

Giving At-Risk Students Preference in a Unified Lottery for Public Schools

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I. **ABSTRACT**

A unified lottery for traditional and public charter schools in Washington, DC serves over 20,000 applicants per year, and can be used as a tool to improve lottery outcomes for applicants that are at-risk of academic failure. The City Council of the District of Columbia defined a group of students as “at-risk” in 2014. The utility of the lottery preference for at-risk students to diversify school populations is limited because the lottery only places new students, and the impact can increase or decrease with corresponding policy decisions. Seats available at high-performing schools are a finite resource and those schools typically fill in the unified lottery. Giving an advantage to one group disadvantages another group’s lottery results at these schools. The strongest preference contemplated in this analysis, giving at-risk students the top priority out of all applicant groups including siblings, would improve lottery outcomes for 8.2% of the 7,432 applicants identified as at-risk. As the preference weakens, a smaller percentage of at-risk applicants will have improved lottery outcomes. Overall outcomes will depend on the strength of the preference and a local education agency’s decision-making to give a preference that will displace other applicants without that advantage.

II. INTRODUCTION

a. What is a unified lottery?

School choice has been an increasing trend in the United States as charter schools have gained support in some areas, particularly cities like DC where student populations are dense, and traditional school districts have offered choice in a variety of ways such as citywide school options and out-of-boundary mobility. As new school options are made available, a market arises, and a random lottery¹ is one way of matching demand to supply and allocating seats in schools. “As urban education landscapes grow more complex, families need help making sense of their public school options, both district and charter. To assist with this process, some cities have launched unified enrollment systems, providing a common timeline for procedures, common application materials, centralized mechanisms to match students to schools, and comprehensive information systems that explain the process and list participating schools.” (Gross & Campbell, 2017). Washington D.C., Denver and New Orleans have led these enrollment reforms and continue to refine them, with other cities in the nascent stages of unifying their enrollment systems. This paper intends to examine one aspect of Washington D.C.’s unified lottery by analyzing possible outcomes if low-income “at-risk”² students were given a lottery preference for the most sought after public schools, both traditional and charter.

In Washington, DC nearly all public schools have participated in the unified lottery to simplify the process for families since it launched in 2014. Public school enrollment has been increasing since 2008, and almost half of the public school population in DC attends public charter schools. DC is home to one large, traditional school district called District of Columbia Public Schools (DCPS) that also participates in the common lottery allowing students to apply to selective high schools and any traditional school that is outside of their designated geographic boundary. Students do not have to apply to their in-boundary schools before the school year begins and, like most other jurisdictions in the country, can always attend an elementary, middle or high school within DCPS that is determined by their address. Currently, nearly three quarters of the public school students in DC choose to attend a school that is not their in-boundary school using the unified lottery (District of Columbia Government, Public Education Supply and Demand for the District of Columbia, 2017).

Every December, the unified lottery application launches to determine seat allocation for the school year that begins the following fall. Applicants can select up to 12 charter schools and traditional public schools on one application and rank the schools in the order they like them. A match-stable “deferred acceptance” algorithm sorts the applicants creating matches and waitlists. The algorithm assigns each student a random lottery number and attempts to match each student with his or her 1st choice first, then 2nd, 3rd, and so on in the order listed on the application. However, when it compares two students who have applied to the same school, the decision is based on two criteria: the students’ randomly assigned lottery number, and the

¹ Any public charter school that received Federal funds through the Charter Schools Program is required to determine admission by random lottery.

² The District of Columbia defines “at-risk” in the legislation that authorizes per pupil school funding: DC Code § 38-2901(2A)

students' preferences at that school (e.g., sibling preference). Currently, there is no lottery preference in place for low-income students in DC. See Appendix A for the list of preferences offered in the DC unified lottery for school year 16-17.

b. What is the current state of racial and socioeconomic diversity in DC schools?

DC diversity conversations should include the important context that the majority of the city's public schoolchildren are low-income based on eligibility for free and reduced price lunch, and citywide, 47% of all public school students were identified as at risk (District of Columbia Government, Public Education Supply and Demand for the District of Columbia, 2017). About 10% of public school enrollment is white. The DC Fiscal Policy Institute determined that the poverty rate in 2016 for white District residents was 7.9 percent, and for Black families it is nearly four times higher at 27.9 percent, and for the Latinx community, 17.8 percent (Naveed, 2017). The Civil Rights Project at UCLA found that 71% of black students in both sectors of the District's public schools attended schools in 2013 that had virtually no white peers (Orfield & Ee, 2017). Recent research suggests that many schools in DC are socioeconomically divided, though the city's population has diversified rapidly by race and income leading to some increase in diversity in schools (District of Columbia Government, Public School Enrollment Trends, 2017). Most students that are low-income in DC are also students of color, going to school with other students of color.

Since the seminal U.S. Supreme Court case of *Brown v. Board of Education* ordered desegregation of public schools in 1964, a half century of research shows that segregation limits achievement and attainment; conversely integration is a key factor in high school graduation, college completion, better life outcomes, and benefits students of all races (Orfield & Ee, 2017). The recent demographic shifts in DC have resulted in a more diverse city, and in some areas, more diverse schools (Mordechay, Ayscue, & Orfield, 2017). If the city creates policy specifically to improve lottery outcomes for at-risk students and foster school integration then the unified lottery is a tool of voluntary school choice that policymakers could use. The outcomes of such policy changes also depend on how DC families exercise choice and any geographic advantage to accessing a school (charter schools in DC currently have no boundaries). A school's proximity to home is a factor that proves influential in schooling decisions, so housing and education policy remain entwined in DC (Mordechay, Ayscue, & Orfield, 2017). Additionally, recent research on how families in DC use the unified lottery finds that parents tend to prefer schools where their children have at least some peers of the same race or ethnicity, but some parents also prefer a diverse school to a homogeneous school (Glazerman & Dotter, 2016).

c. How can a preference influence unified lottery outcomes for low-income students?

Segregation in the context of lottery schools is a topic that has been examined at the Federal level. In January 2014, the U.S. Department of Education updated guidance that expanded the circumstances under which public charter schools receiving Federal Charter Schools Program (CSP) funds may elect to use a weighted lottery in admissions, and later codified that expansion in the Every Student Succeeds Act.³ According to the Federal guidance, public charter schools receiving CSP funds may now use weighted lotteries to give slightly better chances for admission

³ Every Student Succeeds Act of 2015, Pub. L. No. 114-95 § 114 Stat. 1177 (2015-2016).

to all or a subset of educationally disadvantaged students if state law permits the use of such weighted lotteries. The Center for American Progress examined income division in schools nationally and recommended that Districts “consider income background and socioeconomic status in their student assignment systems. More specifically, weighted lottery systems can ensure schools have an economically diverse student body. These so-called controlled choice programs allow parents to rank-order their preferred schools, but district leaders can take into account the parent’s education level, income background, and special needs during the assignment process.” (Boser & Baffour, 2017)

A preference or weighting in favor of low-income students in a unified lottery is not unprecedented. At least 19 states expressly permit the use of weighted lotteries for economically disadvantaged students in their state statutes (Baum, 2015). Denver Public Schools gives a preference in their unified lottery at 20 low-poverty schools for low-income students, and recently opened a comprehensive high school that reserves a third of available seats for students residing in high-poverty neighborhoods (City of Denver, 2016). In DC, a preference in the unified lottery is already permitted for students with special education needs, but new legislation and regulation would likely be needed to permit a preference in the lottery for low-income students.

d. How do preferences work in the DC unified lottery?

