RESEARCH REPORT

Who Wins the Preschool Lottery?

Applicants and Application Patterns in DC Public Prekindergarten

Erica Greenberg *Grace Luetmer* *Carina Chien* *Tomas Monarrez*

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Introduction

Over the past half century, public preschool has emerged as a leading policy remedy for opportunity and achievement gaps. Disparities between low- and high-income students are large—at least three years of learning—and persistent (Hanushek et al. 2020; reardon, Robinson-Cimpian, and Weathers 2015). Yet, socioeconomic gaps at kindergarten entry—before the start of formal schooling—have declined in recent years (reardon and Portilla 2016). Researchers have proposed several explanations to explain this paradox, including more enriching home environments; expanding federal, state, and local investments in public preschool; and rising preschool quality and effectiveness (Bassok, Latham, and Rorem 2016; reardon and Portilla 2016; Yoshikawa et al. 2013).

To take advantage of these expanding investments, rising quality, and growing effectiveness to improve children's early educational experiences at scale, families first need access. The evidence base on preschool choice and access, as well as enrollment and continued participation, is growing (Tang, Coley, and Votruba-Drzal 2012; Greenberg, Michie, and Adams 2018). A recent study of application and enrollment behavior in Boston suggests that children of color, children from low-income households, and dual language learners apply to public preschool at lower rates than their peers, even in a universal preschool context (Shapiro et al. 2019). This study raises concerns about barriers to access and highlights a basic challenge in meeting public equity goals.

Like the program in Boston, public prekindergarten in the District of Columbia is universal, but that label can be misleading. Seventy-one percent of 3-year-olds and 87 percent of 4-year-olds participate (Friedman-Krauss et al. 2020). Program expansion has focused on the District's most disadvantaged communities, and seats for 3-year-olds are still concentrated in these communities. But just because a family can secure a prekindergarten space somewhere in the city does not mean the space will be conveniently located or otherwise desirable. Access to the prekindergarten programs offered by nearly every traditional public and charter school in DC is rationed by a centralized admissions lottery that has been in place since 2014.

We analyze nearly 40,000 preschool applications submitted to the District of Columbia's centralized admissions lottery, My School DC, to assess application and enrollment patterns between 2014 and 2018. My School DC supports a "single, random lottery that determines placement for new students at all participating schools," including those that house public prekindergarten.[1] The My School DC common application began in spring 2014, and our study includes the first five cohorts of students applying for PK3 (the program for 3-year-olds) or PK4 (the program for 4-year-olds). To participate in

the lottery, families complete an online application with basic child and family information, as well as a ranking of up to 12 school choices. Families are then matched with schools using a deferred-acceptance algorithm based on the Nobel Prize–winning work of Al Roth to provide families with their top choices and to maximize the number of overall matches (Abdulkadiroğlu et al. 2017; Gale and Shapley 1962; Pathak 2011). Preferences are given to certain families, including those with enrolled siblings (in most schools), geographic proximity or in-boundary status (for schools that are part of DCPS, or DC Public Schools), transfer status (within some charter networks), or children of staff preference (among some charter schools).

We find that the PK3 and PK4 lotteries differ substantially, both in families' application choices and in outcomes. The PK3 lottery has consistently higher match rates, while the PK4 match rates are lower and have been declining. School preferences, such as in-boundary and sibling preferences, are closely linked to applicants' lottery success. Lotteries for both grades in nearly all schools are oversubscribed, meaning the common application is a source of random assignment to DC prekindergarten. Importantly, applicants closely resemble the populations of 3- and 4-year-old children in DC, based on their community characteristics. Applicants matched by the lottery resemble their respective populations as well. But wait-listed applicants appear to differ in their relative socioeconomic advantage and their higher likelihood of residing in immigrant communities. We interpret these findings in light of ongoing efforts to advance equitable access and outcomes across the District.

Background

Prior research efforts focus on the quality and impacts of universal preschool, but application patterns provide important context for interpreting these findings. Here, we summarize the literature on applicants and applications and describe the unique nature of DC prekindergarten.

Application Patterns

Evidence on early care and education choice and participation suggests that several factors influence families' application decisions. Primary among these are basic logistical factors such as cost and availability, given unequal coverage of free public programs nationwide (Friedman-Krauss et al. 2020). Next, information gaps have been associated with applying to and enrolling children in prekindergarten, along with associated barriers related to completing applications, submitting required documentation, and meeting set deadlines, which are key to take-up (Currie 2004; Greenberg, Michie, and Adams 2018). Program accessibility is important for gathering information and completing applications and for making programs convenient and desirable. Many low-income families report prekindergarten location and available transportation as being among their most important considerations (Peyton et al. 2001; Tang, Coley, and Votruba-Drzal 2012).

Not only are application barriers particularly relevant for families marginalized from traditional education systems (Lareau 2015), but the interplay between family resources, culture, and program preferences exists in each of these factors. For example, low-income immigrant families may value accessible ways of reaching prekindergarten that are safe from immigration enforcement, facilities that are secured to mitigate fears born of past trauma, and information made accessible through translation and interpretation services (Cervantes, Ullrich, and Matthews 2018; Greenberg, Michie, and Adams 2018). In addition, culturally responsive welcoming efforts play an important role in attracting immigrants, especially because prekindergarten programs are voluntary rather than mandatory (Greenberg, Michie, and Adams 2018; Greenberg, Rosenboom, and Adams 2019).

One recent study of public prekindergarten in Boston illustrates the importance of equitable access and application procedures. Shapiro and colleagues' (2019) study on the Boston Public Schools (BPS) prekindergarten program investigates the role that application behavior and systemic biases play in later school readiness outcomes, using data from district and state administrative records, parent surveys, and the American Community Survey (ACS) from 2008 to 2011. They find that

prekindergarten application patterns underrepresent families of color, families with low incomes, and bilingual families (Shapiro et al. 2019). Their findings not only suggest that students who do not apply to prekindergarten in BPS are more likely to attend lower-performing elementary schools but suggest that the prekindergarten application process may exacerbate racial and socioeconomic achievement gaps between applicants and nonapplicants.

The Boston study is a salient comparison for our study for several reasons. First, BPS's prekindergarten system is also a universal program. Second, it comprises a student body as diverse as the one in Washington, DC, in terms of race and socioeconomic status. Finally, like our study, it uses a lottery-based school choice system for prekindergarten through high school.

Although findings from the BPS study are troubling, recent evidence from New Orleans confirms that outreach and family engagement can increase application rates among low-income families. There, researchers randomly assigned prekindergarten applicants to different communication strategies. Families who received a text message reminder to verify their application were 7 percentage points more likely to complete the application process. This study shows how low-cost interventions can greatly improve prekindergarten access among low-income families (Weixler et al. 2019).

Prekindergarten in the District of Columbia

Since 2014, the District of Columbia has used an annual common application to place new 3-year-old prekindergarten students through 12th-grade students in DCPS and DC public charter schools.[2] All children preparing to enter prekindergarten, including those applying to in-boundary schools, must participate in the My School DC lottery. Students in K–12 programs must submit a lottery application only if they are applying to an out-of-boundary school, selective program, or public charter school. Although K–12 students have the right to attend their in-boundary school, this policy does not extend to PK3 or PK4 students. Prekindergarten applicants are not guaranteed a seat.

