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# Constrained Agency and the Architecture of Educational Choice: Evidence from New York City

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# Constrained Agency and the Architecture of Educational Choice:

# Evidence from New York City

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**Abstract**

Many school districts consider family preferences in allocating students to schools. In theory, this approach provides traditionally disadvantaged families greater access to high-quality schools by weakening the link between residential location and school assignment. We leverage data on the school choices made by over 233,000 New York City families to examine the extent to which the city's school choice system fulfills this promise. We find that over-subscribed and high-quality schools enroll smaller proportions of students from traditionally disadvantaged families. We explore three mechanisms to explain this inequitable distribution: application timing, neighborhood stratification, and the architecture of the choice process itself. We find that all three mechanisms have a disequalizing influence and propose several policy shifts to address this inequality.

*Keywords:* school choice, school segregation, inequality

# Constrained Agency and the Architecture of Educational Choice: Evidence from New York City

New York City currently operates the largest and arguably the most complex school choice system in the U.S. For kindergarten alone, roughly 65,000 children each year are matched to one of over 700 traditional public schools. The school allocation process encompasses a complicated set of enrollment deadlines, application priorities, and seat availabilities. This seemingly restrictive structure, however, also affords a tremendous amount of latitude, with families able to apply to any school in the city, regardless of their residential address. For decades, authors have explored the tension between family agency and the architecture of school choice structures (e.g., Bell, 2009a; Denice & Gross, 2016; Edwards, 2021; Jabbar & Lenhoff, 2019; Scott & Wells, 2013). New York City, however, represents a unique opportunity to examine these issues within a choice system where all families are required to participate—no students are guaranteed a spot in any school, even their zoned school—and most schools receive more applications than they have available seats. Central to our current study, these decisions and mechanisms play out in an urban context that is remarkably diverse, yet also among the most segregated and stratified in the nation.

Our focus in this paper is the intersection of family preference and the priority structure that determines whose preferences are honored. We explore how specific components of the allocation process influence whether families receive their top choices. We begin by examining the impact of application timing on how students and schools are matched. Families that apply during a six-week application window are given priority, while those who do not are matched only to schools that have seats remaining after the initial round of offers are made to on-time applicants. Next, we explore the extent to which traditionally disadvantaged students are zoned

to lower-quality schools and, relatedly, how likely they are to choose a school outside their zone. Although families can apply to any school, residential address still affects student placement in the priority hierarchy for each school listed on their application. We therefore consider how selecting a non-zoned school influences the likelihood a student receives their first-choice school. We model whether inequalities in matching to a first-choice school remain after adjusting for individual students' priority rankings for that school. Overall, we demonstrate how differences in application timing and the school assignments resulting from the matching algorithm relegate traditionally disadvantaged families to lower-quality schools, reinforcing rather than ameliorating existing inequalities. We label this seeming freedom amidst structural limitations "constrained agency."

## Background

Family agency and system priorities are in greatest conflict when demand exceeds supply—when more families apply for particular schools than those schools can accommodate. In choice systems where no schools are oversubscribed, family agency is far less likely to be constrained by district priority structures. Disparities in enrollment patterns and school compositions in such contexts will be driven largely by demographic differences in family preferences, whatever the origin of those differences. Conversely, in districts where demand for particular schools exceeds supply, the degree to which choice exacerbates inequality will depend on how the system allocates seats to oversubscribed schools (Jabbar & Lenhoff, 2019). In these instances, family agency might indeed be constrained by the architecture of the system (Abdulkadiroğlu et al., 2009; Sattin-Bajaj & Roda, 2020). In the sections below, we discuss family school selection processes, highlighting how structural constraints within ostensibly open choice systems influence inequalities in access to sought-after schools.

**Family Preferences**

At the start of the choice process, families often create a list of schools they perceive as acceptable options—their "choice set" (Bell, 2009a, 2009b). In deciding which schools are included, studies examining *expressed* preferences find that academic quality, as measured by standardized test scores, is most often cited as the primary factor (Altenhofen et al., 2016; Kleitz et al., 2000; Schneider & Buckley, 2002). However, studies of *revealed* preferences—that is, which schools families ultimately select for their children—find that families often prioritize other school characteristics over academic quality (Stein et al., 2010). In particular, studies have demonstrated the importance of school racial/ethnic compositions in decision-making, particularly among white families (Abdulkadiroğlu et al., 2020; Billingham & Hunt, 2016; Holme, 2002; Schneider & Buckley, 2002), who often take a two-step approach, first eliminating schools based on racial/ethnic compositions and only then considering other criteria in their final decision-making (Saporito & Lareau, 1999). This procedure might reflect the tendency of white families to equate school quality (and their own social standing) with the presence of white students (Johnson & Shapiro, 2003; Renzulli & Evans, 2005; Roda & Wells, 2013). As such, many white families do not consider schools that serve high proportions of Black and Hispanic students, even when such options have more favorable academic and behavioral characteristics (Goyette, 2008; Renzulli & Evans, 2005; Saporito & Lareau, 1999).

Much of the scholarship on school choice examines family preferences through survey and interview data (Altenhofen et al., 2016; Bell, 2009a; Goyette, 2008; Kleitz et al., 2000; Roda & Wells, 2013) or inferred preferences by comparing the schools students attend to their neighborhood schools (Bifulco et al., 2009; Phillips et al., 2015; Renzulli & Evans, 2005). Fewer studies have used application data, examining characteristics of students' ranked schools to

reveal their actual preferences (Denice & Gross, 2016; Glazerman & Dotter, 2017; Hastings et al., 2005). Application data are uniquely valuable, given the common disconnect between expressed preferences and actual behavior: families tend to provide more socially acceptable answers in their public responses. Moreover, inferences based on the outcomes of choice processes may conflate *preference* with *access*. For example, an examination of public school applications in Denver suggests that families across the socio-demographic spectrum tend to prefer schools with high academic performance, but that Black and Hispanic families have fewer high-performing options in their neighborhoods (Denice & Gross, 2016).