The two sectors of public schools in DC are commonly known as the traditional public schools (DCPS) and public charter schools (PCS). In PCS, all new students must be admitted through the lottery, but for DCPS students in Kindergarten through 12th grade do not need a lottery application for their geographic in-boundary, by-right school. Every student seeking a new public school will apply in the DC unified lottery and all applicants are assigned a single, random lottery number. The lottery program utilizes the same random lottery number for each of the schools that the applicant selects and ranks, and also considers any preferences that the applicant has to an individual school. Schools in both sectors apply preferences to their applicants. A common example of a preference is when an applicant has a student that attends the school already. To access the seats made available in a school, the lottery program sorts applicants to that school by random lottery number within a preference group such as those with a sibling attending. The school sets the order in which preference groups are admitted (siblings first, children of staff second, etc.) and that preference order is not standardized across schools. Preferences already have an impact on lottery results; 38% of applicants were matched to a school where they had a preference in the unified lottery for the 16-17 school year.

e. What makes a student “at-risk” in this analysis?

In October of 2014, the Council of the District of Columbia legislated and implemented additional per pupil funding for students that are “at-risk for academic failure.” The at-risk funding applies to PK3-12 students who are homeless, in the District’s foster care system, qualify for Temporary Assistance for Needy Families (TANF) or the Supplemental Nutrition Assistance Program (SNAP), or high school students that are one year older, or more, than the expected age for the grade in which the students are enrolled. With the exception of overage high school students and foster students, each of the qualifying indicators of “at-risk for academic failure” is also an indicator of

low-income for the student’s family. The “at-risk” identification can serve as the student-level income indicator for which a preference would be applied in the unified lottery. Nearly 40,000 of the District’s public school students are identified as at-risk (District of Columbia Government, 2016-17 School Year General Education Enrollment Audit Data and Overview, 2017)⁴, which is more than a third of the public school population in 2016-17.

f. Can a preference in the public school lottery give an advantage to at-risk applicants?

The following sections attempt to answer the question by using the mechanisms currently available in the My School DC matching software, considering what advantages the preferences give to at-risk applicants in DC’s unified lottery and what potential impacts would those have on the socioeconomic diversity in DC schools. The following sections outline the method used, its limitations, and subsequent results.

III. METHOD

My School DC uses a deferred acceptance algorithm. It was designed specifically for My School DC by the Institute for Innovation in Public School Choice (IIPSC). The algorithm is based on the Nobel-prize winning work of economist Al Roth of Stanford University. Interested parties can learn more by reviewing *School Choice: A Mechanism Design Approach*.⁵ School staff members and District leaders gave input into the requirements for the DC matching algorithm design.

The My School DC matching algorithm assigns each student a random lottery number and attempts to match each student with his or her 1st choice first, then 2nd, 3rd, and so on in the order listed on the application. However, when it compares two students who have applied to the same school, the decision is based on two criteria in this order:

- (1) The students' preferences at that school (e.g., sibling preference)
- (2) The students' random lottery number (ex. 0.712493214156708)⁶

My School DC uses decimal numerals between 0 and 1 for the random numbers assigned when running the lottery, with enough decimal places to ensure applicants can be listed in order with no ties. The smaller number is the better number when assigning seats or ordering waitlists; or, to phrase it differently, the number closer to zero is the better random number. Rank is not a criterion in this process – it simply informs the order in which the matching algorithm should proceed when trying to match applicants to seats. An applicant that ranks a particular school 1st and an applicant that ranks that same school 12th (assuming they are not matched to a higher ranked school) have the same opportunity for that seat and only the preference group and random lottery number are used to assign that seat. Waitlists are ordered using the same criteria. This matching process ensures that applicants do not receive a better or worse placement than their criteria allow – they are placed based on their random lottery number and any preferences they have at the school regardless of whether they ranked the school #1 or #12. By removing strategy in ranking and applying, families can rank schools in the order they truly like them without fear of “wasting” a top-ranked school selection on a highly demanded school.

These two criteria are also the two different ways My School DC can readily implement an at-risk preference given the current algorithm programming – My School DC can change an applicant's preference group and their random lottery number. To examine the outcomes of implementing an at-risk preference in the DC unified lottery, My School DC used the same data set used to run the actual school lottery for school year (SY) 16-17 and performed a mock lottery to simulate results using additional preferences for at-risk applicants. These mock lottery results allowed My School DC to compare outcomes from the added preferences with the results of the actual lottery from SY16-17. Six different mock lotteries were performed, each with a different version of the at-risk preferences outlined below.

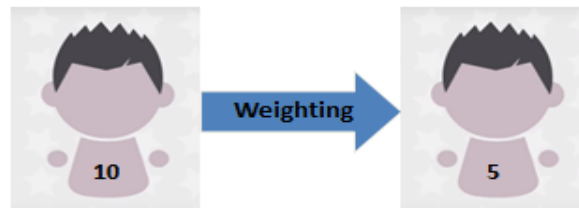
⁵ Abdulkadiroğlu, Atila, and Tayfun Sönmez. 2003. "School Choice: A Mechanism Design Approach." *American Economic Review*, 93(3): 729-747.

⁶ Selective high schools in DC do not use random lottery numbers, but rather their own selection criteria to order applicants.

Preference Types Tested

Weighted preferences change the random lottery number for the eligible applicant at a specific school selection (Figure 1). It does not move the applicant outside of the applicant's preference group, but a weighting would improve the random lottery number and would move the applicant within their preference group. So, if the applicant has no preference at a school selection, the weighting will only move them within the "no preference" group of applicants. My School DC does not currently implement any weighted preferences in the actual lottery.

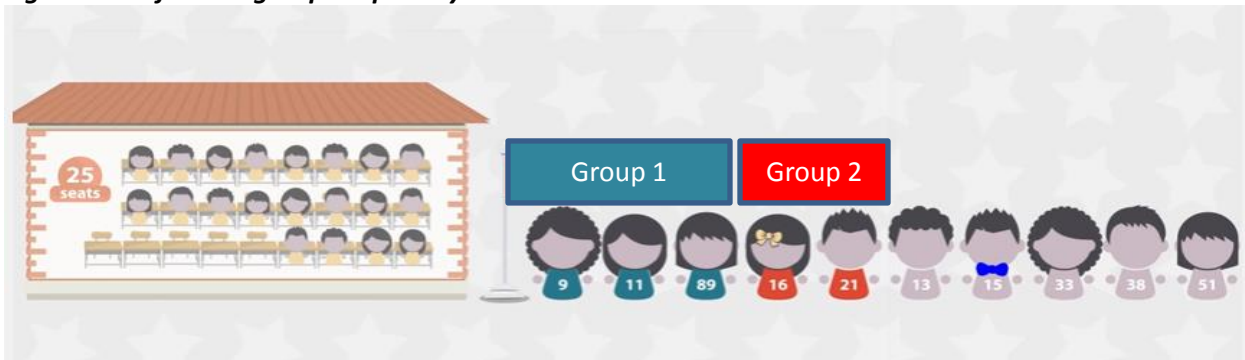
Figure 1. Weighting decreases and improves random lottery number



Priority preferences are structured in ordered groups (Figure 2). If there are two priority preferences, individuals that qualify for the best (first in order) priority preference group will get a seat at a school before all applicants with the 2nd best (second in order) priority preference group. Those within the 2nd best priority preference group will receive a seat before those with no preference. All preferences implemented in the lottery are priority preferences.

See Appendix A for full list of SY16-17 Lottery preferences.

Figure 2. Preference groups in priority order



Preference Versions Tested

When implementing the weighted preference, the mock lotteries used three different degrees of weighting, informally named light, medium, and heavy. When applied to the random lottery numbers (decimal numbers) a light weighting reduced the number by a $\frac{1}{4}$, a medium weighting reduced the number by a $\frac{1}{2}$, and a heavy weighting reduced the number by $\frac{3}{4}$. By reducing that number or moving it further from 1 and closer to 0, applicants received a "better" position which can result in a match or better waitlist spot. Applicants do not move outside of their priority preference group with a weighting, only within that preference group.

