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Setting Priorities in School Choice Enrollment Systems: Who Benefits from Placement Algorithm Preferences?

Jon Valant, Brookings Institution
Brigham Walker, Tulane School of Public Health and Tropical Medicine

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Jon Valant*
Governance Studies Program,
Brookings Institution
jvalant@brookings.edu

Brigham Walker
Department of Health Policy and Management,
Tulane School of Public Health and Tropical Medicine
bwalker6@tulane.edu

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*** Corresponding author**

Abstract

Many cities with school choice programs employ algorithms to make school placements. These algorithms use student priorities to determine which applicants get seats in oversubscribed schools. This study explores whether the New Orleans placement algorithm tends to favor students of certain races or socioeconomic classes. Specifically, we examine cases where families of Black and White or poor and nonpoor children request the same elementary school as their top choice. We find that when Black and White applicants submit the same first-choice request for kindergarten, Black applicants are 9 percentage points less likely to receive it. Meanwhile, students in poverty are 6 percentage points less likely to receive a first-choice placement than other applicants for the same kindergarten program. However, these biases are not inevitable. In non-entry grades, where placement policies favor students whose schools are closing, Black and low-income applicants are more likely to obtain first-choice placements than their peers. We examine these priorities and simulate placements under alternate specifications of a deferred-acceptance algorithm to assess the potential of algorithm reform as a policymaking tool.

1. Introduction

In the United States, most school-age children are assigned to a public school based on where they live. Residential school assignment offers benefits, such as giving families a local, community-based option that typically does not require commuting to a school far from home. However, coupling school assignments with residential locations also has drawbacks, many of which relate to inequitable access to educational opportunities. If families perceive differences in the quality of public schools, those with the ability to pay can sort themselves into the most desirable school zones, thereby excluding less privileged families. This can result in stratification in educational opportunities and segregation by race, ethnicity, and socioeconomic status. Indeed, today's U.S. public school system is highly segregated, with students of color and students from low-income families concentrated in high-poverty schools, at the expense of their educational outcomes (Reardon, Weathers, Fahle, Jang, & Kalogrides, 2022).

Advocates of school choice reforms propose a straightforward solution to these problems. By weakening the links between where students live and which schools they can attend, these reforms could mitigate the roles that wealth and income play in determining children's educational opportunities. However, the reality of school choice reforms is often messier than the theory underlying them. In practice, many school-choosing families—including a disproportionate share of marginalized families—confront barriers to enrolling in schools they might desire (Sattin-Bajaj & Roda, 2020).

This study examines an especially formal type of barrier in school choice settings, although one that can be hidden from researchers' and the public's view. We explore the policies that define which students have priority access to high-demand schools as those priorities are coded into student placement algorithms. In doing so, we consider whether (and how) an algorithm that does not explicitly account for race or most aspects of family background benefits students of a certain race or socioeconomic status over others. Our setting is New Orleans, the U.S. city with perhaps the most robust system of school choice. With an all-charter public school system, New Orleans asks all families to participate in its choice process through a citywide unified enrollment (UE) system called OneApp.[1] This system uses an algorithm to place students in schools based on applicants' rank-ordered requests, schools' seat capacity, and student priorities such as sibling and geographic preference. We examine how policies that define student priorities affect placements—and how placements might differ under alternate policies. We also step back to examine how the various steps of the choice and enrollment process, from families' initial requests to post-OneApp mobility, lead students of different racial and socioeconomic groups to enroll in schools with markedly different performance ratings.

Our results indicate that Black students and students in poverty are severely underrepresented in high-rated schools even in a system that theoretically removes many barriers to enrollment. A large share of this gap arises at the school request stage, which likely reflects a combination of different preferences and different vulnerability to barriers such as transportation and information availability. However, even conditional on submitting the same first-choice request for kindergarten, we find that Black and low-income applicants are less likely than their peers to receive a placement in their top-choice elementary school. This arises through student priorities such as geographic priority that tend to benefit more advantaged applicants. Through simulations, we show that alternate specifications of the placement priorities could improve access for these groups—and, in fact, do tend to benefit more disadvantaged families in non-

[1] In 2021, New Orleans Public Schools renamed the city's unified enrollment system the "NOLA Public Schools Common Application Process," or NCAP (Juhasz, 2021). For clarity, we refer to the system as the OneApp throughout this manuscript.

transition grades. Also, we show that increasing the seat capacity of oversubscribed schools, if feasible, would result in substantially more families receiving seats in the schools they most desire. However, while changing algorithm priorities and seat capacities could remove (or reverse) anti-Black and anti-poor biases, these changes on their own are unlikely to produce an integrated system in which historically disadvantaged and advantaged groups are similarly represented in high-rated schools.

2. Background

2.1. School choice reforms

Increasing school choice has been a prominent education reform strategy in the U.S. Advocates have argued that government-funded, privately run schools could bring market efficiencies to education (Friedman, 1955), improve alignment between school behaviors and parents' interests (Chubb & Moe, 1990), mitigate inequities in access (Coons & Sugarman, 1978), and reduce school segregation (Kahlenberg, 2001). Policymakers created an assortment of school choice options in the late 20th and early 21st centuries, with mixed effects to date. For example, many students in urban charter schools outperform their peers academically (Epple, Romano, & Zimmer, 2016), but charter school expansion has slightly exacerbated racial segregation in public schools (Monarrez, Kisida, & Chingos, 2022).

Recent attention has focused on the design of school choice programs as well as the policy infrastructure surrounding those programs. This attention is rooted, in part, in concerns about the barriers that keep families—particularly those from historically disadvantaged groups—from accessing schools they might want. These barriers relate to issues such as proximity and transportation (Bierbaum, Karner, & Barajas, 2021; Valant & Lincove, 2023), information (Corcoran & Jennings, 2019; Valant & Weixler, 2020), enrollment processes

(Weixler, Valant, Bassok, Doromal, & Gerry, 2020), and discriminatory school practices (Bergman & McFarlin, Jr., 2020). Sattin-Bajaj and Roda (2020) describe an intentionality behind many of these barriers, a form of “opportunity hoarding” in which advantaged families use their political power and other resources to secure preferential access to desirable placements.

2.2. Unified enrollment systems and placement algorithms

Much of the concern about school choice barriers has focused on the application and enrollment process. In a highly decentralized school choice environment, each school might manage its own process, leaving parents to navigate a complex, burdensome school choice landscape with little coordination or oversight (Gross, DeArmond, & Denice, 2015). These decentralized settings also lack a mechanism for assigning students to schools efficiently (Abdulkadiroğlu, Che, Pathak, Roth, & Tercieux, 2017).

Unified enrollment (UE) systems emerged as potential solutions to these problems. Today’s UE systems differ from one another in important respects (Benner & Boser, 2018; Hesla, 2018), but they share two basic features. First, UE systems centralize the application process. Families can apply to many schools, ranked in their order of preference, using a single application. Second, UE systems centralize the placement process. That is, a central agency such as a school district uses an algorithm to place students in schools based on families’ requests, seat capacities, and student priorities. These algorithms have been refined through extensive research on market design (Abdulkadiroğlu & Sönmez, 2013; Pathak, 2011). Several UE systems use a deferred-acceptance (DA) algorithm that assigns applicants to their highest-ranked school where they qualify for a seat (Abdulkadiroğlu & Sönmez, 2003; Gale & Shapley, 1962). Appendix A provides a stylized example of how a basic school choice DA algorithm such as the one used in New Orleans can work. It illustrates how student priorities can determine which students are placed in which schools.

Most of today's DA placement algorithms are strategy-proof in the sense that applicants cannot game the algorithm by ranking a less-preferred, higher-probability school ahead of a lower-probability school they prefer. The practical benefits of using a strategy-proof algorithm include that families have clear instructions for how to use the system ("rank schools in your true order of preference") and rank-ordered requests should generate information about families' preferences. Several studies have examined applicants' requests to examine their revealed preferences for schools. Some find evidence of varied preferences across groups (e.g., Denice & Gross, 2016; Glazerman & Dotter, 2017; Harris & Larsen, 2022; Hastings, Kane, & Staiger, 2009). However, these studies typically cannot disentangle different preferences for school characteristics (e.g., higher test scores) from different exposure to barriers (e.g., a lack of transportation) that keep families from accessing schools with those characteristics.

2.3. School choice and unified enrollment in New Orleans

The public education system in New Orleans has undergone major changes since Hurricane Katrina in 2005. After the storm, the state-run Recovery School District (RSD) took control of most public schools in New Orleans from the Orleans Parish School Board (OPSB)—a controversial move that reshaped education policy and politics in New Orleans (Harris, 2020). The RSD opted for a portfolio management model in which it would, for the most part, oversee charter schools rather than run schools directly (Cowen Institute, 2011). Families would request seats in these schools, as their children would no longer be assigned to a school by default. Policymakers' decisions about which individuals and organizations would lead schools intensified concerns about the disenfranchisement of the Black community in New Orleans, especially with respect to public education (Buras, 2011; Henry, 2021; Jabbar, 2015). The RSD held control of most New Orleans public schools until 2018, when it passed oversight authority back to OPSB. In 2019, New Orleans became the first major U.S. city with an all-charter public school system (Jewson, 2019).

