *Significant difference between the total kindergarten cohort and the four-year-old subsample of pre-k students the previous year at p<0.05. Income for each student was calculated as a combination of the percent of families with income below the federal poverty line and the percent of males unemployed at the census block level. Students with a standard deviation of >1 were considered to be lowest-income and those with a standard deviation <-1 were considered to be highest-income.

[a] Data for Asian, Asian/Pacific Islander, Multiracial, Native American/Alaskan Native, and Pacific Islander/Hawaiian students are represented in the "Additional Race Categories" group. All race/ethnicity categories used for student characteristics here come from CPS data files.

[b] Students in the top or bottom one-third of the CPS population for income and employment (see Measures section).

[c] Students in the top or bottom one-third of the CPS population for education and occupation (see Measures section).

Measures

Enrollment

This study examines two dichotomous enrollment outcome variables. Each student in our cohorts (see *Sample* section) was assigned a 0 or 1 based on whether they enrolled in 1) any school-based pre-k, and specifically 2) full-day pre-k. Enrollment rates within student groups were calculated as the proportion of students in each kindergarten cohort, or student group, who enrolled in school-based pre-k the prior year (when four years old).

Access

The key malleable factors of interest in this study are two measures of access, each calculated in relation to 1) any pre-k classrooms, and 2) only full-day pre-k classrooms (for a total of four access variables):

- **Distance to closest school with (full-day) pre-k.** We measured distance as the most direct path between two locations, or "as the crow flies". This variable measures the distance between a student's home address and the school with (full-day) pre-k closest to that student's home address. For the most accurate geographic information, we used the earliest available address for students. For students in pre-k, this was their pre-k address. For students who did not enter the system until kindergarten, this was their kindergarten address.[21]
- **Number of (full-day) pre-k classrooms near where students lived.** Using the same address information as in our distance access variable, we calculated the number of (full-day) pre-k classrooms that were within a 0.5-mile radius around where students lived.

Student-level background characteristics

For student-level background characteristics, we focus on race/ethnicity, income and employment, and education and occupation. Income and employment for each student was calculated as a combination of the percent of families with income below the poverty level and the percent of males unemployed at the census block level. Education and occupation for each student was calculated as the combination of percent of people employed as professionals or in management positions and the mean level of education at the census block level. Each of these were standardized using the full population of CPS students. Students with a standard deviation of >1 were considered lowest-income (or having the highest education and occupation) and those with a standard deviation <-1 were considered highest-income (or having the lowest education and occupation).

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[21] Across our six cohorts, anywhere from 16 percent to 19 percent of students with a pre-k address had a different address in kindergarten.

Student-level controls

Control variables account for each student's age, as well as indicators for the student's English Learner status, special education status, and whether the student was enrolled in CPS pre-k as a three-year-old. In order to account for "competition" for available pre-k seats near a student's home, we also calculated the number of other students in the same cohort who lived within 0.5 miles.

Neighborhood groupings

Using data from the 2012 American Community Survey five-year estimates, we used a statistical technique called Latent Profile Analyses (LPA) to describe the socioeconomic make-up of neighborhoods in which students lived. In doing so, we combined the information contained in 12 ACS variables,[22] maximizing the similarities of neighborhood make-ups, while minimizing the differential experiences between each neighborhood group. Because we know that these neighborhood characteristics are associated with access to quality educational opportunities, we use these "neighborhood groupings" as a key independent variable in our main analysis to understand how the policy changes may have been differentially related to outcomes for student groups living in different types of neighborhoods. Through our analyses, we identified five groups of neighborhoods in which students across Chicago lived: mostly-Black; mostly-White; mostly-Latinx; racially-diverse, half-White; and racially-diverse, half-Black. Further information on this analysis can be found in a separate research brief, *A New Method for Describing Chicago Neighborhoods.*[23]

Analysis

We used two-level logistic regression to predict the likelihood of enrollment based on distance to nearest school with (full-day) pre-k and number of pre-k classrooms nearby (our two access variables), controlling for all student-level controls. We first estimated these models using the full sample, controlling for student background characteristics (at level 1) and neighborhood characteristics (at level 2).[24] These models were then re-estimated separately within each student group, defined by student-level background characteristics (race/ethnicity, English Learner status, income and employment, and education and occupation) and neighborhood groupings (see description in *Measures* section). These models were conducted separately to allow coefficients on control variables to vary and to help ease interpretation, and post-hoc z-statistic calculations were used to test differences in magnitude of the coefficients of interest between student groups.

To address potential changes over time, models were estimated pre- and post-policy change, and with full sample with an indicator for the year of the policy shift, in order to measure differences in access before and after district management of access and enrollment. A separate set of analyses that included "distance to nearest application center" as a predictor was estimated only in the post-policy years.[25]

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[22] Twelve census tract-level ACS Variables: 4 Racial/Ethnic Variables (% White, % Black, % Asian, % Hispanic (non-White); 3 Language variables (% Speak English Well, % Bilingual, % Speak Another Language); % Foreign Born; Income and Employment (combination of % Males Unemployed and % Families below the Poverty Level); and Education and Occupation (combination of Mean Level of Education and % Employed as Management, Professionals).
[23] Easton et al. (2020).
[24] Students were nested within the census tracts in which they lived.
[25] See box titled *The Introduction of Application Centers into the Application Process.*

This descriptive, exploratory study design allows us to observe patterns of access and enrollment under different policy conditions, but it does not allow us to directly test the effectiveness of these policies nor identify access as a causal mechanism for changes in pre-k enrollment. Instead we interpret our findings as observed patterns and initial evidence of potential policy levers that could lead to more equitable pre-k enrollment. In addition, because our sample is very large, raising concerns about drawing a "false positive" conclusion (i.e., Type 1 error), we attend to practical significance of any findings in addition to statistical significance which is relatively easy to obtain in a sample of this size.

3. Whether and How Access was Related to CPS Pre-K Enrollment Pre-Policy Changes

In this chapter, we focus on the answer to our first research question. We examined two types of access for both any pre-k and full-day pre-k to understand whether access was related to students' likelihood of enrolling in CPS pre-k *prior to policy changes*. This analysis helps to illuminate whether access was a viable lever for changing enrollment patterns in school-based pre-k.

RQ 1: Pre-Policy Changes, Were Families More Likely to Enroll Their Children in School-Based Pre-K When it Was Closer to Their Home?
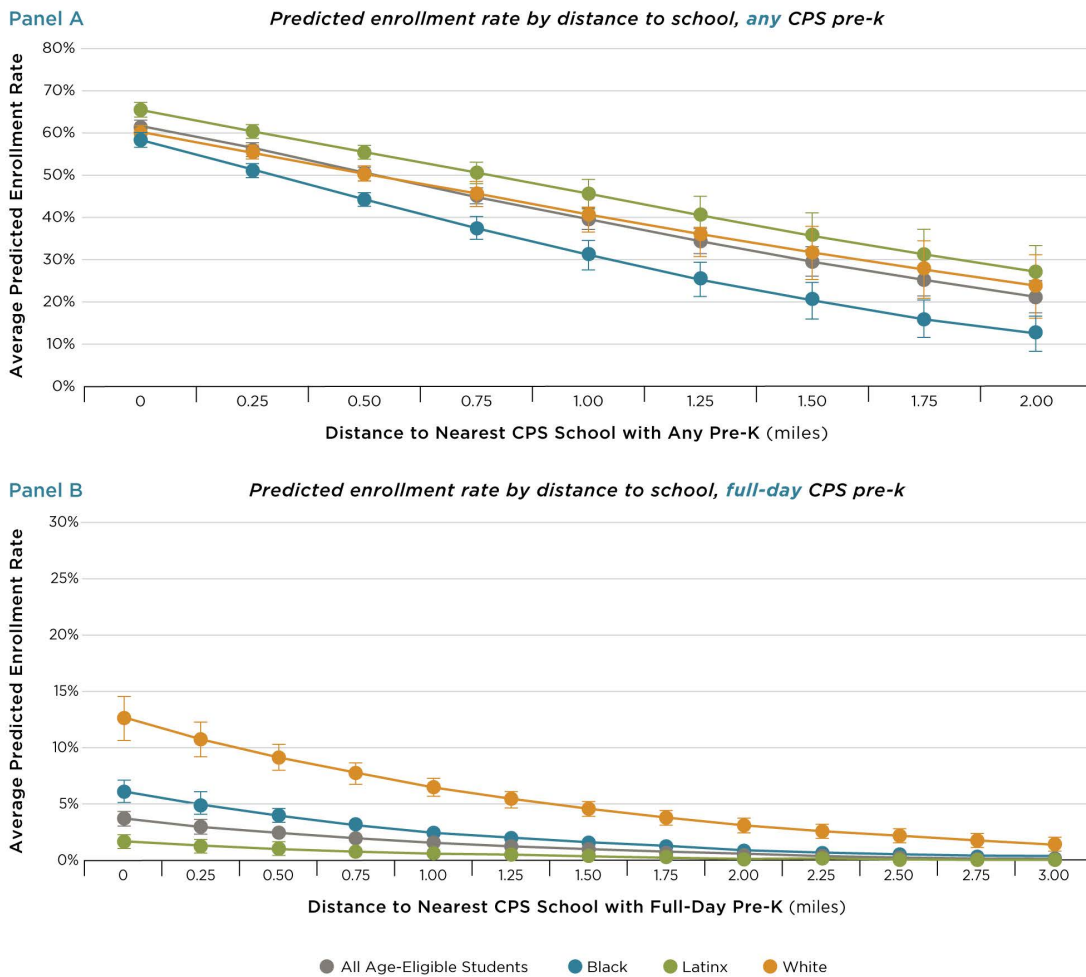
If access is to be a key lever for changing enrollment, it would need to be 1) related to enrollment and 2) change over time. Then, we can examine whether enrollment changes in the expected direction to the changes in access. Therefore, to answer Research Question 1, we explored relationships between two access variables of interest—*distance* to the closest school with pre-k and the *number* of pre-k classrooms near a student's home—and how likely students were to enroll in *any* school-based pre-k and in *full-day* school-based pre-k in the years prior to district management of pre-k access and enrollment (2010–11 through 2012–13).