When implementing the priority preference, the mock analysis ‘prioritized’ the preference three different ways – as the first priority, as the priority that always came before the Sibling Attending priority preference (wherever that may be in an Local Education Agency’s preference ranking), and as the last priority.

Figure 3. Preference type and version tested in each SY16-17 mock lottery

Preference type	Preference version	Explanation
Weighting	Light weighting	Student random lottery number is multiplied by .75, reducing it by a quarter (Ex. Random lottery number .9524*.75 = .7143)
	Medium weighting	Student random lottery number is multiplied by .5, reducing it by half
	Heavy weighting	Student random lottery number is multiplied by .25, reducing it by three quarters
Priority	Last Priority	Preference that is just better than no preference at all in the order the LEA sets
	Priority to Sibling	Preference is placed just ahead of sibling preference (different at every LEA)
	First Priority	Preference is placed in front of all other preferences including Sibling and In-boundary

DC Schools Selected

Eligible schools, from both sectors, were chosen based on whether they enrolled less than 25% at-risk students as counted in the Audited Enrollment File for SY16-17. This threshold was chosen for the analysis for the following three reasons:

- The District of Columbia Mayor adopted recommendations which identified schools with 25% or less at-risk students and recommended a lottery change (District of Columbia Government, Final Recommendations on Student Assignment Policies and DCPS School Boundaries, 2014);
- These schools are some of the most highly demanded and highest performing schools in the city – they typically have many more applicants than seats available; and
- Schools located in neighborhoods with high at-risk populations are already matched to many at-risk applicants even without a preference.

46 out of 232 school options available on the My School DC Lottery Application for SY16-17 (Appendix B) were eligible for the at-risk preference in this analysis. The schools were spread over 15 Local Education Agencies (LEAs), with most school options being a part of DCPS which is the city’s largest LEA. Some of these options could be at the same campus (ex. Elsie Whitlow Stokes Community Freedom PCS’s French Language Program and Spanish Language Program), but would take up two choice slots on an applicant’s application⁷. For a complete list of where each priority preference was ranked at each school for each mock lottery, see Appendix C.

⁷ Some schools in DC have multiple programs with separate applications. When using the 25% or less at-risk cutoff for participating schools, we did not look at the programmatic level of enrollment, only the campus level.

At-risk Applicants Selected

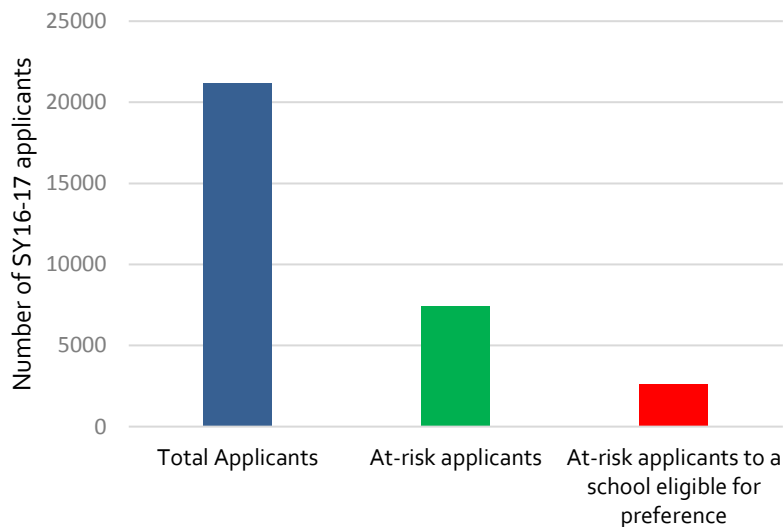
Eligible applicants for the at-risk preferences were identified using SY16-17 audited enrollment data. At-risk status is assigned to students that meet at least one of the following criteria:

- Students experiencing homelessness
- Students in the Districts foster care system
- Students who qualify for Temporary Assistance for Needy Families (TANF) or the Supplemental Nutrition Assistance Program (SNAP)
- High school students that are one year older, or more, than the expected age for the grade in which the students are enrolled⁸

Applicants in the SY16-17 lottery were identified based on the above criteria and received the preference if they applied to one of the eligible schools.

Out of 21,208 total applicants in the actual SY16-17 lottery, 7,432 were linked to the SY16-17 audited enrollment file and identified as at-risk. Of those, 2,644 of them qualified for the preference by selecting at least one qualifying school on their application. 716 of those applicants eligible for the at-risk preference were in pre-kindergarten (PK3 or PK4).

Figure 4. SY16-17 Lottery applicants by at-risk status and preference eligibility



⁸ The at-risk identifier is used as a proxy for low socioeconomic status in this analysis, but it is not a perfect proxy because there could be students with the at-risk identifier that are not low-income.

Limitations of Analysis

While this analysis provides helpful insight into the outcomes an at-risk preference may or may not have in the lottery, the following are current limitations to this analysis:

- This analysis reruns the SY16-17 lottery using the already-assigned random lottery numbers used in that lottery. Because of this static snapshot, our analysis has limited predictive capabilities for future lotteries. In order to understand the full range of outcomes an at-risk preference could have in the lottery, economic experts recommend assigning different random lottery numbers hundreds or even thousands of times to determine average outcomes and establish standard deviations. The My School DC staff is not currently set up for this type of analysis and work would need to be done externally.
- The mock lottery outcomes details in this analysis assume full participation by the eligible schools in applying the preference. Offering this preference would most likely be optional for LEAs. One can assume if fewer schools participate, the overall affects would also be less or at least different.
- A different definition of at-risk, such as using residential addresses in at-risk neighborhoods, could change who qualifies and the outcomes of the mock lotteries
- In order to identify eligible applicants from the SY16-17 Lottery, data are used from the SY16-17 audited enrollment. This allows identification of PK applicants that are eligible for the at-risk preference – the largest group of applicants in the unified lottery. However, these data are not available at the time of running the actual lottery as at-risk status is determined upon enrollment (October of the same school year). In order to practically apply this preference, the District would need to identify at-risk PK applicants by March (when the Lottery is run) for the following school year. For example, applicants would need to be flagged as at-risk in March of 2018 for SY18-19. Alternatively, the preference would only be applied to those that were eligible at the moment the Lottery is run. For example, applicants flagged as at-risk in SY17-18 could receive the preference in the SY18-19 Lottery – but this drastically limits the number of eligible applicants.
- Results are aggregated and specific school outcome examples are de-identified.