Harris (2020) describes the charter school reforms in New Orleans as unfolding in phases. The early years were defined by extreme decentralization with little government coordination, oversight, or accountability. As inefficiencies and abuses arose—for instance, in the treatment of students with disabilities (Wolf, 2011)—the RSD began to assert itself more forcefully in certain areas, including enrollment. The RSD had used a common application for most New Orleans schools since 2008-09 (Cowen Institute, 2011) and then pivoted to a UE system for the first time in 2012. Through OneApp, families would submit rank-ordered requests to the RSD, and then the RSD would place students in schools. OneApp has changed over time in many respects, including the algorithm design, types of participating schools, number of rounds, and priorities applied (Abdulkadiroğlu et al., 2017).

This study focuses on the system that families used to make requests for the 2018-19 school year. In that year, OneApp had two rounds. The first, or Main Round, closed in February 2018. The Main Round is when the most seats were available in the most schools. Applicants could request up to eight schools for elementary and secondary grades. At the time, the state's private school voucher program was integrated in OneApp such that eligible families could request private schools alongside public/charter schools (Lincove, Cowen, & Imbrogno, 2018).[2] The OneApp's DA algorithm processed these requests and assigned students to schools. Families

[2] We generally omit private schools from our analysis since they did not receive state performance ratings. However, applicants to private schools are retained in our student-level data for simulations involving the placement algorithm, as their applications can affect the placements of other applicants. Where we refer to "public" schools, we are including charter schools as well.

that did not participate in the Main Round, did not receive a seat, or wanted to change their placement could participate in a second round ("Round 2") that also used an algorithm-based assignment process. After Round 2 was a late enrollment period during which families could work with district staff to find a seat in a school that had a seat available.

In the Main Round and Round 2, the OneApp placement algorithm used student priorities and lottery numbers to assign seats in oversubscribed schools. State and district policy defined the basic parameters for these priorities, but the specific priorities used—and their hierarchical structure—varied across schools and, in some cases, grade levels within the same school. Appendix Table 1 shows the frequency of the different combinations of priorities for kindergarten, 4th grade, and 9th grade. Kindergarten and 9th grade are common entry grades in New Orleans, when students begin at a new school; 4th grade is not and serves as an example of a non-transition grade. Among the most frequently used priorities were those for siblings of current students, students living in a school's geographic zone (with seven zones across the city), and students whose current school was closing. The closing school priority was a recent addition that was intended as a partial remedy for the harms and disruptions experienced by families whose schools had performed poorly and then closed (EdNavigator, 2019; Valant, 2021). A few schools applied other priorities such as those for students coming from affiliated programs ("feeder"), students with a disability ("IEP"), and economically disadvantaged children as defined by the state ("at-risk").

The core inputs for OneApp's DA algorithm—applicant requests, seat capacity, and school priorities—suggest at least three areas where interventions might alter enrollment patterns. With respect to the first, information interventions have shown potential to affect applicants' requests and placements (Corcoran, Jennings, Cohodes, Sattin-Bajaj, 2018; Hastings

& Weinstein, 2008; Valant & Weixler, 2020). This study focuses on the other two areas. We examine the impacts of priorities, as currently applied, and the consequences of possible changes to priorities and seat capacities.

2.4 Research questions and theory

Specifically, we seek answers to the following research questions (RQs):

- RQ 1: Do students of different racial and socioeconomic groups request, get assigned to, enroll in, and remain enrolled in schools with similar performance ratings?
- RQ 2: Do placement priorities systematically benefit students from certain racial or socioeconomic groups over others?
- RQ 3: Which priorities benefit which groups of students?
- RQ 4: How might changes to school priorities or seat capacities affect placements?

Fundamentally, this study asks how a choice-oriented school system manages scarcity in a valuable resource: the number of seats available in high-demand (and, in some analyses, high-rated) schools. We are particularly interested in this question as it relates to the access afforded to Black families and families in poverty—historically marginalized groups in New Orleans and elsewhere around the country (Perry, 2020).

Theories of "opportunity hoarding" suggest we should expect privileged families to exercise their influence to secure their own disproportionate access to high-demand seats (Diamond & Lewis, 2020; Sattin-Bajaj & Roda, 2020). Schneider and Ingram (1993) complement and complicate this idea, arguing that the social construction (positive/negative) and relative power (strong/weak) of a group shape how it fares in policymaking. The wealthy, as a powerful group with a negative social construction, will see public officials preferring "policy that grants benefits noticed only by members of [this group] and largely hidden from everyone else" (p. 338). The poor, meanwhile, get "symbolic policies [that] permit elected leaders to show great concern but relieve them of the need to allocate resources" (p. 338). In our context, this suggests a hypothesis that some priorities will explicitly benefit marginalized groups, but these priorities will be less consequential in actually determining placements.

Pathak (2017) is perhaps the study most like this one, as it explores the consequences of opting for different algorithm approaches debated in the market design literature (e.g., DA algorithms versus top-trading cycles, and various approaches to lottery-number tiebreakers). Ultimately, it concludes that these properties appear less important in practice than "basic issues" such as whether the public is well informed and how aftermarket (e.g., summer) placements work. This study examines key issues along these lines, in perhaps the most choice-heavy school system in the U.S.

3. Data and Sample

3.1. OneApp data

This study uses OneApp data provided by the New Orleans Public Schools (NOLA-PS). These data include student-level files showing applicants' ranked school requests, priority status at each ranked school, and placement outcomes. The data also include files at the school-grade level that identify the priorities used, the order in which those priorities applied, whether each priority applied to all available seats or only a subset, and seat capacities.

We focus primarily on requests for kindergarten for the 2018-19 school year. Focusing on 2018-19 enables us to analyze the most recent cohort for which we can observe students' enrollment in the fall of the following school year (2019-20) without interruption from the COVID-19 pandemic. Focusing on kindergarten enables us to analyze a key entry grade for elementary/middle schools in New Orleans, when the largest number of children secure a seat.

Some schools also offer a pre-K program that provides a guaranteed seat in kindergarten in the following year (Weixler, Lincove, & Gerry, 2019), but we omit pre-K from our analyses due to complexities in pre-K eligibility and the pre-K application process. For some analyses, we include data on non-transition grades (such as 4th grade) and 9th grade (the main entry grade for high school). Still, our main emphasis is elementary/middle school entry. Elementary grades are more suitable than high schools for this analysis since: (a) elementary school applicants are more racially diverse than high school applicants in New Orleans public schools, and (b) elementary school applications are more evenly divided across a much larger number of schools.

We do not have the exact code used to run the OneApp's placement algorithm. However, using the information provided to us about school requests, placements, and priorities—along with publicly available information about how the placement process works—we created a replica to ensure that we were properly coding a DA algorithm. Our replicated algorithm and the actual algorithm produced the same placement for well over 95% of applicants—and identical placements in some grades—with differences attributable to idiosyncrasies in the OneApp algorithm (e.g., its handling of twin siblings). In our simulations, we use a simplified version of our replica that omits some details of the OneApp algorithm. Using a simplified version provides greater clarity about how our various configurations of the algorithm differ from one another. We believe that it also improves the generalizability of our simulation results by incorporating priorities common to other cities' systems without quirks that may be specific to New Orleans.

3.2. Demographic and enrollment data

Our core objective in analyzing OneApp data is to explore how students of different races and socioeconomic groups fare in actual and simulated placements. This requires data on students' race and family income. Obtaining these data for some students is challenging because the OneApp does not ask applicants to identify their race and only asks applicants to certain programs to identify their family income (e.g., those applying to publicly funded early childhood programs). Therefore, we merge OneApp records with NOLA-PS student enrollment records to obtain student-level data on race and family income. We use these enrollment records to identify the demographic characteristics of most applicants. However, students who never enroll in a New Orleans public school do not have enrollment records. For students whose demographic characteristics are not directly observable, we impute data using the race/family income of their siblings and then modal characteristics from their neighborhoods. We check the robustness of our estimates to approaches that include only applicants with directly observed demographic data.[3]

We begin with enrollment data in which we directly observe students' race/ethnicity or free/reduced-price lunch (FRL) status. We do this with panel data covering the 2016-17 through 2020-21 school years. For race/ethnicity, we create indicator variables for whether a student was ever identified as Black, White, Hispanic, Asian, or another race/ethnicity. If a student was identified with two or more races/ethnicities, we identify that student as multiracial. Ultimately, because we are working with a sample (OneApp applicants) that is much less racially diverse than Louisiana's public school student population, we focus on three groups: Black, White, and other race. We believe this is necessary given the nature of our data but note that our "other" category includes students from a diverse set of backgrounds. For family income, we use the same data but take a slightly different approach. Since family income changes from one year to the next, we use the student's FRL status from the year closest to (or just before) our primary

[3] In our analysis of how the demographic profile of students changes from their initial application to their subsequent school enrollment, we do not use any imputed data. This is noted in the table and figure notes.

data analysis year of 2018. That is, we take the student's FRL status from the 2017-18 year if it is available; if not, we look to 2016-17, then 2018-19, then 2019-20, and finally 2020-21.