The lottery application opens in December and closes at the beginning of March. Families can use these three months to research schools, visit programs, and finalize their ranked list of schools. The lottery results are released at the end of March, and the initial enrollment deadline is in May. All families who wish to enroll their children in a prekindergarten program the following fall must adhere to these application and deadline requirements. Movement between programs is allowed after the initial deadline. If a family enrolls their child in the program they matched, they will remain on the waiting list for programs ranked above their match. If a seat opens up at a higher-ranked school, that family may

take the seat, allowing their old seat to be filled by another child. The lottery data do not reveal the choices families make regarding enrollment, but linking the lottery and enrollment data allows us to analyze waiting list movement.

My School DC leads intensive district-wide outreach in the months leading up to the lottery. It hosts a citywide school fair, advertises on public transportation, presents and trains in city agencies and schools, conducts targeted phone banking, and partners with local nonprofits on community outreach. Phone banking and outreach efforts focus on families in Wards 1, 4, 7, and 8; families of rising prekindergarten students; and families speaking languages other than English at home. Families can also sign up to receive emails and text notifications about the submission process.

Before submitting applications, families can learn more about available programs using the My School DC School Finder, attending the public school fair, or visiting schools. The School Finder is available through the My School DC lottery website and is clearly displayed as a resource for parents as they start the application process. The tool allows parents to find programs by ward, STAR (School Transparency and Reporting) rating, or specific school resources, such as the availability of before- and after-school care. In addition to learning about programs virtually, parents are encouraged to attend EdFEST, the annual public school fair that occurs before the launch of the year's lottery. EdFEST hosts representatives from public schools to provide information to parents before applying to the lottery. My School DC advertises for EdFEST in English, Spanish, Amharic, French, Chinese, and Vietnamese and provides translation services for families who attend the event. Community-based walk-in centers and a help line are available following EdFEST to continue providing support to families. My School DC calls all families with open applications before the submission deadline.

The Current Study

This study is the first to describe applicants and application patterns to DC public prekindergarten. We leverage nearly 40,000 preschool applications submitted to the District of Columbia's centralized admissions lottery between 2014 and 2018 to answer the following research questions:

1. What are the patterns of DC prekindergarten applications, including total counts of applications and numbers of schools ranked, and how do they vary?

2. What are the patterns of lottery outcomes, and how do they vary over time, across geographies, and by preference statuses?

3. What are the characteristics of prekindergarten applicants and matched and wait-listed applicants, and how do they compare with the population of eligible children?

We address the first two questions together using data from My School DC and then turn to the third, linking applications with ACS data to understand the community characteristics of lottery applicants and eligible children.

Data and Methods

We use two sources to study the application patterns of prekindergarten students in the District: applications to the My School DC lotteries held from 2014 through 2018, and 2013–17 five-year estimates from the American Community Survey.

My School DC Lottery Data

This study draws on deidentified lottery applications from every PK3 and PK4 applicant from 2014 through 2018. For each of the nearly 40,000 applications, we have personal data, including addresses, birthdays, and current grade levels (if applicable). The data also include school identification numbers, school names, positions ranked, and lottery grade levels for each program ranked by every applicant. We receive the preferences assigned to each student, both before and during the lottery run. The results files contain the outcomes for each program ranked by students, more than 215,000 outcomes over the five-year period. The lottery data also include the total capacity of each prekindergarten program available to PK3 and PK4 applicants in every year.

Families can rank up to 12 programs on their applications. The lottery assigns each applicant a random number. This number, in conjunction with school PK3 and PK4 capacities and the school preferences described below, dictate program match.

The My School DC lottery allows for two categories of preferences: assigned before the lottery run and assigned during the lottery run (commonly known as "static" and "dynamic" preferences). The preferences in the top panel of table 1 do not depend on the lottery results and are therefore assigned before the run, while those in bottom panel depend on siblings participating in the lottery and are assigned during the run. The 2014 lottery universally applied the same order of preferences for participating schools. Beginning in 2015, schools could choose the relative importance of preferences for their respective programs.

TABLE 1

My School DC Lottery Preferences

Preferences applied in any lottery, 2014–18

Preference	Description
Preferences assigned before the lottery run	
In-boundary	Applicant lives in-boundary of DCPS school
Sibling attending	Applicant indicates a sibling currently attends an application school
In-boundary: sibling attending	Applicant has in-boundary preference and sibling attending preference
Guarantee/Early Action	Applicant is in PK3 or PK4 and lives in-boundary of a DCPS "Early Action" School
Children of staff	Applicant name listed as a child of staff
Founders	Applicant name listed as child of a founder
Proximity	Applicant lives greater than a half-mile walking distance from their in-boundary DCPS elementary school and is applying to attend an out-of-boundary DCPS school that is less than a half-mile walking distance from their home
Transfer	Applicant is applying to transfer from their current school to another school within the same local education agency
Ineligible	Schools may list an applicant as ineligible if they were previously expelled or otherwise are ineligible
Preferences assigned during the lottery run	
In-boundary with sibling accepted to same school or cross-campus	
Sibling accepted to same school or cross-campus	
Twin accepted to same school or cross-campus	
Twin accepted cross-campus	

Notes: DCPS = DC Public Schools; PK3 = public prekindergarten for 3-year-olds; PK4 = public prekindergarten for 4-year-olds. DCPS "Early Action" schools guarantee access to in-boundary PK3 and PK4 programs for all families. If students do not match to another school, they are matched to their in-boundary Early Action program. In 2018, 19 schools were designated as "Early Action" programs.

The lottery relies on a dynamic process known as the deferred acceptance algorithm (Abdulkadiroğlu et al. 2020; Gale and Shapley 1962; Pathak 2011) to match applicants with schools. Applicants are grouped by their school-assigned preferences (table 1). Children within preference groups are admitted first based on lottery number. If seats are still available in the program after all students within the preference groups are admitted, the remaining applicants will be admitted based on lottery number until each seat is filled. When the lottery is run, each program the student ranked has three potential outcomes: matched, wait-listed, or not processed.[3] When a student is matched at a program, every application to a program ranked below the match will not be processed, while every program ranked above the match will remain a waiting list option.[4] Matched, wait-listed, and not processed outcomes have cascading effects for other students whose rankings include the same schools, generating dynamic risk. Waiting lists remain active into the following school year as children and families weigh options and make final decisions regarding program attendance.

My School DC File Preparation

The My School DC lottery data allow us to study families' application patterns, overall match rates to prekindergarten programs, and variations among the match rates and application patterns over time, by program level, and by ward. We use unique within-year application IDs to link the main My School DC lottery files, creating a master file containing all student, program, and application result information. Limited data preparation was required to ensure consistency of program naming conventions and identification over time.

We aggregate My School DC lottery data to the student level to find the number of applications submitted by each student in every year of the study period. We assign each student an application status by reviewing the outcomes for each ranked program. Students who do not receive a match in the lottery run are classified as "wait-listed," and all students who received a match at any of their ranked programs are classified as "matched." We use this binary match variable to compare match and wait-list rates by the number of schools ranked, ward of residence, and assigned preference types.

We use school-level capacity data and the results of each application to understand which schools are oversubscribed and by how many students. We calculate the number of students matched, the number of applicants, and the number of available seats in every program. Each school provides its own program capacity. PK4 programs list the number of available seats assuming PK3 students remain in the school the following year.

American Community Survey Data

The American Community Survey is an ongoing data collection effort conducted by the US Census Bureau. The survey is administered to over 3.5 million randomly selected households each year and gathers information on social, economic, demographic, and housing characteristics. We use the Public Use Microdata Samples downloaded from IPUMS USA for the analysis. We use the five-year ACS estimates, summarizing data from 2013 to 2017, to understand the communities that are home to prekindergarten applicants and their families. The five-year estimates are best for analyzing small populations, as the longer period of study allows for a larger sample size.