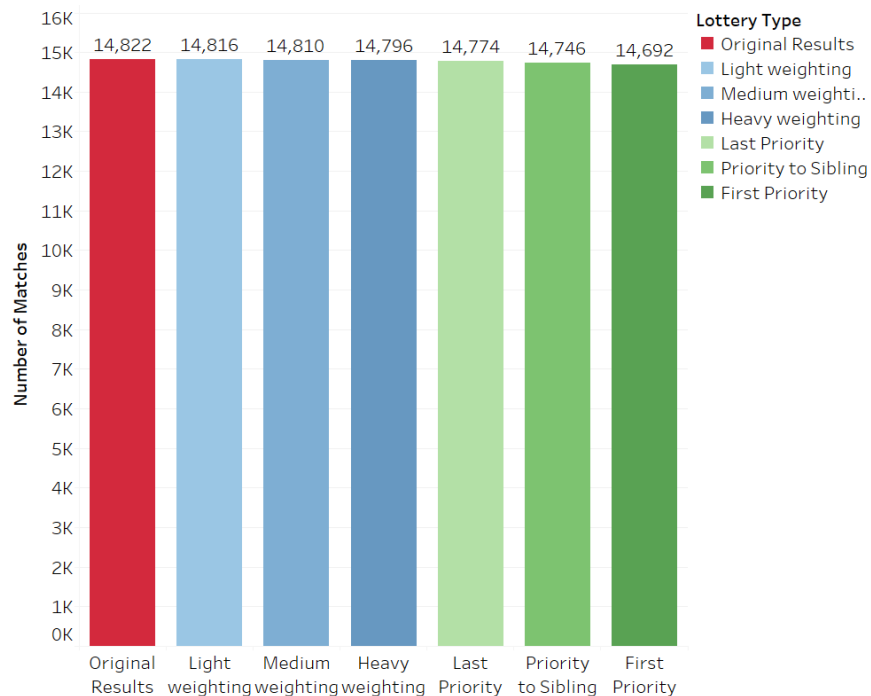
IV. RESULTS

One of the primary goals for the My School DC unified lottery is to match as many applicants as possible to a school they select on their application. To measure this, the My School DC staff reviews the overall number of matches that lottery applicants receive. While considering the potential benefit to one group of students, this paper also presents the outcomes for all other students.

Starting with the overall number of matches, compared to the actual original results from the SY16-17 lottery, each mock lottery showed a reduction in overall matches (see Figure 5). For the schools that were eligible because they enrolled less than 25% at-risk students, the number of open seats available in the lottery is a zero-sum game. That is, each applicant’s gain of a seat at an eligible school results in the loss of a seat for a different applicant.

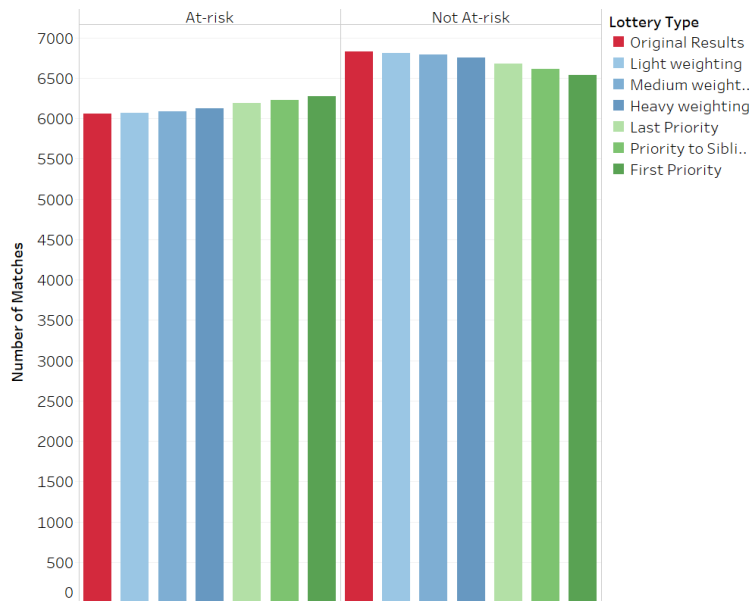
While it is true that in some grades there are more seats than applicants, and in all grades there are seats left on the open market, not all applicants end up with a match. First, there are few seats offered to new students in the lottery relative to the overall school population because most students either re-enroll at their current school or attend their in-boundary school, neither of which requires a lottery application under current DC policies. Second, most applicants only select a handful of school choices on their application. If an applicant that was matched in the original lottery is supplanted when the mock preferences are introduced, the result can be that they do not get a match at any other school. The median number of school selections is three across all grades even though applicants are permitted to select up to 12 schools, so the low number of selections also contributes to these results.

Figure 5. Overall applicant matches by mock lottery type



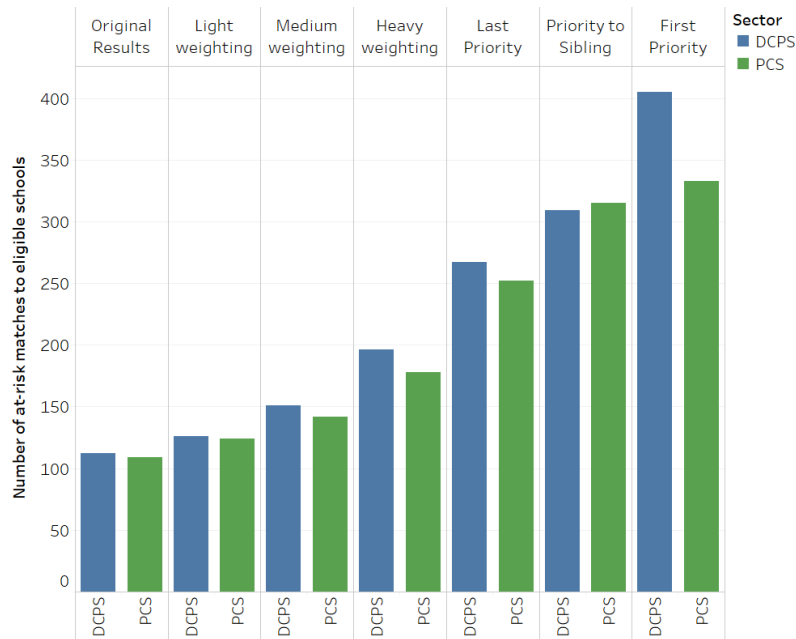
While matches went down slightly overall from the original results in the real lottery for SY16-17, the matches for at-risk applicants rose with each type of mock lottery. As one can see from the Figure 6, the at-risk preference versions that increased the total at-risk applicants that were matched also had the strongest effect on reducing the number of total matches for all applicants and, specifically, applicants not at-risk. The net loss in overall matches occurs because the at-risk matches gained do not offset the not at-risk matches that were lost.

Figure 6. Matches for at-risk and not at-risk applicants by original results and mock lottery type



As previously discussed, both sectors had eligible schools serving less than 25% at-risk students. Overall, the number of at-risk applicants matched, in each sector, increased in the mock lotteries. The *Light weighting* had the smallest effect and *First Priority* had the strongest – when at-risk students were the top priority over siblings and in-boundary students, it resulted in at-risk students being matched with a nearly 300% increase at DCPS schools and over a 200% increase at PCS schools (Figure 7).

Figure 7. Matches for at-risk applicants to eligible schools by original results and mock lottery type