We directly observe the race/ethnicity and FRL status of 67% of kindergarten applicants in the 2018 OneApp Main Round. We provide a set of analyses only for students whose demographics we observe directly, but for our main OneApp analyses, we rely on additional data that we impute. We believe that imputation is necessary due to the possibility that applicants from some subgroups might be more likely than others to enroll in a public school after submitting a OneApp. Our approach for the imputations is to use data from as close as possible to the child. For a small share of applicants, we can use their siblings' directly observed demographics. We then look to their neighborhoods. After geocoding the street addresses that applicants entered on their OneApp, we identified their home block groups, census tracts, and zip codes. We found the modal value of race/ethnicity and FRL status for each geographic unit for OneApp applicants in that year (from any grade level). If we observed the race/FRL status of at least 10 applicants from the child's block group, we used the modal value as our imputed race for the child. This accounts for 21% of the sample for both race and FRL. If not, we looked to the child's census tract, which accounts for 9% of the sample for race and 10% for FRL. If we did not observe the race/FRL of at least 10 applicants from their census tract, we then looked to their zip code, which accounts for 2% for both race and FRL. With these imputations, we have usable demographic data for nearly all applicants.[4]

[4] We ran this imputation for students whose demographics we observe directly to assess the accuracy of the process. About 87% of our imputed values of race match the same student's directly observed race. The share is higher for Black students (88%) than White students (69%). Among the students we would have identified as White who are not White in directly observed data, about half are directly observed as multi-race. About 72% of our imputed values of FRL status match the same student's directly observed status (with similar percentages for FRL-eligible and ineligible families). Some of the FRL discrepancies likely reflect year-to-year changes in families' status.

Among kindergarten applicants, we identify 76% as Black, 13% as White, 8% as multiracial, 3% as Hispanic, and a small share as having another race/ethnicity. These are applicants, not enrolled students, but these numbers are broadly comparable to the demographics of the New Orleans public school population (Cowen Institute, 2020). The city population of New Orleans is more racially diverse than its public schools, with 59% of its residents Black, 33% White, 6% Hispanic/Latino, and all other groups below 3% (U.S. Census Bureau, 2021). This partly reflects that a disproportionate share of private school students in New Orleans come from middle- and upper-class families (Cowen Institute, 2020). We identify 52% of our kindergarten applicant sample as eligible for free lunch and 1% as eligible for reduced-price lunch. For simplicity in reporting outcomes, we focus on students eligible for free lunch as our subgroup of low-income applicants. Our results are not substantively different if we include students eligible for reduced-price lunch in the low-income group.

3.3. School performance ratings

This study examines (a) which families get seats in their first-choice schools and (b) which families get seats in their first-choice schools if those schools have strong performance ratings. Investigating the former allows us to assess whether families are getting what they what, whatever that may be, while the latter considers access to high-demand, high-rated schools. We incorporate school ratings with an awareness that any school rating is reductive and subjective and that some parents might not value traditional measures of school quality (Abdulkadiroğlu, Pathak, Schellenberg, & Walters, 2020). However, assessing whether a school system provides equitable access requires understanding which students have, and do not have, access to some of that system's most sought-after, highly acclaimed schools.

We use school letter grades assigned by the Louisiana Department of Education as part of the state's accountability system. For many years, these grades have been highly visible to families through OneApp materials, state and district websites, and school guides provided by nonprofit organizations. We focus on the grades that were available as families requested schools for the 2018-19 school year. The state computed School Performance Scores and then converted those numerical scores to letter grades. For elementary schools, these grades were based largely on students' scores on state assessments. These letter grades were the most visible indicators of school performance. However, these types of ratings have shortcomings, including what some believe is an overemphasis on student achievement (performance at a single point in time) relative to student growth (how much students learn from one year to the next) (Harris, 2011).

Of the schools with kindergarten programs available in the 2018-19 OneApp Main Round, three received an "A", two received a "B", 26 received a "C", 13 received a "D", and one received an "F". A few schools received a "T" grade (one for kindergarten), which the state used for schools that were transitioning to a new operator (typically to keep from punishing schools for their performance under a prior operator). New schools did not have a performance rating. A few of the city's highest-rated public schools did not participate in OneApp in 2018, opting instead to run their own application and enrollment processes (Jewson, 2021).

4. Empirical Strategy

4.1. Describing request, placement, and enrollment patterns

Our first objective is to explore demographic patterns in school requests, placements, and enrollments. We incorporate state school ratings to assess whether and where disparities arise with respect to high-rated schools. Specifically, we examine the schools that students of various subgroups request (first-choice requests in the 2018 Main Round), the schools in which they are placed (in the 2018 Main Round and then in 2018 Round 2), and the schools where they enroll (in the fall of 2018 and again one year later). By including enrollment one year later, we can explore whether student mobility or changes in schools' performance ratings over time might contribute to the subgroup differences we observe in student enrollment. In doing so, we report summary statistics on schools based on their state letter grades. We convert these grades to a standard grade-point average (GPA) that ranges from 0 to 4 (A=4, B=3, C=2, D=1, F/T=0).

4.2. Assessing bias in the placement algorithm

The descriptive analyses in 4.1 examine how request, placement, and enrollment patterns differ across groups. *Why* they differ is not always clear, but part of the request-placement-enrollment process is straightforward and observable. Conditional on submitting an eligible application, whether an applicant is assigned to their first-choice school depends on whether that school is oversubscribed and, if it is, how the system uses priorities to allocate seats.

Our objective is to understand whether students of certain racial groups (Black/White) or socioeconomic groups (free lunch eligible/ineligible) tend to benefit from the OneApp's priorities. We begin with a simple test of whether the 2018 OneApp algorithm systematically favors certain groups of students. Using a fixed-effects model, we examine cases in which Black and White (or poor and nonpoor) students requested the same school as their first choice. We test whether one group is more likely than the other to receive a first-choice placement. We define the following regression model:

$$Placed_{isg} = \alpha_0 + \alpha_1 Black_i + \alpha_2 OtherRace_i + \tau_{sg} + \varepsilon_{isg} \qquad [1]$$

In this model, whether student *i* is assigned to their first-choice school *s* for grade *g* is a function of their race (with White students the omitted reference group), a set of "first-choice school"-by-grade fixed effects (τ_{sg}), and a random error term (ε_{isg}). For analyses based on family income, we replace the race-related variables with income-related variables. In alternate specifications, we restrict our data to “A” and “B”-rated schools to determine whether different patterns arise at the highest-rated schools.

These models use “first-choice school”-by-grade fixed effects because the OneApp algorithm runs separately at each grade level. In effect, this model looks at the applicant pool to each school-grade, focusing only on applicants’ top choices, and then assesses whether applicants from certain subgroups were more likely than others to receive a placement. We emphasize first choices because we are primarily interested in which families receive seats in the schools they most want. For ease of interpretation, the Results section focuses on estimates from linear probability models. Results from logistic regression models are substantively similar.

4.3. Identifying which priorities favor which groups

The analyses described in 4.2 assess the extent to which race and family income are associated with the probability of receiving a first-choice placement, conditional on families’ first-choice requests. Next, we consider which priorities produce those associations. For a certain priority to contribute to placement biases, it must be correlated with race or family income (i.e., some groups are more likely to qualify than others) and consequential in making placements.

We ran the same model described in Equation 1 but replaced the outcome variable with an indicator for a specific priority. This entails regressing whether a student receives a certain type of priority (e.g., sibling priority) on the student’s race, with “first-choice school”-by-grade fixed effects. This shows, for each priority, whether students of certain racial/income groups were more likely to have that priority when competing for a first-choice school. This helps to illuminate which groups tend to qualify for which priorities. It does not necessarily show that these differences were consequential in making placements. For example, even if White students were more likely than Black students to have a certain type of priority, it might not matter if that priority seldom determines placements. This could happen if the priority ranks low in the hierarchical structure of priorities.

4.4. Simulating placements with alternate student priorities and seat capacities

One way to assess which priorities matter in practice is to evaluate how placements would differ if a particular priority were eliminated or reconfigured. Here, we use simulations to explore how alternate policies might result in different placements. We focus on two types of possible policy reforms. The first involves changes to the student priorities in the placement algorithm. The second involves increasing seat capacity such that more families could obtain seats in their top-choice schools. We also consider models that combine these two reforms (changes in priorities and increases in seat capacity). In short, our approach is to create several versions of a placement algorithm and then run that algorithm using families' actual school requests and priority status, before assessing the resulting placements.

We begin by creating a basic DA algorithm like the one that OneApp used to place students in schools in the 2018-19 Main Round. Our baseline algorithm follows the logic described in Appendix A while incorporating three core priorities. These are a "guaranteed" priority that largely applies to students who remain in the same school, "sibling" priority that applies to students with siblings already enrolled (in a non-terminal grade), and a "geographic" priority that applies to students who live in a school's geographic zone.[5] We chose this as our baseline algorithm after reviewing other cities' enrollment system policies and assessing that this constitutes a rough baseline across those systems and OneApp. We omit some details of the New

[5] A single applicant could qualify for multiple priorities, which would place them ahead of an applicant with just one of those priorities (and no higher-ranking priorities). For example, an applicant with sibling and geographic priority would be ahead of an applicant with only sibling or only geographic priority. A more detailed explanation appears as a note in Appendix Table 1.

Orleans placement rules such as the use of partial priorities (e.g., geographic priorities that apply only to half of all available seats) and a Family Link option that allows applicants to request that multiple children are assigned to the same school. As discussed above, having a simplified baseline model is desirable for both clarity and generalizability.