Relationship between students' distance to the closest school with pre-k and likelihood of enrolling

Prior to district management of pre-k access and enrollment, there was a significant relationship between how close a student lived to a school with pre-k and a student's likelihood of enrolling in school-based pre-k. In the years prior to district management of pre-k access and enrollment (2010–11 through 2012–13), an individual student's likelihood of enrollment was related to the pre-k options they had around where they lived (see **Figure 6**). In particular, distance to school was the access variable that mattered most for any pre-k enrollment; the farther a student lived from a school with any pre-k (increased distance), the lower a student's likelihood of enrolling was (decreased likelihood), as shown in Figure 6-A. In practical terms, a student who lived half a mile farther from a school with pre-k was 11 percentage points less likely to enroll in pre-k than a peer who lived half a mile closer to a school with pre-k.[26] This association was very similar—in both direction and magnitude—for students' likelihood of enrolling in full-day pre-k: the farther a student lived from a school with full-day pre-k (increased distance), the lower that student's likelihood of enrolling was (see Figure 6-B). (See Appendix for more in-depth statistical model results.)

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[26] Results from a logistic regression model examining how access is related to enrollment in any pre-k in the years prior to district management of pre-k access and enrollment can be found in Table A.1 of the Appendix.

FIGURE 6

Pre-Policy, Students Who Lived Farther From School-Based Pre-K Options Were Less Likely to Enroll in CPS Pre-K

Panel A   *Predicted enrollment rate by distance to school, any CPS pre-k*

Panel B   *Predicted enrollment rate by distance to school, full-day CPS pre-k*

● All Age-Eligible Students   ● Black   ● Latinx   ● White

Note: We do not show data for students in the "Additional Race Categories" group here due to the small number of students in that group; error bars at each point on the x-axis were very large. Models control for gender, age, special education status, English Learner status, enrollment in CPS pre-k as a three-year old, total seats available across the district in the year a student could enroll in pre-k, neighborhood type, income and employment, education and occupation, and the number of students living within a half mile radius of each student as a measure of competition.

The relationship between distance to any school with any pre-k and a student's likelihood of enrollment was strongest for Black students. As shown in Figure 6-A, living farther from a school with any pre-k was related to a larger drop in the likelihood of enrolling in school-based pre-k for Black students. For example, predicted enrollment rates for a Black student who lived within 0.25 miles from a school with any pre-k was around 51 percent; however, a Black student who lived 1.0 mile away from a school with any pre-k had a predicted enrollment rate 20 percentage points lower, at 31 percent. Though not shown, results were similar for lowest-income students and students living in neighborhoods with large concentrations of Black residents. This suggests that students in these groups who lived farther from a school with pre-k may have faced particular barriers to enrollment in the years prior to Chicago's policy changes around the application and enrollment process.

The story for full-day pre-k was a bit different.[27] The association between enrollment and distance to a school with full-day pre-k (as shown in Figure 6-B) was modest for all racial/ethnic groups, but slightly stronger among lowest-income students and for students living in mostly-Black and mostly-Latinx neighborhoods. However, the magnitude of these associations was dwarfed by the racial/ethnic disparities in overall enrollment rates. That is, White students who lived right next to a school with at least one full-day pre-k classroom were nearly twice as likely to enroll in full-day pre-k as any other racial/ethnic group, and a White student who lived nearly a mile away was still more likely to enroll than was a Black or Latinx student who lived next door to a school with full-day pre-k.

Relationship between the number of pre-k classrooms near a student's home and likelihood of enrolling

Students' probability of enrolling in school-based pre-k was also related to the number of classrooms with pre-k within 0.5 miles of their home, although this association was smaller than that between distance to school and pre-k enrollment (Figure 7).[28] Students with 2.5 classrooms near their homes were 1 percentage point more likely to enroll in school-based pre-k than were those with zero classrooms nearby. Interestingly, the relationship between the number of full-day pre-k classrooms within 0.5 miles of a student's home and enrollment in full-day is stronger, such that each additional full-day classroom near a student's home was associated with a 0.7 percentage point increased likelihood of enrollment (meaning that adding just 1.4 full-day classrooms increased enrollment changes by 1 percentage point).

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[27] Importantly, in the years prior to Chicago's policy changes, a sizeable portion (one-third) of the districts' full-day classrooms were tuition-based, making them most reachable for families with more financial means.
[28] CPS students are not provided with busing unless it is included in a student's IEP.

FIGURE 7

Pre-Policy, Students With More School-Based Pre-K Classrooms Near Where They Lived Were More Likely to Enroll in CPS Pre-K
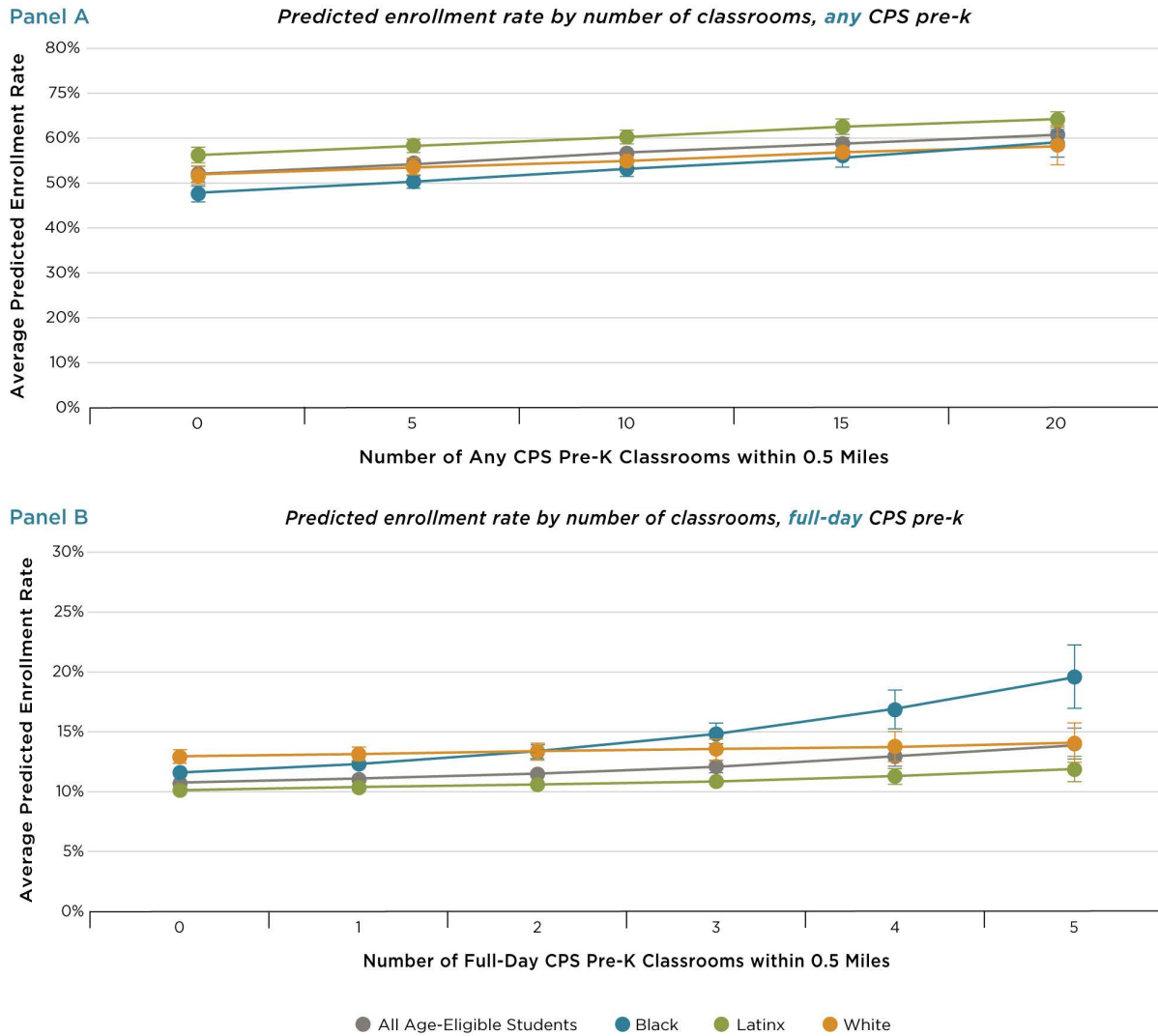
Panel A — *Predicted enrollment rate by number of classrooms, any CPS pre-k*

Panel B — *Predicted enrollment rate by number of classrooms, full-day CPS pre-k*

● All Age-Eligible Students   ● Black   ● Latinx   ● White

Note: We do not show data for students in the "Additional Race Categories" group here due to the small number of students in that group; error bars at each point on the x-axis were very large. Models control for gender, age, special education status, English Learner status, enrollment in CPS pre-k as a three-year old, total seats available across the district in the year a student could enroll in pre-k, neighborhood type, income and employment, education and occupation, and the number of students living within a half mile radius of each student as a measure of competition.