We use data on race, immigration status, home language, disability, work status, poverty, receipt of food stamps, educational attainment, and vehicle ownership to understand the communities of applicants and compare the communities of wait-listed and matched students. We complete this analysis at the Public Use Microdata Area (PUMA) level. ACS estimates are available at the block group

level, but to obtain the required individual- and family-level data, we must use a larger geographic region as the unit of analysis. We limit our analysis to 3- and 4-year-old children and their parents to study a group as close to potential PK3 and PK4 applicants as possible. The District of Columbia is made up of five PUMAs, which align closely, but not exactly, with the eight wards. We join the PUMA-level ACS data with the geocoded My School DC lottery data to make comparisons between student groups.

Mapping

To further understand the geographic patterns of program match rates, we geocode student addresses using an offline tool built by the Urban Institute.[5] Urban Institute researchers created the geocoder using ArcGIS and ESRI StreetMap Premium offline address data. It obtains latitude and longitude coordinates from postal addresses using commercial data provided by ESRI. We use the geocoded addresses to understand the location of prekindergarten applicants in the District.

We geocode more than 99 percent of the applicants in the prekindergarten sample. The remaining applicants that did not geocode live in housing units that are not contained in the commercial data used by the Urban geocoder. Additionally, 491 prekindergarten applicants did not live in the District and are not included in the ACS analysis or District maps.[6]

We join the geocoded student addresses to DC census tracts. To protect families' privacy, we do not map every applicant's address. Rather, each address is placed in the corresponding census tract. We calculate the prekindergarten program match rate for PK3 and PK4 for each census tract and create a map for each study year.

Demographic Comparisons

We use PUMA-level ACS microdata to compare communities of all 3- and 4-year-old children, all prekindergarten applicants, and applicants matched and wait-listed by the lottery. To do this, we use parent-child linking variables to create a child-level dataset with associated parent or caregiver characteristics attached to the child. We include data for children whose ages correspond to PK3 and PK4 birthday cutoffs: 3-year-olds born in quarters one through three, all 4-year-olds, and 5-year-olds born in quarter four. After dropping lottery applicants living outside the District, we use the geocoded applicant addresses to merge the student lottery data to the PUMA-level ACS data.

We approximate several characteristics of the communities where lottery applicants live, including racial composition, family structure, immigration status, language spoken at home, disability status,

employment status, poverty status, and educational attainment. Each lottery applicant is assigned the set of characteristics for the PUMA of residence based on application address. For example, 9 percent of prekindergarten-age children in PUMA 103 have an immigrant parent. When we join the ACS and My School DC lottery data, each applicant whose address is within PUMA 103 is assigned 9 percent as their value for the variable "at least one parent is an immigrant." We do this for each variable of interest. We then calculate the average of each characteristic, first by the students who applied to the lottery and then by the students who were matched and students who were wait-listed. Although this is not an exact measure of the communities of prekindergarten applicants, it provides us an idea of how the group of prekindergarten applicants looks compared with the age group overall in the District. By finding the average of these characteristics according to match status, we can identify differences in the community characteristics of matched students and wait-listed students.

Limitations

Because of the privacy limitations of ACS data, we use a larger geographic unit of analysis (the PUMA) than is ideal. This results in a less detailed analysis than we would be able to complete if the IPUMS data provided block-group-level data for the individual and household variables we use. The five-year ACS estimates cover the same periods as the lottery data but do not allow for observations of changes in communities. If DC's child population changed dramatically from 2013 to 2017, the ACS data will not allow us to analyze the changes in the communities of applicants, matched students, and wait-listed students. Using the five-year ACS data results in the most reliable but least current estimates of community characteristics.

Findings

Patterns of Prekindergarten Applications and Lottery Outcomes

Table 2 shows counts of students applying and matched to PK3 and PK4 in the five lotteries from 2014 to 2018. Applications have increased nearly every year since the lottery's launch: PK3 applications have increased by more than 1,400 (a 33 percent increase), while PK4 applications have increased by nearly 200 (an 11 percent increase). Counts of students matched with a chosen school have increased, as well, though unevenly. Match rates for PK3 largely remained steady, ranging from 86 percent to 88 percent. Match rates for PK4 declined from 67 percent in 2014 to 58 percent in 2018, with the largest number of students matched in 2015, followed by declines and then an uptick in 2018. These match rates suggest that the DC prekindergarten lottery is competitive. Between 2014 and 2018, 95 percent of schools were oversubscribed, with an average of 140 more applicants than available seats. Around 4 percent of schools were undersubscribed, having an average of 16 more seats than applicants.

TABLE 2
Match Rate by Program Level

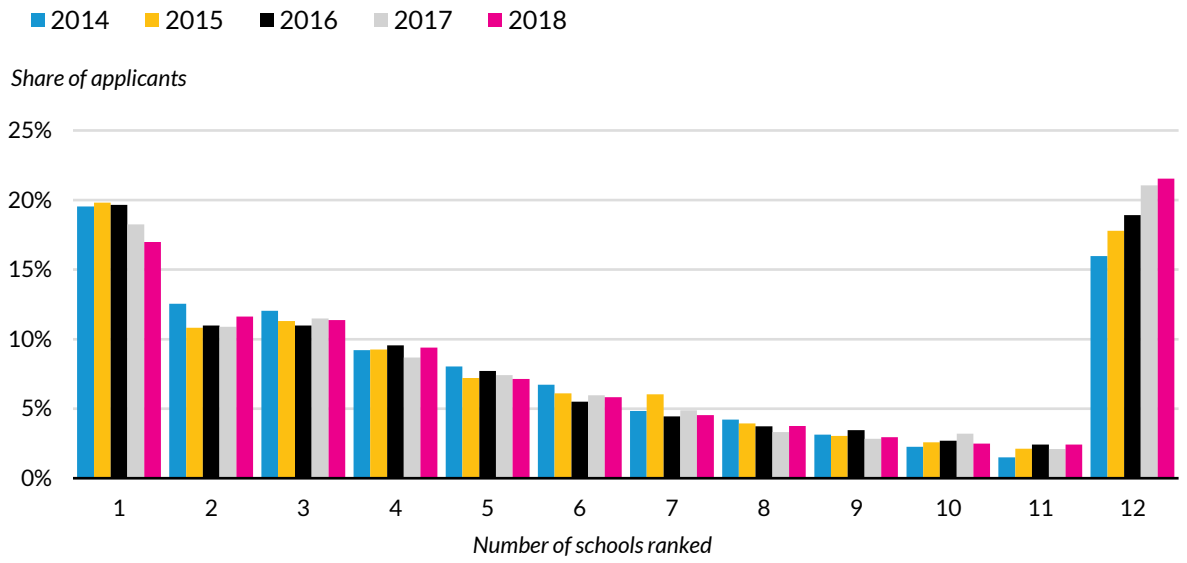
	PK3			PK4		
Year	Total applicants	Number matched	Match rate	Total applicants	Number matched	Match rate
2014	4,250	3,748	88%	2,506	1,669	67%
2015	4,925	4,272	87%	2,998	1,934	65%
2016	5,186	4,539	88%	3,012	1,865	62%
2017	5,167	4,499	87%	2,979	1,710	57%
2018	5,669	4,897	86%	3,195	1,859	58%

Source: My School DC lottery data, 2014–18.
Note: PK3 = public prekindergarten for 3-year-olds; PK4 = public prekindergarten for 4-year-olds.