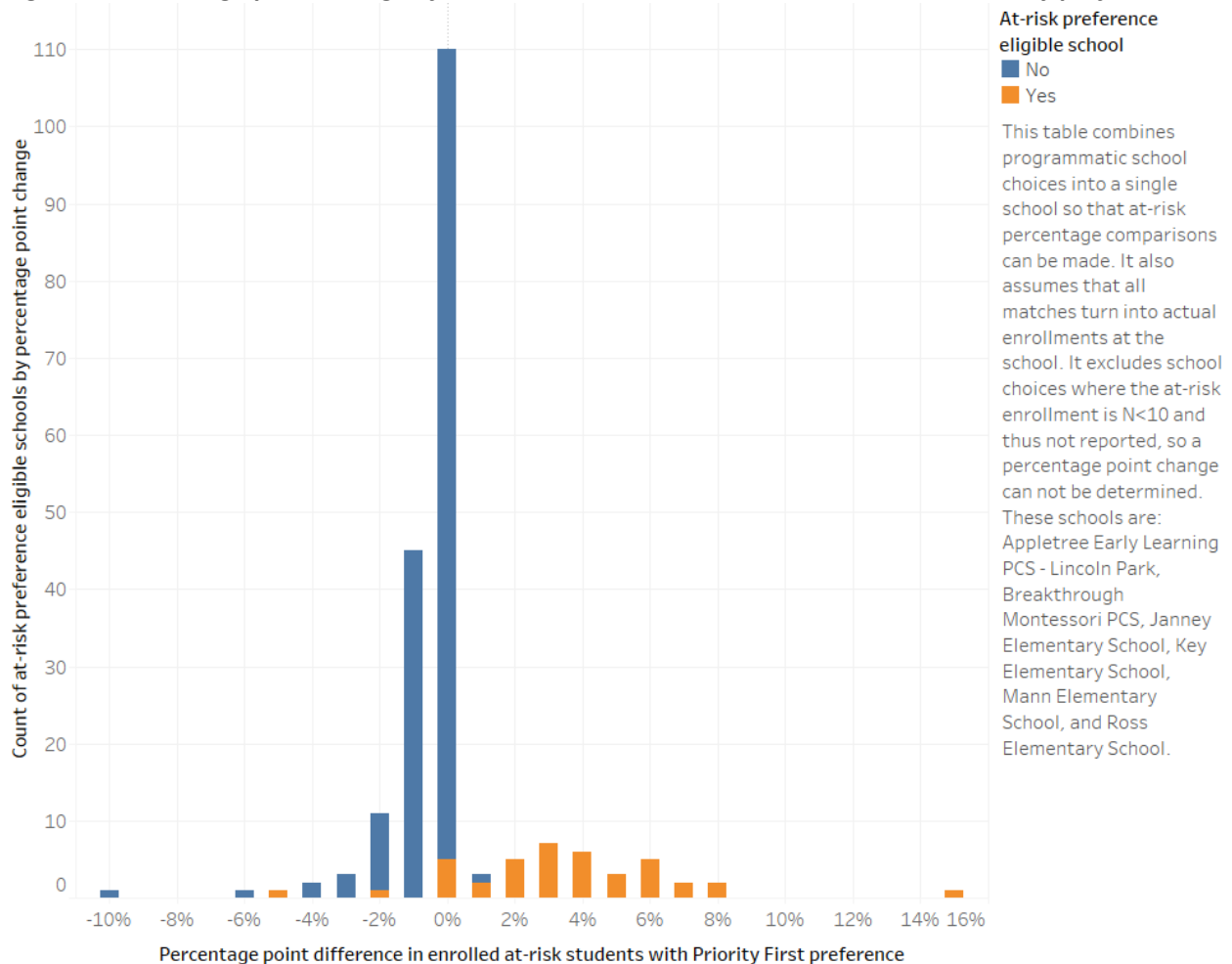
At the school level, the impact of each type of at-risk preference varies. Figure 8 shows two different schools, each from a different sector. In both cases, the weighted at-risk preferences make almost no difference to their lottery outcomes. At most, one additional at-risk applicant is matched as compared to the original results. This absence of impact is because these schools are already filling their seats with applicants that have a priority preference that is *higher* in the order of preference groups. When an at-risk priority preference is applied, applicants with siblings or geographical rights (in-boundary preference) need to be de-prioritized in order for additional at-risk applicants to gain a match at the school.

Figure 8. Sample School Result from each Sector

School Name	Grade	Original Results	Light weighting	Medium weighting	Heavy weighting	Last Priority	Priority to Sibling	First Priority
Charter A	PK3	5	5	5	5	5	16	16
	PK4	0	0	0	0	0	2	3
	K	0	0	0	0	0	5	7
	1	0	0	1	1	1	2	2
	2	1	1	1	1	1	2	2
	3	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0
	5	0	0	0	0	0	1	1
	Total		6	6	7	7	7	28
DCPS A	PK3	1	1	1	1	1	1	10
	PK4	0	0	0	0	0	0	1
	K	0	0	0	0	0	2	2
	1	0	0	1	1	1	1	1
	2	0	0	0	0	1	1	1
	3	0	0	0	0	0	0	0
	4	0	0	0	0	1	1	1
	5	1	1	1	1	1	1	1
	Total		2	2	3	3	5	7

However, even with the introduction of a strong preference like *First Priority* the overall effect at schools is quite small. In almost all cases, the eligible school populations remained under 25% at-risk – even when one assumes that all of the newly matched at-risk applicants go on to enroll at these school selections. The vast majority of a school population is re-enrolling students that do not need to apply through the lottery, and the changes to new student matches that an at-risk can provide in the lottery is further limited by individual choices made on the application like the number of schools selected and how they are ranked.

Figure 9. Percentage point change of enrolled at-risk at all schools based on First Priority preference



While the *First Priority* preference can greatly assist some schools with gaining more at-risk students, it can decrease the number of at-risk students at other schools, reducing the number of at-risk students matched to their school because the student with a preference is matched to a school they ranked more highly. Figure 10 shows three schools that all experienced different effects on the number of at-risk students matched in the mock lotteries. The *Charter B* and *DCPS B* schools saw more at-risk applicants matched with the *Last Priority* and the *Priority to Sibling* preferences with a decline when the *First Priority* preference was implemented. For both cases, the *Heavy weighting* also made an impact to the same degree that a *First Priority* would have, this was not the case at most schools. Finally, *Charter C* saw the same outcomes with the first two weightings (*Light* and *Medium*) and then a decline with the remaining preferences. This case in

particular illustrates the interconnectedness of the lottery, applicants that applied to *Charter C* also applied to other schools that were eligible for the preference and ranked those schools higher. So while at-risk applicants were originally getting into this school, certain preferences allowed them to get into a more preferred school on their application selections.

Figure 10. Examples of schools with different grade-level preference impacts on at-risk applicants

School Name	Grade	Original Results	Light weighting	Medium weighting	Heavy weighting	Last Priority	Priority to Sibling	First Priority
Charter B	PK3	4	4	5	8	8	7	5
	PK4	0	0	0	0	1	2	2
	K	0	0	0	0	0	0	0
	1	2	3	3	3	4	4	4
	2	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0
	Total		6	7	8	11	13	13
Charter C	PK3	4	4	4	4	4	3	3
	PK4	3	3	3	3	3	3	3
	K	4	4	4	4	2	2	2
	1	1	1	1	0	0	0	0
	2	2	2	2	2	2	2	2
	3	0	0	0	0	0	0	0
	Total		14	14	14	13	11	10
DCPS B	PK3	6	10	12	18	22	20	16
	PK4	0	0	0	1	1	3	3
	K	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0
	3	1	1	1	1	1	2	2
	Total		7	11	13	20	24	25

Ultimately, there were schools that gained at-risk applicant matches and schools that lost at-risk applicant matches. The following numbers look at all school choices at all schools. When utilizing the *First Priority* preference (the strongest preference), 610 at-risk applicants received a new or better match amounting to 8.2% of the identified 7,432 total at-risk applicants. A “new match” is an applicant that is waitlisted at all of their school choices in the original lottery, but in the mock lottery for this preference type, they received a match. This *First Priority* preference also resulted in 565 applicants (not at-risk) receiving a worse match or not receiving a match at all, when they had a match in the original lottery. Looking at the *Heavy weighting*, the numbers are smaller, but the pattern is the same. 187 at-risk applicants received a new or better match and 185 applicants not at-risk received a worse or no match.

Figure 11. Overall outcomes by at-risk status and mock lottery type

Mock Lottery	At-risk status	New match	Better match	Lost match*	Worse match	Same status
Light weighting	At-risk	16	20		1	7395
	Not at-risk			19	12	10052
	Unknown	2	2	5	5	3679
Medium weighting	At-risk	32	59	3	7	7331
	Not at-risk	5		36	41	10001
	Unknown	3	2	13	10	3665
Heavy weighting	At-risk	73	114	7	6	7232
	Not at-risk	10	7	84	100	9882
	Unknown	7	4	25	28	3629
Last Priority	At-risk	143	210	13	17	7049
	Not at-risk	14	15	156	209	9689
	Unknown	15	7	51	52	3568
Priority to sibling	At-risk	195	294	19	23	6901
	Not at-risk	18	21	227	218	9599
	Unknown	16	10	59	55	3553
First Priority	At-risk	236	374	19	22	6781
	Not at-risk	23	29	310	255	9466
	Unknown	18	13	78	55	3529

*Applicants that lost a match did not gain another match, and are not counted in the New match, Better match, or Worse match columns.