**Application Timing**

Many choice structures include constraints that disproportionately burden disadvantaged families. One example is application deadlines. Although a seemingly innocuous element of most choice systems, successfully meeting deadlines for registration and admission lotteries can be among the most powerful determinants of whether family preferences are honored. These deadlines require families to have the information and bandwidth to make selections far in advance (Fong & Faude, 2018). However, families often have difficulty finding information about eligibility, priorities, and requirements; can feel overwhelmed by the number of choices; can be unsure how to complete the application before the deadline; and can experience technical difficulties and language barriers (Balu et al., 2021). Low-income families and families of color are also more likely to experience residential mobility, which is associated with late registration (Desmond et al., 2015). Inadequate information regarding timelines and processes, including the consequences of late registration, might disproportionately impact already disadvantaged families (Corcoran et al., 2018; Denice & Gross, 2016; Pérez, 2011). Boston provides an example, where white families are three times more likely than Black families to register for

kindergarten before the initial deadline (Fong & Faude, 2018). To an extent, this mirrors findings from studies of voluntary choice systems, which report higher participation rates among white, higher-income, and more-educated families (Bifulco et al. 2009; Goyette, 2008; Phillips et al. 2015; Saporito & Sohoni, 2006).

These issues are particularly salient in New York City, where priority is given to families who apply during the regular application window. Families who apply after the deadline are generally only offered schools with seats remaining. In 2019, roughly 30% of eligible New York City families did not submit an on-time application for kindergarten, and these rates were higher in low-income districts and among children who were designated English language learners or lived in temporary housing (Balu et al., 2021). Our data allow us to explore the extent to which late application is associated with assignment to a lower-quality school.

**Neighborhood Stratification**

Neighborhood stratification also poses a barrier to honoring family preference. Supporters have long argued that expanding school choice would provide disadvantaged families in high-poverty neighborhoods the option to attend better-resourced schools in other neighborhoods (Archbald, 2004; Betts, 2005; Kahlenberg, 2001; Schneider et al., 2000). However, even within robust choice systems, most students continue to attend their neighborhood school (Andre-Bechely, 2007; Carlson et al., 2023). For many families, school proximity to home is paramount, especially for families with young children who cannot travel to school on their own, either by walking or via public transportation (Ehrlich et al., 2020; Trajkovski et al., 2021; Valant & Weixler, 2020). These challenges associated with transportation disproportionately fall on socioeconomically disadvantaged families, due in part to rigid work schedules and other caregiving responsibilities (Bell, 2009a, 2009b; Cordes &

Schwartz, 2018; DeJarnatt, 2008; Pattillo, 2015; Rhodes & DeLuca, 2014; Sattin-Bajaj, 2014; Trajkovski et al., 2021). As a result, those farthest away from high-quality schools are often the least able to attend them (Andre-Bechely, 2007; Bell, 2009b; Edwards, 2021; Kleitz et al., 2000). This raises "mobility justice" concerns (Bierbaum et al., 2021), as choice structures often reinforce the connections between residential and school segregation (Carlson et al., 2023).

The interrelated nature of New York City's neighborhood and school segregation is striking, with clear implications for its school allocation process. The city's public schools have been labeled the most segregated in the Nation (Kucsera & Orfield, 2014), and Black/white residential segregation in Brooklyn, Queens, and Manhattan is more extreme than that found in any of the ten largest U.S. cities, save Chicago (U.S. Census Bureau, 2022). Hispanic/white segregation is second only to that in Los Angeles (Logan & Stults, 2011). And while other cities have demolished large public housing projects over the past decades, as Chicago did with Cabrini-Green and St. Louis with the Pruitt-Igoe towers (Austen, 2018), New York City has continued to cluster public housing residents into large high-rise developments, a practice that exacerbates segregation (Rothstein, 2017). Indeed, half of NYC children living in public housing are concentrated in only one-tenth of the city's elementary schools (Furman Center, 2008).

**Choice Architecture**

Even when families do seek options outside their neighborhood, the choice architecture itself can pose a barrier. Scholars of school choice generally agree that unregulated choice is unlikely to decrease stratification; only choice-based systems explicitly designed to attenuate stratification will do so (Cobb & Glass, 2009; Scott & Wells, 2013). In fact, seemingly race-neutral choice systems can increase segregation (Bifulco et al., 2009; Saporito & Sohoni, 2006), particularly those that prioritize families who choose their local zoned school. If sought-after

schools are located in more-affluent neighborhoods and the affluent families in those neighborhoods have priority, the priority system reinforces segregation and stratification. School systems that eliminate these residential priorities generally increase disadvantaged students' access to high-performing schools (Gortázar et al., 2023). Sibling preference represents another instance where the choice architecture can exacerbate between-school stratification. Providing younger siblings preferential access to over-subscribed schools that are already segregated represents a type of legacy advantage for already privileged families. These seemingly race-neutral priorities alone have a chilling effect on families considering options outside their neighborhoods: families are less likely to rank schools where they do not have priority (Calsamiglia & Güell, 2018). New York City employs a priority system that is, on its face, race neutral. We explore, however, the extent to which this priority system in fact differentially honors family preferences.

**Kindergarten Choice in NYC**

Public school children in NYC begin kindergarten the calendar year in which they turn five. To match children to schools, the city operates a centralized enrollment system. During a six-week application window open from early December through mid-January, families can list up to 12 schools in order of preference. Most families register online, but applications can also be made over the telephone (with interpretation services available in over 200 languages), or in person at a Family Welcome Center. Public schools in the city are organized into 32 community school districts (CSDs) across the five boroughs (see Figure 1). Within each CSD, elementary schools are (generally) situated within geographic school attendance zones (see Figure 2). Unlike most school districts, students are not guaranteed a seat at their zoned school; students are simply given priority at their zoned school if they apply on time.

For each school on their application, students are assigned a priority rating of one (highest) through eight (lowest). The highest priority (1) is given to students who live in the school zone and have an older sibling already enrolled at the school, followed by students who live in the school zone but do not have a sibling at the school (2). Applicants who live outside the school zone (but within the CSD) and have a sibling at the school (3) have priority over students with a sibling at the school but who live outside the CSD (4). The priority algorithm also considers whether students attended a public pre-K program at the schools to which they are applying. Students who attended pre-K at the school and live outside the zone (but within the CSD) (5) have priority over students who also attended pre-K at the school but live outside the CSD (6). Finally, students who live in the CSD but have no sibling or pre-K connection to the school (7) have priority over similar students who live outside the CSD (8).