Match rates reflect a combination of family priorities, preference statuses, school capacity, and random lottery draw. Figures 1 and 2 show one aspect of family priorities—the number of schools ranked on PK3 and PK4 applications—providing insights into families' selectivity. On average, in each year, families rank more options for children applying to PK3 compared with PK4. Families of PK3 applicants are increasingly applying to the maximum number of schools allowed by the lottery (12). In contrast, more than 20 percent of families of PK4 applicants in each year rank only one school, suggesting that PK4 applicants are "choosier" than their PK3 peers, perhaps because they have other attractive early education options, including their PK3 schools.

FIGURE 1

Number of Schools Ranked by PK3 Applicants



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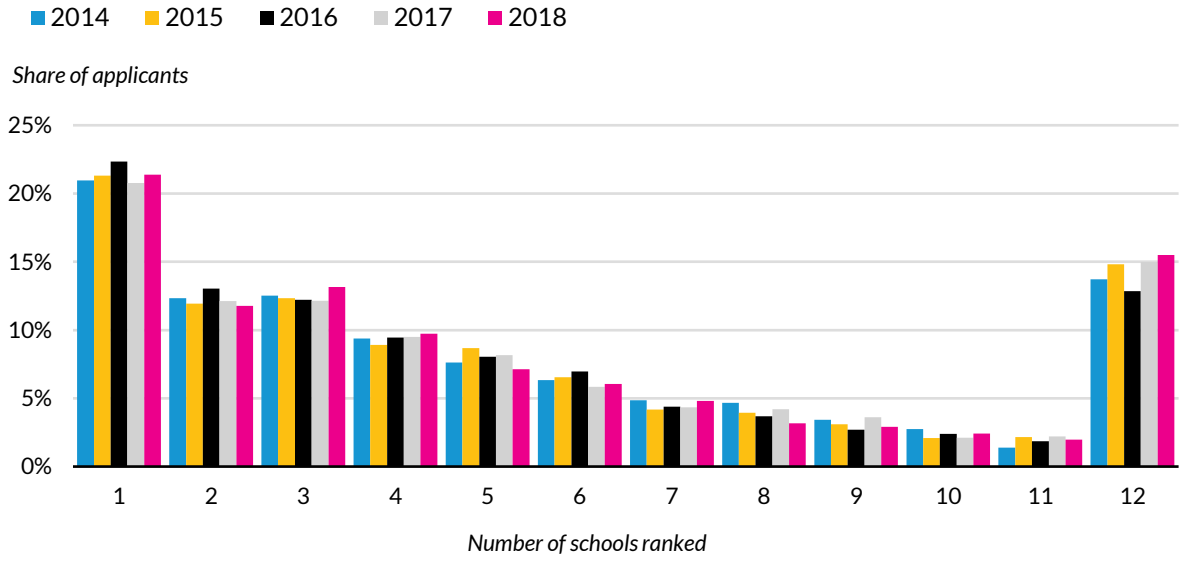
Source: My School DC lottery data, 2014–18.
Note: PK3 = public prekindergarten for 3-year-olds.

FIGURE 2

Number of Schools Ranked by PK4 Applicants



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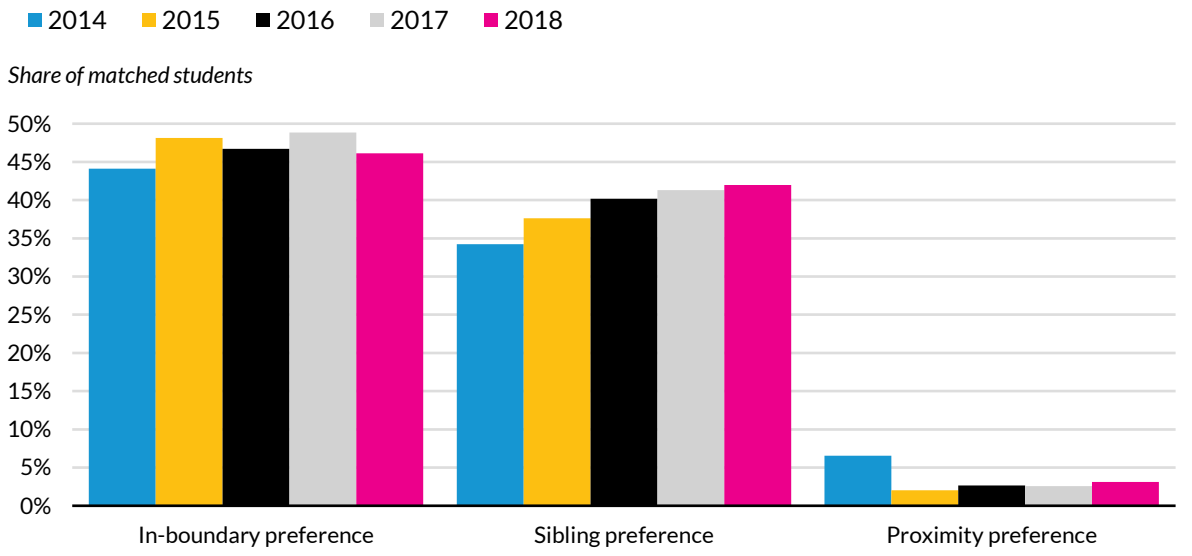
Source: My School DC lottery data, 2014–18.
Note: PK4 = public prekindergarten for 4-year-olds.

In addition to family rankings, preference statuses set by schools and local education agencies (including DCPS and public charter networks) play a role in determining lottery outcomes. These statuses move qualifying applicants to the front of the queue, where they are ordered by their lottery numbers within each status grouping. Figures 3 and 4 display the share of students who are matched to a DC prekindergarten program with specific preferences. More than half the applicants matched in PK4 have an in-boundary preference, slightly higher than students matched to PK3. Students matched in PK3 are more likely to have a sibling preference than those in PK4, and the share of matched PK3 applicants with sibling preference status increased nearly 10 percentage points between 2014 and 2018. Very few students have proximity or transfer preferences in the preschool lottery.

FIGURE 3

Preferences of Matched PK3 Students

Share of matched students by year



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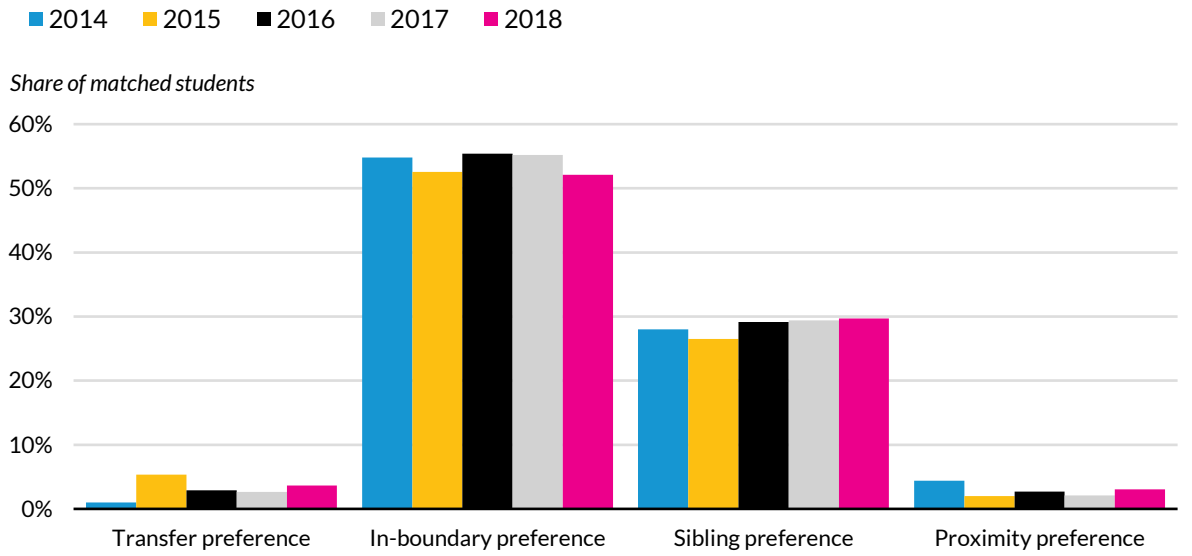
Source: My School DC lottery data, 2014–18.