As with distance to school, the relationships between the number of classrooms near where students lived and their probability of enrolling in school-based pre-k was strongest for Black students, as well as the lowest-income students, and students living in neighborhoods with large concentrations of Black residents. This can be seen most strongly in Figure 7-B, whereby the trend of enrollment based on the number of available full-day classrooms curves upward at a faster rate for Black students than any other student racial/ethnic groups.

We next turn to exploring whether access—how close a student lived to a school with (full-day) pre-k and the number of (full-day) pre-k classrooms near the student's home—changed with the implementation of Chicago's pre-k policy changes.

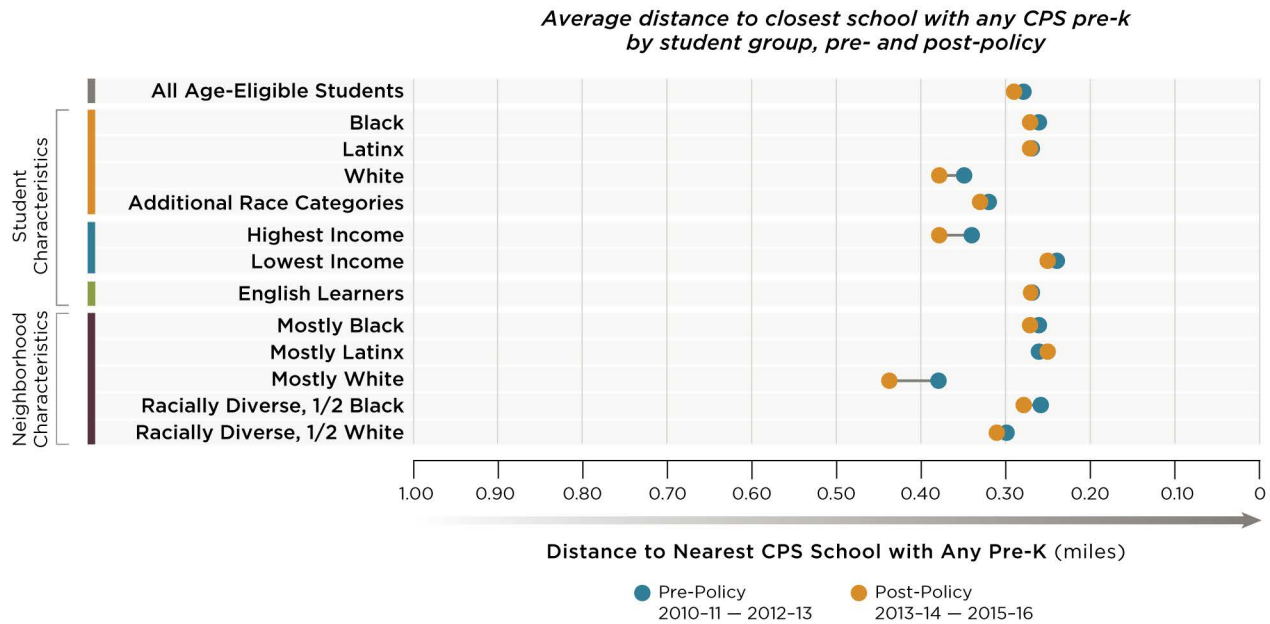# 4. Changes in Pre-K Access Following the Policy Changes

In the following chapter, we explore whether access changed for different student groups between the three years prior to Chicago's pre-k policy changes and the three years after policy implementation began. Our analyses focus on four indicators: changes in 1) distance to any pre-k, 2) the number of pre-k classrooms near students' homes, 2) distance to full-day pre-k, and 4) the number of full-day pre-k classrooms near students' homes.

RQ 2: Post-Policy Changes, Did Access Change—Overall and For High-Priority Student Groups?

Our findings regarding the association between access and enrollment are descriptive; they do not provide evidence of a causal relationship. However, our theory leads us to believe that they may indeed be causally related such that greater access leads to a higher likelihood of enrolling. Thus, if we were to interpret these findings causally, they would suggest that, to the extent that the policy shift resulted in either decreased distance from home to a school with pre-k or increased number of pre-k classrooms near students' homes, we would expect to see increased enrollment rates among those students for whom access increased—particularly if those students were Black, given the strong relationship between access and enrollment for those students. In order to test this hypothesis, there must *first* be meaningful changes in those key access levers following the policy shift. Finding these expected patterns of associations would provide important evidence regarding the nature of the relationship between pre-k access and enrollment in Chicago. Therefore, in this section, we descriptively look explicitly at whether those changes in access took place after the implementation of Chicago's access and enrollment policy changes.

FIGURE 8

Post-Policy, Distance to the Closest School With Any CPS Pre-K Did Not Change Substantially

*Average distance to closest school with any CPS pre-k
by student group, pre- and post-policy*

Distance to Nearest CPS School with Any Pre-K (miles)

Pre-Policy 2010–11 — 2012–13   Post-Policy 2013–14 — 2015–16

Note: All pre- to post-policy differences are statistically significant with Bonferroni correction (p<0.004) except for students in the "Additional Race Categories" group. Income for each student was calculated as a combination of the percent of families with income below the federal poverty line and the percent of males unemployed at the census block level. Students with a standard deviation of >1 were considered to be lowest-income and those with a standard deviation <-1 were considered to be highest-income. To identify and describe CPS pre-k students' neighborhoods, we combined 12 tract-level census variables from the 2012 American Community Survey 5-year estimates that measure race/ethnicity, language, place of birth, and financial and socioeconomic characteristics. We have simplified the names of the neighborhood groups here to the defining racial characteristics, as race was the strongest census variable for differentiating across neighborhood groups. See Easton et al. (2020) for full details on the methodology, rationale, and outcomes of our neighborhood analyses. Data for Asian, Asian/Pacific Islander, Multiracial, Native American/Alaskan Native, and Pacific Islander/Hawaiian students are represented in the "Additional Race Categories" group. All race/ethnicity categories used for student characteristics here come from CPS data files.

Changes in levels of access before vs. after policy changes

Contrary to our expectation, for most student groups in Chicago, distance to a school with *any pre-k did not change substantially* after district management of pre-k access and enrollment was implemented.[29] **Figure 8** shows that most student groups, including Black students and other high-priority student groups, were no more or less likely to live close to a school with pre-k before vs. after the policy shift took place. In fact, the only meaningful changes in these access levers for any pre-k were within lower-priority student groups: White and highest-income students lived statistically significantly farther from a CPS school with pre-k in the three years after the policy shift (2013–14 through 2015–16) than in the three years before.

More striking, the number of classrooms available to students after the policy changes were implemented increased for students in mostly-Latinx neighborhoods, but decreased slightly for all other student groups (**see Figure 9**). This may be due to district-wide school closings in 2013–14, when 49 elementary schools across the district were shut down.[30]

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[29] Most of the differences shown in Figure 8 are *statistically* significantly different, but not meaningfully different in terms of actual distance needed to be traveled.

[30] The Board of Education voted to close 47 elementary schools in June 2013, with an additional two elementary schools phased out over the next two years; see de la Torre, Gordon, Moore, & Cowhy (2015).