The school allocation process employs a deferred acceptance algorithm (Abdulkadiroğlu et al., 2009), where students are tentatively matched to their first-choice school in a random order. If a school reaches capacity and a new student has a higher priority than a student already matched, the new student will be assigned to that school and the other student will be assigned to their next preferred school. If a student ranks a school higher than their matched school, they will be placed on a waitlist. In the spring, families receive an offer and must either accept the offer or join and monitor waitlists until they make their final selection. As students decline seats, waitlist positions convert to matches. One benefit of this algorithm is that it encourages truthful reporting of preferences, in that students are not punished for ranking a competitive school first. However, other school choice algorithms are more successful in matching students to their top choice schools (Mennle & Seuken, 2017).

## Research Focus

Although NYC families are permitted to identify any school in the city as their first choice, the priority structure described above greatly increases the probability that students who request their zoned school will receive it. Since students typically attend a school close to their home, NYC's school segregation is almost as severe as its neighborhood segregation (Ready & Reid, 2023). A choice system in which all families had equal probabilities of gaining admission to all schools might lessen this degree of segregation. In this paper, we examine the extent to which a constrained choice system holds any promise for reducing segregation and stratification. To better understand the outcomes of NYC's school choice structure, we conducted a series of analyses that address the following research questions:

1. How is application timing associated with family background and the composition and quality of the schools to which students are matched?
2. Which families are more likely to rank a non-zoned school first, and is the decision to do so associated with the quality and composition of their zoned school?
3. How do families who do and do not receive their first-choice school differ, how is this related to the composition and quality of the schools they attend, and to what extent does the NYC matching algorithm explain differences in which kindergartners match with their first-choice schools?

## Data and Methods

We have been granted access to restricted-use data on New York City public school kindergarten applications from the 2014-15 through 2017-18 academic years (enrollment for 2015-16 through 2018-19). These represent application cycles prior to the disruptions associated with the COVID-19 pandemic. We restricted our sample to kindergartners who attended

traditional NYC public schools whose seats were allocated through the centralized admissions process described above. This excluded students who applied only to gifted and talented programs, charter schools, alternative schools, dual-language programs, and/or special education schools, all of which operate separate and unique admissions processes. Our sample restrictions also eliminated children whose first-choice and/or attended schools were located in one of three community school districts which use a different choice architecture (CSDs 1, 7, and 23), and a small number of schools in other districts that were non-zoned or that reserved a certain number of seats for specific student populations.

As we describe below, NYC's school choice processes are generally working as designed, with school matches and denials closely following the published application priorities. However, to test the integrity of the choice architecture more closely, we compared the actual outcome for each student to what the priority system ostensibly dictated. We found that roughly one percent of students were wrongfully denied (that is, denied their first choice when a student with a lower priority number at that school was accepted). We exclude this small number of students from the sample. Though not our focus here, why some students' matched schools differ from what we would expect given the published priority system is a question worthy of investigation. In total, these restrictions produced an analytic sample of just over 233,000 kindergarteners attending one of 743 schools across these four academic years.

**Measures**

Our data include student-level demographic and residential information, the school that the student was zoned to and the school they attended, and whether the family applied before the application deadline. For families who applied on time, our data indicate their ranked school choices and the school to which the family initially matched (prior to movement off waitlists).

Given the administrative nature of these data, we encountered virtually no missing student-level data. To explore how the choice process influences the types of schools to which students have access, we combine these data with publicly available school-level measures for the school year during which families applied (the year prior to kindergarten). These include school demographic composition, aggregate state standardized test scores in ELA and mathematics, and teacher/family ratings of school quality from the annual NYC School Survey. We also incorporate publicly available data from the New York State Education Department, including school-level measures of the number of violent and non-violent incidences (per 100 students); teacher-quality ratings consisting of classroom observation scores (60%) and student growth on assessments (40%); and indicators of teacher education and years of experience. Due to school openings and closings, and the fact that not all data were collected every year by the City or State, some schools are missing select measures in particular years. To maintain the school and student samples, when data are missing we calculate school-average scores from the years with available data. These data from both the City and the State allow us to use a more comprehensive array of school quality measures than prior work, which tends to rely primarily on test scores and accountability ratings (e.g., Denice & Gross, 2016; Glazerman & Dotter, 2017; Hastings et al., 2005; Phillips et al., 2015; Renzulli & Evans, 2005; Stein et al., 2010).

**Methods**

We begin by exploring the extent to which school acceptance rates are associated with school quality and demographic composition. We establish that Black families are disproportionately matched to schools that receive fewer applications and that have weaker measures of school quality. The bulk of our analyses then unpack these inequities in school access. We consider three possible mechanisms. The first relates to application timing. Building

off Condliffe and Balu's (2019) finding that traditionally disadvantaged NYC families are less likely to apply during the six-week application period, we descriptively investigate whether student demographic characteristics are associated with on-time application, and the extent to which application timing is related to differential access to high-quality schools. The second mechanism we explore is the interplay between residential segregation and families' preferences for neighborhood schools. If most families opt for their zoned school, and Black and Hispanic families are zoned to lower quality schools, the choice system will fail to disrupt stratification.