V. DISCUSSION

a. Citywide Impacts

The impact of at-risk lottery preferences on at-risk students gaining a match in the lottery is positive – that is, more at-risk students gain matches when all varieties of the at-risk preference are applied to the qualifying schools. However, while those individual at-risk students gain matches, it appears these matches will have little impact on the socioeconomic diversity of the qualifying schools because the new number of matches is relatively small in comparison to total enrollment. Using the unified lottery as a tool for redistributing students among schools is limited by the number of seats offered in the lottery relative to total school populations.

Most of the qualifying schools filled completely in the lottery, suggesting they are highly demanded seats. Therefore, the result is that when at-risk students gain matches, students not at-risk lose matches. And this was not attributable to a difference in the number of school selections for each group (Appendix D). Again, the results of using the strongest priority preference (ahead of siblings and in-boundary students): 610 at-risk applicants received **better or new** matches in the lottery. Conversely, 565 applicants that are not at-risk received **worse or lost** matches as their lottery results. Considering the competing political priorities of maintaining community neighborhood schools and keeping siblings together at school, policymakers may look to implement a weaker preference for at-risk students. Even a weaker preference with little

immediate impact could compound over time as at-risk students start attending and their siblings applying later would then have preference. Using the *Last Priority* preference, which would allow at-risk students to match just before those with no preference if there was still space available, the impact is even smaller because often there was no longer space available after siblings. 353 at-risk applicants received **better or new** matches in their lottery results. 365 applicants that are not at-risk received **worse or lost** matches as their results.

My School DC tracks the citywide match rate⁹ as the percentage of applicants in the lottery that are matched to *any* of the schools to which they applied. Historically, the match rate in the common lottery has ranged between 66% and 72%. As seen in the results, the citywide match rate declined as stronger at-risk preferences were added into the mock lottery. As the number of matches for at-risk applicants increased with the application of stronger preferences in the mock lottery, matches decreased in greater number for those applicants that are not at-risk. If an applicant that was matched in the original lottery is supplanted when the mock preferences are introduced to the process, the result can be that the supplanted applicant does not match anywhere else.

Applicant behavior could change with the introduction of an at-risk preference and those behavioral changes may affect the number of schools an applicant selects and how they are ranked. For a number of families, especially those with a sibling or In-boundary preference, the school selections where they are eligible for those preferences are the only options that work for them and the only selection on their application. For example, dropping off two children in two different locations may not be logistically feasible given the family's transportation options or employment schedule. The family may also know that their preference to that school gives them a very good chance at getting a match, and for that reason did not make other school selections. Theoretical behavioral changes are difficult to predict, so while the estimates in this analysis show that there would be a net decrease in matches, this may not actually happen if implemented. One noteworthy change will be that at-risk students matched could have younger siblings that would also then get a preference in later years, so even a small impact could, potentially, compound over time. Another potential scenario that would affect impact is a new school that opens and offers an at-risk preference presumably with many open seats, no re-enrolling students, and no siblings that are competing for those seats.

a. School-level Impacts

The mock lotteries applied preferences to 46 school selections that qualified by serving less than 25% at-risk students from both sectors. The most any qualifying school increased the number of at-risk matches was by 34 applicants (an increase from 19 applicants to 53 applicants). While that school had an appreciable difference in its at-risk population raising it from 14%- 22%, most schools did not, and many had fewer than five new at-risk applicants matched in the mock lottery analyses.

⁹ http://www.myschooldc.org/sites/default/files/dc/sites/myschooldc/page/L_applications_yearoveryear_04182017.pdf

Individual lottery results are interconnected in a unified lottery system. That is, when one applicant's result is changed by a new preference, that applicant vacates a seat that another student can then fill (even without a preference). Thus, matches to schools that don't qualify because they serve more 25% at-risk students will also be affected. In some cases, qualifying schools had an overall *loss* of at-risk applicant matches because at-risk students did not rank those schools highly enough to be matched and were matched to a higher ranked school.

A natural question arises as to why the impacts are not *greater* at eligible schools. In most cases, schools make the most seats available in the lottery in their entry grades, because non-entry grades typically filled by re-enrolling students. Almost all elementary schools in DC begin in pre-kindergarten (PK3, and a few in PK4). Some schools have large at-risk applicant pools at non-entry grades in which very few or no seats are made available. Two examples show how policy decisions on preference order and accepting students in non-entry grades affect lottery outcomes, regardless of preference strength.

Example 1: Four of the highest performing DCPS elementary schools that serve the fewest at-risk students¹⁰ offered **258** seats in the unified lottery. Of those, only 28 seats were awarded to out-of-boundary students and none of those 28 out of boundary students were in the pre-kindergarten entry grade, 5 of those 28 had a sibling already at the school, so only 23 lottery seats across four schools were truly awarded on the "open market" to students living outside of the boundary.

Example 2: An eligible charter school without a boundary serves middle and high school students with the entry grade at the middle school level. A few more at-risk middle schoolers were matched with the preferences, but many more at-risk applicants sought a seat in 9th grade where there were zero seats available in the lottery for new students.

These two examples elucidate how the impact of the lottery as a tool to change student population is limited by other policies and structures within the DC education landscape, However, the overall impact is not absent because at-risk students do gain access to schools in each of the tested mock lottery scenarios.

VI. SUMMARY AND CONCLUSION

This paper examined whether an at-risk preference in a unified lottery can meet a policy goal of socioeconomically diversifying some of the most highly demanded DC schools. An at-risk preference *can* socioeconomically integrate schools to some degree, especially if policymakers and school leaders elect to prioritize at-risk students over students not at-risk in the unified lottery at the entry grades, even when those students not at-risk have a geographic or sibling preference. If that prioritization is absent then the immediate impact is low and would not change the school demographic make-up appreciably. The impact is low because the number of new lottery matches a school gains through a preference is relatively small compared to a school's overall population that includes re-enrolling students. However, even a small impact could still improve lottery outcomes for at-risk students. Over time, such outcomes could influence school demographics and diversity because younger siblings of at-risk students that were matched with the new preference will also gain access.

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Appendix A – List of Preferences used in the 16-17 Lottery

Preference name	Definition
Sibling attending	Applicant has a sibling attending the school in SY15-16
Sibling offered	Applicant has a sibling who was matched or received a waitlist offer for SY16-17
Twin offered	Applicant has a twin who was matched or received a waitlist offer for SY16-17
Sibling attending (cross lea)	Applicant has a sibling who was attending a DCI member school in SY15-16
Sibling offered (cross lea)	Applicant has a sibling who was matched or received a waitlist offer for SY16-17 at a DCI member school
Transfer	Applicant currently attends a multi-campus LEA and is applying to another campus in the same LEA
In-boundary	Applicant is applying for PK3 or PK4 at their in-boundary DCPS school
In-boundary with sibling attending	Applicant is applying for PK3 or PK4 at their in-boundary DCPS school and has a sibling attending the school in SY15-16
In-boundary with sibling offered	Applicant is applying for PK3 or PK4 at their in-boundary DCPS school and has a sibling who was matched or received a waitlist offer for SY16-17
Proximity	Applicant resides more than a half mile from their DCPS in-boundary elementary school, and within a half mile of another DCPS, non-citywide, elementary school.
Children of staff	Applicant's parent is a full time staff member and a DC resident
Children of staff (cross lea)	Applicant's parent is a full time staff member at a DCI member school and a DC resident
Founders	Applicant's parent was a founding board member
Special education	Applicant's IEP meets LEA specific qualifications for the preference
Early action PK	Guarantees a seat at participating DCPS elementary schools for in-boundary applicants that apply during the lottery for PK3 and PK4
Dual language guaranteed	Guarantees a seat at DCPS dual-language feeder schools for applicants currently attending a DCPS dual language school if they apply during the lottery