FIGURE 9

Post-Policy, The Number of Any School-Based Pre-K Classrooms Near Where Students Lived Decreased Slightly
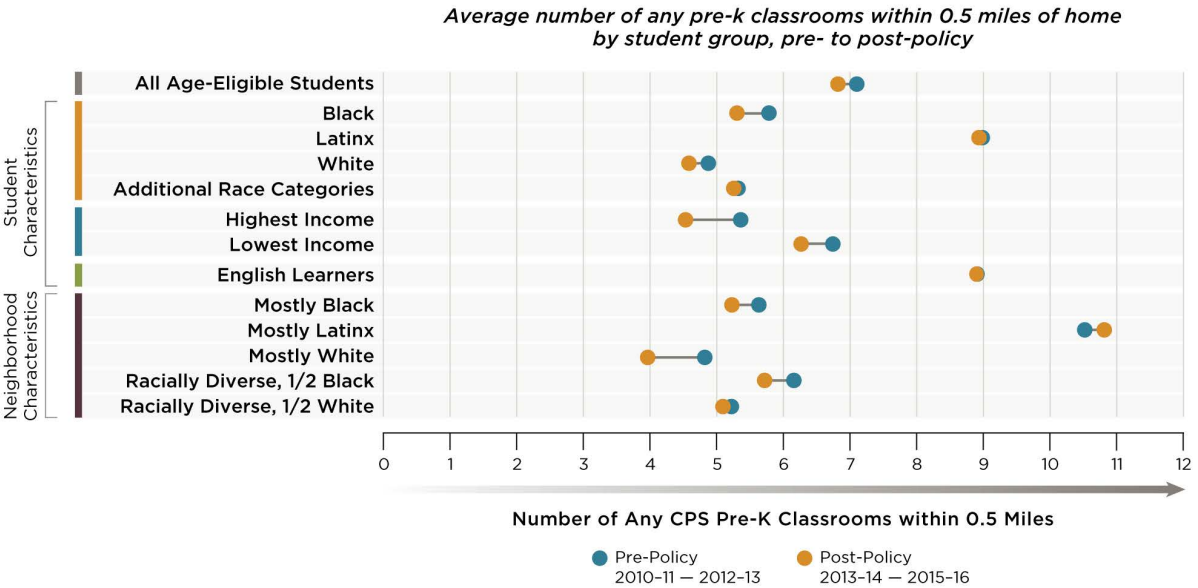
Average number of any pre-k classrooms within 0.5 miles of home by student group, pre- to post-policy

Number of Any CPS Pre-K Classrooms within 0.5 Miles

● Pre-Policy
2010–11 — 2012–13

● Post-Policy
2013–14 — 2015–16

Note: All pre- to post-policy differences are statistically significant with Bonferroni correction (p<0.004) except for Latinx students, students in the "Additional Race Categories" group, English Learners, and students living in racially diverse, ha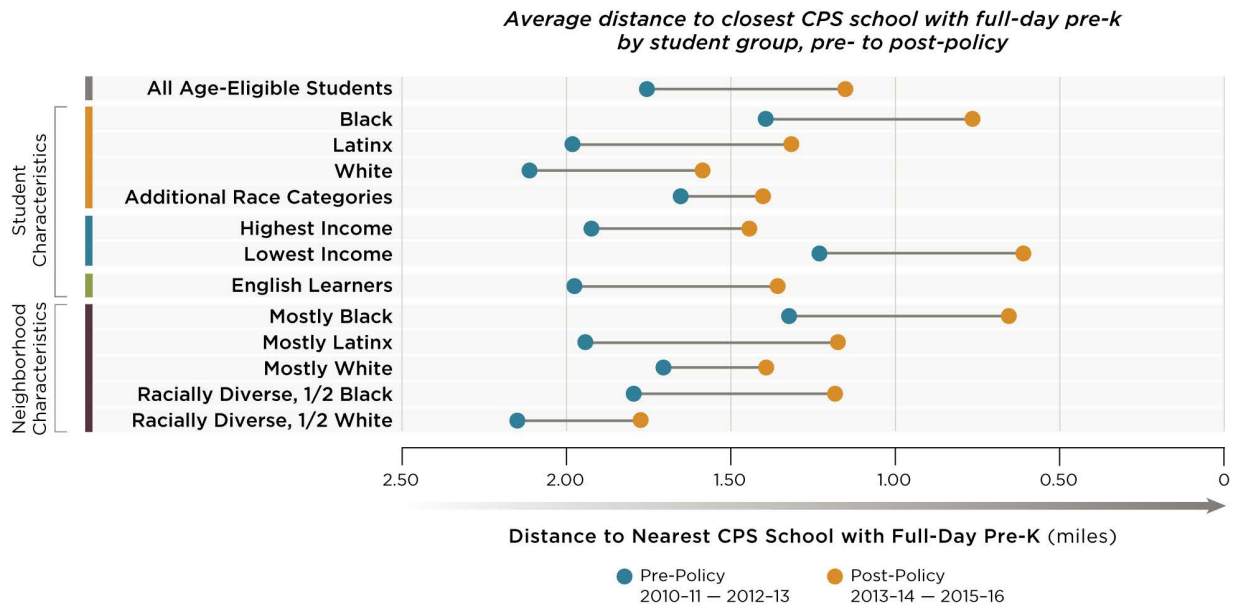lf White neighborhoods. Income for each student was calculated as a combination of the percent of families with income below the federal poverty line and the percent of males unemployed at the census block level. Students with a standard deviation of >1 were considered to be lowest-income and those with a standard deviation <-1 were considered to be highest-income. To identify and describe CPS pre-k students' neighborhoods, we combined 12 tract-level census variables from the 2012 American Community Survey 5-year estimates that measure race/ethnicity, language, place of birth, and financial and socioeconomic characteristics. We have simplified the names of the neighborhood groups here to the defining racial characteristics, as race was the strongest census variable for differentiating across neighborhood groups. See Easton et al. (2020) for full details on the methodology, rationale, and outcomes of our neighborhood analyses. Data for Asian, Asian/Pacific Islander, Multiracial, Native American/Alaskan Native, and Pacific Islander/ Hawaiian students are represented in the "Additional Race Categories" group. All race/ethnicity categories used for student characteristics here come from CPS data files.

In contrast to any pre-k, *access to full-day pre-k increased* following the district management of access and enrollment policy changes, especially for Black students and lowest-income students. This intentional placement of full-day classrooms , including the conversion of some formerly half-day pre-k classrooms into full-day classrooms, resulted in more and closer full-day pre-k for almost all students. In fact, on average, students were 0.6 miles closer to a school with full-day pre-k after policy changes, compared to before (**see Figure 10**). In particular, high-priority student groups (Black, Latinx, lowest-income, English Learners, and those living in high-priority neighborhoods) saw the largest decreases in distance to schools with full-day pre-k.

FIGURE 10

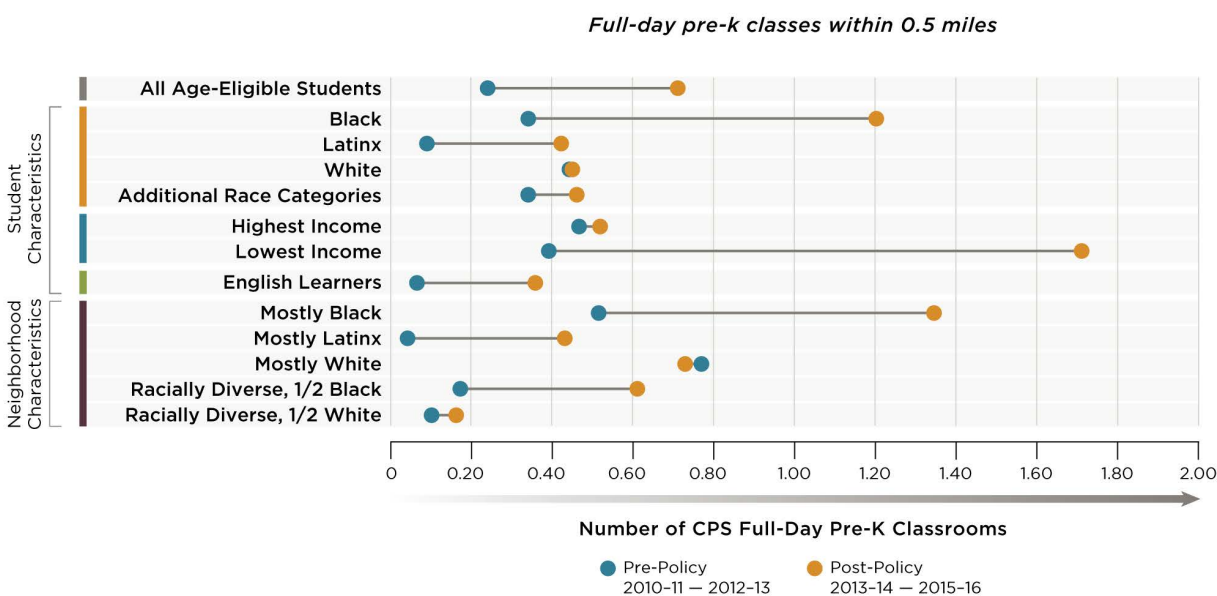**Post-Policy, All Student Groups Lived Closer to a School With Full-Day Pre-K**

Average distance to closest CPS school with full-day pre-k by student group, pre- to post-policy

Distance to Nearest CPS School with Full-Day Pre-K (miles)

● Pre-Policy
2010–11 — 2012–13

● Post-Policy
2013–14 — 2015–16

Note: All pre- to post-policy differences are statistically significant with Bonferroni correction (p<0.004). Income for each student was calculated as a combination of the percent of families with income below the federal poverty line and the percent of males unemployed at the census block level. Students with a standard deviation of >1 were considered to be lowest-income and those with a standard deviation <-1 were considered to be highest-income. To identify and describe CPS pre-k students' neighborhoods, we combined 12 tract-level census variables from the 2012 American Community Survey 5-year estimates that measure race/ethnicity, language, place of birth, and financial and socioeconomic characteristics. We have simplified the names of the neighborhood groups here to the defining racial characteristics, as race was the strongest census variable for differentiating across neighborhood groups. See Easton et al. (2020) for full details on the methodology, rationale, and outcomes of our neighborhood analyses. Data for Asian, Asian/Pacific Islander, Multiracial, Native American/Alaskan Native, and Pacific Islander/Hawaiian students are represented in the "Additional Race Categories" group. All race/ethnicity categories used for student characteristics here come from CPS data files.