Notes: PK3 = public prekindergarten for 3-year-olds. Proximity preference is defined by My School DC as a "lottery preference provided to students who live greater than a half-mile walking distance from their in-boundary DCPS elementary school and apply to attend an out-of-boundary school that is a half-mile or less walking distance from their home. This preference only applies to students enrolling in grades PK3-5. Proximity preference is not offered at citywide schools. The application will automatically populate this preference based on the guardian's home address provided on the application."

FIGURE 4

Preferences of Matched PK4 Students

Share of matched students by year



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Source: My School DC lottery data, 2014–18.

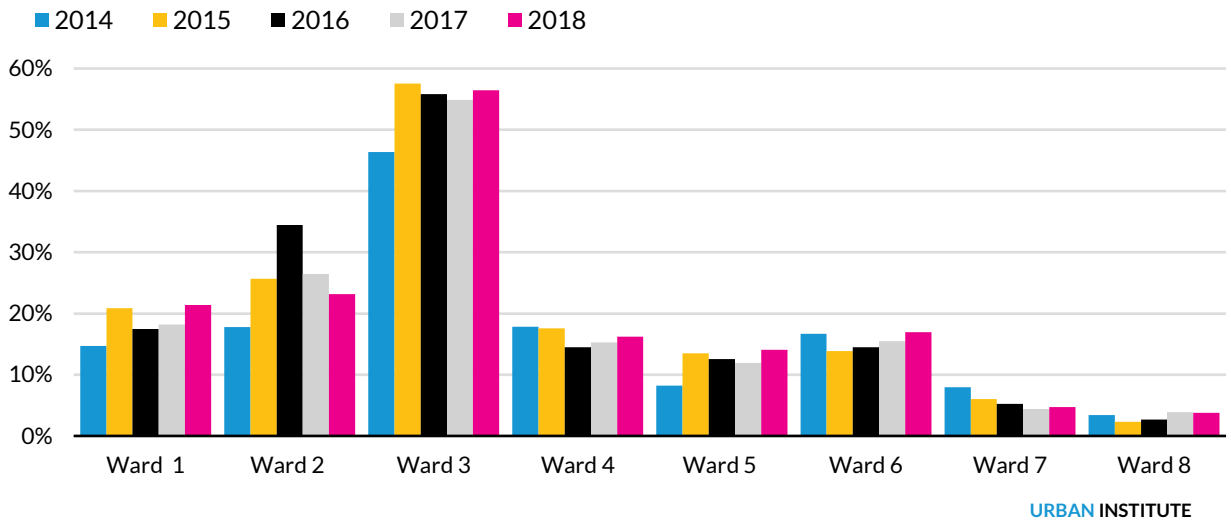
Note: PK4 = public prekindergarten for 4-year-olds. Proximity preference is defined by My School DC as a "lottery preference provided to students who live greater than a half-mile walking distance from their in-boundary DCPS elementary school and apply to attend an out-of-boundary school that is a half-mile or less walking distance from their home. This preference only applies to students enrolling in grades PK3-5. Proximity preference is not offered at citywide schools. The application will automatically populate this preference based on the guardian's home address provided on the application."

The match rates summarized in table 2 vary substantially across the District. Figures 5 and 6 show the share of applicants who are wait-listed, or not matched to a program through the lottery, by ward of residence. (Wait-list rates provide a preliminary estimate of unmet need and decrease after the lottery, as efforts are made to help children enroll in available programs.) For the PK3 lottery, the highest rate of wait-listed applicants occurs in Ward 3, which has no schools offering that grade. The pattern shifts for PK4, where Wards 1 and 2 have a greater share of wait-listed students than other wards. For both grades, the lowest-income wards (Wards 7 and 8) have the lowest wait-list rates.

FIGURE 5

Wait-Listed PK3 Applicants by Ward

Share of applicants wait-listed by year



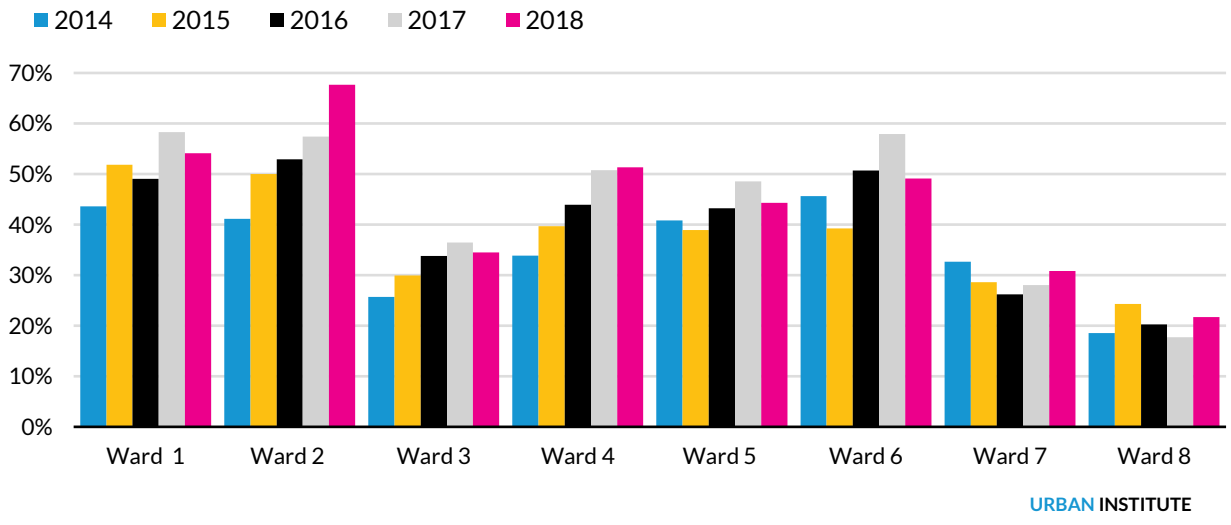
Source: My School DC lottery data, 2014–18.

Notes: PK3 = public prekindergarten for 3-year-olds. Applicants are idenfied as wait-listed, or not matched to any school, as the final result of the lottery.

FIGURE 6

Wait-Listed PK4 Applicants by Ward

Share of applicants wait-listed by year



Source: My School DC lottery data, 2014–18.

Notes: PK4 = public prekindergarten for 4-year-olds. Applicants are identified as wait-listed, or not matched to any school, as the final result of the lottery.