Appendix B – Schools that qualified for the at-risk preference

- AppleTree Early Learning PCS – Lincoln Park
- BASIS DC PCS
- Breakthrough Montessori PCS
- Brent Elementary School
- Capitol Hill Montessori School @ Logan
- Creative Minds International PCS
- Deal Middle School
- District of Columbia International School (Chinese Language Program)*
- District of Columbia International School (French Language Program)*
- District of Columbia International School (Spanish Language Program)*
- Eaton Elementary School
- Elsie Whitlow Stokes Community Freedom PCS (French Language Program)*
- Elsie Whitlow Stokes Community Freedom PCS (Spanish Language Program)*
- Hardy Middle School
- Hearst Elementary School
- Hyde-Addison Elementary School
- Inspired Teaching Demonstration PCS
- Janney Elementary School
- Key Elementary School
- Lafayette Elementary School
- Lee Montessori PCS
- Ludlow-Taylor Elementary School
- Mann Elementary School
- Maury Elementary School
- Mundo Verde Bilingual PCS
- Murch Elementary School
- Oyster-Adams Bilingual School (Adams)*
- Oyster-Adams Bilingual School (Oyster)*
- Oyster-Adams Bilingual School (Oyster) - English Dominant*
- Oyster-Adams Bilingual School (Oyster) - Spanish Dominant*
- Peabody Elementary School
- Ross Elementary School
- School Without Walls @ Francis-Stevens
- School-Within-School
- Sela PCS
- Shepherd Elementary School
- Shining Stars Montessori Academy PCS
- Stoddert Elementary School
- Two Rivers PCS at 4th Street
- Two Rivers PCS at Young
- Van Ness Elementary School
- Washington Latin PCS – Middle School
- Washington Latin PCS – Upper School
- Washington Yu Ying PCS
- Watkins Elementary School
- Wilson High School

*These are separate school selections in the My School DC application, but are shown as one campus in the OSSE Audited Enrollment File.

Appendix C – Preference ranking for each of the preference eligible schools used in the analysis

School Name	Early Action PK (Guaranteed)	Founders	In-boundary with sibling attending	In-boundary with sibling offered	In-boundary	Sibling attending	Twin offered	Sibling offered	Transfer	Children of Staff	Proximity	Sibling attending cross LEA	Sibling offered cross LEA	Children of Staff cross LEA	At-Risk	Mock Lottery
AppleTree Early Learning PCS – Lincoln Park						4		5	2	6					3	Priority to Sibling
BASIS DC PCS						4		5		2					3	Priority to Sibling
Breakthrough Montessori PCS		2					5	6		4					3	Priority to Sibling
Brent Elementary School			2	3	4	6		7			8				5	Priority to Sibling
Capitol Hill Montessori School @ Logan						3		4							2	Priority to Sibling
Creative Minds International PCS						4		5		2					3	Priority to Sibling
Deal Middle School						3		4							2	Priority to Sibling
District of Columbia International School (Chinese Language Program)						4		5	2	6		7	8	9	3	Priority to Sibling
District of Columbia International School (French Language Program)						4		5	2	6		7	8	9	3	Priority to Sibling
District of Columbia International School (Spanish Language Program)						4		5	2	6		7	8	9	3	Priority to Sibling
Eaton Elementary School			2	3	4	6		7			8				5	Priority to Sibling
Elsie Whitlow Stokes Community Freedom PCS (French Language Program)						3		5		4					2	Priority to Sibling
Elsie Whitlow Stokes Community Freedom PCS (Spanish Language Program)						3		5		4					2	Priority to Sibling
Hardy Middle School						3		4							2	Priority to Sibling
Hearst Elementary School			2	3	4	6		7			8				5	Priority to Sibling
Hyde-Addison Elementary School			2	3	4	6		7			8				5	Priority to Sibling
Inspired Teaching Demonstration PCS						3		4		5					2	Priority to Sibling
Janney Elementary School			2	3	4	6		7			8				5	Priority to Sibling
Key Elementary School			2	3	4	6		7			8				5	Priority to Sibling
Lafayette Elementary School			2	3	4	6		7			8				5	Priority to Sibling
Lee Montessori PCS		2				5		6		3					4	Priority to Sibling
Ludlow-Taylor Elementary School			2	3	4	6		7			8				5	Priority to Sibling
Mann Elementary School			2	3	4	6		7			8				5	Priority to Sibling
Maury Elementary School			2	3	4	6		7			8				5	Priority to Sibling
Mundo Verde Bilingual PCS						4		5		2		7	8	6	3	Priority to Sibling
Murch Elementary School			2	3	4	6		7			8				5	Priority to Sibling
Oyster-Adams Bilingual School (Adams)						3		4			5				2	Priority to Sibling
Oyster-Adams Bilingual School (Oyster)			2	3	7	5		6			8				4	Priority to Sibling
Oyster-Adams Bilingual School (Oyster) - English Dominant			2	3	7	5		6			8				4	Priority to Sibling
Oyster-Adams Bilingual School (Oyster) - Spanish Dominant			2	3	7	5		6			8				4	Priority to Sibling
Peabody Elementary School			2	3	4	6		7			8				5	Priority to Sibling
Ross Elementary School			2	3	4	6		7			8				5	Priority to Sibling

School Name	Early Action PK (Guaranteed)	Founders	In-boundary with sibling attending	In-boundary with sibling offered	In-boundary	Sibling attending	Twin offered	Sibling offered	Transfer	Children of Staff	Proximity	Sibling attending cross LEA	Sibling offered cross LEA	Children of Staff cross LEA	At-Risk	Mock Lottery
School Without Walls @ Francis-Stevens			2	3	4	6		7			8				5	Priority to Sibling
School-Within-School						3		4							2	Priority to Sibling
Sela PCS						3		4		5					2	Priority to Sibling
Shepherd Elementary School			2	3	4	6		7			8				5	Priority to Sibling
Shining Stars Montessori Academy PCS						4		5		2					3	Priority to Sibling
Stoddert Elementary School			2	3	4	6		7			8				5	Priority to Sibling
Two Rivers PCS at 4th Street						4		6	5	2					3	Priority to Sibling
Two Rivers PCS at Young						4		6	5	2					3	Priority to Sibling
Van Ness Elementary School	1		2	3	4	6		7			8				5	Priority to Sibling
Washington Latin PCS – Middle School						3		5		4					2	Priority to Sibling
Washington Latin PCS – Upper School						3		5		4					2	Priority to Sibling
Washington Yu Ying PCS						4		5		2		6	7	8	3	Priority to Sibling
Watkins Elementary School						3		4			5				2	Priority to Sibling
Wilson High School						3		4							2	Priority to Sibling
AppleTree Early Learning PCS – Lincoln Park						4		5	3	6					2	First Priority
BASIS DC PCS						4		5		3					2	First Priority
Breakthrough Montessori PCS		3					5	6		4					2	First Priority
Brent Elementary School			3	4	5	6		7			8				2	First Priority
Capitol Hill Montessori School @ Logan						3		4							2	First Priority
Creative Minds International PCS						4		5		3					2	First Priority
Deal Middle School						3		4							2	First Priority
District of Columbia International School (Chinese Language Program)						4		5	3	6		7	8	9	2	First Priority
District of Columbia International School (French Language Program)						4		5	3	6		7	8	9	2	First Priority
District of Columbia International School (Spanish Language Program)						4		5	3	6		7	8	9	2	First Priority
Eaton Elementary School			3	4	5	6		7			8				2	First Priority
Elsie Whitlow Stokes Community Freedom PCS (French Language Program)						3		5		4					2	First Priority
Elsie Whitlow Stokes Community Freedom PCS (Spanish Language Program)						3		5		4					2	First Priority
Hardy Middle School						3		4							2	First Priority
Hearst Elementary School			3	4	5	6		7			8				2	First Priority
Hyde-Addison Elementary School			3	4	5	6		7			8				2	First Priority
Inspired Teaching Demonstration PCS						3		4		5					2	First Priority
Janney Elementary School			3	4	5	6		7			8				2	First Priority
Key Elementary School			3	4	5	6		7			8				2	First Priority
Lafayette Elementary School			3	4	5	6		7			8				2	First Priority
Lee Montessori PCS		3				5		6		4					2	First Priority