Similarly, students lived near more classrooms with full-day pre-k in the post-policy years compared to pre-policy years (**see Figure 11**). Overall, in the years prior to the policy implementation, students were unlikely to have even one classroom near where they lived, while after the policy changes, most students had at least one full-day classroom close to home. Student groups who gained the most full-day classrooms near where they lived included Black students, lowest-income students, and students living in mostly-Black neighborhoods. For example, 0.5 percent of Black students had one full-day pre-k classroom near them before the policy shift, compared to more than 2 percent after. Latinx students and students in mostly-Latinx neighborhoods also experienced an increase in the number of full-day classrooms near their homes following the policy changes, while students living in mostly-White neighborhoods experienced a small drop in the number of full-day pre-k classrooms near their homes. The changes in these two key access levers are consistent with the district's stated goals in distributing the new full-day pre-k classrooms.

FIGURE 11

Post-Policy, High-Priority Student Groups Lived Near More CPS Full-Day Pre-K Classrooms

Full-day pre-k classes within 0.5 miles

Number of CPS Full-Day Pre-K Classrooms

● Pre-Policy
2010–11 — 2012–13

● Post-Policy
2013–14 — 2015–16

Note: All pre- to post-policy differences were statistically significant with Bonferroni correction (p<0.004) for all student groups except White students and students living in mostly-White neighborhoods. Income for each student was calculated as a combination of the percent of families with income below the federal poverty line and the percent of males unemployed at the census block level. Students with a standard deviation of >1 were considered to be lowest-income and those with a standard deviation <-1 were considered to be highest-income. To identify and describe CPS pre-k students' neighborhoods, we combined 12 tract-level census variables from the 2012 American Community Survey 5-year estimates that measure race/ethnicity, language, place of birth, and financial and socioeconomic characteristics. We have simplified the names of the neighborhood groups to the defining racial characteristics, as race was the strongest census variable for differentiating across neighborhood groups. See Easton et al. (2020) for full details on the methodology, rationale, and outcomes of our neighborhood analyses. Data for Asian, Asian/Pacific Islander, Multiracial, Native American/Alaskan Native, and Pacific Islander/Hawaiian students are represented in the "Additional Race Categories" group. All race/ethnicity categories used for student characteristics here come from CPS data files.

How the changes in access to full-day pre-k allow us to study the role of access as a policy lever for changes in enrollment

In order to understand whether changes in access could potentially lead to changes in students' probability of enrolling in school-based pre-k, there would first need to be a change in access and then we could examine whether enrollment changed in expected ways (assuming the relationship between access and enrollment remained constant in the pre- vs. post-policy years). The findings above indicate that there were no substantial changes in access to any pre-k program for most student groups (see Figure 8 and Figure 9). The fact that these key access levers did not change within the high-priority groups that the policies were intended to target means that we cannot explore our remaining research questions regarding the relationship between changes in pre-k access and enrollment within the context of any pre-k.

However, because there were changes to both distance to schools with full-day pre-k and the number of classrooms with full-day pre-k once Chicago's policies were implemented (see Figure 10 and Figure 11), we have an opportunity to examine whether enrollment shifted in corresponding patterns. Assuming the relationship between access and enrollment remained constant before and after the policy changes, the changes in access to full-day pre-k suggest that we should expect to see slightly decreased rates of enrollment in full-day pre-k among students in mostly-White neighborhoods and increased enrollment rates among Black students, lowest-income students, and students in mostly-Black neighborhoods. In the next chapter, we take a closer look at whether that occurred for full-day pre-k in Chicago.

5. Whether and How Changes in Access Corresponded to Changes in Enrollment

In this chapter, we compare information presented in Chapters 3 and 4 to describe the extent to which differences in access to full-day pre-k corresponded to enrollment changes in full-day pre-k. We also note which student groups experienced the largest changes in access and enrollment rates.

RQ 3: Post-Policy Changes, Were Changes in Access Associated with More Equitable Enrollment Rates for High-Priority Student Groups?

Yes. When distance to the closest school with full-day pre-k decreased and the number of full-day pre-k classrooms increased for particular student groups, those student groups also experienced increases in full-day enrollment. Importantly, these changes in access occurred in patterns that were analogous to the changes in rates of enrollment in full-day pre-k. That is, the largest increases in enrollment in full-day pre-k were much larger for the same student groups that experienced increases in access to full-day pre-k following the policy shift.

We can see this by comparing what we learned about overall full-day enrollment patterns before and after the policy shift with the changes in full-day access. **Table 5** summarizes this, where we can see that the bolded changes in distance to the closest school with full-day pre-k (students living, on average, more than 0.6 miles closer to a school with full-day) corresponds strongly to the student groups with the largest increases in enrollment (bolded numbers under the % change in enrollment column). This includes students who were Black; Latinx; lowest-income; or lived in racially-diverse, half-Black, mostly-Black, or mostly-Latinx neighborhoods. These groups of students saw increases in enrollment that were between 1.2 and 2.4 times higher after the policy implementation compared to pre-policy implementation.

TABLE 5

Changes in Distance to Elementary Schools with Full-Day Pre-K and Number of Full-Day Pre-K Classrooms Corresponded to Changes in the Probability of Enrollment

		Change in Distance to CPS School with Full-Day Pre-K (miles)	Change in Number of CPS Full-Day Pre-K Classrooms Nearby	Absolute Change in Enrollment (raw percentage points)	% Change in Enrollment
Student Characteristics	Black	**-0.627**	**0.85**	8.9	**217%**
	Latinx	**-0.667**	0.33	1.7	**189%**
	White	-0.519	0.01	-0.5	-6%
	Additional Race Categories	-0.254	0.11	0.4	9%
	% Highest Income	-0.483	0.05	1.1	17%
	% Lowest Income	**-0.61**	**1.32**	10.6	**236%**
	English Learners	**-0.624**	0.28		
Neighborhood Characteristics	Mostly Black Neighborhoods	**-0.674**	**0.98**	9.8	**117%**
	Mostly Latinx Neighborhoods	**-0.771**	0.39	1.9	**238%**
	Mostly White Neighborhoods	-0.317	-0.04	-0.4	-4%
	Racially Diverse, 1/2 Black Neighborhoods	**-0.611**	0.44	3.7	**116%**
	Racially Diverse, 1/2 White Neighborhoods	-0.38	0.06	0.9	47%

Note: All changes are calculated as the variable post-policy minus the variable pre-policy. Bolded values indicate a change of <-0.50 miles, >0.50 full-day CPS classrooms nearby, and >100% likelihood of enrollment in full-day CPS pre-k for a given student group. Income for each student was calculated as a combination of the percent of families with income below the federal poverty line and the percent of males unemployed at the census block level. Students with a standard deviation of >1 were considered to be lowest income and those with a standard deviation <-1 were considered to be highest income. To identify and describe CPS pre-k students' neighborhoods, we combined 12 tract-level census variables from the 2012 American Community Survey 5-year estimates that measure race/ethnicity, language, place of birth, and financial and socioeconomic characteristics. We have simplified the names of the neighborhood groups here to the defining racial characteristics, as race was the strongest census variable for differentiating across neighborhood groups. See Easton et al. (2020) for full details on the methodology, rationale, and outcomes of our neighborhood analyses. Data for Asian, Asian/Pacific Islander, Multiracial, Native American/Alaskan Native, and Pacific Islander/Hawaiian students are represented in the "Additional Race Categories" group. All race/ethnicity categories used for student characteristics here come from CPS data files.

6. Whether and How Access Still Mattered After Policy Changes

In the following chapter, we return to the important context that many different aspects of Chicago's pre-k policies were changing simultaneously. Our research questions focus specifically on two types of policy levers related to access: distance to schools with (full-day) pre-k and the number of (full-day) pre-k classrooms near where students lived. However, other policies were put in place and on-the-ground supports were implemented in an effort to increase enrollment among high-priority student groups. Our final research question, therefore, asks whether the relationship between access and enrollment was different in the context of these new policies and supports.

RQ 4: Post-Policy Changes, Was Full-Day Pre-K Access Still Related to Enrollment in the Same Direction and to the Same Magnitude as it Had Been Before?

As noted under the *Chicago Pre-k Policy Context* on p.6, Chicago implemented a series of policy changes all aimed at increasing enrollment among age-eligible children in under-enrolled neighborhoods who stood to benefit the most from a quality pre-k experience. The previous research questions focused specifically on whether *access* to school-based (full-day) pre-k changed after those policy changes took place, and if so, whether enrollment changed in corresponding ways. However, other changes (not related to access as we have defined it) were simultaneously taking place, including intentional efforts to help provide high-priority families with information about pre-k options around them and to assist in filling out applications.