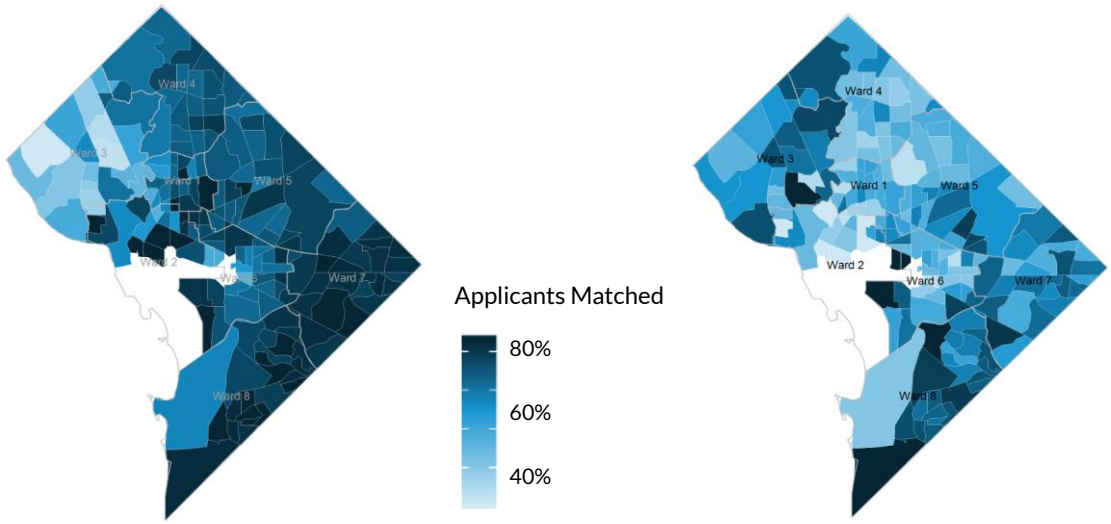
Looking within wards, we find some variation in lottery outcomes. Figures 7 and 8 show the match rates of each census tract, or neighborhood, within the District. Darker shades of blue indicate higher average match rates across all applicants within the tract. Variation within wards is generally greater in PK4 than in PK3. For example, nearly all census tracts in Wards 7 and 8 show match rates above 60 percent in PK3. In PK4, we find more variability. Patterns look similar for Wards 4, 5, and 6. Match rates in Wards 2 and 3 vary across both grades, but they decrease as applicants progress from PK3 to PK4 in Ward 2 and increase in Ward 3, on average. Several factors may explain these patterns, including families' satisfaction with PK3, which may determine the number of seats open for PK4 at each school, and the status of PK4 as an entry grade in Ward 3 and as a bridge to kindergarten and beyond, district-wide.

FIGURE 7

PK3 Match Rate by Census Tract in 2018

FIGURE 8

PK4 Match Rate by Census Tract in 2018



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Source: My School DC lottery data, 2018.
Note: PK3 = public prekindergarten for 3-year-olds; PK4 = public prekindergarten for 4-year-olds.

Characteristics of Prekindergarten Applicants and Matched and Wait-Listed Applicants

To better understand patterns of prekindergarten applications and lottery outcomes, ideal analyses would draw on a rich set of background data on children and families and explore variation in

participation and match rates across demographic and socioeconomic groups. But the DC prekindergarten lottery collects minimal background data because of its primary mission: to support a streamlined and accessible application system. Instead, we use families' listed addresses, geocoded and linked to five-year ACS microdata on community characteristics at the PUMA level, to proxy for the individual characteristics of prekindergarten applicants and matched and wait-listed applicants. Although this approach has notable limitations, it provides the best opportunity to learn about applicants and their families before school enrollment.

Tables 3 and 4 describe the characteristics of 3- and 4-year-old children in the District of Columbia, prekindergarten applicants, and matched and wait-listed applicants. Columns 1 and 2 estimate the number of preschoolers in the District and their average community characteristics. DC's young children live in communities that are about 50 percent Black, 20 percent Hispanic, and 20 percent white.[7] (In comparison, the population of DC is nearly 46 percent Black, 20 percent Hispanic, and 37 percent white.[8]) About 50 percent of households in their communities have two parents. In their communities, about 25 percent of families have at least one immigrant parent, and about 35 percent of families speak a language other than English, most often Spanish, at home. Young children live in communities with high employment rates: both one- and two-parent households most often have all parents working full time, on average, in part because of DC prekindergarten (Malik 2018). Still, these communities experience substantial financial hardship, with roughly 20 percent of families experiencing poverty and many more qualifying as low income (earning up to 200 percent of the federal poverty level); communities of 4-year-olds are less well resourced than those of 3-year-olds, on average. Roughly 35 percent of families receive food stamps. Young children live in communities where parents typically do not hold a bachelor's degree, but the vast majority of families own cars.

Columns 3, 4, and 5 describe the average community characteristics of DC prekindergarten applicants, those matched by the lottery, and those wait-listed, respectively. Comparisons to column 2 show striking similarity: applicants and those matched to prekindergarten look nearly identical across all characteristics examined, differing from all young children by 3 percentage points, at most.

Larger differences appear in comparing wait-listed applicants and the population as a whole. Communities of children wait-listed into PK3 contain, on average, lower shares of Black families (40 percent versus 54 percent) and higher shares of Hispanic and white families (19 percent versus 14 percent and 29 versus 22 percent). Their communities have lower shares of families with one parent (29 percent versus 43 percent) and higher shares of families with two or no parents (65 percent versus 52 percent and 32 percent versus 24 percent). Wait-listed applicants come from communities with higher shares of families with at least one immigrant parent (32 percent versus 24 percent) and lower

shares of families speaking only English at home (59 percent versus 69 percent). Their communities are also more socioeconomically advantaged: they have higher shares of two-parent full-time working households (36 percent versus 28 percent), families with higher incomes (earning more than 200 percent of the federal poverty level, 76 percent versus 63 percent), families with four-year college degrees or more (55 percent versus 43 percent), and families with at least one vehicle (83 percent versus 74 percent), along with lower shares of families receiving food stamps (26 percent versus 37 percent). Patterns are substantially similar for PK4 applicants. Given that these comparisons rely on data from only five PUMAs, the number and magnitude of these differences is remarkable. Findings suggest the need for new questions around lottery priorities, prekindergarten availability, and outreach, discussed below.

TABLE 3

Select Characteristics of Children in Washington, DC

Including children eligible for PK3 in 2018

	Number of pre-K-eligible children (1)	Community characteristics of: Pre-K-eligible children (2)	All applicants (*N* = 5,669) (3)	Matched students (*N* = 4,897) (4)	Wait-listed students (*N* = 772) (5)
Total population	7,590				
Child's race or ethnicity					
Black	4,086	54%	52%	55%	40%
Hispanic	1,074	14%	16%	15%	19%
White	1,681	22%	22%	20%	29%
Asian	288	4%	4%	4%	5%
Other race or multiracial	461	6%	6%	6%	7%
Family composition					
One parent	3,251	43%	40%	43%	29%
Two parents	3,932	52%	54%	51%	65%
No parents	407	5%	6%	6%	6%
At least one parent is an immigrant	1,832	24%	26%	25%	32%
Language spoken at home[a]					
English only	5,226	69%	66%	68%	59%
Spanish	902	12%	13%	12%	15%
Other languages	1,055	14%	15%	14%	19%
Disability[b]					
Parental disability	709	9%	9%	9%	7%
Child disability	0	0%	0%	0%	0%
Parental work status[c]					
One-parent household, not working	1,237	16%	15%	17%	10%
One-parent household, working part time	683	9%	9%	9%	6%
One-parent household, working full time	1,331	18%	17%	18%	13%
Two-parent household, not working	37	0%	0%	0%	0%
Two-parent household, one working part time	40	1%	1%	1%	1%
Two-parent household, one working full time	1,081	14%	15%	14%	17%
Two-parent household, both working part time	108	1%	1%	1%	2%
Two-parent household, one working part time, one full time	513	7%	7%	7%	9%
Two-parent household, working full time	2,153	28%	29%	28%	36%
Poverty, family income below 100% of FPL	1,790	24%	22%	24%	15%

	Number of pre-K-eligible children (1)	Community characteristics of Pre-K-eligible children (2)	All applicants (*N* = 5,669) (3)	Matched students (*N* = 4,897) (4)	Wait-listed students (*N* = 772) (5)
Low income, family income below 200% of FPL	2,713	36%	34%	37%	24%
Not low income, family income at or above 200% of FPL	4,772	63%	66%	63%	76%
Food stamp recipients	2,811	37%	35%	38%	26%
Highest educational attainment of parents					
Less than high school	911	12%	12%	13%	10%
High school diploma or some college	3,403	45%	44%	46%	34%
Four-year college degree or more	3,258	43%	44%	41%	55%
Family has access to at least one vehicle	5,626	74%	76%	74%	83%

Source: Estimates using 2013–17 American Community Survey Public Use Microdata Samples downloaded from IPUMS-USA.