We begin by running our baseline algorithm using applicants' actual requests and priority status (Simulation 1). We then create several alternate formulations of the algorithm. First, since questions of geographic priority are so fundamental to school choice reforms, we create an algorithm that fully eliminates geographic priorities from our baseline algorithm (Simulation 2). To do this, we take the ordered priorities for each school-grade, remove every priority that includes geographic considerations (for any seat), and then renumber the priorities while preserving the order of the surviving priorities. Next, we create a parallel version that drops sibling preference instead of geographic preference (Simulation 3). Then, we combine these first two steps, eliminating both geographic and sibling priorities. We do this separately for models that preserve the guaranteed priority (Simulation 4) and eliminate it (Simulation 5). The latter shows the placements that would result from a system that uses lottery numbers only and incorporates no other priorities.

Next, we construct several versions of the algorithm that prioritize vulnerable and/or economically disadvantaged students. We do this to understand the potential impacts of creating a system that intentionally prioritizes these subgroups. To do so, we create a "disadvantaged" priority that considers, in order: (1) eligibility for free lunch, (2) enrollment in a school that is closing, (3) enrollment in a school with a "D", "F", or "T" state rating, (4) enrollment in a school with a "C" rating, and (5) eligibility for reduced-price lunch. Some students are members of two or more of these groups, and we define our priority structures in ways that account for this possibility. For example, we define the highest possible priority group as students who are eligible for free lunch and enrolled in a school with a “D”/“F”/“T” rating that is scheduled to close. Since, in practice, a school system might be reluctant to apply these priorities without also providing sibling or geographic priority, we examine three versions of this simulation. The first omits sibling and geographic priority (Simulation 6). The second places the priority for disadvantaged students ahead of sibling and geographic priorities (Simulation 7). The third places sibling and geographic priorities ahead of the priority for disadvantaged students (Simulation 8).

Finally, we examine would-be placements if schools’ seat capacities were higher. We simulate a scenario in which the maximum number of seats available in each school-grade increases by 10% (rounding up, as needed). For instance, if a school-grade had a capacity of 50 students, we increased it to 55 students. A uniform increase in seat capacity would not result in every school enrolling more students, as many schools are undersubscribed (and increasing capacity in oversubscribed schools could lead to fewer placements in other schools). Of course, a universal increase in seat capacities would be logistically difficult, but targeted seat increases have occurred frequently in New Orleans, whether through relocations, renovations, or simply placing more students in the same physical space. We run two simulations that involve seat capacity increases: one that uses the priorities from our baseline algorithm (Simulation 9) and one that incorporates a high-ranking priority for disadvantaged students (Simulation 10).

For each of these scenarios, we simulate the placements that would occur using actual OneApp requests (with students’ actual, school-specific eligibility for priorities as indicated in our data). That is, we assume that families would have submitted the same requests, in the same order, that they submitted in the 2018-19 Main Round. This assumption is broadly consistent with the idea that families have an incentive to apply to all schools they are interested in, ranked in their true order of preference. However, changes to student priorities or seat capacities could induce different application behaviors. How, exactly, application behaviors would change in response to policy changes is difficult to predict but important to consider. For example, it may be that changes in which students are assigned to a school (e.g., more children from the school's neighborhood) have longer-term effects on which families request that school.

After running these various formulations of the algorithm, we examine the simulated placements. First, we compare placements with respect to the number of students (overall and for each subgroup) that received a first-choice school. We then look specifically at assignments to "A"/ "B"-rated schools to see whether alternate formulations of the placement algorithm result in meaningful differences in who is assigned to the highest-rated schools. We then use the regression model in Equation 1 to assess how different versions of the algorithm tend to benefit certain racial or socioeconomic groups relative to others.

5. Results

5.1. Describing request, placement, and enrollment patterns

Perhaps more than any other U.S. city, New Orleans has weakened the link between where students live and which schools are available to them. Yet, gaps in the types of schools that students of different races, ethnicities, and socioeconomic groups attend remain stark.

Figure 1 displays enrollment patterns for K-12 students in public schools in New Orleans, based on the schools' state ratings. Figure 1a disaggregates by race and ethnicity, showing very different distributions for Black and Hispanic/Latino students versus White and other-race students. For example, more than one-third of the city's White (40%) and other-race (38%) students attended a school with an "A" rating, which was not the case for the city's Black (10%)

and Hispanic/Latino (7%) students.[6] Figure 1b presents parallel results by family income, where students eligible for free lunch (7%) were much less likely to attend an “A”-rated school than students eligible for reduced-price lunch (29%) or ineligible for FRL (23%).

Table 1 examines pathways into schools, focusing on students who started kindergarten in 2018-19. Here, too, we use school performance ratings, but in this case, we convert them to a four-point GPA. We show the ratings of schools that families requested as their first choice in the Main Round, received via OneApp in the Main Round and Round 2, and enrolled in the subsequent school year (2018-19) as well as one year later (2019-20).[7] Examining the 2019-20 school year enables us to see patterns after one year of mobility and changes in school performance. For this year, we show performance ratings that were issued in 2018 (such that a student’s school GPA would not change if the student stayed in the same school) and 2019 (such that it could). Panel A restricts the sample to students observed in each step with a school that has a state letter grade. Panel B does not impose this restriction. The patterns are similar across these panels, so we focus this discussion on the results from Panel A.

This table reveals large differences across subgroups that begin with applicants’ Main Round requests. For example, in Panel A, we see differences between 0.99 and 1.40 GPA points for Black and White students (1.11 for Main Round requests), with differences between 0.37 and 0.69 GPA points between students eligible for free lunch and students ineligible for FRL (0.44 for Main Round requests).

Table 1 also shows that the average school rating of families’ first-choice requests is higher than the average rating of the schools where they are placed. This is consistent with data showing that OneApp applicants’ higher-ranked choices tend to have higher performance ratings

[6] These figures include public/charter schools in New Orleans that did not participate in OneApp.
[7] If a family did not participate in Round 2, its Main Round placement would be its Round 2 placement as well.

(Lincove, Valant, & Cowen, 2018). However, the data in Table 1 do not allow for a rigorous examination of whether the algorithm tends to favor some groups of students over others. This requires a look at students from different groups who apply to the same schools.

5.2. Assessing bias in the placement algorithm

Table 2 presents evidence on biases that arise from the algorithm's priorities. This table is divided into two parts. Columns 1 and 2 show differences by race and family income (from separate models) in whether applicants receive a first-choice placement. Columns 3 and 4 show differences by race and family income in whether applicants receive a first-choice placement if that school has an "A" or "B" rating. Odd-numbered columns show raw differences that do not restrict comparisons to applicants to the same school-grades. Even-numbered columns show differences with "first-choice school"-by-grade fixed effects that allow for causal interpretations. With these fixed effects, we are identifying differences in the probability, in percentage-point terms, that students of different races or family incomes receive a first-choice placement when their first-choice requests are the same.

The negative coefficients on Black in Panel A indicate that Black students are generally less likely than White students (the omitted group) to receive a first-choice placement. From Column 2, we estimate that Black applicants are 8.6 percentage points (SE=0.035, p=0.02) less likely than White applicants to obtain a first-choice kindergarten placement when they apply for the same first-choice school. When we focus on "A"/ "B"-rated schools, we find a similar difference of 8.3 percentage points (SE=0.039, p=0.04). Meanwhile, students eligible for free lunch are 5.6 percentage points less likely (SE=0.029, p=0.05) to receive a first-choice placement than others who submit the same first-choice request. When focusing on "A"/ "B"-rated schools by family income, we see a negative coefficient but not a statistically significant difference.

The sample for Table 2—our preferred sample—excludes students with guaranteed placements (i.e., those who had been enrolled in a pre-K program at the same school). In Appendix Table 2, we remove this restriction as a robustness check. We obtain generally similar estimates in our fixed-effects models, but they are attenuated toward zero since all students with guaranteed placements (regardless of their race and family income) receive a placement. In Appendix Table 3, we restrict the sample to students whose demographics we observe directly, without imputation. Here, too, we find similar results. Black applicants are less likely than White applicants to receive a first-choice placement (8.8 percentage points) and first-choice placement in an "A"/ "B"-rated school (11.0 percentage points), while the coefficients on free lunch are negative but statistically insignificant.

5.3. Identifying which priorities favor which groups

The Black-White differences observed in Table 2 arise without any explicit racial priorities in OneApp. Therefore, race must be correlated with priorities in ways that affect placements. Next, we examine which groups of students are more likely to have which priorities. We examine several of the most prominent priorities for kindergarten placements in 2018-19. Appendix Table 1 shows the priority combinations—in hierarchical order—that schools used for kindergarten, 4th grade (an example of a non-transition grade), and 9th grade. Technically, the most common priority sequence for kindergarten is (1) closing school, (2) sibling, and then (3) geography. However, as shown in Appendix Table 4, no kindergarten applicants qualified for closing school priority at their first-choice school. In kindergarten, applicants most often qualified for geographic priority (35.3%) or sibling priority (22.9%).

Table 3 shows differences in the groups that qualify for various priorities at their first-choice schools. These models are identical to those from Table 2 except that we switch the dependent variable from whether students received a first-choice placement to whether they received each priority at their first-choice schools. Here, we present only results from fixed-effects models, as these models provide a better glimpse of who benefits when different groups vie for the same seats.