The third, and most consequential, mechanism we consider is the priority hierarchy at the heart of the matching algorithm. Though race-neutral on its face, if Black students are systematically assigned lower priority levels and therefore more likely to be denied their first-choice schools, the priority system itself could drive inequitable access to quality schools. We examine associations between whether families match to their first-choice school and student demographic characteristics, and between match status and school quality. We then estimate a series of linear probability models with school-by-year fixed effects to explore the likelihood that students received their first-choice school, *compared to students who selected the same first choice school*. We define this model as:

$$Match_{ijt} = B_0 + B_1 Asian_{ijt} + B_2 Black_{ijt} + B_3 Hispanic_{ijt} + B_4 Other_{ijt} + \pi Z_{ijt} + \mu_{jt} + \epsilon_{ijt}$$

where $Match_{ijt}$ is a binary indicator of whether student *i* matched with their first-choice school *j* in year *t*. $B_1$ through $B_4$ represent percentage point differences between Asian, Black, Hispanic, and other non-white students' likelihoods of matching with their first-choice schools as compared to white students' likelihood of doing so. $Z_{ijt}$ then represents a vector of student-level

variables, including English language learner, disability, and free/reduced-price lunch status, as well as students' priority level at their first-choice school. Lastly, we look descriptively at student demographic representation within each priority group level to further illustrate whether the priority system disadvantages some families more than others.

## Results

As noted above, the New York City kindergarten selection process occurs within a set of highly stratified and segregated schools. Although families can apply to any of the more than 700 regular public schools that offer kindergarten, many schools receive more applications than they have available seats. Access to these oversubscribed schools is determined by the matching algorithm, described above. Roughly seven percent of schools admitted fewer than half of the students who selected them as their top choice; one-quarter admitted more than 90% of those who ranked them first; and the remaining two out of three schools admitted between 50 and 90% (see Table 1). Schools with high acceptance rates received roughly 54 applications each year, on average. Given that most schools operate two kindergarten classes of approximately 20 children, and that some families who are granted a spot in a particular school will not actually enroll, families selecting these schools will likely receive them. Conversely, schools with low acceptance rates received almost 88 applications each year, over twice as many applications as available seats. It is important to again stress that although we refer to school acceptance rates, admissions are driven exclusively by the matching algorithm, and individual schools have no discretion in which students they enroll.

Key to our current study, acceptance rates are strongly associated with both objective and subjective indicators of school quality. A gap of 0.8 SDs in average ELA test scores favors low- over high-acceptance-rate schools, as does a gap of roughly 0.7 SDs in math. Schools with low

acceptance rates also had teacher observation scores over one-third standard deviation higher, and teacher and family perception ratings over 0.6 SDs higher, compared to schools with high acceptance rates. Schools with low acceptance rates also had fewer violent incidents. Interestingly, however, schools with high acceptance rates employed teachers with more years of experience. Each of these indicators is from the year students applied (i.e., the year prior to enrollment).

These school-level acceptance rates were also associated with school demographic composition. Black students were over-represented in schools with high acceptance rates, while white students were under-represented. In the sections below we examine the social and structural forces that disproportionately place Black students in the least sought after and lowest-rated schools. We test three possible mechanisms: application timing, neighborhood stratification, and the architecture of the choice process itself.

**Application Timing**

The first step determining access to over-subscribed schools is whether a family applied during the regular six-week application period. Families who do so are more likely to receive their first-choice school. Families who apply after the deadline—as roughly one-third did during the period of our study—are still guaranteed a school placement, but only among schools with available seats, which are, by definition, less popular (see Table 2). Again confirming Condliffe and Balu's (2019) findings, family characteristics were strongly associated with meeting the application deadline. Black families were considerably more likely to apply after the deadline, while Asian and white families were over-represented among those who applied during the regular six-week period. Students who qualified for free- or reduced-price lunch and those designated English language learners were roughly 10 and five percentage points more likely to

enroll after the deadline, respectively. We also find small differences by student disability status and gender.

The most striking difference here is associated with attending a NYC pre-K program during the year families applied to kindergarten. Fewer than half of the families who enrolled after the deadline attended NYC public pre-Ks compared to over three-quarters of those who applied on time. This could indicate that pre-K staff provide information about kindergarten enrollment practices and deadlines, or it could reflect family residential mobility, in that some families might have moved to NYC after the deadline. The bottom panel of Table 2 suggests why application timing matters. Families who applied late were more often matched to schools with lower average test scores and teacher/family perceptions of quality, higher rates of both violent and non-violent incidents, and weaker teacher quality. Inequitable access to high-quality schools, then, can in part be explained by differential on-time application rates.

**Neighborhood Stratification**

A second possible mechanism driving inequitable access to high-quality, oversubscribed schools is neighborhood segregation. Although NYC allows families to choose schools outside their immediate neighborhood, if traditionally disadvantaged families' neighborhood schools are less sought after, and if most families select their neighborhood schools, then neighborhood segregation would result in differential access. We test each of these premises in turn. As indicated in Table 3, Black and Hispanic families do live in attendance zones with schools that have lower ELA and math scores, higher levels of both violent and non-violent incidents, weaker teacher quality ratings, and somewhat weaker teacher and family perceptions of quality. It is important to stress the circular nature of these associations. Over time, the fact that sought-after

schools are located in more-affluent neighborhoods increases demand among families with the resources to afford the elevated housing costs.

This neighborhood stratification, however, is only relevant for school stratification if families attend their neighborhood schools. We focus here on families who applied during the regular application window. Among these families, roughly 70% ranked their zoned school first, suggesting that neighborhood stratification does influence school stratification (see Table 4). However, many families conclude that, for a variety of reasons, options beyond their zone would be best for their child. In general, traditionally disadvantaged families were *more* likely to seek schools outside of their attendance zone. Black families were 8.8 percentage points more likely to select a non-zoned school first, while Hispanic families were 7.1 percentage points more likely to do so. Children living in poverty were also more likely to seek schools outside of their zone, as were students with disabilities. Conversely, Asian and white families were considerably more likely to select their zoned school. These differences may well reflect an effort to gain access to schools perceived as higher quality given the quality of schools in families' immediate neighborhood (see Table 3). According to market logic, these families are exhibiting agency and rightly seeking better options for their children.