Notes: FPL = federal poverty level; PK3 = public prekindergarten for 3-year-olds. Percentage totals may not sum to 100 percent because of rounding and nonresponse. The table does not include demographic data for children living outside, but attending prekindergarten within, the District of Columbia (195 children over five years in our study). The table does not present data from the DC Office of the State Superintendent of Education but uses students' lottery outcomes to describe average community characteristics of matched and wait-listed students, respectively. Children eligible for PK3 (children age 3, born January through September, and children age 4, born October through December) are included in the table.

[a] This variable reflects parents' primary language; if one parent speaks a non-English language, we use that language.

[b] Any reported conditions involving an individual's visual, auditory, or physical abilities are included in this variable. Individuals who have a physical, mental, or emotional difficulty that limits the ability to live alone are also included.

[c] We define this variable using caregiver work status in place of parents when there are no parents in the household.

TABLE 4

Select Characteristics of Children in Washington, DC

Including children eligible for PK4 in 2018

		Community characteristics of			
	Number of pre-K-eligible children (1)	Pre-K-eligible children (2)	All applicants (*N* = 5,669) (3)	Matched students (*N* = 4,897) (4)	Wait-listed students (*N* = 772) (5)
Total population	8,625				
Child's race or ethnicity					
Black	4,423	51%	50%	53%	38%
Hispanic	1,949	23%	23%	22%	27%
White	1,607	19%	19%	18%	25%
Asian	167	2%	2%	1%	3%
Other race or multiracial	479	6%	6%	6%	8%
Family composition					
One parent	3,908	45%	45%	47%	35%
Two parents	4,185	49%	50%	46%	60%
No parents	532	6%	6%	6%	5%
At least one parent is an immigrant	2,653	31%	31%	29%	38%
Language spoken at home[a]					
English only	5,483	64%	64%	65%	59%
Spanish	1,669	19%	20%	19%	23%
Other languages	941	11%	11%	10%	14%
Disability[b]					
Parental disability	751	9%	9%	9%	8%
Child disability	108	1%	1%	1%	1%
Parental work status[c]					
One-parent household, not working	1,008	12%	12%	13%	9%
One-parent household, working part time	513	6%	6%	6%	5%
One-parent household, working full time	2,387	28%	27%	29%	21%
Two-parent household, not working	13	0%	0%	0%	0%
Two-parent household, one working part time	147	2%	2%	1%	2%
Two-parent household, one working full time	1,139	13%	14%	13%	16%
Two-parent household, both working part time	0	0%	0%	0%	0%
Two-parent household, one working part time one full time	973	11%	11%	10%	14%
Two-parent household, working full time	1,913	22%	23%	21%	28%
Poverty, family income below 100% of FPL	1,567	18%	17%	19%	12%
Low income, family income below 200% of FPL	3,857	45%	44%	47%	36%

	Number of pre-K-eligible children (1)	Community characteristics of Pre-K-eligible children (2)	All applicants (*N* = 5,669) (3)	Matched students (*N* = 4,897) (4)	Wait-listed students (*N* = 772) (5)
Not low income, family income at or above 200% of FPL	4,681	55%	56%	53%	64%
Food stamp recipients	2,939	34%	33%	35%	27%
Highest educational attainment of parents					
Less than high school	1,175	14%	14%	14%	14%
High school diploma or some college	3,871	45%	44%	46%	35%
Four-year college degree or more	3,488	40%	42%	39%	51%
Family has access to at least one vehicle	5,894	68%	69%	68%	73%

Source: Estimates using 2013–17 American Community Survey Public Use Microdata Samples downloaded from IPUMS-USA.

Notes: FPL = federal poverty level; PK4 = public prekindergarten for 4-year-olds. Percentage totals may not sum to 100 percent because of rounding and nonresponse. The table does not include demographic data for children living outside, but attending prekindergarten within, the District of Columbia (195 children over five years in our study). The table does not present data from the DC Office of the State Superintendent of Education but uses students' lottery outcomes to describe average community characteristics of matched and wait-listed students, respectively. Children eligible for PK4 (children age 4, born January through September, and children age 5, born October through December) are included in the table.

[a] This variable reflects parents' primary language; if one parent speaks a non-English language, we use that language.

[b] Any reported conditions involving an individual's visual, auditory, or physical abilities are included in this variable. Individuals who have a physical, mental, or emotional difficulty that limits the ability to live alone are also included.

[c] We define this variable using caregiver work status in place of parents when there are no parents in the household.

Discussion

Our findings demonstrate substantial differences between the PK3 and PK4 lotteries and unifying themes of equitable access and outcomes. The PK3 lottery attracts more applicants and has a substantially higher and more stable match rate over time, relative to the PK4 lottery. PK3 applicants also rank more schools, on average, and are increasingly matched through sibling preference. In-boundary preference is the most common preference status held by matched applicants across all grades and years. Although nearly all applicants have in-boundary DCPS schools,[9] the role of this status in ensuring equitable access remains unclear. PK3 match rates are lowest in Ward 3, which does not include any schools offering the grade, while PK4 match rates are lowest in Wards 1 and 2. Wards 7 and 8, home to many households with low incomes and communities of color, have the highest match rates in the District.

When we link lottery applications with ACS data on community characteristics, patterns largely hold. Applicants closely resemble the populations of 3- and 4-year-old children in DC. Applicants matched to public prekindergarten do as well. But wait-listed applicants show notable differences. Wait-listed applicants come from communities with

- higher shares of Hispanic and white families and lower shares of Black families,
- higher shares of families with two or no parents and lower shares of families with one parent,
- higher shares of immigrant families and families speaking languages other than English at home, and
- higher shares of two-parent full-time working families, families with higher incomes, families with four-year college degrees and at least one vehicle, and families not receiving food stamps.

These findings suggest that wait-listed applicants disproportionately come from socioeconomically advantaged communities. Findings also suggest disparities in lottery outcomes for immigrant families that warrant further consideration, especially as public preschool has been shown to improve access and school readiness for children of immigrants in other contexts (Greenberg, Rosenboom, and Adams 2019; Greenberg, Michie, and Adams 2018).

Findings for immigrant families reflect the experiences of those living in low-income communities and those in affluent communities of international diplomats and academic scholars (table 5). For example, PUMAs 102 and 105 include the highest shares of immigrant families with preschool-age children. In PUMA 105 (which largely overlaps with Ward 2 and the southern half of Ward 1), just 9

percent of immigrant families with 3-year-olds and 37 percent of immigrant families with 4-year-olds have low incomes, while in PUMA 102 (which includes Ward 4 and the northern half of Ward 1), 44 percent of immigrant families with 3-year-olds and 50 percent of immigrant families with 4-year-olds have low incomes. Understanding the rankings, preference statuses, and characteristics of schools ranked by immigrant families from more advantaged and less advantaged communities is key to interpreting our wait-list findings.