Some of the differences in Table 3 are large. Black applicants were 32.1 percentage points (SE=0.028, $p<0.01$) less likely than White applicants to qualify for geographic priority when they applied to the same first-choice schools for kindergarten, and that difference climbs to 36.5 percentage points (SE=0.030, $p<0.01$) when those schools have "A" or "B" ratings. Black applicants are also much less likely to have sibling priority than the White applicants who seek the same seats, with differences of about 9 percentage points for all schools (SE=0.029, $p<0.01$) and "A"/ "B" schools alone (SE=0.032, $p=0.01$). On the other hand, across all schools, Black applicants are more likely to receive at-risk and IEP priorities (estimate=0.052 [SE=0.017, $p<0.01$] and estimate=0.015 [SE=0.007, $p=0.03$], respectively). However, relatively few schools used these priorities for kindergarten (Appendix Table 1), and relatively few kindergarten applicants qualified for them (Appendix Table 4).

The differences by family income (Panel B) are weaker in magnitude. Students eligible for free lunch were 10.4 percentage points less likely to qualify for geographic priority (SE=0.022, $p<0.01$) than other students, and 13.2 percentage points less likely when applying to "A"/ "B"-rated schools (SE=0.023, $p<0.01$). Applicants eligible for free lunch were about 2 percentage points more likely to qualify for IEP priority.

5.4. Examining non-transition grade levels

Appendix Table 4 suggests important differences between an elementary/middle school entry grade (kindergarten) and non-entry grade (4th grade). In particular, the second-most common priority for 4th-grade applicants is closing school priority, while no kindergarten first-choice applicants receive that priority. Given that closing school priority is the highest-ranking priority for 4th grade in most schools (Appendix Table 1)—ahead of even sibling and geographic priority—we might expect different patterns in which groups obtain contested, first-choice seats for 4th grade than kindergarten.

Table 4 presents estimates for non-transition grades, aggregated across grades 1-8. It reports on models parallel to the ones in Tables 2 and 3 and shows that placement patterns were, in fact, different in non-transition grades. In these grades, Black students were 5.3 percentage points *more* likely than White students to receive a first-choice placement when vying for the same seats (SE=0.009, p<0.01). Students eligible for free lunch were 2.9 percentage points more likely than other students to receive a first-choice placement (SE=0.009, p<0.01).

In non-transition grades, like in kindergarten, Black students and students eligible for free lunch are less likely to have geographic priority than others seeking the same seats. However, Black students are 10.1 percentage points more likely than White students to have closing school priority (SE=0.014, p<0.01), while students eligible for free lunch are 9.3 percentage points more likely than students ineligible for free lunch to receive that same priority (SE=0.012, p<0.01). Compared to kindergarten applicants, a much smaller share of non-transition grade applicants have sibling priority (Appendix Table 4), and among those who do, we do not see significant differences in which groups receive them (Table 4). All in all, it appears that the relative strength of the closing school priority, coupled with the large and disproportionate share of Black and free lunch-eligible students who quality for that priority, leads to a reversal in the groups that tend to obtain oversubscribed seats (relative to kindergarten).

5.5. Simulating placements with alternate student priorities and seat capacities

To assess how kindergarten placements might differ under alternate student priorities and seat capacities, we next turn to our simulated placements. These results appear in Table 5. The first column shows the actual placement results for the students in our analytical sample (2,661 of the full sample of 3,427 were placed in their first-choice school for kindergarten). The next column, Sim. 1, shows the number of placements resulting from a basic DA algorithm that gives priority, in order, to (1) students with a guaranteed placement, (2) siblings of current students, and (3) students who live in a school's geographic zone. We use this as our baseline simulation, with the results of other simulations compared to the results of this one. The remaining simulations (Sims. 2 through 10) show differences in percentage terms between that simulation and Sim. 1. For example, when we drop geographic priority from the basic DA model (Sim. 2), we see a 1% increase in the number of students who receive a first-choice placement, with a 2% increase for Black students and 6% decrease for White students.

Several results in this table are worth highlighting. First, as noted in the preceding paragraph, running a basic DA algorithm without geographic priorities (Sim. 2) leads to more Black and free lunch-eligible students getting first-choice placements and placements in "A"/ "B"-rated schools. Removing sibling priority, on its own, does not have this same effect. This is further evidence that differences in which students qualify for geographic priority contribute heavily to the gaps observed in Table 2. Second, giving priority to disadvantaged students can have a fairly large impact on the distribution of students across schools, but: 1) its impact depends on how it is implemented; and 2) even an exclusive priority for disadvantaged students (Sim. 6) probably would not be enough, in the short run, to eliminate the gaps observed in the ratings of school where students are placed (Table 1). By comparing the placements in Sim. 7 and Sim. 8, we see how important the hierarchical ordering of priorities can be in determining which students obtain seats in oversubscribed schools. Black and free lunch-eligible students benefit much more when the priority for disadvantaged students ranks ahead of sibling and geographic priorities (Sim. 7) than below them (Sim. 8). Third, increasing seat capacity results in fairly uniform increases in the share of students from these subgroups who obtain a first-choice or "A"/"B" placement (Sim. 9). However, pairing seat capacity increases with changes to priorities can result in substantial changes in which subgroups obtain desirable seats (Sim. 10). This illustrates an important point, which is that simply increasing seat capacity will tend to benefit the same groups that are advantaged by a placement algorithm's existing priority structure. On the other hand, coupling seat capacity increases with a move toward different priority structures could have a multiplicative effect.

Table 6 analyzes these simulated placements from the perspective of potential biases in which students are placed in their top-choice schools (parallel to Table 2's fixed-effects models). Panel A shows results by race, while Panel B shows results by family income. Interestingly, eliminating geographic priority alone, while leaving sibling priority, is enough to eliminate a statistically significant difference by race. This is evident in the estimate for Black in Simulation 2. Eliminating sibling priority does not have the same effect, as the estimates for Black are very similar in Simulations 1 and 3. Increasing capacity, on its own, also does not address racial biases (Sim. 9). Meanwhile, the simulations that incorporate explicit preferences for historically disadvantaged students either eliminate or reverse these biases (Sims. 6, 7, 8, and 10). Panel B shows more modest differences in general. Unsurprisingly, however, priorities that explicitly benefit economically (and otherwise) disadvantaged students tend to result in free lunch-eligible children winning seats in first-choice schools when they vie for those seats against more economically advantaged peers.

6. Discussion

By weakening the links between where students live and which schools they can attend, school choice policies have the potential to remake enrollment patterns. In settings with high levels of racial, ethnic, and socioeconomic segregation, this could result in more integrated schools and more equal access to the most sought-after educational opportunities. However, just giving families the ability to request more schools does not ensure meaningful change in access or enrollment patterns. Barriers to enrollment, from transportation to admissions processes, often keep families from accessing schools they might want. These barriers tend to create the steepest challenges for the most disadvantaged families (e.g., Bergman & McFarlin, Jr., 2018; Cohodes, Corcoran, Jennings, & Sattin-Bajaj, 2022; Valant & Lincove, 2023).

This study examines student enrollment patterns in New Orleans, which has perhaps the most choice-oriented school system in the United States. Even in this setting, we observe a highly unequal distribution of students across schools (e.g., a disproportionate share of White and nonpoor students in schools with the strongest state performance ratings). Our data suggest these patterns are attributable to an assortment of factors, many of which are hard to disentangle. For example, historically disadvantaged groups are less likely to request high-rated elementary schools, which could reflect a variety of factors, including differences in how much families value state performance ratings, the geographic dispersion of high-rated schools, and an assortment of barriers that can keep disadvantaged families from applying to certain schools (e.g., information inequities, transportation barriers, and discriminatory school practices).

However, one aspect of the student enrollment process is largely observable: which applicants in the New Orleans choice system receive the placements they request. That is the primary focus of this study. We find that when families of Black and White children submit the same first-choice requests for kindergarten placements, White children are 9 percentage points more likely to receive a first-choice placement. When poor and nonpoor families submit the same first-choice requests, nonpoor families are 6 percentage points more likely to have that request fulfilled. This disparity arises because students' race and family income are correlated with priorities that are influential in determining placements at oversubscribed schools. Geographic priorities, in particular, tend to benefit White and nonpoor applicants, since a disproportionate share of these applicants reside within priority-conveying geographic zones of the most sought-after schools.

This raises a basic, if fraught, question about unified enrollment systems. If they result in different placement rates for students of different races, conditional on families requesting the same schools, are their placement algorithms racially discriminatory? We would argue that, yes, they are under longstanding definitions of bias and discrimination (Pager & Shepherd, 2008). At the same time, context is important. In the U.S., access to schools has long been unequal by race, ethnicity, and socioeconomic status. That is not unique to New Orleans, nor to cities with school choice policies. What distinguishes a setting like New Orleans from cities with more traditional systems of residential school assignment is probably not the presence of biases in the school enrollment process. Rather, it is the relative ease with which we can identify and measure certain types of bias. It is notable, too, that the key source of anti-Black, anti-poor bias in kindergarten placements appears to be the system's geographic priorities. We might expect that a more traditional system that assigns students to schools based solely on where they live amplifies these biases, albeit in less measurable ways.