**Choice Architecture**

We now turn to the third potential mechanism: the extent to which the choice architecture differentially provides families their first choice school (see Table 5). Over 81% of on-time applicants were granted their first-choice school, a positive indicator that NYC's matching algorithm generally honors family preferences. However, preferences were not recognized equally across groups. The key disparity is between students who did and did not choose their zoned school first. Almost 87% of students who ranked their zoned school first were granted

their first choice, compared to only six percent of students who did not rank their zoned school first—a remarkable difference. This makes perfect sense given that the matching algorithm prioritizes choices among students who apply to their zoned school. Again, one can interpret this as a positive finding, in that the NYC DOE algorithm is working exactly as designed. However, as we learned above, traditionally disadvantaged students were less likely to select their zoned school as their first choice (see Table 4). Table 5 indicates that these families are, by extension, less likely to be matched to their preferred school. Indeed, students matched to their first-choice school were more likely to be Asian or white and to have attended a NYC pre-K. Students with a disability were roughly four percentage points less likely to be matched with their first-choice school, while English language learners were just over a percentage point more likely. This discrepancy in matching is then linked to inequitable access to quality schools. Families matched with their first choice ultimately attend schools with higher ELA and math scores, stronger teacher and family perceptions of quality, fewer violent and non-violent incidents, superior teacher ratings, and a more experienced and credentialed teacher workforce.

One explanation for why certain families were more often denied their first-choice school is that they selected schools for which they had a lower priority ranking. To test this, we constructed linear probability models with fixed effects for first-choice school (see Table 6). This model allows us to examine the likelihood students were matched to their first-choice school among families that selected the same first-choice school. We find meaningfully larger discrepancies by student demographic characteristics with this approach compared to the simple descriptive results reported in Table 5. Controlling for other demographic characteristics, Black students were 14 percentage points less likely to match with their first-choice school than white students. Hispanic and Asian students were roughly eight and two percentage points,

respectively, less likely to match with their first-choice school, compared to white students who ranked the same school first in their application. Similarly adjusted, English language learners were slightly more likely to match with their first choice, while students with disabilities were almost five percentage points less likely to do so. We find no adjusted difference by free or reduced-price lunch status.

The most likely explanation for these disparities is that the priority system—that is, the rules by which students are offered spots—systematically disadvantages particular groups of students. Model 2 in Table 6 estimates the probability of being matched to a first-choice school solely as a function of a student's priority *for that school*. Each estimate here compares the match probability for each priority level compared to the immediately higher priority level. For example, students selecting their zoned school without an enrolled sibling (priority level 2) were 2.7 percentage points less likely to be awarded their first-choice school compared to a student for whom the same school is also their zoned school but where they have a sibling already enrolled (priority level 1). Importantly, students in both of these priority groups selected their zoned school as their first choice, with the only advantage being the presence of a sibling at the school for the priority 1 group.

The importance of school zones is clearly evident when we move lower in the priority rankings to students applying from outside the zone. Students with a sibling at the school but who live outside the attendance zone in the district (priority level 3), were a sizable 37.7 percentage points less likely to be matched to that school compared to students with no sibling advantage but who live in the attendance zone (priority level 2). We find another substantial decrease in the probabilities of being matched related to whether the student attended pre-K at the same school. Students who live in the community school district (CSD) but did not attend

pre-K at the school (priority level 7) were 32.2 percentage points less likely to be awarded their first-choice school compared to students who lived *outside* the CSD but attended pre-K at the school (priority level 6).

Model 3 then examines the extent to which differences in priority rankings explain the demographic discrepancies shown in the probability of matching to a first-choice school produced by Model 1. Note that the Black/white difference in the probability of matching is reduced from over 14 percentage points to less than one percentage point. Similarly, the Hispanic estimate is reduced to under one percentage point, and the Asian/white gap is rendered non-significant. The estimates associated with disability and language status are also reduced to virtually zero, with the statistical significance largely an artifact of the very large sample size. These findings suggest that when applying to the same schools, traditionally underserved students are at a serious disadvantage in New York City's current school allocation system, a disadvantage driven largely by the fact that these families are seeking schools outside of their immediate neighborhoods.

We explore this hypothesis more explicitly in Table 7, which provides student demographic information organized by priority level at their first-choice school. Note that white and Asian students each represent almost double the proportion of Black students in the top two priority categories, while all three groups are roughly equally represented among priority group three. Conversely, Black students are over-represented within the remaining priority categories. Hispanic students are also under-represented among children in the first two categories. The architecture of NYC's school choice system, while theoretically enabling families to choose their children's schools, in reality constrains their agency by prioritizing residential location, in a city whose neighborhoods are notoriously segregated.

## Conclusion

This paper explored how structural constraints influence the extent to which family school preferences are recognized in New York City. Fundamental to this study is the fact that many schools receive more applications than they have available seats. We sought to understand which families are granted access to these sought-after schools, and how family decisions and school allocation processes are associated with the likelihood of success. We found that high-quality schools enroll smaller proportions of traditionally disadvantaged students, particularly Black students. We then explored three possible mechanisms to explain this inequitable distribution: application timing, neighborhood stratification, and the architecture of the choice process itself.

First, application timing has a disequalizing impact: Black and Hispanic families are less likely to apply during the regular six-week window, and late applicants are, unsurprisingly, less likely to be assigned sought-after schools. Next, neighborhood stratification contributes to some extent, in that most families select their zoned schools and traditionally disadvantaged students are zoned to lower-quality schools. However, the importance of this mechanism is attenuated somewhat because traditionally disadvantaged students are more likely to apply outside their zoned schools, presumably in response to the lower-quality schools to which they are zoned. The architecture of the choice process itself, in contrast, plays a substantial role. Students applying to schools outside of their zone—as traditionally disadvantaged students are more likely to do—are at a considerable disadvantage. As a consequence, among students applying to the same schools, Black and Hispanic students are far less likely to be matched with their first-choice schools as compared to their white peers. In sum, family agency is contingent upon applying within a window that opens eight months prior to the start of the academic year, and securing housing in a

neighborhood with a high-performing, in-demand school. Given these structural limitations, increasing agency would not have the capacity to ameliorate unequal outcomes, unless that agency were expressed through the housing market, an option not available to most families. However, several policy shifts might move NYC's choice system in a more equitable direction.

First, eliminating zoned school, sibling, and pre-K priorities would likely reduce the inequalities produced by the allocation algorithm. But this approach, of course, is politically and logistically fraught. Foremost is the tension between the desire to preserve local neighborhood schools—particularly for very young children—and the aim of reducing segregation. Similarly, removing sibling preference and potentially requiring families to manage student drop-offs, pick-ups, meetings and events across multiple schools is understandably unappealing to many families. Three CSDs in New York City have in fact eliminated zoned school priorities. Future research should examine the impact of this shift on family access to higher-quality schools.