TABLE 5

Children of Immigrant and US-Born Parents in the American Community Survey, by PUMA

Including children eligible for PK3 and PK4

	PK3				PK4			
	Immigrant families		Immigrant families, low income		Immigrant families		Immigrant families, low income	
PUMA	Share	*N*	Share	*N*	Share	*N*	Share	*N*
101	31%	290	0%	0	53%	633	9%	54
102	43%	564	44%	248	54%	1,095	50%	548
103	25%	382	42%	161	21%	275	54%	148
104	4%	108	39%	42	8%	280	61%	170
105	52%	488	9%	40	46%	370	37%	138

Source: Estimates using 2013–17 American Community Survey Public Use Microdata Samples downloaded from IPUMS-USA.
Notes: PK3 = public prekindergarten for 3-year-olds; PK4 = public prekindergarten for 4-year-olds; PUMA = Public Use Microdata Area. Immigrant families are those where at least one parent is an immigrant. A family is considered low income if it earns less than 200 percent of the federal poverty level. Small samples for families with 3-year-olds in PUMA 105 suggest caution in interpretation.

Additional information on individual applicants can help answer questions such as these:

- What is the average number of schools ranked by more and less socioeconomically advantaged families, and how do rankings differ between immigrant and US-born families?
- Do other lottery inputs, such as use of school preferences, vary by families' socioeconomic status and immigrant background?
- What is the role of language-specific lotteries in dual language immersion schools? Do they have higher match rates for applicants whose home language is Spanish (or other languages) than similar schools without?

Answers to these questions can inform solutions to potential disparities in lottery outcomes. For example, they can illuminate whether outreach encouraging immigrant families with low incomes to apply to more schools or schools with language-specific application tracks would help families find a match. We could also assess whether there are certain types of schools or areas of the District where

expanding prekindergarten capacity would improve access for Hispanic children, families with home languages other than English, and immigrant families. Specific recommendations, driven by evidence, can help My School DC and OSSE ensure that wait-listed applicants more closely mirror the populations of applicants and young children District-wide.

Although evidence can help families overcome barriers to access, it cannot fully define equity in application patterns and lottery outcomes. It is encouraging that applicants and matched applicants closely resemble the overall population of prekindergarten-age students, and yet equality may be insufficient to overcome historical and ongoing advantages wealthy and white families have in accessing high-quality preschool. To advance equitable outcomes, application and match rates may need to be higher for students with low incomes and students of color, especially Black and Hispanic students. A current proposal to include an "at risk" preference in the My School DC lottery (Bill 23-717) would reshape the patterns described in this report.[10] The DC Policy Center estimates that this new preference would increase the share of students experiencing poverty, homelessness, or foster care served and increase socioeconomic diversity in PK3 and PK4 programs (Coffin 2020). Similarly, family priorities may play a role in defining equity. Families in Wards 7 and 8 ranked five schools when applying to PK3, on average, while families in Wards 3 and 6 ranked an average of seven. PK4 applicants in Ward 8 ranked four schools, on average, while those in Wards 1, 2, 5, and 6 ranked six. Additional data on program quality and child outcomes, in addition to convenience and other factors affecting choice and application patterns, can illuminate issues of equity in the lottery (Latham et al. 2020; Valentino 2017).

Looking Ahead

This report is the first publication of our study of DC public prekindergarten. In later reports, the applicants and application patterns described here become the basis for a randomized experiment. We leverage the lottery to estimate the impacts of DC prekindergarten using state-of-the-art methods pioneered by Abdulkadiroğlu and colleagues (2017). Abdulkadiroğlu and colleagues develop techniques that make efficient use of random variation in program assignment generated by the lottery. We use these techniques to reconstruct and then simulate the lottery, generating propensity scores that estimate applicants' chances of being matched to a prekindergarten program under different random lottery draws. Applicants with nondegenerate risk (propensity scores other than zero or one, or simulated lottery outcomes that are not all matched or all wait-listed) can contribute to our experimental sample. The experimental sample will differ from all applicants in important ways, as figures 5 through 8 illustrate. For example, applicants in the experimental sample may be more likely to

come from immigrant families and more socioeconomically advantaged families. Some wards (e.g., Ward 3 for PK3 and Ward 1 for PK4) are likely to play a bigger role in the analyses than others.

Our next steps involve linking lottery applications, propensity scores computed through lottery reconstruction and simulation, and enrollment data provided by OSSE. A key question is whether students comply with their assignments. That is, do students matched with PK3 and PK4 enroll, and do students who are wait-listed remain so? Understanding compliance patterns can inform more responsive recommendations regarding outreach efforts and lottery procedures that support equitable access and outcomes.

For now, this report offers the first comprehensive description of DC public prekindergarten applicants and application patterns. Findings form the basis of the broader DC prekindergarten study and serve as a reference for other preschool programs seeking to provide access through a centralized lottery. Findings show that DC prekindergarten in a leading example for other state and local programs, such as ones in Boston (Shapiro et al. 2019), but gaps remain, suggesting that additional research, outreach, and application support can help ensure all young children have a chance to win the preschool lottery.

Notes

[1] "About My School DC," My School DC, accessed August 12, 2020, https://www.myschooldc.org/about/about-my-school-dc.

[2] Though all charter schools are encouraged to participate in the My School DC lottery, not every charter school does. All PK3 and PK4 charter school programs participate in the lottery during our study period, except Latin American Montessori Bilingual.

[3] The lottery includes a fourth possible outcome, ineligible, which has not historically gone to prekindergarten applicants. Schools may list this outcome for previously expelled applicants or those otherwise ineligible according to school handbooks, such as those who have not qualified for selective high schools.

[4] A sibling exception policy also applies. If an applicant's sibling was matched to a school that the applicant also selected on their application, the applicant will be added to the waiting list at that school, regardless of how the school was ranked on their application.

[5] All geocoding was completed behind Urban's firewall and is done offline, maintaining Family Educational Rights and Privacy Act compliance in line with our data-sharing agreement.

[6] Families living outside the District can submit applications. Residency requirements are not implemented until registration.

[7] We follow the racial and ethnic categories included in the ACS while acknowledging that they may not be families' preferred identifiers, and we remain committed to employing inclusive language whenever possible.

[8] "QuickFacts: District of Columbia," US Census Bureau, accessed August 12, 2020, https://www.census.gov/quickfacts/DC#qf-headnote-b.

[9] Families living outside the District can submit applications. Residency requirements are not implemented until registration.

[10] Expanding Equitable Access to Great Schools Act of 2020, B23-0717, https://lims.dccouncil.us/Legislation/B23-0717.

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About the Authors

Erica Greenberg is a senior research associate in the Center on Education Data and Policy at the Urban Institute. Her research spans early childhood and K–12 education, focusing on programs and policies like public prekindergarten, Head Start, child care subsidies, and home visiting. She also investigates the causes, consequences, and measurement of educational inequality. Greenberg holds a BA from Yale University. She received her MA in political science and her PhD in education policy from Stanford University.

Grace Luetmer is a research analyst in the Center on Education Data and Policy. She graduated from Boston College with a BA in economics and from Carnegie Mellon University with an MS in public policy and management.

Carina Chien is a research assistant in the Center on Education Data and Policy. She graduated from Cornell University with a bachelor's degree in economics and comparative literature.

Tomas Monarrez is a research associate in the Center on Education Data and Policy. His research focuses on education policy topics as they relate to economic and racial inequality. Monarrez received bachelor's degrees in economics and mathematics from the University of Texas at Austin and earned his doctoral degree in economics from the University of California, Berkeley.

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