As deeply rooted as they may be, racial biases are not inescapable realities of school choice placement algorithms. Unsurprisingly, when we simulate placements using (a) alternate priority configurations and (b) increased seat capacities, we see that biases could be eliminated or reversed through policy. Perhaps more surprising given research on how scarce resources are allocated to groups of varying political power (Schneider & Ingram, 1993), we find that Black and low-income applicants tend to fare well when they seek placements in non-transition grades. In grades 1 through 8, Black students are 5 percentage points *more* likely than White students to receive a seat when they apply for the same school at the same grade level, and students eligible for free lunch are 3 percentage points more likely than students ineligible for free lunch. However, context is important here, too. This pattern appears to arise from a high-ranking priority for students whose current schools were closing. The priority exists to mitigate a direct harm experienced disproportionately by Black families and families in poverty, and it applied to grade levels where relatively few seats in oversubscribed schools were available. Even so, implementing the closing school priority was politically challenging for state and local leaders (EdNavigator, 2019). Perhaps this closing school priority in New Orleans—or a similar priority elsewhere (Young, 2022)—serves as a political proof of concept, but it is a limited one.

It is also important to note that while we can remove or reverse anti-Black and anti-poor biases through simulations (or by looking to the non-transition grades), there is no plausible, short-term path to creating an integrated school system simply by tinkering with algorithm policies. Our simulations show the potential for policy changes to shift placement patterns, and some configurations—e.g., those that change priorities and seat capacities—result in a meaningful amount of movement. However, at least in present-day New Orleans, policymakers could not realistically engineer their way to an integrated system through changes to student priorities or seat capacities alone. They can remove a certain type of bias from these systems through algorithm reform, but the sources of inequity and segregation run too deep to be addressed simply with changes to a placement algorithm.

This study has limitations and relies on some assumptions. The first, which applies to our simulations, is an assumption that applicants would have submitted the same school requests even if schools had different priorities or seat capacities. This is broadly consistent with the logic of a strategy-proof algorithm (where families should rank schools in their true order of preference with little, if any, consideration of placement probabilities). However, families might not behave this way in practice (Kapor, Neilson, & Zimmerman, 2020), and changes in which students enroll in one year could affect families' desires for that school in a subsequent year. A second limitation relates to our data, as we cannot observe demographic information for children who never enroll in a public school. However, we can impute students' likely demographic characteristics based on the home neighborhoods, and our preferred estimates are similar to estimates obtained from samples restricted to students with directly observed demographics. Third, the multiple grade-level entry points into New Orleans elementary schools (pre-K and kindergarten), coupled with complexity in pre-K entry, limits our view of elementary school entry. We focus on kindergarten to avoid issues associated with pre-K, but this could result in missing certain types of students or schools, such as schools that strategically choose to run pre-K programs (Weixler, Lincove, & Gerry, 2019). Finally, one might wonder about the generalizability of these findings to other settings. The divergent patterns we observe across transition and non-transition grades serve as a reminder that placement policies could look quite different across—and even within—various contexts. This implies a need for research from other settings. We also believe that analyses like the ones in this study, if conducted with local data, could help to inform decision-making as school choice policies are debated.

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TABLE 1
State Performance Ratings of Schools Where Students Applied to Kindergarten, Were Placed, and Enrolled, By Race and Family Income

	Race			Free/Reduced-Price Lunch Eligibility		
	Black	White	Other/Unknown	Free	No FRL	Reduced/Unknown
A. Balanced panel						
Main Round first choice for 2018-19	1.79	2.90	2.24	1.82	2.26	2.74
Main Round placement for 2018-19	1.69	2.75	2.13	1.72	2.12	2.66
Round 2 placement for 2018-19	1.72	2.74	2.14	1.76	2.13	2.69
Schools attended in 2018-19 (2018 letter grade)	1.76	2.82	2.19	1.77	2.24	2.69
Schools attended in 2019-20 (2018 letter grade)	1.83	2.82	2.21	1.80	2.33	2.64
Schools attended in 2019-20 (2019 letter grade)	1.57	2.97	2.10	1.55	2.24	2.79
N	1,490	259	310	1,256	768	35
B. All observations						
Main Round first choice for 2018-19	1.83	2.92	2.32	1.84	2.31	2.40
Main Round placement for 2018-19	1.67	2.69	1.97	1.71	2.08	1.95
Round 2 placement for 2018-19	1.69	2.66	1.94	1.73	2.06	1.92
Schools attended in 2018-19 (2018 letter grade)	1.73	2.89	2.06	1.73	2.18	2.73
Schools attended in 2019-20 (2018 letter grade)	1.82	2.94	2.11	1.78	2.31	2.81
Schools attended in 2019-20 (2019 letter grade)	1.55	3.00	1.95	1.51	2.17	2.92
N (range)	1,702-2,731	302-409	525-1,158	1,435-2,293	898-1,382	59-825

Notes: Table shows the state performance ratings of public schools in New Orleans where students applied to kindergarten for the 2018-19 school year, were placed (in the Main Round and then Round 2), and enrolled (in 2018-19 and then 2019-20). Ratings come from school letter grades assigned by the Louisiana Department of Education and were converted to a standard grade-point average with a range of 0 to 4 (A=4, B=3, C=2, D=1, F/T=0). Schools that were new or transitioning to a different charter management organization received a grade of T. Schools without letter grades are omitted from these analyses. Panel A restricts sample to students observed at each step with an associated school with a non-missing letter grade. Panel B does not apply this restriction. Students who enrolled in multiple schools in one year are given the mean grade-point average of those schools. For enrollment in the 2019-20 school year, results are reported separately based on the letter grades issued to those schools in 2018 and 2019.

TABLE 2
Placed in First-Choice School for Kindergarten, By Race and Family Income

	Placed in First-Choice School		Placed in First-Choice School if "A"/ "B"-Rated School	
	(1)	(2)	(3)	(4)
Panel A. Race				
Black	-0.063*	-0.086**	-0.032	-0.083**
SE	0.034	0.035	0.039	0.039
P	0.07	0.02	0.42	0.04
Other race	-0.013	-0.042	0.051	-0.018
SE	0.053	0.054	0.061	0.062
P	0.81	0.43	0.41	0.77
School-by-grade FEs		X		X
N	1,144	1,144	765	765
Panel B. Family income				
Free lunch	-0.043	-0.056**	0.006	-0.029
SE	0.030	0.029	0.037	0.034
P	0.15	0.05	0.88	0.39
School-by-grade FEs		X		X
N	1,144	1,144	765	765

Notes: Dependent variable is an indicator for whether students were placed in their first-choice school in the Main Round. In Panel A, the reference group is White students. In Panel B, the reference group is students ineligible for free lunch (which combines students eligible for reduced-price lunch and students ineligible for free or reduced-price lunch). Sample includes students whose demographic information is directly observed and students whose demographic information is imputed as described in the Data and Sample section. Sample is limited to students without a guaranteed placement. Significance: *p<0.10, **p<0.05, ***p<0.01.

TABLE 3

Qualified for Priority Status at First-Choice School for Kindergarten, By Race and Family Income

	Priority at First-Choice School				Priority at First-Choice School if "A"/ "B"-Rated School			
	Geography	Sibling	At-Risk	IEP	Geography	Sibling	At-Risk	IEP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Race								
Black	-0.321***	-0.092***	0.052***	0.015**	-0.365***	-0.087***	0.034*	0.020**
SE	0.028	0.029	0.017	0.007	0.030	0.032	0.020	0.009
P	<0.01	<0.01	<0.01	0.03	<0.01	0.01	0.09	0.03
Other race	-0.220***	-0.064	0.036	-0.002	-0.210***	-0.059	0.026	-0.004
SE	0.042	0.042	0.025	0.009	0.045	0.049	0.033	0.012
P	<0.01	0.13	0.16	0.85	<0.01	0.23	0.43	0.77
School-by-grade FEs	X	X	X	X	X	X	X	X
N	1,144	1,144	1,144	1,144	765	765	765	765
Panel B. Family income								
Free lunch	-0.104***	-0.028	0.020	0.015**	-0.132***	-0.016	0.027	0.022**
SE	0.022	0.021	0.014	0.008	0.023	0.026	0.020	0.011
P	<0.01	0.18	0.15	0.05	<0.01	0.55	0.17	0.05
School-by-grade FEs	X	X	X	X	X	X	X	X
N	1,144	1,144	1,144	1,144	765	765	765	765

Notes: Dependent variable is an indicator for whether students received the specified priority at their first-choice school in the Main Round. In Panel A, the reference group is White students. In Panel B, the reference group is students ineligible for free lunch (which combines students eligible for reduced-price lunch and students ineligible for free or reduced-price lunch). Sample includes students whose demographic information is directly observed and students whose demographic information is imputed as described in the Data and Sample section. Sample is limited to students without a guaranteed placement. Significance: **p*<0.10, ***p*<0.05, ****p*<0.01.