Second, reserving seats for underserved groups could increase equitable access to the most sought-after schools. While seats cannot legally be held based on student race/ethnicity, there are viable alternatives that could serve as a proxy. For example, Berkeley Unified School District assigns a "diversity code" to each microneighborhood (four to eight blocks). The diversity code reflects the percentage of students of color, income level, and adult education level in the microneighborhood and has fostered racially diverse school enrollment. Because this system relies on the racial composition of the neighborhood, rather than individual student race, it passes legal muster (Frankenberg, 2011). A small number of pilot schools in New York City have already implemented a limited version of this approach. Pilot schools reserved a portion of their seats for underserved groups, including low-income students and ELLs. While participating schools with low poverty rates increased attendance among low-income students, enrollment

rates for students of color did not change (Mader et al., 2018). This is a fairly typical outcome when districts take a completely race-neutral approach. Conversely, race-conscious approaches, like that taken in Berkeley, have a higher likelihood of success (Frankenberg, 2011). NYC could borrow from Berkeley, reserving seats for students with diversity codes above a certain threshold.

The NYC priority structure holds such importance due partly to the substantial variation in school quality. We see this reflected in our finding that families aim to opt out of their zoned schools at greater rates when their zoned school is lower quality. A third policy option is to increase the availability of high-quality options by bolstering the capacity of high-performing schools, which might have spillover benefits beyond providing more families with access to desirable schools, including decreased segregation (Glazerman & Dotter, 2017). However, there are obviously limits to the scalability of this solution.

Finally, changes to the process could also better serve families not currently applying on time to kindergarten. NYC families experiencing stress and trauma might not be ready to select schools in December and would be better served by later application deadlines. Of course, this change too is not so simple. It is possible that pushing back traditional public school application deadlines, while private school deadlines presumably remain stable, might lead higher-income families to opt out of traditional public schools at higher rates. Even so, these changes—altering the priority characteristics, reserving seats for underserved groups, increasing high-performing schools' capacity, and later application deadlines—might serve as the first steps to fully honoring all families' preferences and fulfilling the choice system's promise to reduce the links between residential location and access to high-quality schools.

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Figure 1. New York City's 32 Community School Districts (CSDs)

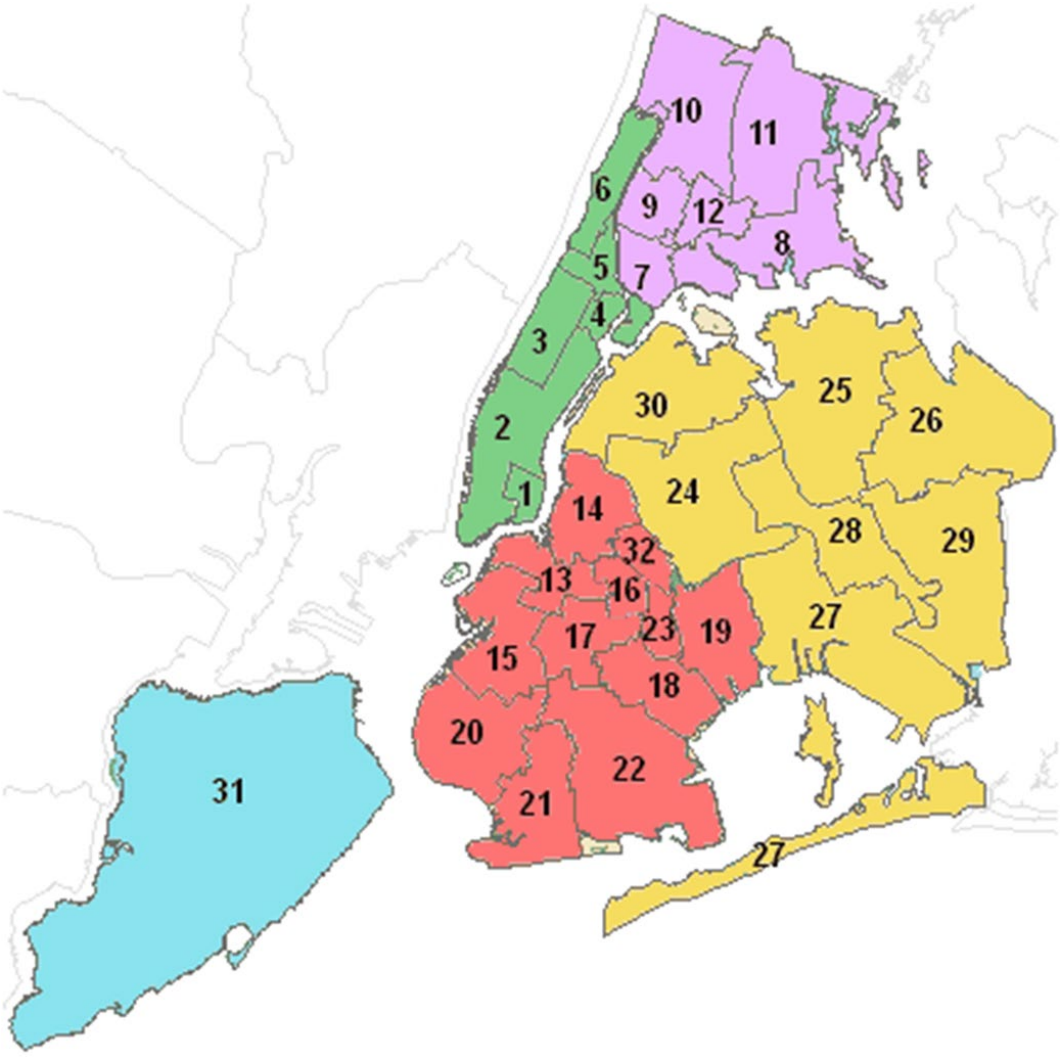

Figure 2. New York City's Community School District 3: Internal School Attendance Boundaries