One assumption that could have been made is that distance to the nearest school and the number of classrooms near where students lived behaved as levers for full-day pre-k enrollment in a similar way before and after the policy changes. However, given these other policy changes, it is critical to test that assumption by asking whether access remained as important for families as it was before all of these policy changes took place. Because we only found changes in access to full-day pre-k following the policy shift (see *Research Question 2* on p.23–27), we continue to focus on full-day pre-k in this final research question.

Access continued to be positively related to enrollment after all policy changes took place, but the magnitude of the relationships between enrollment in full-day pre-k and key access levers (distance to schools with full-day pre-k and the number of full-day pre-k classrooms) changed post-policy implementation. Overall, the association between a student's full-day pre-k enrollment likelihood with the number of full-day pre-k classrooms nearby became *weaker,* while the association with distance to the nearest school with full-day pre-k became *stronger*. That is, the number of full-day pre-k classrooms near students' homes after the policy changes was *less* predictive of their likelihood to enroll— and distance to the nearest school with full-day pre-k was *more* predictive—than they were before the

policy changes.[31] For most student groups, although these key access levers still functioned in the same direction as they did before the policy changes were implemented (shorter distance and more classrooms nearby corresponds to greater likelihood of enrollment), their importance in predicting students' likelihood to enroll in full-day pre-k did change.

The relative importance of both access variables for full-day pre-k enrollment changed most dramatically for Black and Latinx students and students living in mostly-Black neighborhoods.

The importance of having full-day school-based pre-k options close to home
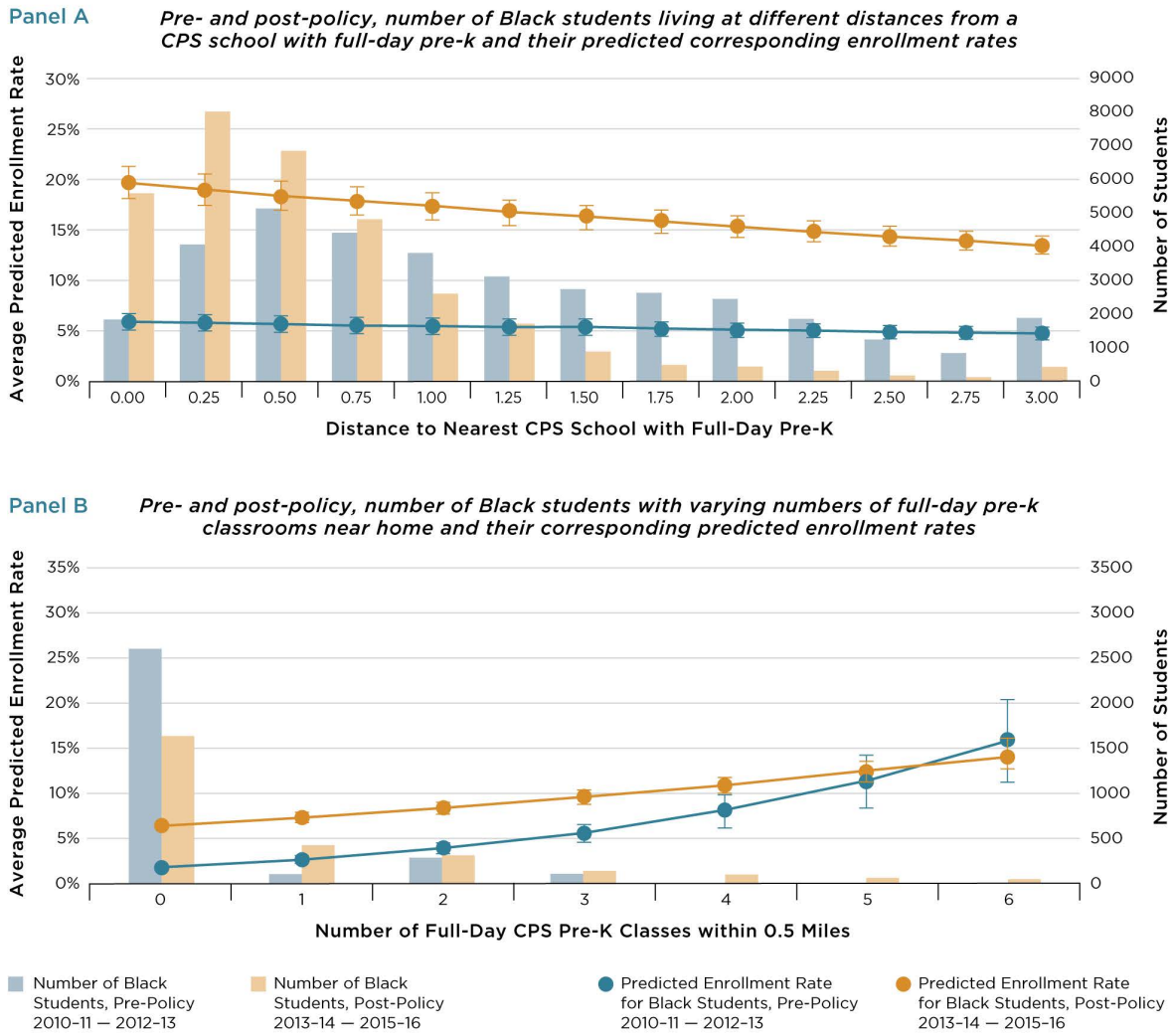
In addition to what we learned under Research Question 3 (that as full-day access changed, so did enrollment), we found that there were exponential increases in enrollment as distance decreased, particularly for Black students.[32] As we can see in the modeled curves in **Figure 12-A**, the difference in enrollment rates between Black students who lived closer vs. farther from a school with full-day pre-k was far greater in the post-policy years than in the pre-policy years. In other words, distance became more strongly associated with enrollment in post-policy years than it had been previously. In addition, Black students became far more likely to live very close to a school with full-day pre-k. These two simultaneous changes actually served to magnify one another, resulting in much higher enrollment rates in full-day pre-k among Black students following the policy change compared to earlier years.

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[31] We also examined what this relationship looked like for enrollment in any pre-k. In this case, the relationship between distance to school with any pre-k and the likelihood of enrollment stayed very similar to the pre-policy years in the post-policy years. This relationship pattern held for almost all racial/ethnic groups, income groups, and neighborhood groupings.

[32] Results from separate student group analytic models can be found in Table A.2 in the Appendix.

FIGURE 12

Post-Policy, Black Students Saw Meaningful Changes Both in Their Level of Access to Full-Day Pre-K, and in the Relationship Between Access and Enrollment

Panel A *Pre- and post-policy, number of Black students living at different distances from a CPS school with full-day pre-k and their predicted corresponding enrollment rates*

Distance to Nearest CPS School with Full-Day Pre-K

Panel B *Pre- and post-policy, number of Black students with varying numbers of full-day pre-k classrooms near home and their corresponding predicted enrollment rates*

Number of Full-Day CPS Pre-K Classes within 0.5 Miles

- Number of Black Students, Pre-Policy 2010–11 — 2012–13
- Number of Black Students, Post-Policy 2013–14 — 2015–16
- Predicted Enrollment Rate for Black Students, Pre-Policy 2010–11 — 2012–13
- Predicted Enrollment Rate for Black Students, Post-Policy 2013–14 — 2015–16

Note: Models control for gender, age, special education status, English Learner status, enrollment in CPS pre-k as a three-year-old, total seats available across the district in the year a student could enroll in pre-k, neighborhood type, income and employment, education and occupation, and the number of students living within a half mile radius of each student as a measure of competition.

34

The importance of the number of full-day classrooms near students' homes

The modeled curves graphed in **Figure 12-B** show the change in the role that the number of classrooms near Black students' homes played before vs. after the policy shift. In contrast to the pattern we saw for distance to school, the difference in enrollment rates between Black students who had more vs. fewer classrooms within 0.5 miles of their homes was smaller post-policy than it had been before. For example, in pre-policy years, increasing a Black student's access from one full-day classroom to three full-day classrooms was associated with a 3 percentage point increase in the likelihood of enrolling in a full-day pre-k program. In post-policy years, that same change in access was only associated with an increase of just 2.3 percentage points.