TABLE 4
Placed or Qualified for Priority Status at First-Choice School for Non-Transition Grades 1 through 8, By Race and Family Income

	Placement	Priority		
		Geography	Sibling	Closing
	(1)	(2)	(3)	(4)
Panel A. Race				
Black	0.053***	-0.295***	0.007	0.101***
SE	0.009	0.037	0.013	0.014
P	<0.01	<0.01	0.57	<0.01
Other race	0.048***	-0.204***	-0.009	0.082***
SE	0.015	0.042	0.016	0.021
P	<0.01	<0.01	0.57	<0.01
School-by-grade FEs	X	X	X	X
N	2,838	2,838	2,838	2,838
Panel B. Family income				
Free lunch	0.029***	-0.075***	-0.008	0.093***
SE	0.009	0.016	0.009	0.012
P	<0.01	<0.01	0.38	<0.01
School-by-grade FEs	X	X	X	X
N	2,838	2,838	2,838	2,838

Notes: Dependent variable is an indicator for whether students were placed in their first-choice school (Column 1) or whether they received the specified priority at their first-choice school (Columns 2-5) in the Main Round. In Panel A, the reference group is White students. In Panel B, the reference group is students ineligible for free lunch (which combines students eligible for reduced-price lunch and students ineligible for free or reduced-price lunch). Sample includes students whose demographic information is directly observed and students whose demographic information is imputed as described in the Data and Sample section. Sample is limited to students without a guaranteed placement. Significance: **p*<0.10, ***p*<0.05, ****p*<0.01.

TABLE 5

Differences in Kindergarten Placements with Simulated Changes to Priorities and Seat Capacities

	Actual Number of Students	Sim. 1: Basic DA algorithm	Sim. 2: No Geo.	Sim. 3: No Sibling	Sim. 4: Guar. Only	Sim. 5: Lottery Only	Sim. 6: Disadv. Only	Sim. 7: Basic DA + Disadv. (High Priority)	Sim. 8: Basic DA + Disadv. (Low Priority)	Sim. 9: Increase Seat Capacity by 10%	Sim. 10: Basic DA + Disadv. + Increase Seat Capacity
Priority rank in algorithm											
Guaranteed (Guar.)		1	1	1	1			1	1	1	1
Sibling		2	2					3	2	2	3
Geography (Geo.)		3		2				4	3	3	4
Disadvantaged (Disadv.)							1	2	4		2
Increase capacity by 10%										X	X
Panel A. Placement in first-choice school											
All students	2,661	2,645	1%	-1%	2%	1%	1%	1%	0%	3%	4%
Black	2,085	2,062	2%	-1%	3%	3%	5%	3%	0%	3%	6%
White	267	280	-6%	-2%	-11%	-12%	-27%	-13%	-4%	6%	-9%
Other race	309	303	0%	-1%	1%	-1%	-4%	-3%	-1%	3%	-2%
Free lunch	1,478	1,481	1%	-1%	2%	1%	6%	4%	1%	2%	7%
Non-free lunch	1,165	1,147	1%	-1%	1%	2%	-6%	-4%	-2%	4%	0%
Panel B. Placement in “A”/“B”-rated school											
All students	530	525	2%	-2%	3%	1%	-3%	1%	-1%	9%	9%
Black	286	273	8%	-4%	15%	13%	17%	10%	1%	11%	22%
White	164	175	-5%	1%	-13%	-13%	-29%	-8%	-2%	8%	-3%
Other race	80	77	-5%	-1%	-4%	-12%	-13%	-13%	-5%	6%	-10%
Free lunch	199	197	5%	-6%	8%	1%	19%	15%	6%	9%	23%
Non-free lunch	322	320	0%	0%	0%	1%	-17%	-9%	-6%	10%	-1%

Notes: Table shows placements resulting from simulated changes to school priorities and/or seat capacities. The first column shows the actual number of students in the analytic sample who were placed in their first-choice school (Panel A) or an “A”/“B”-rated school (Panel B). The second column (Simulation 1) shows the number of students placed using a simulated, basic deferred-acceptance (DA) algorithm. Simulations 2-10 show how the number of students placed would differ from the corresponding number in Simulation 1 (e.g., Simulation 2 results in 1% more students being placed in a first-choice school than Simulation 1). Several simulations incorporate priorities for vulnerable students. This “disadvantaged” priority considers, in order: (a) eligibility for free lunch, (b) enrollment in a school that is closing, (c) enrollment in a school with a D/F/T rating, (d) enrollment in a school with C rating, and (e) eligibility for reduced-price lunch. Simulations 9 and 10 increase the seat capacity of each school by 10%. Each simulation considered 3,427 applicants for seats.

TABLE 6

Placed in First-Choice School for Kindergarten with Simulated Changes to Priorities and Seat Capacities, By Race and Family Income

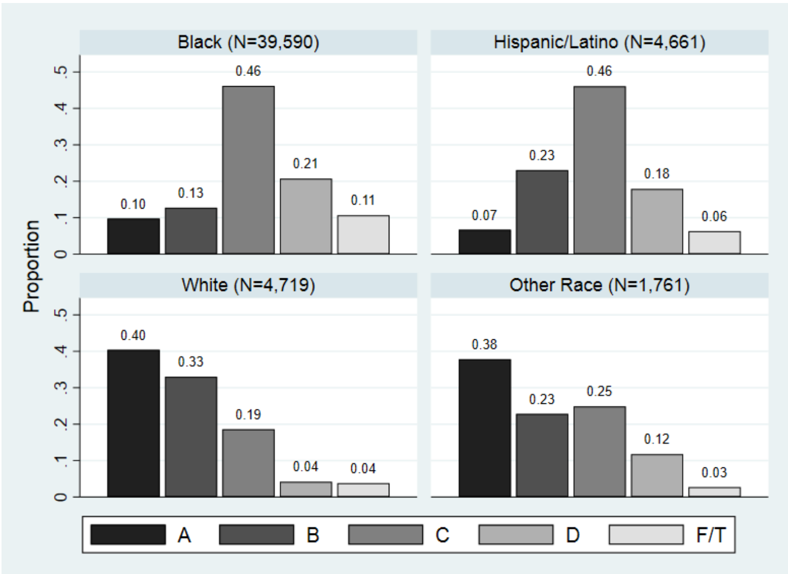
	Sim. 1: Basic DA algorithm	Sim. 2: No Geo.	Sim. 3: No Sibling	Sim. 4: Guar. Only	Sim. 5: Lottery Only	Sim. 6: Disadv. Only	Sim. 7: Basic DA + Disadv. (High Pri.)	Sim. 8: Basic DA + Disadv. (Low Pri.)	Sim. 9: Increase Seat Capacity by 10%	Sim. 10: Basic DA + Disadv. + Increase Seat Capacity
Priority rank in algorithm										
Guaranteed (Guar.)	1	1	1	1			1	1	1	1
Sibling	2	2					3	2	2	3
Geography (Geo.)	3		2				4	3	3	4
Disadvantaged (Disadv.)						1	2	4		2
Increase capacity by 10%									X	X
Panel A. Race										
Black	-0.193***	-0.014	-0.213***	0.043	0.055	0.337***	0.245***	-0.020	-0.213***	0.280***
SE	0.051	0.053	0.050	0.051	0.051	0.040	0.040	0.044	0.050	0.042
P	<0.01	0.80	<0.01	0.40	0.28	<0.01	<0.01	0.66	<0.01	<0.01
Other race	-0.177***	-0.070	-0.123*	-0.016	0.038	0.083**	0.031	-0.057	-0.178***	-0.004
SE	0.072	0.071	0.071	0.069	0.069	0.047	0.043	0.060	0.072	0.045
P	0.01	0.32	0.08	0.81	0.58	0.08	0.47	0.34	0.01	0.93
School-by-grade FEs	X	X	X	X	X	X	X	X	X	X
Panel B. Family Income										
Free lunch	-0.018	-0.022	-0.042	0.027	0.019	0.423***	0.336***	0.158***	-0.043	0.380***
SE	0.045	0.047	0.044	0.048	0.047	0.045	0.045	0.043	0.045	0.044
P	0.69	0.65	0.34	0.57	0.69	<0.01	<0.01	<0.01	0.35	<0.01
School-by-grade FEs	X	X	X	X	X	X	X	X	X	X

Notes: This table shows the results of regression models mirroring the models from Table 2 using the simulated priorities and seat capacities presented in Table 5. Students with guaranteed placements are omitted. Significance: *p<0.10, **p<0.05, ***p<0.01.

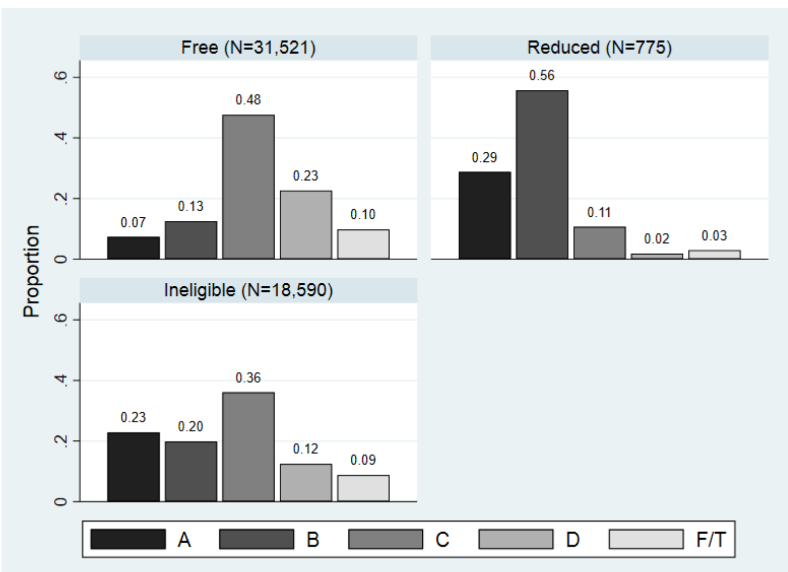
FIGURE 1

State Performance Ratings of Schools Where Students Enrolled in Grades K-12, By Race and Family Income

1a. Enrollment by Race/Ethnicity



1b. Enrollment by Family Income (Free or Reduced-Price Lunch Eligibility)



Notes: Figures show the state performance ratings of public schools in New Orleans where students were enrolled during the 2018-19 school year (grades K-12). Ratings come from school letter grades assigned by the Louisiana Department of Education in 2018. Schools that were new or transitioning to a different charter management organization received a grade of T. Schools without letter grades—and students without directly observed demographic data—are omitted from these analyses.