Table 1. New York City School Characteristics by Kindergarten Acceptance Rate

| | High Acceptance Rate (*n*=708) | Medium Acceptance Rate (*n*=2,020) | Low Acceptance Rate (*n*=220)[6] |
|---|---|---|---|
| Number of Students Listing School First | 53.9 | 73.9*** | 87.6*** |
| Average ELA Scores (z-scored) | -0.42 | -0.04*** | 0.38*** |
| Average Math Scores (z-scored) | -0.49 | -0.06*** | 0.20*** |
| Family/Teacher Perceptions of Quality (z-scored) | -0.20 | 0.02*** | 0.44*** |
| Violent Incidents (per 100 students) | 0.19 | 0.15*** | 0.14*** |
| Non-Violent Incidents (per 100 students) | 0.17 | 0.15 | 0.14 |
| Teacher Observational Rating (z-scored) | -0.35 | -0.10*** | 0.06*** |
| % Teachers w/ Masters Deg.+ | 88.7 | 87.1 | 84.3 |
| % Teachers with 5+ Years | 75.5 | 68.4*** | 65.8* |
| School Demographics | | | |
| Race/Ethnicity | | | |
| % Asian | 11.6 | 15.5*** | 10.8 |
| % Black | 32.4 | 22.1*** | 20.9*** |
| % Hispanic | 39.1 | 41.7 | 43.6 |
| % Other | 2.4 | 2.8 | 4.1*** |
| % White | 14.2 | 17.9** | 20.6** |
| % Female | 48.2 | 48.7 | 48.6 |
| % SWD | 15.8 | 15.1 | 14.9 |
| % ELL | 17.0 | 21.0*** | 16.0 |
| % FRL | 77.2 | 70.6*** | 64.2*** |

*$p$<.05; **$p$<.01; ***$p$<.001; statistical comparison group is high acceptance rate schools. Low acceptance rate is ≤50%; mid is >50% and <90%; and high is ≥90%

Table 2. New York City Student Demographic and Attended School Characteristics by Kindergarten Application Timing

| | Applied On-Time (*n*=152,389) | Applied After Deadline (*n*=80,612) | Full Sample (*n*=233,001)[6] |
|---|---|---|---|
| **Student Demographics** | | | |
| Race/Ethnicity | | | |
| % Asian | 20.8 | 13.1 | 18.2 |
| % Black | 15.7 | 26.9 | 19.6 |
| % Hispanic | 39.6 | 44.3 | 41.2 |
| % Other | 2.8 | 2.9 | 2.9 |
| % White | 21.0 | 13.3 | 18.3 |
| % Female | 49.0 | 47.6 | 48.5 |
| % SWD | 14.2 | 15.9 | 14.8 |
| % ELL | 21.2 | 26.6 | 23.1 |
| % FRL | 67.0 | 77.9 | 70.8 |
| % Attend Pub. Pre-K | 76.9 | 46.4 | 66.4 |
| **Attended School Quality** | | | |
| Average ELA Scores (z-scored) | 0.14 | -0.27 | 0.00 |
| Average Math Scores (z-scored) | 0.15 | -0.29 | 0.00 |
| Family/Teacher Perceptions of Quality (z-scored) | 0.07 | -0.13 | 0.00 |
| Violent Incidents (per 100 students) | 0.13 | 0.16 | 0.14 |
| Non-Violent Incidents (per 100 students) | 0.13 | 0.16 | 0.14 |
| Teacher Observational Rating (z-scored) | 0.12 | -0.23 | 0.00 |
| % Teachers w/ Masters Deg.+ | 88.6 | 87.3 | 88.1 |
| % Teachers with 5+ Years | 71.2 | 70.5 | 71.0 |

Note: All differences across groups significant at the $p<.001$ level.

Table 3. New York City Zoned School Quality and Student Race/Ethnicity

| | Asian (*n*=42,361) | Black (*n*=45,592) | Hispanic (*n*=95,950) | Other (*n*=6,347) | White (*n*=42,751) |
|---|---|---|---|---|---|
| Average ELA Scores (z-scored) | 0.49*** | -0.57*** | -0.33*** | 0.36*** | 0.81 |
| Average Math Scores (z-scored) | 0.65*** | -0.71*** | -0.30*** | 0.27*** | 0.73 |
| Family/Teacher Perceptions of Quality (z-scored) | 0.06 | -0.06*** | -0.02*** | 0.06 | 0.06 |
| Violent Incidents (per 100 students) | 0.10*** | 0.22*** | 0.15*** | 0.13*** | 0.12 |
| Non-Violent Incidents (per 100 students) | 0.09*** | 0.24*** | 0.15*** | 0.14*** | 0.11 |
| Teacher Observational Rating (z-scored) | 0.43*** | -0.63*** | -0.19*** | 0.20*** | 0.53 |
| % Teachers w/ Masters Deg.+ | 89.3*** | 87.1*** | 87.3*** | 88.9** | 90.1 |
| % Teachers with 5+ Years | 71.2*** | 73.5 | 69.6*** | 71.5 | 72.7 |

*$p$<.05; **$p$<.01; ***$p$<.001; statistical comparisons are to schools to which white students are zoned.

Table 4. New York City Student Characteristics and Zoned School Ranking

| | Zoned School Ranked First (*n*=109,114) | Other School Ranked First (*n*=43,275) |
|---|---|---|
| Student Demographics | | |
| Race/Ethnicity*** | | |
| % Asian | 23.0 | 15.5 |
| % Black | 13.2 | 22.0 |
| % Hispanic | 37.6 | 44.7 |
| % Other | 2.8 | 2.9 |
| % White | 23.4 | 15.0 |
| % Female | 49.1 | 48.6 |
| % SWD*** | 13.4 | 16.0 |
| % ELL** | 21.5 | 20.5 |
| % FRL*** | 65.5 | 70.8 |
| % Attend Pub. Pre-K*** | 77.2 | 76.3 |