Importantly, as we saw with distance to school, enrollment rates among Black students were higher at nearly all levels of access after the policy changes compared to before policy changes (i.e., the "post" curve sits almost entirely above the "pre" curves in both graphs). As an illustration, Black students who had no full-day classrooms within 0.5 miles of their home after the policy changes were *more likely* to enroll in full-day pre-k (6.3 percent) than Black students who had three full-day classrooms near their homes before the policy changes (5.5 percent). Thus, even without a full-day classroom so close to home, enrollment rates among Black students were higher in the post-policy years. (See Appendix Table A.3 for modeled results for all student groups; the pattern was similar for Latinx students, but not for White students.)
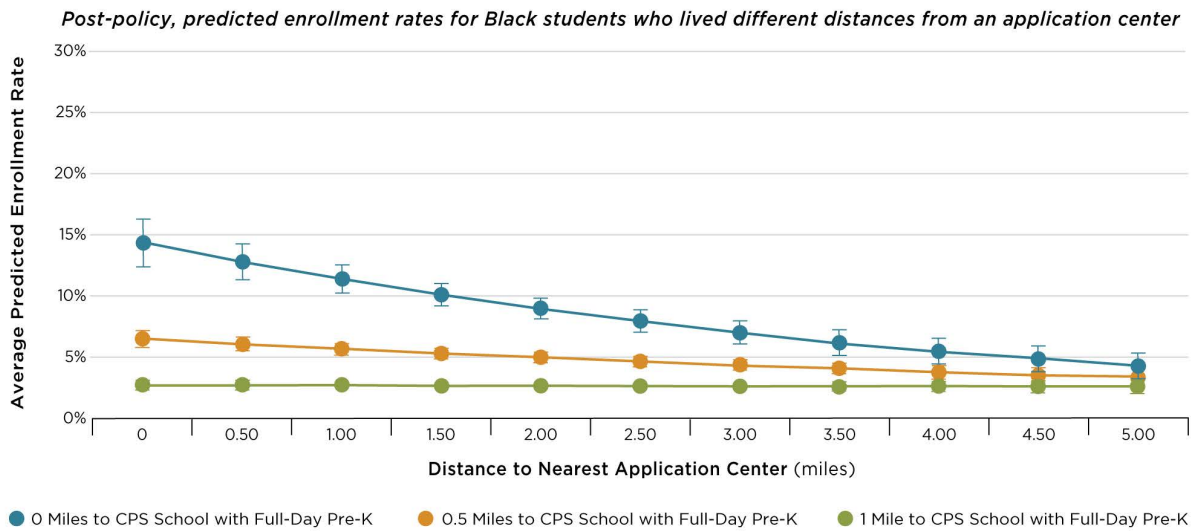
The role of application centers

One other potential policy lever related to access that coincided with the implementation of these policy changes was the shift from filling out applications at any local school to a policy whereby families needed to complete applications/verification documents at specific application centers. This reduced application locations from over 300 schools to between 13 and 23 application centers across the city from 2013–14 through 2015–16. Our expectation was that this new policy may have created a barrier to enrollment— perhaps especially for high-priority student groups—by providing few options and further distance to travel. But, as detailed in the box titled *The Introduction of Application Centers into the Application Process*, with one notable exception, this was generally not the case.

The Introduction of Application Centers Into the Application Process

In the years after Chicago implemented their centralized application process, families were required to apply to enroll their child in school-based pre-k at one of the limited number of application centers in the city. There were just 13, 17, and 23 application centers in the years 2013–14, 2014–15, and 2015–16, respectively. This is in contrast to over 300 schools that accepted applications in earlier years. However, when predicting enrollment in any school-based pre-k program, distance to the nearest application center seemed to matter much less than distance to school for most students. This might lead one to conclude, therefore, that where application centers were located did not matter at all; but this would be an incorrect conclusion. Distance to an application center did play an important role in predicting enrollment in full-day pre-k among Black students and students living in mostly-Black neighborhoods. For these students—even those who lived very close to a school with full-day pre-k— the farther away they lived from an application center, the less likely they were to enroll in full-day pre-k (**see Figure A**).[A] This was true even though, on average, Black students lived just as close to an application center as other student groups (Black students = 1.6 miles; Latinx students = 1.5 miles; White students = 1.8 miles; students in the Additional Race Categories group = 1.8 miles).

FIGURE A

Black Students Who Lived Very Close to a CPS School With **Full-Day** Pre-K Were More Likely to Enroll if They Also Lived Close to an Application Center

Post-policy, predicted enrollment rates for Black students who lived different distances from an application center

● 0 Miles to CPS School with Full-Day Pre-K   ● 0.5 Miles to CPS School with Full-Day Pre-K   ● 1 Mile to CPS School with Full-Day Pre-K

Note: Models control for gender, age, special education status, English Learner status, enrollment in CPS pre-k as a three-year-old, total seats available across the district in the year a student could enroll in pre-k, neighborhood type, income and employment, education and occupation, and the number of students living within a half mile radius of each student as a measure of competition.

[A] Model results that include application centers can be found in Table A.3 of the Appendix.

Key Takeaways and Implications

This study investigated patterns of pre-k access and enrollment before and after a set of policy changes intended to address inequities in pre-k enrollment. These policy changes shifted responsibility from local school leadership to centralized district management of pre-k access, application process, and enrollment decisions. The goals included prioritization of pre-k choice and enrollment for families with age-eligible children in under-enrolled neighborhoods who stood to benefit the most from pre-k. Here, we summarize the key findings and implications of this research.

Although the overall pre-k enrollment rates did not appreciably change after Chicago's policy changes, the *groups of students* that were most likely to enroll changed in ways that were consistent with the district's stated goals. In 2010–11 through 2012–13, pre-k enrollment patterns across student groups painted a picture of inequity that Chicago was grappling with at the time. The goal of this non-universal pre-k system was to serve the students who would benefit the most from attending publicly-funded pre-k; however, some high-priority students—in particular Black students and lowest-income students—were the *least* likely to enroll in school-based pre-k. The policy changes that are the focus of this study were implemented in large part as a reaction to these realities.

As policymakers intended, Chicago experienced significant changes in who enrolled in school-based pre-k in the years following the set of policy changes described above. This was particularly true for enrollment in full-day pre-k: Black students, lowest-income students, and students living in neighborhoods with high concentrations of Black residents were up to three times more likely to enroll in full-day pre-k after the policy changes than they were before. Latinx students also saw large enrollment increases, although their overall enrollment in full-day pre-k remained low. This is important because Chicago was indeed aiming to increase enrollment for these groups.

Before Chicago's policy changes, the distance from a student's home to a school with (full-day) pre-k was strongly related to whether or not they enrolled. Independently, students were also more likely to enroll in (full-day) pre-k when there were more classrooms near their home (although this association was not as strong). These findings suggest that Chicago's effort to intentionally locate pre-k classrooms—especially full-day classrooms—in particular neighborhoods was a viable policy strategy to use in trying to increase enrollment among high-priority student groups. We recommend that other cities explore similar relationships to identify their own potential levers for changing patterns of enrollment to meet their own goals.

Following Chicago's policy changes, the district was successful in increasing access to full-day pre-k classrooms among high-priority student groups, including students living in the lowest-income neighborhoods, which corresponded with higher enrollment rates among those students. We found that neither the average distance between a student's home and the closest school with any pre-k, nor the average number of any school-based pre-k classrooms near a student's home, changed when Chicago transitioned to district management of access and enrollment. However, both distance to school and number of classrooms did change substantially for some student groups when considering access to full-day pre-k. Importantly, high-priority student groups gained greater access and exhibited higher enrollment rates in the post-policy years. For example, the average lowest-income student lived almost two-thirds of a mile closer to a school with full-day pre-k, lived within half a mile of 1.3 full-day

classrooms, and was more than twice as likely to enroll in full-day pre-k after the policy shift compared to before.

These findings suggest that results of both the policy levers (changes in access) and aims (changes in enrollment) were concentrated most acutely within the district's high-priority student groups. This was precisely what Chicago's policies aimed to do, and they resulted in more equitable enrollment in school-based pre-k. The longer-term implications of this may be substantial. With high-priority student groups more likely to enroll in school-based pre-k in post-policy years, they are theoretically more likely to be better prepared for kindergarten, to be engaged in the system early enough to opt into choice options for kindergarten and beyond (possibly attending high-quality or better-fitting schools for themselves/their families), and ultimately may have more positive longer-term academic outcomes. These are questions that we will seek to answer in future work.

After Chicago's policy changes, the distance between a student's home and the closest school with full-day pre-k became even more strongly related to whether or not they enrolled than it had been before. Conversely, the number of full-day pre-k classrooms nearby mattered *less* in predicting a student's enrollment than it did in the three years before the policy changes. These findings were particularly strong for high-priority student groups. The changes in the importance of these access variables are not surprising in light of the complementary policy changes and on-the-ground recruitment efforts that Chicago implemented at the same time. As the district added full-day pre-k classrooms in locations that increased access for high-priority student groups, it also employed other strategies toward their goal of enrolling high-priority students into those new classrooms—including prioritizing their placement in the family's top-choice school (as indicated on their application) and "high-touch," targeted marketing and communication efforts to high-priority student groups and neighborhoods.

Perhaps these findings point to the success of those complementary strategies. For example, perhaps as a result of targeted marketing and communication, high-priority students were more likely to know about and apply to full-day pre-k in a nearby school than they had been before. And perhaps as a result of prioritizing their applications, high-priority students who applied were now also more likely to be offered a seat in one of the limited number of full-day pre-k classrooms in that school. Although this study cannot test these hypotheses directly, our findings do indicate that contextual factors such as these may have changed the relationship between access and enrollment in full-day pre-k (for some students more than others). We recommend that other cities explore similar relationships when seeking to understand the success of their own policy levers for changing patterns of enrollment.

The proximity of application centers did not pose a major barrier to enrollment overall, but it may play a role for some high-priority student groups. Before Chicago implemented district management of access and enrollment, families could visit any of the over 300 local elementary schools with pre-k to apply. After the policy changes took place, families could no longer apply at their local school and were instead required to visit one of just 13-23 application centers across the city (the number varied by year). We hypothesized that this would have presented significant barriers for some families, leading to a potential decrease in enrollment—particularly for families living farther away from application centers. Overall, our results indicate that wasn't the case: for most families, the distance to the closest application center was not related to enrollment.