APPENDIX TABLE 1

Counts of Placement Priority Combinations by School, Disaggregated by Grade

Sequence of Priorities					Number of Schools		
Priority 1	Priority 2	Priority 3	Priority 4	Priority 5	Kindergarten	Grade 4	Grade 9
Closing school	Sibling	Geography			41	50	7
Feeder	Sibling	Geography			9		1
IEP	At-Risk	Sibling	Feeder		3		
Sibling	Geography				2		
Sibling	School-specific				2		
Sibling					1	1	20
Feeder	IEP	Sibling	Child of staff	Geography	1	1	1
Closing school	Feeder	Sibling	Geography		1	1	
Closing school	Sibling	At-Risk	Geography		1	1	
IEP	At-Risk	Sibling			1		
Sibling	Feeder					3	1
Closing school	Sibling	School-specific				2	
Feeder	Sibling						3
IEP	Sibling						1
Sibling	Feeder	Geography					1

Notes: Table shows the number of public schools with the specified sequence of priorities in the 2018-19 Main Round. The full priority hierarchy includes combinations of these priorities. For example, if a school has three ordered priorities—A, B, and C—the full priority hierarchy would be: 1) A+B+C, 2) A+B, 3) A+C, 4) A, 5) B+C, 6) B, and then 7) C. Some priorities apply to all seats; others apply to only a subset of seats (e.g., geography). School-specific priorities are unique to particular schools (e.g., a priority for children of French nationals in a French immersion program). Schools are included regardless of whether any applicants qualified for the priorities listed.

APPENDIX TABLE 2

Placed in First-Choice School for Kindergarten, By Race and Family Income—Students with Guaranteed Seats Included

	Placed in First-Choice School		Placed in First-Choice School if "A"/"B"-Rated School	
	(1)	(2)	(3)	(4)
Panel A. Race				
Black	0.207***	-0.064***	-0.045	-0.058*
SE	0.025	0.026	0.035	0.033
P	<0.01	0.01	0.19	0.08
Other race	0.199***	-0.032	0.062	0.020
SE	0.031	0.029	0.051	0.048
P	<0.01	0.27	0.22	0.67
School-by-grade FEs		X		X
N	3,427	3,427	1,061	1,061
Panel B. Family income				
Free lunch	0.134***	0.003	0.048	0.020
SE	0.014	0.012	0.032	0.029
P	<0.01	0.79	0.13	0.48
School-by-grade FEs		X		X
N	3,427	3,427	1,061	1,061

Notes: Dependent variable is an indicator for whether students were placed in their first-choice school in the Main Round. In Panel A, the reference group is White students. In Panel B, the reference group is students ineligible for free lunch (which combines students eligible for reduced-price lunch and students ineligible for free or reduced-price lunch). Sample includes students whose demographic information is directly observed and students whose demographic information is imputed as described in the Data and Sample section. This table is parallel to Table 2, but this sample also includes students who were guaranteed a seat in their first-choice school. Significance: *p<0.10, **p<0.05, ***p<0.01.

APPENDIX TABLE 3

Placed in First-Choice School for Kindergarten, By Race and Family Income—Restricted to Students with Directly Observed Demographic Data

	Placed in First-Choice School		Placed in First-Choice School if "A"/"B"-Rated School	
	(1)	(2)	(3)	(4)
Panel A. Race				
Black	-0.110**	-0.088*	-0.078**	-0.110*
SE	0.048	0.053	0.059	0.064
P	0.02	0.10	0.19	0.09
Other race	-0.062	-0.048	0.012	-0.042
SE	0.070	0.073	0.085	0.088
P	0.38	0.51	0.89	0.63
School-by-grade FEs		X		X
N	614	614	370	370
Panel B. Family income				
Free lunch	-0.078*	-0.042	-0.047	-0.013
SE	0.047	0.047	0.063	0.061
P	0.10	0.37	0.46	0.83
School-by-grade FEs		X		X
N	614	614	370	370

Notes: Dependent variable is an indicator for whether students were placed in their first-choice school in the Main Round. In Panel A, the reference group is White students. In Panel B, the reference group is students ineligible for free lunch (which combines students eligible for reduced-price lunch and students ineligible for free or reduced-price lunch). Sample is limited to students without a guaranteed placement. This table is parallel to Table 2, but this sample is restricted to students whose race/ethnicity and family income are directly observed in administrative data (no imputations). Significance: **p*<0.10, ***p*<0.05, ****p*<0.01.

APPENDIX TABLE 4
Share of Applicants with Priority Status at Their First-Choice School, Disaggregated by Grade

	Kindergarten	Grade 4	Grade 9
At-Risk	5.1	0.0	0.0
Child of staff	0.0	0.0	0.0
Closing school	0.0	17.5	0.0
Feeder	2.5	0.0	10.2
Geography	35.5	45.5	12.4
IEP	1.0	0.0	0.2
School-specific	0.4	0.4	0.0
Sibling	22.9	6.0	11.4

Notes: Table shows the percentage of applicants who had the specified priority at their top-ranked public school. Applicants were marked as *not* having a priority if either: (a) their top-ranked school used that priority but the applicant did not qualify; or (b) their top-ranked school did not use that priority. School-specific priorities are unique to a small number of schools (e.g., a priority for children of French nationals in a French immersion program). Table only includes students without a guaranteed placement in that school.

Online Appendix A

This appendix provides a stylized example of how the OneApp's deferred-acceptance algorithm works. Figure A1.1 depicts a scenario in which four students (Chris, Imani, James, and Kayla) submit rank-ordered requests for up to five schools (Schools A, B, C, D, and E). In this scenario, each school has only one seat available. Student priorities determine which students receive seats in cases of oversubscription, with some priorities common across all schools and others specific to individual schools. For example, while Chris is first in line at most schools (perhaps because he is coming from a D/F-rated school), James has a sibling enrolled in School C, which places him ahead of Chris in that school's priority order.

Figure A1.1

	Chris	Imani	James	Kayla
Choice #1	C	D	C	A
Choice #2	D	A	D	D
Choice #3		E	A	
Choice #4		B		
Placement				

Student priority order:

- School A: Chris, Imani, James, Kayla
- School B: Chris, Imani, James, Kayla
- School C: James (sibling), Chris, Imani, Kayla
- School D: Chris, Imani, James, Kayla
- School E: Imani (guaranteed), Chris, James, Kayla

The algorithm initially works through applicants' first choices. It tentatively places Imani in School D and Kayla in School A since those schools only had one first-choice request. Chris and James both requested School C. Chris receives that tentative placement because of his higher priority status, which means that James is eliminated from consideration for School C.

Figure A1.2

	Chris	Imani	James	Kayla
Choice #1	~~C~~	D (tentative)	C (tentative)	A (tentative)
Choice #2	D	A	D	D
Choice #3		E	A	
Choice #4		B		
Placement				

On the algorithm's second pass, it will give Chris—the one applicant without a tentative placement at that point—full consideration at his second-ranked choice, School D. This is key to the algorithm's strategy-proofness. Chris is not punished for ranking School D second when others (Imani) ranked it first. In fact, Chris has higher priority at School D, so he tentatively takes Imani's placement in School D and Imani is eliminated from consideration for that school. This leaves Imani without a seat, at least temporarily.

Figure A1.3

	Chris	Imani	James	Kayla
Choice #1	~~C~~	~~D~~	C (tentative)	A (tentative)
Choice #2	D (tentative)	A	D	D
Choice #3		E	A	
Choice #4		B		
Placement				

In the algorithm's third pass, Imani receives full consideration for School A. Since Imani has higher priority than Kayla at School A, she takes Kayla's (tentative) seat. This eliminates Kayla from consideration for a Main Round placement in School A.

Figure A1.4

	Chris	Imani	James	Kayla
Choice #1	~~C~~	~~D~~	C (tentative)	~~A~~
Choice #2	D (tentative)	A (tentative)	D	D
Choice #3		E	A	
Choice #4		B		
Placement				

In what will be the final pass for this this algorithm, Kayla is considered for a seat in School D. However, James holds onto that seat by virtue of his higher priority status. Since Kayla did not request any other schools, she will not receive a placement in this round.

Figure A1.5

	Chris	Imani	James	Kayla
Choice #1	~~C~~	~~D~~	C	~~A~~
Choice #2	D	A	D	~~D~~
Choice #3		E	A	
Choice #4		B		
Placement	D	A	C	Unassigned

At this point, the tentative placements are finalized. The system assigns Chris to School D, Imani to School A, and James to School C. Kayla will need to seek out a seat through another pathway (e.g., Round 2 or summer enrollment) or find an alternative option (e.g., private school).