**$p<.01$; ***$p<.001$. Only includes students who applied during the regular application period.

Table 5. New York City Student and Attended School Characteristics by Receipt of First-Choice School

| | First Choice Match (*n*=123,545) | First Choice Denied (*n*=28,844)[6] |
|---|---|---|
| **Student Characteristics** | | |
| % Selected Zoned School*** | 86.9 | 6.3 |
| Race/Ethnicity*** | | |
| % Asian | 21.5 | 18.1 |
| % Black | 14.8 | 19.4 |
| % Hispanic | 39.0 | 42.3 |
| % Other | 2.9 | 2.9 |
| % White | 21.9 | 17.3 |
| % Female*** | 49.2 | 48.2 |
| % SWD*** | 13.4 | 17.5 |
| % ELL*** | 21.4 | 20.2 |
| % FRL | 66.9 | 67.2 |
| % Attended Pub. Pre-K*** | 78.0 | 72.7 |
| **Attended School Quality** | | |
| Average ELA Scores (z-scored)*** | 0.03 | -0.11 |
| Average Math Scores (z-scored)*** | 0.03 | -0.12 |
| Family/Teacher Perceptions of Quality (z-scored)*** | 0.01 | -0.04 |
| Violent Incidents (per 100 students)*** | 0.13 | 0.14 |
| Non-Violent Incidents (per 100 students)*** | 0.12 | 0.14 |
| Teacher Observational Rating (z-scored)*** | 0.02 | -0.10 |
| % Teachers w/ Masters Deg.+*** | 88.7 | 88.0 |
| % Teachers with 5+ Years*** | 71.5 | 70.0 |

***$p<.001$. Only includes students who applied during the regular application period.

Table 6. Probability of Matching to First Choice New York City School (*n*=152,389)

| | (1) Likelihood of Being Matched to First Choice | (2) Likelihood of Being Matched to First Choice | (3) Likelihood of Being Matched to First Choice |
|---|---|---|---|
| Student Characteristics | | | |
| Asian[1] | -0.023*** | | -0.003 |
| | (0.004) | | (0.002) |
| Black | -0.141*** | | -0.009*** |
| | (0.004) | | (0.002) |
| Hispanic | -0.076*** | | -0.007*** |
| | (0.003) | | (0.002) |
| Other | -0.050*** | | 0.000 |
| | (0.006) | | (0.003) |
| SWD | -0.048*** | | -0.004** |
| | (0.003) | | (0.001) |
| ELL | 0.007** | | 0.002* |
| | (0.003) | | (0.001) |
| FRL | -0.001 | | -0.001 |
| | (0.002) | | (0.001) |
| Priority Group[2] | | | |
| Priority 2 vs. Priority 1 | | -0.027*** | -0.027*** |
| | | (0.001) | (0.001) |
| Priority 3 vs. Priority 2 | | -0.377*** | -0.377*** |
| | | (0.002) | (0.002) |
| Priority 4 vs. Priority 3 | | -0.103*** | -0.102*** |
| | | (0.005) | (0.005) |
| Priority 5 vs. Priority 4 | | -0.028*** | -0.029*** |
| | | (0.005) | (0.005) |
| Priority 6 vs. Priority 5 | | -0.055*** | -0.055*** |
| | | (0.006) | (0.006) |
| Priority 7 vs. Priority 6 | | -0.322*** | -0.321*** |
| | | (0.006) | (0.006) |
| Priority 8 vs. Priority 7 | | -0.102*** | -0.101*** |
| | | (0.003) | (0.003) |
| Constant | 0.875*** | 1.037*** | 1.043*** |
| | (0.003) | (0.001) | (0.002) |

*$p$<.05; **$p$<.01; ***$p$<.001. Only includes students who applied during the regular application period.
[1] Racial/ethnic groups compared to white students.
[2] Priority 1: students who live in the zone and have a sibling at the school; Priority 2: other students who live in the zone; Priority 3: students with a sibling at the school who live in the district; Priority 4: students with a sibling at the school who live outside the district; Priority 5: students who live in the district and are currently enrolled at the school for pre-K; Priority 6: students who live outside the district and are currently enrolled at the school for pre-K; Priority 7: other students who live in the district; Priority 8: other students who live outside the district.

Table 7. New York City Priority Groups by Student Background Characteristics

| | Priority 1 *n*=39,284 | Priority 2 *n*=69,830 | Priority 3 *n*=8,286 | Priority 4 *n*=2,536 | Priority 5 *n*=4,797 | Priority 6 *n*=1,420 | Priority 7 *n*=20,461 | Priority 8 *n*=5,775 | Full Sample *n*=152,389 |
|---|---|---|---|---|---|---|---|---|---|
| Race/Ethnicity | | | | | | | | | |
| % Asian | 23.1 | 22.9 | 16.7 | 9.07 | 10.8 | 8.1 | 17.9 | 14.0 | 20.9 |
| % Black | 12.0 | 13.8 | 18.3 | 29.1 | 30.2 | 39.2 | 18.6 | 25.2 | 15.7 |
| % Hispanic | 37.3 | 37.8 | 43.2 | 50.3 | 44.1 | 44.9 | 43.8 | 48.0 | 39.6 |
| % Other | 2.7 | 3.0 | 2.8 | 2.3 | 2.8 | 3.0 | 2.9 | 2.5 | 2.9 |
| % White | 24.8 | 22.6 | 18.9 | 9.3 | 12.1 | 4.9 | 16.8 | 10.4 | 21.0 |
| % Female | 49.5 | 48.9 | 48.9 | 48.3 | 50.7 | 49.1 | 48.1 | 47.7 | 49.0 |
| % SWD | 12.1 | 14.2 | 12.9 | 13.4 | 9.7 | 9.4 | 18.4 | 19.4 | 14.2 |
| % ELL | 20.4 | 22.1 | 20.6 | 19.1 | 15.4 | 13.2 | 22.1 | 21.4 | 21.2 |
| % FRL | 68.2 | 64.0 | 71.8 | 78.9 | 72.5 | 76.2 | 68.6 | 70.6 | 67.0 |
| % NYC Pub. Pre-K | 81.5 | 74.8 | 79.5 | 80.9 | 97.5 | 97.8 | 70.0 | 69.3 | 77.0 |