There is one exception to this finding. Distance to the closest application center *was* related to enrollment for Black students and students living in mostly-Black neighborhoods, even though Black students lived

no closer or farther away than did other student groups. This finding may suggest that some high-priority families struggled in particular ways around accessing the application centers. Identifying these specific struggles are beyond the scope of this study. However, because this finding shows up for particular student groups (i.e., Black students, students living in mostly-Black neighborhoods), and not across all high-priority student groups (as many of our findings do), one might hypothesize that barriers particular to Black students and communities in Chicago, such as racism or limited transportation options, could be at play. Implications for Chicago and other districts implementing similar strategies are to carefully monitor whether reducing application sites creates new obstacles for families—particularly the families the district is aiming to reach—to understand whether additional supports may be necessary.

Limitations and Future Directions

This study provides new insight into the patterns of access and enrollment under different policy conditions in Chicago, but it does have some limitations. First, as noted previously, this study is descriptive and exploratory, and thus we cannot draw conclusions about the effectiveness of these policies or identify access as a causal mechanism for changes in pre-k enrollment. Also as previously discussed, our sample is very large, raising concerns about drawing "false positive" conclusions (i.e., Type 1 error); we aimed to mitigate this risk by interpreting findings in terms of practical (in addition to statistical) significance. In addition, we make large numbers of comparisons, but reduce the chance of Type I error by using adjustments for the significance level.

Importantly, this study examines access and enrollment only in *school-based* pre-k, even though there are several other public or privately-funded preschool options in Chicago, including Head Start, child care, or other community-based organizations. Further research is needed to examine how patterns of access and enrollment may differ in each of these other program types, as well as explore these patterns together to understand how they may influence one another within the system as a dynamic whole. In addition, this study examines students' access and enrollment in school-based and full-day (vs. half-day) pre-k, it does not otherwise address the quality of the pre-k classrooms that students have access to and enroll in, or their ability to fully meet families' needs. Future research should extend this work to more directly explore patterns of access and enrollment in high-quality pre-k programs, and in programs that provide comprehensive services to families.

Finally, this study was conducted using data from students who were eligible for pre-k between 5-10 years ago, when the pre-k policy context in Chicago was different from what it is now. In particular, at the time of this study, there was limited capacity in the system such that it could not serve all children who applied. Currently, Chicago is expanding school-based pre-k to a universal system with capacity to serve all interested and eligible students, which will likely affect patterns of access and enrollment across the city, as well as the association between the two. As such, future research conducted should examine the extent to which our findings generalize under different policy contexts, and how patterns may differ across universal and non-universal systems.

Conclusion

This study found that after Chicago implemented district management of pre-k access and enrollment, both access to and enrollment in full-day pre-k expanded substantially among Black students, lowest-income students, and students living in mostly-Black neighborhoods—even as overall pre-k enrollment remained relatively constant. We found a modest association between a student's distance to the nearest school with full-day pre-k and whether or not they enrolled. This relationship became stronger following the policy changes, especially for high-priority student groups. Importantly, we found that introducing application centers presented a barrier to enrollment for Black students, but not others.

This study provides initial evidence that increasing access to school-based, full-day pre-k may be an effective way of increasing enrollment among high-priority student groups and making pre-k opportunities more equitable. Specifically, our findings demonstrate that the geographic distribution of school-based pre-k may be an important policy lever for addressing inequities in student access and enrollment in Chicago, perhaps especially in the context of other enrollment efforts.

This study has important implications for districts like Chicago that are moving toward universal full-day pre-k, in which the system will expand until it has the capacity to enroll every age-eligible child who applies. Our findings suggest that, to the extent that such expansion results in more children living near at least one full-day pre-k classroom, universal systems are likely to be successful in achieving higher enrollment rates, particularly among those who did not previously live near full-day pre-k options. For districts with limited full-day pre-k capacity, this study offers an example of how to make careful decisions about how to reach those students who are most likely to benefit, and of an approach to analyzing how the policies are working. For all districts, this study demonstrates the importance of carefully considering the myriad decisions required when implementing application and enrollment policies in order to achieve an equitable and accessible pre-k system.

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Appendix

Table A.1 presents results from our full model examining how access is related to enrollment in CPS pre-k prior to Chicago's pre-k policy changes. Living farther away from a school with pre-k decreased a student's likelihood of enrollment, while having more pre-k classrooms within 0.5 miles increased a student's likelihood of enrollment.

TABLE A.1

Students Who Lived Closer to Any CPS Elementary School and Those With More Classrooms Near Where They Lived Had an Increased Chance of Enrolling in Any CPS Pre-K

Multi-level model results predicting enrollment based on students' distance to nearest CPS school with any pre-k and the number of CPS pre-k classrooms near where they lived

Predictors in Model	Coefficients (odds ratios)
Constant	0.481***
Distance to Nearest CPS School With Pre-K (-)	0.912***
Number of CPS Pre-K Classrooms Within 0.5 Miles (+)	1.019***
Student-Level Controls (Age, Sex, Special Education, English Learners, Pre-K as 3-Year-Old)	X
Student-Level Covariates (Race, Income and Employment, Education and Occupation, Neighborhood Type)	X
Controls for "Competition"	X

Note: Competition includes the number of other students in the same kindergarten cohort who lived within 0.5 miles of where a student lived. * p<0.05, ** p<0.01, *** p<0.001; Distance measured in 0.1 miles; students nested within census tracts; coefficients presented as odds ratios.

Table A.2 presents results from a model examining how access is related to enrollment in full-day CPS pre-k across the six years of the study, with separate models run for each racial/ethnic student group. Access to application centers was not included in these models, as there were no application centers prior to the district management of access. The rows with Policy Change look at the change as district management of access came into effect. The effects were strongest (odds ratios are lowest) for the Black student group, implying that these students saw a greater benefit from living close to a school with full-day pre-k and having more full-day pre-k classrooms around them after district management of access came into effect.

For Black and Latinx Students, the Number of Full-Day Pre-K Classrooms Nearby Became Less Predictive of Their Likelihood to Enroll Post-Policy

Multi-level model results predicting enrollment based on access to full-day pre-k, before and after Chicago's policy changes

Predictors in Model	All	Black	Latinx	White
Constant	0.075***	0.037***	0.028***	0.054***
Policy Change	1.574***	2.299***	1.292	0.996
Distance to Nearest CPS School With Full-Day Pre-K (-)	0.915***	0.921***	0.925***	0.920***
Number of CPS Full-Day Pre-K Classrooms Within 0.5 Miles (+)	1.375***	1.488***	1.459***	1.132**
Policy Change * Distance to CPS School With Full-Day Pre-K	0.947***	0.932***	0.949***	0.971**
Policy Change * Number of CPS Full-Day Pre-K Classrooms Within 0.5 Miles	0.877***	0.782***	0.868*	0.992
Student-Level Controls (Age, Sex, Special Education, English Learners, Pre-K as 3-Year-Old)	X	X	X	X
Student-Level Covariates (Race, Income and Employment, Education and Occupation, Neighborhood Type)	X	X	X	X
Controls for "Competition"	X	X	X	X

Note: Likelihood Ratio Test with vs. without Policy Change: X^2=92.01; p<0.0001. * p<0.05, ** p<0.01, *** p<0.001; Distance measured in 0.1 miles; students nested within census tracts; coefficients presented as odds ratios.

Table A.3 presents results from a model examining how access is related to enrollment in full-day CPS pre-k after Chicago's pre-k policy changes were implemented. Living farther away from a school with full-day pre-k decreased a student's likelihood of enrollment, while having more full-day pre-k classrooms within 0.5 miles increased a student's likelihood of enrollment. Living closer to an application center, also slightly increased a student's likelihood of enrollment in full-day pre-k. However, little evidence of interaction effects were found between 1) distance to school and distance to the nearest application center and, 2) number of full-day pre-k classrooms and distance to the nearest application center.

TABLE A.3

Living Closer to a School With Full-Day Pre-K and Having More Full-Day Pre-K Classrooms Nearby Were More Strongly Related to Predicted Enrollment Than Distance to Application Centers

Multi-level model results predicting enrollment based on students' distance to nearest school with pre-k, the number of classrooms near where they live, and distance to application centers

Predictors in Model	Coefficients (odds ratios)
Constant	0.311***
Distance to Nearest School With Full-Day Pre-K (-)	0.834***
Number of Full-Day Pre-K Classrooms within 0.5 miles (+)	1.095***
Distance to Nearest Application Center (-)	0.97***
Number of Full-Day Pre-K Classrooms * App-Center Distance	1.005***
School Distance * App-Center Distance	1.003***
Student-Level Controls (Age, Sex, Special Education, English Learners, Pre-K as 3-Year-Old)	X
Student-Level Co-Variates (Race, Income and Employment, Education and Occupation, Neighborhood Type)	X
Controls for "Competition"	X

Note: + indicates an expected positive relationship, - indicates an expected negative relationship. * $p<0.05$, ** $p<0.01$, *** $p<0.001$; Distance measured in 0.1 miles; students nested within census tracts.

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