School Name	Early Action PK (Guaranteed)	Founders	In-boundary with sibling attending	In-boundary with sibling offered	In-boundary	Sibling attending	Twin offered	Sibling offered	Transfer	Children of Staff	Proximity	Sibling attending cross LEA	Sibling offered cross LEA	Children of Staff cross LEA	At-Risk	Mock Lottery
Ludlow-Taylor Elementary School			3	4	5	6		7			8				2	First Priority
Mann Elementary School			3	4	5	6		7			8				2	First Priority
Maury Elementary School			3	4	5	6		7			8				2	First Priority
Mundo Verde Bilingual PCS						4		5		3		7	8	6	2	First Priority
Murch Elementary School			3	4	5	6		7			8				2	First Priority
Oyster-Adams Bilingual School (Adams)						3		4			5				2	First Priority
Oyster-Adams Bilingual School (Oyster)			3	4	7	5		6			8				2	First Priority
Oyster-Adams Bilingual School (Oyster) - English Dominant			3	4	7	5		6			8				2	First Priority
Oyster-Adams Bilingual School (Oyster) - Spanish Dominant			3	4	7	5		6			8				2	First Priority
Peabody Elementary School			3	4	5	6		7			8				2	First Priority
Ross Elementary School			3	4	5	6		7			8				2	First Priority
School Without Walls @ Francis-Stevens			3	4	5	6		7			8				2	First Priority
School-Within-School						3		4							2	First Priority
Sela PCS						3		4		5					2	First Priority
Shepherd Elementary School			3	4	5	6		7			8				2	First Priority
Shining Stars Montessori Academy PCS						4		5		3					2	First Priority
Stoddert Elementary School			3	4	5	6		7			8				2	First Priority
Two Rivers PCS at 4th Street						4		6	5	3					2	First Priority
Two Rivers PCS at Young						4		6	5	3					2	First Priority
Van Ness Elementary School	1		3	4	5	6		7			8				2	First Priority
Washington Latin PCS – Middle School						3		5		4					2	First Priority
Washington Latin PCS – Upper School						3		5		4					2	First Priority
Washington Yu Ying PCS						4		5		3		6	7	8	2	First Priority
Watkins Elementary School						3		4			5				2	First Priority
Wilson High School						3		4							2	First Priority
AppleTree Early Learning PCS – Lincoln Park						3		4	2	5					6	Last Priority
BASIS DC PCS						3		4		2					5	Last Priority
Breakthrough Montessori PCS		2						4	5	3					6	Last Priority
Brent Elementary School			2	3	4	5		6			7				8	Last Priority
Capitol Hill Montessori School @ Logan						2		3							4	Last Priority
Creative Minds International PCS						3		4		2					5	Last Priority
Deal Middle School						2		3							4	Last Priority
District of Columbia International School (Chinese Language Program)						3		4	2	5		6	7	8	9	Last Priority
District of Columbia International School (French Language Program)						3		4	2	5		6	7	8	9	Last Priority
District of Columbia International School (Spanish Language Program)						3		4	2	5		6	7	8	9	Last Priority
Eaton Elementary School			2	3	4	5		6			7				8	Last Priority

School Name	Early Action PK (Guaranteed)	Founders	In-boundary with sibling attending	In-boundary with sibling offered	In-boundary	Sibling attending	Twin offered	Sibling offered	Transfer	Children of Staff	Proximity	Sibling attending cross LEA	Sibling offered cross LEA	Children of Staff cross LEA	At-Risk	Mock Lottery
Elsie Whitlow Stokes Community Freedom PCS (French Language Program)						2		4		3					5	Last Priority
Elsie Whitlow Stokes Community Freedom PCS (Spanish Language Program)						2		4		3					5	Last Priority
Hardy Middle School						2		3							4	Last Priority
Hearst Elementary School			2	3	4	5		6			7				8	Last Priority
Hyde-Addison Elementary School			2	3	4	5		6			7				8	Last Priority
Inspired Teaching Demonstration PCS						2		3		4					5	Last Priority
Janney Elementary School			2	3	4	5		6			7				8	Last Priority
Key Elementary School			2	3	4	5		6			7				8	Last Priority
Lafayette Elementary School			2	3	4	5		6			7				8	Last Priority
Lee Montessori PCS		2				4		5		3					6	Last Priority
Ludlow-Taylor Elementary School			2	3	4	5		6			7				8	Last Priority
Mann Elementary School			2	3	4	5		6			7				8	Last Priority
Maury Elementary School			2	3	4	5		6			7				8	Last Priority
Mundo Verde Bilingual PCS						3		4		2		6	7	5	8	Last Priority
Murch Elementary School			2	3	4	5		6			7				8	Last Priority
Oyster-Adams Bilingual School (Adams)						2		3			4				5	Last Priority
Oyster-Adams Bilingual School (Oyster)			2	3	6	4		5			7				8	Last Priority
Oyster-Adams Bilingual School (Oyster) - English Dominant			2	3	6	4		5			7				8	Last Priority
Oyster-Adams Bilingual School (Oyster) - Spanish Dominant			2	3	6	4		5			7				8	Last Priority
Peabody Elementary School			2	3	4	5		6			7				8	Last Priority
Ross Elementary School			2	3	4	5		6			7				8	Last Priority
School Without Walls @ Francis-Stevens			2	3	4	5		6			7				8	Last Priority
School-Within-School						2		3							4	Last Priority
Sela PCS						2		3		4					5	Last Priority
Shepherd Elementary School			2	3	4	5		6			7				8	Last Priority
Shining Stars Montessori Academy PCS						3		4		2					5	Last Priority
Stoddert Elementary School			2	3	4	5		6			7				8	Last Priority
Two Rivers PCS at 4th Street						3		5	4	2					6	Last Priority
Two Rivers PCS at Young						3		5	4	2					6	Last Priority
Van Ness Elementary School	1		2	3	4	5		6			7				8	Last Priority
Washington Latin PCS – Middle School						2		4		3					5	Last Priority
Washington Latin PCS – Upper School						2		4		3					5	Last Priority
Washington Yu Ying PCS						3		4		2		5	6	7	8	Last Priority
Watkins Elementary School						2		3			4				5	Last Priority
Wilson High School						2		3							4	Last Priority

Appendix D – Median number of school selections by at-risk status and grade

Grade	All	At-risk	Not at-risk	Unknown
PK3	4	3	5	5
PK4	4	3	4	4
K	4	3	4	5
1	3	3	4	4
2	3	3	3	4
3	3	3	4	4
4	3	3	3	3
5	2	2	2	3
6	3	3	3	3
7	3	3	3	3
8	3	3	3	3
9	4	4	3	3
10	3	3	2	3
11	2	3	3	2
12	2	2	2	3